A DESCRIPTIVE STUDY OF THE STANDARD OPERATING PROCEDURES FOR DISASTER RESPONSE IN THE SAUDI ARABIAN MILITARY HEALTH SERVICES

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Declaration:

I, Tariq Lafi Alshaabani, hereby declare that the work contained in this assignment is my original work and that I have not previously submitted it, in its entirety or in part, at any university for degree purposes.

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ACKNOWLEDGEMENTS

There are many people who proved to be invaluable in the implementation of this research. First, I would like to thank my supervisor Professor Lee Wallis for his support and guidance throughout the entire process. Colonel Mohammad Alshahrani was my co-investigator in Saudi Arabia, and the research would not have been possible without him. Bader Alotibi (research centre in MSD), Samar Alwabl (the Dean's office in Prince Sultan Military Collage), Shatha Alsabouni (Research coordinator in Taif's Hospital) did a fantastic job as facilitators; they truly made the data collection possible. Finally, I would like to acknowledge my parents, my wife, and my daughters for their support and patience during the period that I spent in doing this research.

ABSTRACT

Background

Saudi Arabia has suffered from disasters commonly in the last decade. The Saudi military medical services play a major role in confronting these events, but there are anecdotal challenges with their planning and response systems. Currently, disaster planning in Saudi Arabia appears to be undertaken in some detail, but the medical response to disasters is fragmented. This study aimed to review and assess the standard operating procedures for disaster response in the Saudi Arabian military health services.

Methods

We undertook a prospective, survey-based assessment of disaster response. We sought all disaster plans and Standard Operating Procedures from management and emergency department leadership at each of the 13 Military hospitals. We used a standardised survey tool to evaluate facility disaster planning. This tool gathers quantitative data using close-ended questions and open-ended commentary surrounding a hospital's disaster response operating procedures.

Results

There was wide variability in the hospitals across the 20 themes in the survey. While most hospitals have a disaster plan, an up to date version was not always available. Key issues were identified in: management of contaminated patients; coordination of visitors, volunteers and extra staff; media management, and collaboration with other agencies.

Conclusion

The study highlighted a number of strengths in facility disaster preparedness, and a number of aspects where concerted efforts are required to improve the situation. In general, most hospitals had reasonable disaster plans in place, although none covered all the recommended areas in sufficient detail.

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CHAPTER 1: INTRODUCTION

1.1 BACKGROUND & MOTIVATION

Saudi Arabia has suffered from major incidents – sudden, unexpected mass casualty events – commonly in last decade. As examples, in 2012, a gas tanker explosion in Riyadh killed 22 people and injured 111; in 2015, a hospital fire in Jazan killed 25.[1,2] Typically, disasters are considered to be large scale incidents such as earthquakes; however, in common usage, the terms are often used interchangeably. For simplicity, the term *disaster* will be used to describe all major incidents, regardless of size or cause, throughout this work.

Individual disasters are typically unpredictable, but, if it is possible that a disaster might occur in a given region, advance disaster response planning can improve outcomes. Currently, disaster planning in Saudi Arabia appears to be undertaken in some detail, but the medical response to disasters is fragmented: typically, there are multiple agencies involved with no central coordination. The same is true within the Saudi Arabian Military, where multiple agencies are involved in a response, and yet each maintains its own lines of authority and reporting. Although the centralisation of disaster response has been seen increasingly in other countries, there has been no movement towards this in Saudi Arabia, especially within the military.

Moreover, in the military, disaster response strategies are made on an *ad hoc* basis. In terms of activation of resources, the usual decision loop is as follows: a responder has to contact a senior manager in his department, who seeks his manager's approval, and so on up the chain of command until it reaches the General-in-Charge. The General then contacts his opposite number in another branch of the military in order to request assistance; if these two individuals are contactable and in agreement, communication must then spread back down both sides to allow the response to occur. Yet, at the scene of a disaster, both units maintain independent line command structures and coordination efforts are minimal. While this is usual in many countries between, for example, police and ambulance services, in the Saudi Arabian Military, there will be multiple medical services with the potential to respond, and the problem relates to lack of coordination within the health services. Consider this example to illustrate the point (see box):

An explosion occurs on a military base. Ambulances from the closest military hospital are the first emergency medical services (EMS) to be dispatched. The personnel in the ambulance arrive on scene and make an assessment, which they communicate to their manager at the hospital EMS base. This manager now needs to activate other resources, but, in the absence of a plan or un updated one, there is no clear line of authority: does he do this through the emergency department? Directly to the Head of the hospital? Or above hospital level, to the Medical Services Directorate (MSD, overall responsible for all health services in the Saudi Arabian military)? This ambiguity creates confusion for both clinical and non-clinical personnel, delays effective response, and, presumably, worsens clinical outcomes.

Additionally, if the incident requires support from another military hospital (which is often the case with disasters), this process requires significant time and resource consuming paperwork, limiting the speed and effectiveness of the disaster response. These delays may worsen outcomes for patients.

The efficiency of the disaster response system could be improved by adopting a centralised command and control structure – a practice currently employed in many other countries.[3-4] Most have adopted the British Major Incident Medical Management and Support (MIMMS) system for prehospital response, and its sister course, Hospital-MIMMS[5]. MIMMS principles include three layers of command (*Gold* – central; *Silver* – around the scene; and *Bronze* – at the scene itself), clear line management functions, reporting structures, and priority actions to help ensure a maximally effective response.[6] MIMMS improves a health system's

resilience, preparing medical staff to manage disasters effectively.[7] In addition to the actual response, planning and practice are essential in ensuring that the system can respond effectively when a disaster occurs. Post-response auditing and de-briefing are also important in order to review procedures, and to improve practice to further avoid harm or loss of life in future responses.[7]

There are 13 military hospitals under MSD administration across the Kingdom. Each hospital runs its own small EMS service and has its own emergency ddepartment. There is no centralised process of developing plans, protocols, or policies.

Anecdotally, the disaster response system within the Saudi Arabian military needs significant improvement. In order to do this, baseline data are required about the current system, including information on: what plans are in place; whether existing plans meet international norms; which drills and exercises take place; how response occurs; what works well, and what could be improved. On this basis, recommendations for improvements can be made. The purpose of the study, therefore, is to assess disaster preparation and response systems that exist across the Kingdom's military medical services, to identify challenges and strengths in the current system, and to outline potential areas for improvement.

1.2 PURPOSE OF THE STUDY

Given the current gaps in preparation and response to disasters, we planned this study to help to improve response to mass casualty situations within the Saudi Arabian military health services.

1.3 RESEARCH QUESTION

What are the standard operating procedures for disaster response in the Saudi Arabian military health services?

1.4 AIM AND OBJECTIVES

The study aimed to review and assess the standard operating procedures (SOPs) for disaster response in the Saudi Arabian military health services.

In order to achieve this aim, the study was planned to meet the following objectives:

1. To review the SOPs for disaster response in MSD hospitals and EMS systems.
2. To assess those SOPs against a previously published Disaster Planning Assessment Tool.
3. To derive recommendations for improving disaster preparedness and planning within the MSD.

CHAPTER 2: METHODOLOGY

2.1 METHODOLOGY

2.1.1 Study Design
We undertook a prospective, survey-based assessment of disaster response.

In order to review the standard operating procedures, we sought all disaster plans and SoPs from management and emergency department leadership at each of the 13 MSD hospitals. In preparation for the 2010 FIFA World Cup, the South African National Department of Health undertook a nationwide assessment of disaster preparedness at all hospitals, using a disaster planning assessment tool. We used this same tool for evaluating facility disaster planning (Appendix 1)[8]. This tool gathers quantitative data using close-ended questions and open-ended commentary surrounding a hospital's disaster response operating procedures.

2.1.2 Study Population
All 13 MSD hospitals were included in this study. The hospitals are:
Central: 1. Prince Sultan Military Medical City in Riyadh. 2. Prince Sultan Air Base Hospital in Al Kharj. 3. Military Hospital of the General Establishment of Military Industries. 4. Al-Kharj Armed Forces Hospital
North: 1. Armed Forces Hospital in Northern Area. 2. Armed Forces Hospitals Administration – Tabuk.
South: 1. Armed Forces Hospital in Khamis Moushit.
West: 1. Armed Forces Hospital in Hada. 2. Prince Sultan Militatary Hospital Taif. 3. Prince Mansour Hospital for Community Medicine. 4. Taif Medical Rehabilitation Hospital.
East: 1. Armed Forces Hospital in Jubail. 2. King Fahad Military Medical Complex in Dhahran.

2.1.3 Data Collection & Management
The disaster plans for each facility were requested from senior management and evaluated using the disaster planning assessment tool[8]. At each site, the hospital director and the emergency department head were contacted by the researcher (TA) to request the plans and SoPs. The purpose of the study was made clear but sharing of material was entirely voluntary.

The lead researcher and another independent evaluator (Col.Dr. Mohammad Alshahrani who is an emergency physician with disaster medicine expertise, within Saudi Arabia) evaluated each facility's plans against the Disaster Planning Assessment Tool. All data were entered into encrypted files in Microsoft Excel (© Microsoft, Richmond, WA) for Windows.

2.1.3 Data Analysis
Basic descriptive analysis was undertaken using Microsoft Excel. We presented frequencies, medians and ranges for most data; open ended commentary was collated by topic and used to describe recurrent issues raised by respondents.

2.2 ETHICAL CONSIDERATIONS

Ethical approval was obtained from UCT HREC as well as from the MSD ethical review board. The head of MSD was asked to provide permission to undertake the study, on receipt of UCT HREC approval.

2.2.1 Description of risks and benefits
There were no perceived risks to hospital or individuals from participating. Any units not providing their disaster plans were not prejudiced in any way, nor excluded from participating in further studies. While

individuals were not directly benefited, the research should inform improvements in disaster capability for the whole of MSD.

2.2.2 Privacy and confidentiality

All data were de-identified. Hospitals were assigned a unique study number known only to the investigators, and all data were managed and reported against this number. Individual hospitals will receive reporting back on their own plans.

CHAPTER 3: RESULTS

3.1 Foundations

95% of hospitals have disaster plans in place: 75% for Central Region (only one hospital did not have a disaster plan), 100% for all Eastern Region, Northern Region, Southern Region and Western Region. 90% of the hospitals have a dedicated multidisciplinary disaster planning committee which includes administrative members and controlling staff (Central and Western Region 75%, others 100%).

85% have a collaborative relationship with other health services (which include local EMS, emergency management, red crescent and health department). Half the hospitals in Central Region and one in Western did not have such a collaborative relationship with their local health services.

Detailed plans for internal and external disasters were available in 80% of hospitals (50% central, 75% western, 100% others); 20 % have not widely distributed the plan, or do not have it readily available throughout the facility. The majority (95%) address how the hospital will manage a mass casualty incident where routine emergency resources and facilities are inadequate.

The latest version of the disaster plan was only available to the user at 25% of hospitals in central region. The majority of eastern, northern southern and western hospitals have good version access. What constitutes a major incident for that specific hospital was clearly specified in 80% of hospitals, so 95% of hospitals have included an assessment of local hazards and risks in their planning, although only 50% of hospitals include specific procedures for dealing with a chemical/biological or radiation incident in their planning.

3.2 Surveillance

In terms of a baseline established for numbers of patients seen in the facility Emergency Department, outpatient clinics, or via direct admission, stratified according to clinical symptoms, the data show that 95% of the all hospitals have covered it; however, only 25% of central region hospitals have a database of its emergency care capability and additional capacity.

While 75% of central region hospitals have a process to notify infection control 24 hours a day/7 day a week, the southern region has not. 40% of the hospital plans do not specify the number and location of isolation or protective environment rooms.

Table 1: SURVEILLANCE

SURVEILLANCE							
Yes Answer (%)							
No.	**Question**	**Total**	**Central (n=4)**	**Eastern (n=1)**	**Northern (n=2)**	**Southern (n=1)**	**Western (n=4)**
14	Does the facility currently have:						
A	A baseline established for numbers of patients seen in the. facility Emergency Department, outpatient clinics, or via direct admission, stratified according to clinical symptoms?	95	100	100	100	100	75
B	A database of its emergency care capability and additional capacity?	80	25	100	100	100	75
15	Is there currently a process to evaluate and track 100% of all microbiology results and stratify according to organism?	65	50	100	100	0	75
16	Does a process exist to notify infection control 24 hours day/7 days a week?	75	75	100	100	0	100
17	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?	80	50	100	100	0	50

3.3 Identification of Authorised Personnel

The majority of hospitals (90%) have a designated medical commander and have identified key personnel in their disaster plan (85%), and (85%) has a notification system in place to alert staff. Central region hospitals were less likely to have a notification system in place to alert staff. 90% of hospitals felt that the relevant personnel were familiar with the plan, and 95% of hospitals have action cards. 80% of the hospitals have designated how people will be identified within the facility. Only 25% of central region have designated how people will be identified within the facility. The majority of hospitals staff can gain access to the facility when called back on duty.

Table 2: IDENTIFICATION OF AUTHORISED PERSONNEL

IDENTIFICATION OF AUTHORISED PERSONNEL							
Yes Answer (%)							
No.	**Question**	**Total**	**Central (n=4)**	**Eastern (n=1)**	**Northern (n=2)**	**Southern (n=1)**	**Western (n=4)**
18	Is there an individual designated as a disaster coordinator on a 24-hour per day basis?	85	75	100	100	100	50
19	Has the facility designated a medical commander who will be responsible for the hospital's medical responses during the time the plan is activated?	90	50	100	100	100	100
20	Have other key position holders who have a role in disaster management been identified? This should be identified in the disaster plan.	85	75	100	100	100	50
21	Is a notification system in place that can alert personnel to a potential disaster situation?	85	25	100	100	100	100
22	Does the plan include lines of authority, role responsibilities, and provide for succession?	95	75	100	100	100	100
23	Are those who are expected to implant and use the plan familiar with it?	90	50	100	100	100	100
24	Have action cards been developed for all personnel involved in disaster response?	95	75	100	100	100	100
25	Does the plan designate how people will be identified within the facility (e.g. staff, news media, visitors)?	80	25	100	100	100	75
26	Can staff gain access to the facility when called back on duty?	90	75	100	100	100	75

3.4 Activation of the Plan

95% of hospitals specified the criteria necessary to activate their hospital disaster plan and 85% having guidelines and procedures to escalate or step down the disaster response. Also, 90% of the hospitals have set out the process for informing upwards that the plan has been activated.

Table 3: ACTIVATION OF THE PLAN

ACTIVATION OF THE PLAN							
Yes Answer (%)							
No.	**Question**	**Total**	**Central (n=4)**	**Eastern (n=1)**	**Northern (n=2)**	**Southern (n=1)**	**Western (n=4)**
27	Does the plan specify the circumstances under which the plan can be activated?	95	75	100	100	100	100
28	Have activation stages been established and roles outlined with each stage? 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.	85	50	100	100	100	75
29	Does it set out the mechanism for informing upwards that the plan has been activated?	90	75	100	100	100	75

3.5 Alerting system

60% of hospitals include their emergency plan to be activated within 1-2 hours during normal as well as off-hours. Southern region plan does not provide it at all, also 75% of central region hospitals. 95% of hospitals specified how notification in the hospital would occur and 85% having a detailed system for recalling staff back on duty and having alternative systems of notification that considers people, equipment, and procedures. 75% of emergency plans in hospitals have a mechanism for recruiting staff according to their skill levels and availability.

Table 4: ALERTING SYSTEM

ALERTING SYSTEM							
Yes Answer (%)							
No.	Question	Total	Central (n=4)	Eastern (n=1)	Northern (n=2)	Southern (n=1)	Western (n=4)
30	Does the plan provide for activation within 1 – 2 hours during normal as well as off hours?	60	25	100	100	0	75
31	Does the plan specify how notification within the facility will be carried out?	95	75	100	100	100	100
32	Does the plan specify the chain of command to notify internal staff and appropriate external personnel indicating the status of the facility?	90	50	100	100	100	100
33	Does the plan detail responsibility to initiate a system for recalling staff back on duty?	85	25	100	100	100	100
34	Does the plan provide for alternative systems of notification that considers people, equipment, and procedures?	85	50	100	100	100	75
35	Does the plan provide mechanisms to ration staffing according to their skill levels and availability?	75	25	100	100	100	50

3.6 Response

Internal disaster plans are available for 100% of hospitals, and the majority of hospitals (90%) developed plans to respond to an external disaster. Moreover, 75% of hospitals have developed a plan to provide equipment and personnel in response to external disasters.

55% of hospitals do not have a mechanism to integrate and manage unexpected volunteers and responders to medical services who wish to help. 54% of the hospitals have: a separate entry to the Emergency Department for contaminated patients, a dedicated facility, area, or portable device for decontamination, a hot and cold-water supply to the decontamination area. have the ability water run-off from the decontamination area be contained, the ability to isolate a ventilation system in the Emergency Department from the rest of the facility. Almost 55% of the hospitals have an arrangement for: accommodating the ambulance liaison officer, accommodating the police documentation team, a provision for the preservation of forensic evidence, special arrangements needed in the event that children are involved in an incident and

facilities for decontamination of casualties where potential contamination is identified before entry to the hospital and set out for accessing stocks of antidotes/vaccines.

Table 5: RESPONSES

RESPONSES							
Yes Answer (%)							
No.	Question	Total	Central (n=4)	Eastern (n=1)	Northern (n=2)	Southern (n=1)	Western (n=4)
36	Has the facility developed internal disaster plans for internal emergencies (e.g. fire, bomb threat)?	100	100	100	100	100	100
37	Has the facility developed plans to respond to an external disaster? Does this plan indicate how the hospital will respond to an abnormally large (>10% of the beds) influx of patients?	90	50	100	100	100	75
38	Are there 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?	75	50	100	50	100	75
39	Have provisions been made for activating a disaster medical team in response to both internal and external disasters?	90	75	100	100	100	75
40	Does the plan include procedures for incorporating and managing volunteers and unexpected responders who want to help?	45	0	100	100	0	25
41	In the ED section of the plan:						
	A) Is there a separate entry to the ED for contaminated patients, if necessary?	65	50	100	50	100	25
	B) Is there a dedicated facility, area, or portable device for decontamination, if necessary?	55	50	100	50	0	75
	C) Is there a hot and cold water supply to the decontamination area?	45	50	100	50	0	25
	D) Can water run-off from the decontamination area be contained?	60	100	100	50	0	50
	F) Can the ventilation system in the ED be isolated from the rest of the facility?	55	75	100	50	0	50
	H) Has the ED set a system so communication can be established and maintained with the local EMS Agencies, Disaster Management, and the local Health Department?	45	25	100	50	0	50
42	Has jurisdictional control been discussed and staff informed of the hierarchy in the event outside law enforcement assistance is required?	50	25	100	50	0	75
43	Has it set out the arrangements for accommodating the ambulance liaison officer?	55	50	100	50	0	75
44	Have arrangements been set out for accommodating the police documentation team?	50	50	100	50	0	50
45	Have arrangements been set out for deployment of a mobile medical team to the scene of an incident?	80	75	100	50	100	75
46	Does it include arrangements for keeping staff informed of the incident response?	80	75	100	50	100	75
47	Does it make provision for additional mortuary facilities?	75	50	100	50	100	75
48	Is provision made for preservation of forensic evidence?	65	25	100	50	100	50

49	Does it cover special arrangements needed in the event that children are involved in an incident? (Especially uninjured or minor injured children)	65	25	100	50	100	50
50	Does it cover arrangements and facilities for decontamination of casualties where potential contamination is identified before entry to the hospital?	45	50	100	50	0	25
52	Are there set out arrangements for accessing stocks of antidotes / vaccines?	50	50	100	50	0	50

3.7 Hospital Disaster Operations Centre

Between 60-85% of hospitals have developed standard operating procedures for a Hospital Operations Centre, have made alternative communication arrangements should the existing system fail, and have plans to alert and establish a control team.

Table 6: HOSPITAL DISASTER OPERATION CENTRE

HOSPITAL DISASTER OPERATION CENTRE							
	Yes Answer (%)						
No.	**Question**	**Total**	**Central (n=4)**	**Eastern (n=1)**	**Northern (n=2)**	**Southern (n=1)**	**Western (n=4)**
53	Does the plan indicate where the Hospital Disaster Operation Centre is to be located (with preference given to an area away from the ED)?	80	50	100	100	100	50
54	Has an alternate location been determined?	80	50	100	100	100	50
55	Have standard operating procedures been developed for the Operation Centre?	60	25	100	100	0	75
56	Do the procedures for the Operation Centre specify chain of command and communication channels for the key position holders within the Operation Centre?	85	50	100	100	100	75
57	Is there provision for alternative communication arrangements in the event the hospital communication system fails or is overloaded?	75	25	100	100	100	50
58	Have special communication networks been established and tested that will maintain communication between the facility and the local Disaster Management?	70	25	100	50	100	75
59	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?	55	0	100	100	0	75
60	Does the plan contain arrangements for: promptly alerting and establishing a control team?	75	50	100	100	100	25
61	Pre-allocated communication lines / telephones, known to those departments?	85	75	100	100	100	50

3.8 Security

All the facilities have a method to close down their facility to control access and egress. Most (85%) have a defined plan to control vehicular and pedestrian traffic in the event of a major incident and communicate with individuals immediately outside the facility in the event lock down is initiated. Less than 35% of the hospitals do not have established process to credential healthcare workers from outside the individual network in order to facilitate safe and qualified patient care.

Table 7: SECURITY

SECURITY							
Yes Answer (%)							
No.	Question	Total	Central (n=4)	Eastern (n=1)	Northern (n=2)	Southern (n=1)	Western (n=4)
62	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?	100	100	100	100	100	100
63	Have steps been taken to minimize and control points of access and egress in buildings and areas without utilization of lock down procedures?	95	75	100	100	100	100
64	Is there a plan to control vehicular traffic and pedestrians?	85	25	100	100	100	100
65	Have arrangements been made to meet and escort responding emergency service personnel?	85	50	100	100	100	75
66	Does the facility have the ability to communicate with individuals immediately outside the facility in the event lock down is initiated?	80	25	100	100	100	75
67	Does the facility security plan recognize the extent of the security problems for the individual facility?	85	75	100	100	100	50
68	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?	65	50	100	100	0	75

3.9 Communications System

70% - 85% of the disaster plans have contingency plans should the existing communication system fail.

Table 8: COMMUNICATIONS SYSTEM

COMMUNICATION SYSTEM							
Yes Answer (%)							
No.	Question	Total	Central (n=4)	Eastern (n=1)	Northern (n=2)	Southern (n=1)	Western (n=4)
69	Is there provision for alternative communication arrangements in circumstances where the communication system fails/overloads (e.g. unlisted numbers, pay phones, walkie-talkie sets)?	75	25	100	100	100	50
70	Is there an organized runner, messenger system as back-up for communication system and power failures?	75	50	100	50	100	75
71	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?	70	75	100	100	0	75
72	Has the facility established communication networks with the local EMS Agency and Disaster Management?	85	50	100	100	100	75
73	Are cover arrangements for recording messages received, management decisions and actions taken during a major incident in place?	80	25	100	100	100	75

3.10 Internal Traffic Flow and Control

The control of internal traffic flow for movement of patients through corridors and staff movement throughout their areas has been detailed in 85% of hospitals. Egress routes for patients and staff been provided for evacuation purposes and elevators be manned and controlled in 90-95% of the hospitals. Only 60% specified that elevator usage is prioritized.

Table 9: INTERNAL TRAFFIC FLOW AND CONTROL

INTERNAL TRAFFIC FLOW AND CONTROL							
Yes Answer (%)							
No.	Question	Total	Central (n=4)	Eastern (n=1)	Northern (n=2)	Southern (n=1)	Western (n=4)
74	Have provisions been made for internal traffic that allow for movement of patients through corridors and staff movement throughout their areas?	85	50	100	100	100	75
75	Have egress routes for patients and staff been provided for evacuation purposes?	90	50	100	100	100	100
76	Will elevators be manned and controlled?	95	25	100	100	100	50
77	Has elevator usage been prioritized (e.g. casualties, supplies)?	60	25	0	100	100	75

78	Have movement routes been designated within the hospital and have traffic flow charts been prepared and posted?	80	25	100	100	100	75

3. 11 External Traffic Flow and control

The majority of hospitals have considered the impact of external traffic on the flow into the hospital grounds as well as possible exit points. This includes half central region hospitals and all other hospitals region. The majority (85-90%) have also specified areas for ambulances, supply vehicles and authorized personnel.

3.12 Visitors

About 75% of hospitals have made provision in their plans for the influx of family members and visitors to the receiving hospital and established designated areas for waiting rooms. 65% of hospitals do not have waiting areas that have supportive counselling away from the Emergency Department and only 45% have an area to re-unite discharged patients and uninjured patients with their family.

Table 10: VISITORS

VISITORS							
Yes Answer (%)							
No.	**Question**	**Total**	**Central (n=4)**	**Eastern (n=1)**	**Northern (n=2)**	**Southern (n=1)**	**Western (n=4)**
82	Does the plan include mechanism to deal with anticipated increases in visitors and curious onlookers seeking to gain entrance during disasters?	70	25	100	50	100	75
83	Has provision been made to establish:						
	Waiting areas, with supportive counselling, away from the ED to minimize unwanted access to the relatives and friends of disaster victims?	35	25	0	100	0	50
	Area to re-unite discharged patients and uninjured patients with their family	45	25	100	50	0	50
	Area of privacy to inform family member of their loved-one's death	80	25	100	100	100	75
84	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.	85	50	100	100	100	75
85	Has a position holder been designated to control and take care of housekeeping issues that arise due to visitors?	35	0	0	100	0	75
86	Does the plan contain arrangements for dealing with VIP visits following a major incident?	85	50	100	100	100	75

3.13 Media

Only 55% of hospitals have allocated a specific area in the hospital to house the media and have identified areas suitable to hold press briefings. A total of 30% have a designated internal spokesperson to liaise with the media. only between 30-50% of hospitals have a position person been designated to control and take

care of the housekeeping needs of the media and determined the communication tree connecting the internal spokesperson with the external spokespersons for Disaster Management or other lead agency.

Table 11: MEDIA

MEDIA							
Yes Answer (%)							
No.	**Question**	**Total**	**Central (n=4)**	**Eastern (n=1)**	**Northern (n=2)**	**Southern (n=1)**	**Western (n=4)**
87	Do the media have a designated area?	55	25	0	50	100	75
88	Has this been located as not to be in close proximity to the Emergency Department, Command Centre, and waiting area for relatives, family, and friends?	45	25	0	50	100	50
89	Has a position holder been designated to control and take care of the housekeeping needs of the media?	30	25	0	50	0	75
90	Does the plan designate an internal spokesperson as a media contact?	30	25	0	50	0	75
91	Does the plan determine the communication tree connecting the internal spokesperson with the external spokespersons for Disaster Management or other lead agency?	50	25	0	50	100	75
92	Have provisions been made to identify the procedures for handling requests for information from the media?	50	25	0	50	100	75
93	Have locations been identified for press briefings?	30	25	0	50	0	75

3.14 Reception of Casualties and Victims

The majority (80 – 90%) of hospitals have a system of flow within the ED for triaging and identification of patients as well as plans for the movement of patients out of the unit. More than three quarters have plans in place to address the hospital's surge capacity. The majority of hospitals have an efficient plan to obtain documentation for the disaster victims and have designated areas to attend to the victims and have quick access to extra stock and supplies that may be needed.

Table 12: RECEPTION OF CASUALTIES AND VICTIMS

RECEPTION OF CASUALTIES AND VICTIMS							
Yes Answer (%)							
No.	**Question**	**Total**	**Central (n=4)**	**Eastern (n=1)**	**Northern (n=2)**	**Southern (n=1)**	**Western (n=4)**
94	Is there a precise plan of action whereby at short notice, multiple casualties can be:	80	75	100	50	100	75
	Identified	90	75	100	100	100	75
	Triaged	90	75	100	100	100	75
	Personnel are familiar with triage tags	80	75	100	50	100	75
	Registered	90	75	100	100	100	75
	Treated in designated treatment areas	90	75	100	100	100	75
	Admitted or transferred	90	75	100	100	100	75
	Transported as needed	90	75	100	100	100	75
	A pre-numbered system be used	85	50	100	100	100	75
	Routes to designated areas from triage area marked for untrained porters	75	50	100	50	100	75
	Admission wards vs admit to empty beds?	85	50	100	100	100	75
95	In the confirmation notification of a disaster, does the plan provide for:						
	Clearance of all non-emergency patients and visitors from the ED;	85	50	100	100	100	75
	Cancelling elective admissions and surgery	85	50	100	100	100	75
	Determination rapidly available or open beds	85	50	100	100	100	75
	Determination of space that can be converted to patient care areas	85	50	100	100	100	75
	Determination of number of patients who can be transferred or discharged	85	50	100	100	100	75
	Plan to assemble discharged patients, screen/re-evaluate them, record all information/plan transport and accommodation	85	50	100	100	100	75
96	Is the receiving and sorting area accessible and in close proximity to the areas of the hospital in which definitive care will be given?	85	50	100	100	100	75
97	Is the reception area equipped with portable auxiliary power for illumination and other electrical equipment, or can power be supplied from hospital emergency generator circuits?	85	50	100	100	100	75
98	Does the reception area allow for retention, segregation and processing of casualties?	85	50	100	100	100	75
99	Are sufficient equipment, supplies, and apparatus available and organized to permit prompt and efficient casualty movement?	85	50	100	100	100	75
100	Can radiological monitors and radiation detection instruments be assigned to the area?	85	50	100	100	0	75
101	Has provision been made for a large influx of casualties to include such factors as:						
	Bed arrangements	85	50	100	100	100	75
	Personnel requirements	85	50	100	100	100	75
	An extra resource such as interpretive services, linen, pharmaceutical needs, dressings, etc?	65	50	100	100	0	75
102	Are the medical records and admission departments able to handle a casualty influx?	85	50	100	100	100	75
103	Is there a system for retention and safe-keeping of personal items removed from casualties?	80	25	100	100	100	75
104	Is there a plan to isolate contaminated victims from the rest of the hospital?	75	25	100	100	100	50

105	Is there a single-entry point for all casualties?	80	50	100	100	100	75
106	Does the plan identify receiving wards??	80	50	100	100	100	75

3.15 Hospital Evacuation

70% of hospitals have a clear plan in place to facilitate the quick discharge of patients or to transfer existing patients to other local health facilities.

Table 13: HOSPITAL EVACUATION

HOSPITAL EVACUATION							
Yes Answer (%)							
No.	**Question**	**Total**	**Central (n=4)**	**Eastern (n=1)**	**Northern (n=2)**	**Southern (n=1)**	**Western (n=4)**
107	Is there an organized discharge routine to handle large numbers of patients upon short notice?	70	50	100	100	0	100
108	Is it detailed that a position holder is responsible for removal and control of patient records and documents?	65	25	100	100	0	100

3.16 Hospital out of communication or cut off from resources

In the event of a breakdown in channels of communication or services to the hospitals concerned, 75% have a designated person responsible for auxiliary power. More than half (60%) have an assigned position for food and water rationing and waste and garbage disposal. 55% considered the rest and rotation of staff in their plan.

Table 14: HOSPITAL OUT COMMUNICATION OR CUT OFF FROM RESOURCES

HOSPITAL OUT COMMUNICATION OR CUT OFF FROM RESOURCES							
Yes Answer (%)							
No.	Question	Total	Central (n=4)	Eastern (n=1)	Northern (n=2)	Southern (n=1)	Western (n=4)
119	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:						
	Auxiliary power	75	25	100	100	100	50
	Rationing of food and water	60	50	100	100	0	50
	Waste and garbage disposal	70	50	100	100	0	100
	Rest and rotation of staff	60	25	100	100	0	75
	Rationing of medication and supplies	65	50	100	100	0	75
	Medical gas supply	70	50	100	100	0	100
120	Has consideration been given to utilization of patients and visitors to assist staff with duties?	65	50	100	100	0	75
121a	Generators:						
	Are critical areas identified?	95	100	100	100	100	75
	Are power points supplied by generator marked?	85	50	100	100	100	75
	What is the duration the generator can function before additional fuel is required?	85	50	100	100	100	75
121b	Food & Water:						
	Has the time the hospital can be self-sufficient on its own water reserves/tanks and food resources been pre-determined?	60	75	0	50	100	75
	Can the water tanks be filled from a portable source such as a tanker or bore hole?	50	100	0	50	0	100
	Are there boreholes close to the hospital?	55	75	0	0	100	100
	Can mass food freezer facilities be supplied by portable generators/ connections available/ parking space?	65	100	0	50	100	75
	Is rationing of water planned?	55	75	0	50	100	50

3.17 Pharmaceuticals

Only 55%-70% of hospitals have adequate stocks of basic emergency drugs (Atropine, Morphine, Adrenaline and bronchodilators) and intravenous resuscitation fluids.

Table 15: PHARMACEUTICALS

PHARMACEUTICALS							
Yes Answer (%)							
No.	Question	Total	Central (n=4)	Eastern (n=1)	Northern (n=2)	Southern (n=1)	Western (n=4)
129	What is the current level of stock for the following pharmaceuticals:						
	Atropine	70	75	100	0	100	75
	IV fluids	65	50	100	0	100	75
	Morphine	55	50	50	0	100	75
	Bronchial dilators	65	50	100	0	100	75
	Atropine	70	75	100	0	100	75
130	Does the pharmaceutical allocation plan make provision for prophylaxis of care giving staff and their immediate family?	65	50	100	0	100	75
131	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.	60	25	100	0	100	75
132	Does the plan identify pharmaceutical warehouses within the local areas?	90	75	100	100	100	75
133	Does the plan outline how pharmaceuticals can be procured, transported, and delivered to the facility while within a secure environment?	85	50	100	100	100	75

3.18 Post Disaster Recovery

More than half (65%) of hospital plans have clear methods to deal with the post disaster recovery stages. While most of the hospitals (60-65)% do not have Critical Incident Stress Debriefing Program, Employee Assistance Program, Group/Individual counselling services or Family Support Program.

Table 16: POST DISASTER RECOVERY

POST DISASTER RECOVERY							
Yes Answer (%)							
No.	**Question**	**Total**	**Central (n=4)**	**Eastern (n=1)**	**Northern (n=2)**	**Southern (n=1)**	**Western (n=4)**
134	Does the plan designate who will be in charge of recovery operations?	65	50	100	100	0	75
135	Does the plan make provision for the following during recovery?						
	Documentation	65	50	100	100	0	75
	Financial matters	65	50	100	100	0	75
	Inventory and re-supply	65	50	100	100	0	50
	Record preservation	65	50	100	100	0	75
	Clean-up	65	50	100	100	0	75
	Hazard removal and clean-up	65	50	100	100	0	75
	Garbage and waste disposal	65	50	100	100	0	75
	Utility and equipment servicing	65	50	100	100	0	75
	Physical plant restoration and renovation	65	50	100	50	0	75
136	Does the plan address the following programs?						
	Critical Incident Stress Debriefing Program	35	25	100	50	0	25
	Employee Assistance Program	35	0	100	50	0	25
	Group/Individual counselling services	35	0	100	50	0	25
	Family Support Program	40	25	100	50	0	25

3.19 Education and Training

Between 60-70% of hospitals have a dedicated disaster plan training program and educate their new staff as to the institution's disaster plan.

Table 17: EDUCATION AND TRAINING

EDUCATION AND TRAINING							
Yes Answer (%)							
No.	Question	Total	Central (n=4)	Eastern (n=1)	Northern (n=2)	Southern (n=1)	Western (n=4)
137	Does the plan specify who is responsible for the training program?	70	75	100	100	0	75
138	Does the plan include methods for ramp up and extemporaneous training for new and altered roles?	60	25	100	100	0	75
139	Does the facility have ongoing, mandatory disaster training programs?	65	50	100	100	0	75
140	Has the facility considered adapting disaster procedures for application when dealing with routine procedures so personnel can become familiar with them?	65	50	100	100	0	75
141	Does the program provide disaster education material at staff orientation to facilitate staff awareness?	65	50	100	100	0	75
142	Does the program provide ongoing disaster education to facilitate staff awareness and currency of procedures?	65	50	100	100	0	75
143	Does the program have inter-organization joint training sessions that deal with common aspects of disaster response?	60	25	100	100	0	75
144	Does the plan set out appropriate Health and Safety measures that staff should be aware of?	65	50	100	100	0	75

3.20 Exercising the Disaster Plan

65% of hospitals exercise their disaster plan bi-annually; 60% ensure that all key players are familiar with the plan.

Table 19: EXERCISING THE DISASTER PLAN

EXERCISING THE DISASTER PLAN							
Yes Answer (%)							
No.	Question	Total	Central (n=4)	Eastern (n=1)	Northern (n=2)	Southern (n=1)	Western (n=4)
145	Does the facility program conduct an annual exercise?	65	50	100	100	0	75
146	Does the exercise ensure all key participants are familiar with the contents of the plan?	60	25	100	100	0	75
147	Does the exercise ensure all key participants are familiar with the contents of the plan?	60	25	100	100	0	75
148	Is a formal critique performed with results distributed to all key individuals and participating groups?	65	50	100	100	0	75
149	Does it identify somebody responsible for ensuring that the plan is updated, distributed and tested on a regular basis?	65	50	100%	100	0	75

CHAPTER 4: DISCUSSION

4.1 DISCUSSION

The aim of this study was to evaluate disaster response plans and resources in military hospitals in Saudi Arabia. To our knowledge, this study is the first of its kind and no published research exists on the subject. Excepting an assessment of disaster preparedness in select units of a military hospital in Tehran in 2016, [9] no countries have published research on disaster preparedness in military hospitals to date. In contrast, various studies have surveyed disaster equipment and responses in hospitals around the world and specifically in Saudi Arabia. Similar to the aforementioned Tehran study, studies within Saudi Arabia have focused on emergency departments in one city or at most on one hospital.

Though data on Saudi Arabian military hospitals are lacking, one study evaluated disaster preparedness in 13 major private hospitals in Riyadh from 2015-2016. The study found that 92.3% of hospitals reported a disaster plan though such plans were weakened by a lack of staff training, education and simulation in disaster response[10].

Another study conducted in Mecca assessed emergency department nurse preparedness during mass gatherings in four major hospitals. Published in 2017, the study focused on emergency nurses' response to the Haj, a mass pilgrimage of two to three million people in confined in small areas at specific times. This study stressed the importance of increasing the awareness and education of nurses working in emergency departments[11].

The aim of this research was to evaluate Saudi military hospitals' levels of disaster preparedness and their relationships with external parties in disaster management. Thirteen Saudi military hospitals opted to participate in this research and respond to the questionnaire. 95% of participating hospitals had a disaster plan. Despite the existence of a disaster plan, 15% of the hospitals lacked an established, cooperative relationship with external health authorities, which play an important role in the transfer and treatment of patients in disasters both internal and external to the hospital.

Only 80% of hospitals specified a difference between external and internal disasters. These same hospitals had not adequately distributed their disaster plans among employees. Both internal and external disaster assessment require an integrated multidisciplinary approach, and the disruption of integration in the contingency plan may negatively impact the outcome, especially in hospitals vulnerable to internal disasters[12].

Although most hospitals are designated disaster responders, only 50% of them had specific procedures regarding management of biological, chemical and nuclear hazards. The lack of hazard identification and management increases risk and may exacerbate the disaster. Pfenninger *et al.* reported on the relationship between CBRN risk management and disaster preparedness in hospitals; they showed that hospitals with higher risk tend to have poorer plans in place[13].

Awareness of the role of disaster managers in risk management is a critical contributor to successfully mitigating losses and damage caused by a disaster[14]. Most of the hospitals included in this study had a disaster coordinator, apart from two hospitals in the Western Region and a hospital in the central region. In contrast, there is a severe shortage of medical officers in the central region – only half of central region hospitals had a medical officer on staff. Only one central region hospital has an alert system for staff in the event of a disaster, which is a serious challenge to informing staff and stakeholders who could significantly contribute to disaster reduction.

"Emergency planning should be a process, rather than a product or outcome."[15] Despite specific requirements of hospital disaster plan implementation, half of the central region hospitals lack clarity in the process of dividing disasters into stages and in activation, preparedness and termination procedures. The division of disasters into stages plays a major role in disaster management as it alerts planners and implementers to the needs , resources and external support required in each stage. The lack of this division of stages in disaster management may lead to failure[15].

While almost all of the hospitals in this study had a plan for internal disasters, only 75% had a plan for external disasters, including the provision of resources and staff. Only 45% of hospitals had plans that included external resources such as volunteers. Volunteers can greatly benefit disaster management when divided according to their qualifications to reduce hospital staff burden and increase manpower[15]. As the hospital's gateway to emergency and disaster situations, the Emergency Department clearly requires special access to decontamination areas for hazard management; however, only 65% of hospitals had a dedicated area for decontamination. As stated in *Disaster and Emergency Planning for Preparedness, Response, and Recovery,* the allocation of the area of decontamination is essential in disaster management[15]. In cases of hospitals that lacked decontamination areas, it is unlikely that other disinfection facilities were available. Hospitals differ in decontamination arrangements.

Between 60-85% of hospitals had developed standard operating procedures for a Hospital Operations Centre and alternative communication arrangements should the existing system fail. These same hospitals had plans to alert and establish a control team. The purpose of the standard operating procedures is "to guarantee that a standardized and uniform set of procedures is applied within the entire system"[16] however, only 60% of the hospitals comply with these standards.

Military hospitals require full control over entrance and exit from the hospital. All military hospitals control entrance and exit to the hospital and can shut down the hospital under any circumstances. However, 35% of military hospitals in this study do not had a mechanism for its experienced health professionals to contribute to external disaster management through and thus increase disaster response efficiency. A system and mechanism for accreditation and inclusion in the hospital are necessary to prevent infiltrators or vandals from entering with the medical staff.

Dependence on a single communication channel in case of disaster is very dangerous. In the case of disruption, communication and guidance between the operating room and the medical teams and support will break down, creating confusion and chaos that could exacerbate the disaster. In this questionnaire, three-quarters of the hospitals in the central region and half of the hospitals in the western region had no alternative to the main communication channel. This dangerous oversight can be remedied by opening channels of communication and benefiting from hospitals that contain these systems[17-18-19] .

Most hospitals control the flow of internal and external traffic to increase the speed of transport, evacuation and reception of patients. In the event of disasters, visitors and families are expected to be reassured by their relatives or acquaintances. The presence of a special area to receive visitors and families and provision of psychological and religious information and counselling alleviates stress and reduces confusion. Only 35% of all hospitals had been identified as having a disaster-prone visitor area with the necessary counselling, and only 45% had a reunification area for patients discharged from hospital.

With the development and proliferation of social media networks in the last two decades, the role of the media has become important and effective in directing people and communicating information in disasters. Disaster management stands to greatly benefit from the media and its services rather than ignoring it. As a result, 55% of the hospitals in this study had identified a designated area for the media, though fewer had designated a spokesman for the hospital[20].

This study shows that 80 – 90% of hospital-based emergency departmentw had a system for triage, patient identification, patient flow and patient transport out of the unit. Over 75% of hospitals had plans to address the hospital's surge capacity. Most hospitals had an efficient plan to obtain documentation for the disaster victims and had designated areas to attend to the victims with quick access to extra stock and supplies. This is considered as an essential element in the disaster plan, whether in the case of activation or standby stage. However, only 70% of the hospitals had a clear plan in place to facilitate the quick discharge and transfer of patients to other local health facilities. The goal of an evacuation plan is to mitigate damage caused by moving patients and staff to a safe and well-equipped area. Therefore, evacuation plans play an important role in disaster preparedness medical staff should receive proper evacuation training[21].

In 75% of hospitals, there is a person responsible for operating the reserve power in the hospital in the case of collapse of communication channels or electrical services. Only 60-70% of hospitals had appointed officials responsible for the rationing of food and water, management of waste and garbage disposal, rotation of staff, and rationing of medication. It is expected that there will be a significant shortage of resources in disaster situations thereby necessitating order and preparedness.

The post-disaster phase is an important stage that enables completion, review and constructive criticism of the plan. The results of this questionnaire showed that 65% of hospital plans had clear methods to manage post disaster recovery stages, though most hospitals do not had Critical Incident Stress Debriefing Program, Employee Assistance Program, Group/Individual counselling services or Family Support Programs.

This study also shows that 60-70% of hospitals had a dedicated disaster plan with new staff education and training programs on the institution's disaster plan. 65% of hospitals exercise their disaster plan bi-annually whereas 60% ensure that all key players are familiar with the plan. Training and simulation of the disaster plan improve disaster preparedness, identifying and correcting potential errors that may occur during the implementation of the disaster plan to avoid any major incident. Training and disaster programs are important to improve disaster response level but lacking in close to one-third of the hospitals participating in the questionnaire[22].

4.2 LIMITATIONS

The following potential limitations to the study have been identified:

There may be a degree of reluctance or reticence amongst senior staff to disclose or be critical of their disaster plans. In order to minimise this potential limitation, we ensured that respondents were aware that all responses were anonymised for collated reports. This means that our results represent a best-case scenario.

Even if a facility has a "good" disaster plan according to the assessment, it is not an indication of the degree of preparedness of the facility to respond to a disaster. This will be communicated back to MSD and each hospital, and further assessments will be made as a follow up to close this gap.

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

This research is the first of its kind in the military hospitals of the Ministry of Defence in the Kingdom of Saudi Arabia, which is looking at the issue of disaster management. The results of this research are based on a self-reported questionnaire and, therefore, can be considered the best-case scenario.

The study highlighted a number of strengths in facility disaster preparedness, and a number of aspects where concerted efforts are required to improve the situation. In general, most hospitals had reasonable disaster plans in place, although none covered all the recommended areas in sufficient detail.

We will report our findings through the chain of command and make a number of recommendations to improve the disaster response among military hospitals. We recommend:

1- Create a unified command system across all MoD hospitals and within MSD for major incidents and disaster response
2- In the case of major incidents, coordination between military hospitals and other sectors should be done through the unified command system
3- Undertake annual assessments of disaster plans and preparedness in military hospitals.
4- Bring specialized international disaster planning and response courses to MSD and the hospitals, and adjust them to suit the nature of military tasks and hospitals
5- Recruit and train a cadre of dedicated disaster medicine professionals within MSD
6- Undertake more research within MSD, to determine whether the self-reported preparedness reflects in either actual response or in simulated scenarios.

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APPENDICES

APPENDIX 1: DISASTER PLANNING ASSESSMENT TOOL[8]

FOUNDATIONS				
No.	**Question**	**Yes**	**No**	**Comments**
1	Does the facility have a disaster plan?			
2	A)Is there a disaster planning committee?			
	B)Is it multi-disciplinary and include administrative members?			
3	Is there currently a collaborative relationship as part of the planning operating with:- Local Emergency Medical Services (EMS)			
	Local Red Crescent			
	Local Emergency Management,			
	Local Health Department?			
	Does the plan detail actions to be taken for both internal and external disasters?			
4	Does the plan detail how it links with the local EMS Agencies and local Emergency Management Agency?			
5	Is the plan widely distributed and readily available throughout the hospital/healthcare facility?			
6	Does the plan set out responsibilities of the chief executive?			
7	Does the plan set out the mechanism for consultation across the Trust and with external agencies?			
8	Have the plan version controls within it to ensure that the user has the latest version?			
9	Does the plan state clearly the circumstances that would constitute a major incident for the hospital?			
10	Does the plan provide an assessment of local hazards and risks?			
11	Does it address how the hospital will manage a mass casualty incident where routine emergency resources and facilities are inadequate?			
12	Does it cover specific arrangements for dealing with a chemical / biological / radiation incident			
13				

SURVEILLANCE				
No.	**Question**	**Yes**	**No**	**Comments**
14	Does the facility currently have:			
	A baseline established for numbers of patients seen in the facility Emergency Department, outpatient clinics, or via direct admission, stratified according to clinical symptoms?			
	A database of its emergency care capability and additional capacity?			
15	Is there currently a process to evaluate and track 100% of all microbiology results and stratify according to organism?			
16	Does a process exist to notify infection control 24 hours a day/7 days a week?			
17	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?			
IDENTIFICATION OF AUTHORISED PERSONNEL				
No.	**Question**	**Yes**	**No**	**Comments**
18	Is there an individual designated as a disaster coordinator on a 24-hour per day basis?			
19	Has the facility designated a medical commander who will be responsible for the hospital's medical responses during the time the plan is activated?			
20	Have other key position holders who have a role in disaster management been identified? This should be identified in the disaster plan.			
21	Is a notification system in place that can alert personnel to a potential disaster situation?			
22	Does the plan include lines of authority, role responsibilities, and provide for succession?			
23	Are those who are expected to implant and use the plan familiar with it?			
24	Have action cards been developed for all personnel involved in disaster response?			
25	Does the plan designate how people will be identified within the facility (e.g. staff, news media,visitors)?			
26	Can staff gain access to the facility when called back on duty?			

ACTIVATION OF THE PLAN				
No.	**Question**	**Yes**	**No**	**Comments**
27	Does the plan specify the circumstances under which the plan can be activated?			
28	Have activation stages been established and roles outlined with each stage? *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.			
29	Does it set out the mechanism for informing upwards that the plan has been activated?			
ALERTING SYSTEM				
No.	**Question**	**Yes**	**No**	**Comments**
30	Does the plan provide for activation within 1 – 2 hours during normal as well as off hours?			
31	Does the plan specify how notification within the facility will be carried out?			
32	Does the plan specify the chain of command to notify internal staff and appropriate external personnel indicating the status of the facility?			
33	Does the plan detail responsibility to initiate a system for recalling staff back on duty?			
34	Does the plan provide for alternative systems of notification that considers people, equipment, and procedures?			
35	Does the plan provide mechanisms to ration staffing according to their skill levels and availability?			
RESPONSE				
No.	**Question**	**Yes**	**No**	**Comments**
36	Has the facility developed internal disaster plans for internal emergencies (Including a hospital fire, bomb threat, evacuation)?			
37	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?			
38	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?			
39	Have provisions been made for activating a disaster medical team in response to both internal and external disasters?			
40	Does the plan include procedures for incorporating and managing volunteers and unexpected medical services responders who want to help?			
41	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: • Administrative			
	• Emergency			
	• Nursing			
	• Radiology			
	• Infection Control / Hospital Epidemiology			
	• Occupational Health			
	• Laboratory			
	• Pharmacy			
	• Critical Care			
	• Central Supply			
	• Maintenance and Engineering			
	• Biomedical Engineering			
	• Respiratory Therapy			
	• Security			
	• Food and Nutrition			
	• Housekeeping			
	• Social Services			
	• Pastoral Counselling			
	• Mortuary Physician services including Medicine and Surgery			
42	In the Emergency Department section of the plan, are the following detailed? • Is there a separate entry to the Emergency Department for contaminated patients, if necessary?			

	• Is there a dedicated facility, area, or portable device for decontamination, if necessary?			
	• Is there a hot and cold water supply to the decontamination area?			
	• Can water run-off from the decontamination area be contained?			
	• Can the ventilation system in the Emergency Department be isolated from the rest of the facility, if necessary?			
	• Is a communication method established within the Emergency Department so communication can be established and maintained with the local EMS Agencies, Disaster Management, and the local Health Department?			
43	Has jurisdictional control been discussed and staff informed of the hierarchy in the event outside law enforcement assistance is requested or required?			
44	Has it set out the arrangements for accommodating the ambulance liaison officer?			
45	Have arrangements been set out for accommodating the police documentation team?			
46	Have arrangements been set out for deployment of a mobile medical team to the scene of an incident?			
47	Does it include arrangements for keeping staff informed of the incident response?			
48	Does it make provision for additional mortuary facilities?			
49	Is provision made for preservation of forensic evidence?			
50	Does it cover special arrangements needed in the event that children are involved in an incident? (Especially uninjured or minor injured children)			
51	Does it cover arrangements and facilities for decontamination of casualties where potential contamination is identified before entry to the hospital?			
52	Are there set out arrangements for accessing stocks of antidotes / vaccines?			
HOSPITAL DISASTER OPERATION CENTRE				
No.	**Question**	**Yes**	**No**	**Comments**
53	Does the plan indicate where the Hospital Disaster Operation Centre is to be located (with preference given to an area away from the Emergency Department)?			
54	Has an alternate location been determined?			

55	Have standard operating procedures been developed for the Operation Centre?			
56	Do the procedures for the Operation Centre specify chain of command and communication channels for the key position holders within the Operation Centre?			
57	Is there provision for alternative communication arrangements in the event the hospital communication system fails or is overloaded?			
58	Have special communication networks been established and tested that will maintain communication between the facility and the local Disaster Management?			
59	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?			
60	Does the plan contain arrangements for:			
	promptly alerting and establishing a control team?			
	Pre-allocated communication lines / telephones, known to those departments?			
SECURITY				
No.	**Question**	**Yes**	**No**	**Comments**
61	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?			
62	Have steps been taken to minimize and control points of access and egress in buildings and areas without utilization of lock down procedures?			
63	Is there a plan to control vehicular traffic and pedestrians?			
64	Have arrangements been made to meet and escort responding emergency service personnel?			
65	Does the facility have the ability to communicate with individuals immediately outside the facility in the event lock down is initiated?			
66	Does the facility security plan recognize the extent of the security problems for the individual facility?			
67	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?			
COMMUNICATION SYSTEMS				

No.	Question	Yes	No	Comments
68	Is there provision for alternative communication arrangements in circumstances where the communication system fails/overloads (e.g. unlisted numbers, pay phones, walkie-talkie sets)?			
69	Is there an organized runner, messenger system as back-up for communication system and power failures?			
70	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?			
71	Has the facility established communication networks with the local EMS Agency and Disaster Management?			
72	Are cover arrangements for recording messages received, management decisions and actions taken during a major incident in place?			
INTERNAL TRAFFIC FLOW AND CONTROL				
No.	**Question**	**Yes**	**No**	**Comments**
73	Have provisions been made for internal traffic that allow for movement of patients through corridors and staff movement throughout their areas?			
74	Have egress routes for patients and staff been provided for evacuation purposes?			
75	Will elevators be manned and controlled?			
76	Has elevator usage been prioritized (e.g. casualties, supplies)?			
77	Have movement routes been designated within the hospital and have traffic flow charts been prepared and posted?			
EXTERNAL TRAFFIC FLOW AND CONTROL				
No.	**Question**	**Yes**	**No**	**Comments**
78	Have arrangements been made for both vehicular (including helicopter) and people entrance to and exit from the hospital premises?			
79	Have the following been established: • Uninterrupted flow of ambulances and other vehicles to casualty sorting areas or emergency room entrances			
	• Access and egress control of authorized vehicles carrying supplies and equipment to a dock area			
	• Authorized vehicle parking			
	• Direction for authorized personnel and visitors to proper entrances			
	• Emergency parking for key personnel			

	• Are these areas accessible for large disaster vehicles such as disaster busses?			
80	Have arrangements been made for police support in maintaining order in the vicinity of the facility?			
81	Does the plan include a method to impact the management of vehicle and people convergence upon the facility?			

VISITORS				
No.	**Question**	**Yes**	**No**	**Comments**
82	Does the plan include mechanism to deal with anticipated increases in visitors and curious onlookers seeking to gain entrance during disasters?			
83	Has provision been made to establish:			
	Waiting areas, with supportive counselling, away from the Emergency Department to minimize unwanted access to the relatives and friends of disaster victims?			
	Area to re-unite discharged patients and uninjured patients with their family			
	Area of privacy to inform family member of there loved-ones death			
84	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.			
85	Has a position holder been designated to control and take care of housekeeping issues that arise due to visitors?			
86	Does the plan contain arrangements for dealing with VIP visits following a major incident?			
MEDIA				
No.	**Question**	**Yes**	**No**	**Comments**
87	Do the media have a designated area?			
88	Has this been located as not to be in close proximity to the Emergency Department, Command Centre, and waiting area for relatives, family, and friends?			

89	Has a position holder been designated to control and take care of the housekeeping needs of the media?			
90	Does the plan designate an internal spokesperson as a media contact?			
91	Does the plan determine the communication tree connecting the internal spokesperson with the external spokespersons for Disaster Management or other lead agency?			
92	Have provisions been made to identify the procedures for handling requests for information from the media?			
93	Have locations been identified for press briefings?			

RECEPTION OF CASUALTIES AND VICTIMS				
No.	**Question**	**Yes**	**No**	**Comments**
94	Is there a precise plan of action whereby at short notice (within 1 hour), multiple casualties can be received and: • Identified			
	• Triaged			
	• Personnel are familiar with triage tags			
	• Registered			
	• Treated in designated treatment areas			
	• Admitted or transferred			
	• Transported as needed			
	• A pre-numbered system be used			
	• Routes to designated areas from triage area marked for untrained porters			
	• Admission wards versus distribution to empty beds?			
95	In the confirmation notification of a disaster, does the plan provide for: • Clearance of all non-emergency patients and visitors from the emergency department;			
	• Cancellation of all elective admissions and elective surgery			
	• Determination of rapidly available or open beds			
	• Determination of space that can be converted to patient care areas			
	• Determination of number of patients who can be transferred or discharged			
	• Plan to assemble discharged patients, screen/re-evaluate them, record all information/ plan transport and accommodation			
96	Is the receiving and sorting area accessible and in close proximity to the areas of the hospital in which definitive care will be given?			
97	Is the reception area equipped with portable auxiliary power for illumination and other electrical equipment, or can power be supplied from hospital emergency power (generator) circuits?			
98	Does the reception area allow for retention, segregation and processing of incoming casualties?			
99	Are sufficient equipment, supplies, and apparatus available, in an organized manner, to permit prompt and efficient casualty movement?			

100	Can radiological monitors and radiation detection instruments be assigned to the area, if required?			
101	Has provision been made for a large influx of casualties to include such factors as: • Bed arrangements			
	• Personnel requirements			
	• An extra resource such as interpretive services, linen, pharmaceutical needs, dressings, etc?			
102	Are the medical records and admission departments organized to handle an influx of casualties			
103	Is there a system for retention and safe-keeping of personal items removed from casualties?			
104	Is there a plan to segregate/isolate disaster victims from the rest of the hospital if those victims are contaminated (e.g. hazardous materials)?			
105	Does the plan consider the need for a single entry point for all casualties of the incident?			
106	Does it identify the receiving wards that may need to be used?			
HOSPITAL EVACUATION				
No.	**Question**	**Yes**	**No**	**Comments**
107	Is there an organized discharge routine to handle large numbers of patients upon short notice?			
108	Is it detailed that a position holder is responsible for removal and control of patient records and documents?			
RELOCATION OF PATIENTS AND STAFF				
No.	**Question**	**Yes**	**No**	**Comments**
109	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?			
110	Have arrangements been made with other healthcare facilities for the relocation of patients should the facility be unable to support patient care?			
111	Have satellite locations been pre-determined and confirmed for the housing of patients and staff in the event of an evacuation?			
112	Have transportation requirements been pre-designated for the movement of people?			

113	Have transportation resources been identified for patients that must be moved in hospital beds, on ventilators, and connected to specialized equipment?			
114	Has provision been made for the movement of patient records and documents?			
115	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?			
116	Is there a sequence for patient transfers along pre-established routes?			
117	Are procedures established for the orderly disposition of patients to their homes, if applicable?			
118	Has provision been made for immediate refuge, care and comfort for the patients and staff on the hospital grounds during inclement and winter weather?			
HOSPITAL OUT OF COMMUNICATION OR CUT OFF FROM RESOURCES				
No.	**Question**	**Yes**	**No**	**Comments**
119	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: • Auxiliary power			
	• Rationing of food and water			
	• Waste and garbage disposal			
	• Rest and rotation of staff			
	• Rationing of medication and supplies			
	• Medical gas supply			
	• Laundry			
	• Staff and patient morale			
120	Has consideration been given to utilization of patients and visitors to assist staff with duties?			
121a	Generators: Are critical areas identified?			
	Are power points supplied by generator marked?			
	What is the duration the generator can function before additional fuel is required?			
	Food & Water:			

121 b	Has the time the hospital can be self-sufficient on its own water reserves/tanks and food resources been pre-determined?			
	Can the water tanks be filled from a portable source such as a tanker or bore hole?			
	Are there boreholes close to the hospital?			
	Can mass food freezer facilities be supplied by portable generators/ connections available/ parking space?			
	Is rationing of water planned?			

EQUIPMENT, SERVICES, FACILITY AND LABORATORY ASSESSMENT				
No.	**Question**	**Yes**	**No**	**Comments**
122	Current number of the following pieces of equipment readily available within the facility: • Ventilators (adult)			
	• Ventilators (neonate)			
	• Incubators			
	• IV pumps			
	• IV poles			
	• Suction Machines			
	• Beds			
	• Linen			
	• Spinal boards			
	• Stretchers			
	• Wheelchairs			
123	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)			
124	Are local suppliers of medical equipment identified? Are there 24-hour contract numbers for these suppliers?			
125	Current level of linen maintained and readily available (days)			
126	Does the facility have the ability to shut down air intakes?			
127	Does the plan include measures to insure the ability to provide hand washing/hand sanitizing measures?			
128	Does the plan include measures to insure adequate amounts of personal protective equipment?			

PHARMACEUTICALS				
No.	**Question**	**Yes**	**No**	**Comments**
129	What is the current level of stock for the following pharmaceuticals: • Atropine			
	• IV fluids			
	• Morphine			
	• Bronchial dilators			
130	Does the pharmaceutical allocation plan make provision for prophylaxis of care giving staff and their immediate family?			
131	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.			
132	Does the plan identify pharmaceutical warehouses within the local areas?			
133	Does the plan outline how pharmaceuticals can be procured, transported, and delivered to the facility while within a secure environment?			
POST DISASTER RECOVERY				
No.	**Question**	**Yes**	**No**	**Comments**
134	Does the plan designate who will be in charge of recovery operations?			
135	Does the plan make provision for the following during recovery? • Documentation			
	• Financial matters			
	• Inventory and re-supply			
	• Record preservation			
	• Cleanup			
	• Hazard removal and cleanup			
	• Garbage and waste disposal			
	• Utility and equipment servicing			
	• Physical plant restoration and renovation			
136	Does the plan address the following programs?			

	• Critical Incident Stress Debriefing Program			
	• Employee Assistance Program			
	• Group/Individual counselling services			
	• Family Support Program			

EDUCATION AND TRAINING				
No.	**Question**	**Yes**	**No**	**Comments**
137	Does the plan specify who is responsible for the training program?			
138	Does the plan include methods for ramp up and extemporaneous training for new and altered roles?			
139	Does the facility have ongoing, mandatory disaster training programs?			Are these exercises reviewed and is changes made to the plan.
140	Has the facility considered adapting disaster procedures for application when dealing with routine procedures so personnel can become familiar with them?			
141	Does the program provide disaster education material at staff orientation to facilitate staff awareness?			
142	Does the program provide ongoing disaster education to facilitate staff awareness and currency of procedures?			
143	Does the program have inter-organization joint training sessions that deal with common aspects of disaster response?			
144	Does the plan set out appropriate Health and Safety measures that staff should be aware of?			
EXERCISING THE DISASTER PLAN				
No.	**Question**	**Yes**	**No**	**Comments**
145	Does the facility program conduct an annual exercise?			
146	Does the exercise ensure all key participants are familiar with the contents of the plan?			
147	Does the exercise ensure all key participants are familiar with the contents of the plan?			
148	Is a formal critique performed with results distributed to all key individuals and participating groups?			
149	Does it identify somebody responsible for ensuring that the plan is updated, distributed and tested on a regular basis?			

APPENDIX 2: SUBMITTED STUDY PROTOCOL

A descriptive study of the standard operating procedures for disaster response in the Saudi Arabian Military Health Services

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PURPOSE OF THE STUDY

Given the current gaps in preparation and response to disasters, we plan this study to help to improve response to mass casualty situations within the Saudi Arabian military health services.

BACKGROUND & MOTIVATION

Saudi Arabia has suffered from major incidents – sudden, unexpected mass casualty events – are common in last decade. In 2012, a gas tanker explosion in Riyadh killed 22 people and injured 111; in 2015, a hospital fire in Jazan killed 25.[1,2] Typically, disasters are considered to be large scale incidents such as earthquakes; however, in common usage, the terms are often used interchangeably. For simplicity, the term *disaster* will be used to describe all major incidents, regardless of size or cause.

Individual disasters are typically unpredictable, but, if it is possible that a disaster might occur in a given region, advance disaster responses planning can improve outcomes. Currently, disaster planning in Saudi Arabia appears to be undertaken in some detail, but the medical response to disasters is fragmented: typically, there are multiple agencies involved with no central coordination. The same is true within the Saudi Arabian Armed Services, where multiple agencies are involved in a response, and yet each maintains its own lines of authority and reporting. Although the centralisation of disaster response has been seen increasingly in other countries, there has been no movement towards this in Saudi Arabia.

Moreover, in the military, disaster response strategies are made on an *ad hoc* basis. In terms of activation of resources, the usual decision loop is as follows: a responder has to contact a senior manager in his department, who seeks his manager's approval, and so on up the chain of command until it reaches the General-in-Charge. The General then contacts his opposite number in another branch of the military in order to request assistance; if these two individuals are contactable and in agreement, communication must then spread back down both sides to allow the response to occur. Yet, at the scene of a disaster, both units maintain independent line command structures and coordinate efforts are minimal. While this is usual in many countries between, for example, police and ambulance services, in the Saudi Arabian Military, there will be multiple medical services with the potential to respond, and the problem relates to lack of coordination within the health services. Consider this example to illustrate the point:

An explosion occurs on a military base. Ambulances from the closest military hospital are the first emergency medical services to be dispatched. The personnel in the ambulance arrive on scene and make an assessment, which they communicate to their manager at the hospital Emergency Medical Services (EMS) base. This manager now needs to activate other resources, but, in the absence of a plan, there is no clear line of authority: does he do this through the emergency centre? Directly to the Head of the hospital? Or above hospital level, to the Medical Services Directorate (MSD - which is overall responsible for all health services in the Saudi Arabian military)? This ambiguity creates confusion for both clinical and non-clinical personnel, delays effective response, and, presumably, worsens clinical outcomes. Additionally, if the incident requires support from another military hospital (which is often the case with mass casualty situations), this process requires significant time- and resource-consuming paperwork, limiting the speed and effectiveness of the disaster response. These delays may worsen outcomes for patients.

The efficiency of the disaster response system could be improved by adopting a centralised command and control structure – a practice currently employed in many other countries.[3-4] Most have adopted the British Major Incident Medical Management and Support (MIMMS) system for prehospital response, and its sister course, Hospital-MIMMS[5]. MIMMS principles include three layers of command (*Gold* – central; *Silver* – around the scene; and *Bronze* – at the scene itself), clear line management functions, reporting structures, and priority actions to help ensure a maximally effective response.[6] MIMMS improves a health system's resilience, preparing medical staff to manage disasters effectively.[7] In addition to the actual response, planning and practice are essential in ensuring that the system can respond effectively when a disaster

occurs. Post-response auditing and de-briefing are also important in order to review procedures, and to improve practice to further avoid harm or loss of life in future responses.[7]

There are 13 military hospitals under MSD administration across the Kingdom. Each hospital runs its own small EMS service and has its own emergency centre. There is no centralised process of developing plans, protocols, or policies.

Anecdotally, the disaster response system within the Saudi Arabian military needs significant improvement. In order to do this, baseline data are required about the current system, including information on: what plans are in place; whether existing plans meet international norms; which drills and exercises take place; how response occurs; what works well, and what could be improved. On this basis, recommendations for improvements can be made. The purpose of the study, therefore, is to assess disaster preparation and response systems that exist across the Kingdom's Armed Forces Medical Services, to identify challenges and strengths in the current system, and to outline potential areas for improvement.

RESEARCH QUESTION

What are the standard operating procedures for disaster response in the Saudi Arabian Military Health Services?

AIM AND OBJECTIVES

The study aims to review and assess the standard operating procedures (SOPs) for disaster response in the Saudi Arabian Military Health Services.

In order to achieve this aim, the study will meet the following objective:

1. To review the SOPs for disaster response in MSD hospitals and EMS systems.
2. To assess those SOPs against a previously published Disaster Planning Assessment Tool
3. To derive recommendations for improving disaster preparedness and planning within the MSD.

METHODOLOGY

Study Design

This is a prospective, survey based assessment of disaster response.

In order to review the standard operating procedures, we will seek all disaster plans and SoPs from management and emergency department leadership at each of the 13 MSD hospitals. In preparation for the 2010 FIFA World Cup, the South African National Department of Health undertook a nationwide assessment of disaster preparedness at all hospitals, using a disaster planning assessment tool. We will use this tool for evaluating facility disaster planning (Appendix 1)[8]. This tool gathers quantitative data using close-ended questions and open-ended commentary surrounding a hospital's disaster response operating procedures.

Study Population

All 13 MSD hospitals will be included in this study. The hospitals are: 1- Armed Forces Hospital in Northern Area. 2- Armed Forces Hospitals Administration – Tabuk. **3**- Armed Forces Hospital in Khamis Moushit. 4- Armed Forces Hospital in Hada. 5- Prince Sultan Militatary Hospital Taif. 6- Prince Mansour Hospital for Community Medicine. 7- Taif Medical Rehabilitation Hospital. 8- Armed Forces Hospital in Jubail. 9- Prince Sultan Military Medical City in Riyadh. 10- Prince Sultan Air Base Hospital in Al Kharj.

11- Military Hospital of the General Establishment of Military Industries. 12- Al-Kharj Armed Forces Hospital. 13-King Fahad Military Medical Complex in Dhahran.

Data Collection & Management

The disaster plans for each facility will be requested from senior management and evaluated using the disaster planning assessment tool. At each site, the hospital director and the emergency department head will be contacted by the research (TA) to request the plans and SoPs. The purpose of the study will be made clear, but sharing of material is entirely voluntary.

The lead researcher and another independent evaluator (an emergency physician with disaster medicine expertise, within Saudi Arabia) will evaluate each facility's plans against the Disaster Planning Assessment Tool. All data will be entered into encrypted files in Microsoft Excel (© Microsoft, Richmond, WA) for Windows.

Data Analysis

Basic descriptive analyses will be undertaken using Microsoft Excel. We will present frequencies, medians and ranges for most data; open ended commentary will be collated by topic and used to describe recurrent issues raised by respondents.

Ethical considerations

Ethical approval will be sought from UCT HREC as well as from the MSD ethical review board. The head of MSD will be asked to provide permission to undertake the study, on receipt of UCT HREC approval.

Description of risks and benefits

There are no perceived risks to hospital or individuals from participating. Any units not providing their disaster plans will not be prejudiced in any way, nor excluded from participating in further studies.
While individuals will not directly benefit, the research should inform improvements in disaster capability for the whole of MSD.

Privacy and confidentiality

All data will be de-identified. Hospitals will be assigned a unique study number known only to the investigators, and all data will be managed and reported against this number. Individual hospitals will receive reporting back on their own plans.

LIMITATIONS

The following potential limitations to the study have been identified:

There may be a degree of reluctance or reticence amongst senior staff to disclose their disaster plans. In order to minimise this potential limitation, we will ensure that respondents are aware that all responses are anonymised for collated reports.

Even if a facility has a "good" disaster plan according to the assessment, it is not an indication of the degree of preparedness of the facility to respond to a disaster. This will be communicated throughout the study and in all reporting, and further assessments will be made as a follow up to close this gap.

REPORTING

At the end of the study, a report will be provided to the Director of MSD, aiming to inform improvements to disaster preparation and response by the Saudi Arabian Armed Forces Medical Services. Each hospital and EMS director will receive an individualised report. The dissertation will be presented for publication in a peer reviewed journal.

BUDGET:

Item	**Cost (ZAR)**
Paperwork and printing	1500
Travel from Cape Town to Riyadh, and from Riyadh to other cities within Saudi Arabia	40000
Total	**41500**

The lead researcher will cover all costs associated with the proposed study, with no external funding required.

PROJECT TIMELINE

2017-2018	**Oct 2017**	**Nov 2017**	**Dec 2017**	**Jan 2018**	**Feb 2018**	**Mar 2018**	**Apr 2018**	**May 2018**	**Jun 2018**	**Aug 2018**	**Sep 2018**
Ethics Review			**X**	**X**							
Data Collection					**X**	**X**	**X**	**X**			
Data Compilation & analysis								**X**			
Compilation of final report									**X**	**X**	
Submission of MSc dissertation											**X**

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APPENDIX 3: HREC REF: 129/2018

UNIVERSITY OF CAPE TOWN
Faculty of Health Sciences
Human Research Ethics Committee

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Website: www.health.uct.ac.za/fhs/research/humanethics/forms

09 March 2018

HREC REF: 129/2018

Prof L Wallis
Emergency Medicine
F51, OMB

Dear Prof Wallis

PROJECT TITLE: A DESCRIPTIVE STUDY OF THE STANDARD OPERATING PROCEDURES FOR DISASTER RESPONSE IN THE SAUDI ARABIAN MILITARY HEALTH SERVICES (MPHIL CANDIDATE – MR T ALSHAABANI)

Thank you for submitting the relevant approvals from the Saudi organisations to the Faculty of Health Sciences Human Research Ethics Committee.

It is a pleasure to inform you that the HREC has **formally approved** the above-mentioned study.

Approval is granted for one year until the 28 February 2019.

Please submit a progress form, using the standardised Annual Report Form if the study continues beyond the approval period. Please submit a Standard Closure form if the study is completed within the approval period.
(Forms can be found on our website: www.health.uct.ac.za/fhs/research/humanethics/forms)

Please quote the HREC REF in all your correspondence.

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Please note that for all studies approved by the HREC, the principal investigator **must** obtain appropriate institutional approval, where necessary, before the research may occur.

The HREC acknowledge that student Mr T Alshaabani will also be involved in this study.

Yours sincerely

Signature removed to avoid exposure online

PROFESSOR M BLOCKMAN
CHAIRPERSON, FHS HUMAN RESEARCH ETHICS COMMITTEE
Federal Wide Assurance Number: FWA00001637.
Institutional Review Board (IRB) number: IRB00001938
This serves to confirm that the University of Cape Town Human Research Ethics Committee complies to the Ethics Standards for Clinical Research with a new drug in patients, based on the Medical

Research Council (MRC-SA), Food and Drug Administration (FDA-USA), International Convention on Harmonisation Good Clinical Practice (ICH GCP), South African Good Clinical Practice Guidelines (DoH 2006), based on the Association of the British Pharmaceutical Industry Guidelines (ABPI),and Declaration of Helsinki (2013) guidelines.
The Human Research Ethics Committee granting this approval is in compliance with the ICH Harmonised Tripartite Guidelines E6: Note for Guidance on Good Clinical Practice (CPMP/ICH/135/95) and FDA Code Federal Regulation Part 50, 56 and 312.

APPENDIX 4: LOCAL HREC REF: 1031

Prince Sultan Military Medical City,

Scientific Research Center
P.O. Box 7897, Riyadh, 11159
Kingdom of Saudi Arabia
Research Ethics Committee

28 Feb. 2018
Prof. Lee A Wallis
Dept. of Emergency Medicine,
Cape Town

Re: **A descriptive study of the standard operating procedures for disaster response in the Saudi Military Health Services**

Prof Lee A Wallis
Col Dr. Mohammad Al-shahrani

This is in reference to your submitted proposal which has been reviewed by the appointed member of the committer through an expedited review process. On the recommendation of the board of review in the ethical aspects of the proposal, Research Ethics committee is pleased to approve and grant permission to conduct your study.
Your Research protocol has been documented under

Project No: 1031
Date Approved: 28 February
Series of: 2018

Kindly Quote the project number indicated herein in all transactions and communications. You are advised to submit a report in relation to this research scheme to update the committee of its progress.
Also please note that this approval is valid only one year commencing from the date of this letter.
I trust your research scheme provides fruitful and beneficial to the central region military hospitals.

Best Regards,

Signature removed to avoid exposure online

Dr. Nawaf Alkhayat
Chairman, Research Ethics Committee

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