INVESTIGATING THE ACQUISITION AND RETENTION OF THE MAJOR INCIDENT RESPONSE PLAN BY HAMAD MEDICAL CORPORATION AMBULANCE SERVICE PARAMEDICS

By

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Declaration

I Naven Kasenthiren Pullian Student Number 2013153859 do hereby declare that the work contained in this mini dissertation that is submitted for the degree of Masters in Disaster Management at the University of the Free State through the Disaster Management Training and Education Centre for Africa (DiMTEC) department, is my own work. I the undersigned also declare that all sources or works belonging to others have been referenced and that this dissertation has not been previously submitted to any other University for a degree.

I hereby forfeit any copyright of this thesis to the DiMTEC department and the University of the Free State.

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Naven K Pullian

30/03/2017

Date

Dedication

I dedicate my thesis to the staff members at Hamad Medical Corporation Ambulance Service (HMCAS). The hard work and dedication of every multinational working at HMCAS is appreciated. I salute you in your efforts of encouraging quality living in Qatar.

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Abstract

Hamad Medical Corporation Ambulance Service (HMCAS) major incident response plan was designed and developed to guide its employees during major incident responses (MIR). The MIR plan aimed to improve the employees understanding of their roles and responsibilities when managing a MIR within the State of Qatar. The HMCAS MIR plan therefore encompasses principles that must be understood by both managers and first responders. The principles of the HMCAS MIR plan thus standardize all operations related to MIRs for its multi-national workforce.

Internationally emergency medical services are the first responders to major incidents. Geographically the State of Qatar is a peninsula and only shares a border with Saudi Arabia. Due to the country's location should a major incident occur, the country would receive delayed responses from willing neighbouring countries. Improving the paramedic's knowledge and skills on the MIR plan is therefore important to enhance rapid responses when the plan will be activated. Investigating the acquisition and retention of the MIR plan by HMCAS paramedics is thus essential as the plan is complex and caters for a wide variety of natural or unnatural major incidents.

The aim of this study therefore focussed on the HMCAS paramedic's understanding and retention of the knowledge and skills related to the MIR plan within the State of Qatar. The study was quantitative and descriptive in nature. A total of 130 willing participants completed the self-addressed questionnaire. The questionnaire comprised of 19 questions. A 100 percent response rate was recorded.

The major findings of the study highlighted that knowledge and skill gaps related to the MIR plan exist amongst HMCAS paramedics. These relate to the acquisition and retention of the principles of the HMCAS MIR plan. This can be attributed to the lack of regular MIR related education and training. These findings are however consistent with other related studies.

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Acronyms

ALS	Advanced Life Support
AP	Ambulance Paramedic
BLS	Basic Life Support
CBRNE	Chemical, Biological, Radiological, Nuclear, Explosives
CCP	Critical Care Paramedic
DRR	Disaster Risk Reduction
ECV	Emergency Control Vehicle
EOC	Emergency Operations Centre
EMC	Emergency Medical Care
EMS	Emergency Medical Services
ESV	Emergency Support Vehicle
ETA	Estimated Time of Arrival
HAZMAT	Hazardous Materials
HFA	Hyogo Framework for Action
HLO	Hospital Liaison Officer
HMCAS	Hamad Medical Corporation Ambulance Service
IAP	Incident Action Plan
IC	Incident Commander
ICP	Incident Command Post
ICS	Incident Command System
JCAHO	Joint Commission on Accreditation
JESCC	Joint Emergency Services Control Centre
MERIT	Mobile Emergency Response Incident Team
MIO	Medical Incident Officer
MLP	Media Liaison Point

MOI	Ministry of Interior
MOPH	Ministry of Public Health
OEM	New York's City's Office of Emergency Management
PPE	Personal Protective Equipment
QCHP	Qatar Council Healthcare Providers
RTA	Road Traffic Accident
SRC	Survivors Reception Area
UK	United Kingdom
USA	United States of America

Definition of Terms

Acceptable risk; the level of 'potential' losses that a community considers acceptable when given existing social, economic, political, cultural, technical and environmental conditions (UNISDR, 2007).

Capacity; the combination of all strengths, attributes and resources available within a community, society or organization that can be used to achieve agreed goals (UNISDR, 2007).

Capacity development; the process by which people, organizations and society systematically stimulate and develop their capacities over time to achieve social and economic goals, including through improvement of knowledge, skills, systems, and institutions (UNISDR, 2007).

Contingency planning; a management process that analyses specific potential events or emerging situations that might threaten society or the environment and establishes arrangements in advance to enable timely, effective and appropriate responses to such events and situations (UNISDR, 2007).

Corrective disaster risk management; management activities that address and seek to correct or reduce disaster risks which are already present (UNISDR, 2007).

Disaster; a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources (UNISDR, 2007).

Disaster risk management; the systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster (UNISDR, 2007).

Disaster risk reduction; the concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events (UNISDR, 2007).

Emergency management; the organization and management of resources and responsibilities for addressing all aspects of emergencies, in particular preparedness, response and initial recovery steps (UNISDR, 2007).

Emergency services; the set of specialised agencies that have specific responsibilities and objectives in serving and protecting (UNISDR, 2007).

Hazard; a dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage (UNISDR, 2007).

Mitigation; the lessening or limitation of the adverse impacts of hazards and related disasters to a society (UNISDR, 2007).

Preparedness; the knowledge and capacities developed by governments, professional response and recovery organizations, communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazard events or conditions (UNISDR, 2007).

Public awareness; the extent of common knowledge about disaster risks, the factors that lead to disasters and the actions that can be taken individually and collectively to reduce exposure and vulnerability to hazards (UNISDR, 2007).

Recovery; the restoration and improvement where appropriate, of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors (UNISDR, 2007).

Response; the provision of emergency services and public assistance during or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety and meet the basic subsistence needs of the people affected (UNISDR, 2007).

Risk; the combination of the probability of an event and its negative consequences (UNISDR, 2007).

Chapter 1: Methodological Orientation

1.1 Introduction

Hamad Medical Corporation Ambulance Service (HMCAS) is the national ambulance service provider for the State of Qatar. HMCAS group provides both ground and air emergency medical services (EMS). In addition HMCAS conducts inter facility transfers of critically ill patients, provides mobile health services coupled with home based nursing and major incident responses (MIR). (Morris, 2014) These services are free of charge to all residences of Qatar. HMCAS is a clinically led, high performance EMS which provides high-quality pre-hospital emergency care that assures the provision of access to effective care. (Morris, 2014)

Pre-hospital emergency medical care (EMC) during major incidents is premised on the provision of basic (BLS) and advanced life support (ALS) patient management. The emphasis is therefore placed on the understanding of the principles of MIR including; command, safety, communications, overall scene assessment, resources, triage, treatment and transportation, with the appropriate distribution and utilisation of resources. The organisation's MIR plan therefore prescribes the steps that must be undertaken during a major incident.

Following a national mandate, HMCAS recently improved its preparedness for natural or unnatural disasters. HMCAS aligned its preparedness with The Hyogo Framework for Action (HFA) for disaster risk reduction. The seven key areas of the HFA were fostered in Qatar. The HMCAS sought assistance from Qatar's Ministry of Public Health to strengthen its preparedness for MIR in the country.

The HFA highlights that; preparedness must be recognized as a government function, the role of leaders in organisations that deal with preparedness must be highlighted and explored, there must be a move towards a national system, there must be a culture of disaster risk reduction which in turn encourages that there is both accountability and processes in place towards preparedness at local level, there must be a common framework that exists and the use of technology and science to highlight patterns associated with financing of disaster preparedness (Burke and Kent, 2014).

Effective major incident plans are important in that it requires thought, regular training, practice and organizations to be effective (Wong *et al*, 2005). This topic was guided by the development and implementation of MIR as being part of HMCAS. The focus was mainly on operational first responders and middle to senior management as they are the team directly involved in the first response to major incidents.

Within HMCAS currently there are introduction sessions to HMCAS MIR plans which includes general major incident considerations, specific developed HMCAS major incident levels, HMCAS command structure, HMCAS radio channels and communications, role and responsibility of first crews on scene, triage, hazardous materials (HAZMAT) which includes decontaminating patients and sections that covers production aspects as well as post incident activities.

1.2 Background

HMCAS is constituted with multi nationals, with expertise in various medical disciplines such as EMC, respiratory technicians, nurses and physiotherapy. The organisation employs approximately 1800 HMCAS staff members. HMCAS has an extensive training programme that each new recruit has to undergo to become certified as an ambulance paramedic (AP) or a critical care paramedic (CCP). Obtaining these qualifications then allows the staff member to register with the Qatar Council for Healthcare Providers (QCHP). Staff members are currently recruited from South Africa, the United States of America (USA), United Kingdom (UK), Tunisia, India, Morocco, Egypt, Australia, New Zealand and the Philippines. Base on the diversity of the workforce, the organisation has streamlined its MIR plan to achieve common strategic goals during a major incident.

Within the HMCAS EMS section there are various departments including emergency services, non-emergency services, education and training, research, quality improvement, communications and production. Each section has a specific role to play in the preparation and response to a major incident. Therefore through processes of improved teamwork, communication and collaboration, a holistic understanding of the MIR plan is crucial to minimize risk. The MIR plan encompasses command structures with specific roles and responsibilities, communications, triage, specific scene and equipment layout according to the levels of response, production roles and responsibilities, special situations such as chemical, biological, radiological and nuclear (CBRN) incidents, management of events or mass gatherings and post incident activities to ensure that there is business as usual to assist the community with normal emergency response apart from the major incidents.

Presently in Qatar there are various major construction projects underway. These include the development of a major rail transport system and the building of sports stadia for the 2019 World Athletics Championship and the 2022 FIFA World Cup. In addition to these major projects, the

harsh summer climate makes it imperative that the HMCAS MIR plan is understood and practiced. The oil and gas industries in Qatar also contribute to the increased risk of major incidents.

1.3 Description of Study Area

The State of Qatar is a peninsula which is found in the eastern part of Arabia which borders Saudi Arabia and the Persian Gulf. This extends 160km north from the Arabian Peninsula (Figure 1.1). The recent population as off September 2016 was 2.6 million (Country Meters Info, 2016). The country's average weather varies from 14 degrees calcium in the winter months and 41 degrees Celsius in the summer months (Figure 1.2).

Figure 1.1 Location of Qatar

Source: World Atlas, 2017

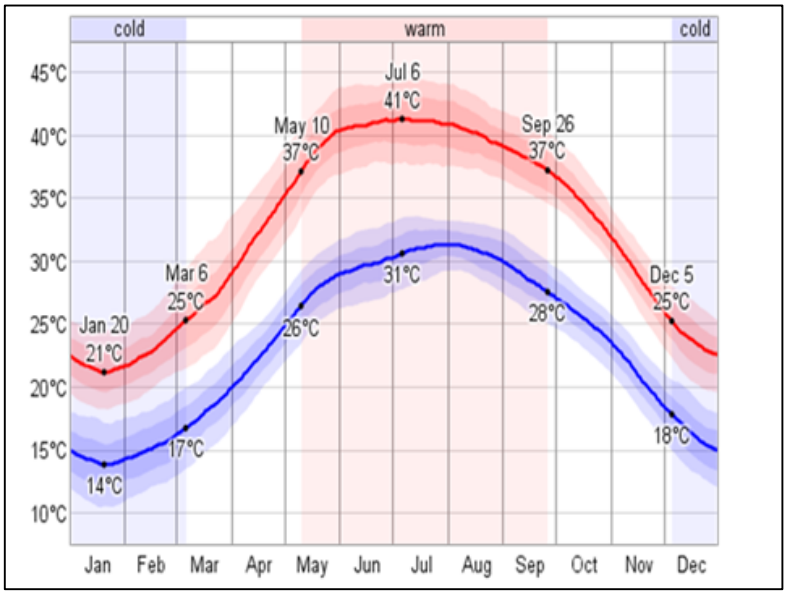


Figure 1.2 Average Weather Qatar

Source: weatherspark.com, 2016

There is a paucity of research in Qatar related to MIR. However, recently focus group discussions have been conducted to highlight knowledge, skills and practices on MIR. Empirical evidence is needed to advance MIR needs highlighting the specific roles and responsibilities of all role players. Evaluating the Paramedic's understanding, of the MIR used by HMCAS, a better approach can be adopted to training and education and strategies could be developed in line with continuous quality improvement for MIR.

1.4. Research Problem

A MIR plan was recently designed by HMCAS. It encompasses best practices adopted internationally. The plan has since been implemented across the EMS through classroom training programs, workshops and simulated exercises. There is no evidence to indicate the extent to which this training has been effective in ensuring acquisition and retention of the plan. As there is no evidence there is no assurance that any level of compliance to the new revised plan will be achieved.

1.5 Research Questions

- Did all HMCAS staff members receive training on the new MIR plan?
- Do HMC staff members understand the new MIR plan?
- Are HMCAS staff members able to take command and control of a major incident?
- Can HMCAS staff members provide a METHANE report?

1.6 Significance of Study

HMCAS defines a major incident as an "*incident which presents a serious threat to the health of the community and/or cause disruption to the service by becoming protracted in their management, either as a result of their size and/or complexity, or by exceeding or overwhelming the routine capabilities"* (HMCAS, 2013). A major incident has the ability to become complex and people often forget what is expected of them by getting caught up in the emotions of the situation they are in (Waller *et al*, 2011).

Cynthia (2012) emphasises that it is important that EMC practitioners understand their designated roles and responsibilities to prevent chaos. When dealing with major incidents it is important that a command and control structure is adapted and followed with pre-defined roles and responsibilities. Triage in a major incident is the first step in medical support. Triage is a dynamic process (Smith, 2012). HMCAS uses "triage sieve" and "triage sort" in major incidents with the appropriate responding triage tags. Smith (2012) notes that "triage should ideally be done by junior staff". However, triage has to be easy to teach, understand and at the same time be fast and reliable. The "triage sieve" and "triage sort" is a technical process that has to be understood to be effective. Triage can only be effective if the person using it is able to understand and follow the process (Smith, 2012).

Communications, radio channels and distribution used by HMCAS is a very simple process although it can be daunting at first glance. Staff should be able to understand the procedures and channels that they are required to use in a major incident. Understanding communications in a major incident response and training with the use of appropriate channels is important (HMCAS makes use of various radio channels in the event of major incidents). The lack of technology is one of the main reasons that there is a breakdown in essential communications (Kluger et al, 2000). The understanding of special situations such as CBRN, mass gatherings

such as sporting events, and other special situations requires an understanding of the changes but the concept of major incident response should be the same (Smith, 2012).

A comprehensive literature search was conducted on MIR plans for Qatar. No such research was available. This study will show the understanding of the HMCAS staff members on the MIR plan. The study will also highlight appropriate methods of teaching and developing staff to be confident in the MIR plan and its principles of command, triage, communications and special circumstances. It will further improve the HMCAS staff members understanding of MIR and thus enable them to be comfortable during major incidents.

1.7 Study Aim

The aim of this study is to investigate the acquisition and retention of the MIR plan by HMCAS staff members. The recently designed HMCAS MIR plan covers all operational aspects of assessing and dealing with major incidents. The multi-national workforce at HMCAS as well as the different training backgrounds makes it imperative that all staff within HMCAS understand and work in cohesion when dealing with major incidents.

Together with the aim of the study it would be possible to develop a comprehensive training program towards major incidents using the MIR plan.

1.8 Objectives

To investigate the acquisition and retention of the MIR plan by HMCAS staff members.

1.8.1 Sub Objectives

- To determine the HMCAS staff members existing knowledge on the recently designed MIR plan.
- To identify the skills competencies of HMCAS staff members related to the MIR plan.

1.9 Research Methodology

1.9.1 Research Design

A prospective cohort descriptive study design will be used to address the aim of this study to investigate the acquisition and retention of the major incident response plan by HMCAS. This

type of design is said to be very valuable in the generation of knowledge in situations where it would be unethical to use and experimental methodology (Brink, Van der Walt & Van Rensburg, 2012).

1.9.2 Selection of sections

This will cover all aspects of the major incident response plan showing the importance of the sections being discussed. This is discussed in detail in chapter 3.

1.9.3 Population and sampling

Using the confidence interval approach to sample size estimation it was calculated that a sample of 130 paramedics would at a confidence interval of 7.87, generate the range within which the true value for the effect at 95% would likely fall. The use of of the simple random sampling technique means that each individual paramedic working in HMCAS will have an equal chance of being selected to participate in the study. Population and sampling is further discussed in chapter 3.

1.9.4 Data Collection and Data Analysis

Data collection would be done 1 week post training and this data would be analysed by using windows excel. Data collection and analysis would be discussed in detail in chapter 3 of this document.

1.10 Common terminologies related to MIR

The terminologies described in this study are used internationally as highlighted by the United Nations International Strategy for Disaster Reduction (UNISDR). Terminologies contained in the MIR plan have been adopted and adapted from the UNISDR.

1.10.1 HMCAS Specific Terminology

Terminology in HMCAS is specific as it deals with the unique divisions and the responsibilities that each section has when it comes to MIR. Therefore, terminology from the HMCAS MIR plan is included in this chapter. In the event of a major incident having a common language is essential in ensuring there is effectiveness in managing the incident. Thywissen (2006) argues that the definition of a term is there to ensure that its 'content' and 'context' is consistent amongst various disciplines ensuring that there is no misunderstanding in the facilitation of an event. HMCAS therefore has the following terminology being used and must be understood by staff working at a major incident.

Ambulance Control Point; a point at which a specially equipped vehicle (Command & Control) is sited, at the scene of a Major Incident, to operate as an Ambulance and or Medical Control Point. It provides a reporting, coordinating and communications centre for ambulance, medical, nursing and voluntary aid personnel. This point will be established in close proximity to the Police and Fire Service Control vehicles subject to radio interference constraints (HMCAS, 2014).

Ambulance Equipment Officer; an Officer that is responsible for the mustering, issue and collection of all patient care equipment on site. He/she will maintain control of the Emergency Support Vehicle's equipment and will replenish on site stocks as necessary. He/she will direct, in liaison with the Silver Commander, the on-site distribution of stretcher bearers assembled at this point (HMCAS, 2014).

Ambulance Forward Incident Officer; an Officer who, under the direction of the Silver Commander, co-ordinates health care resources at Forward Control Point's (HMCAS, 2014).

Ambulance Silver Commander; the Officer in overall control of ambulance operations at the site (HMCAS, 2014).

Ambulance Liaison Officer; an officer that is responsible for providing liaison with ambulance crews and hospital receiving staff from a Major Incident. The officer is based at the hospital (HMCAS, 2014).

Ambulance Loading Officer; an officer that is responsible for the management of the Ambulance Loading Point. He/she will ensure that casualties are documented and evacuated in priority order. He/she will maintain control over vehicle access/egress and personnel operating within this area (HMCAS, 2014).

Ambulance Loading Point; an area, preferably on hard standing and in close proximity to the Casualty Clearing Station, from where casualties are evacuated in order of priority (HMCAS, 2014).

Ambulance Parking Officer; an officer that is responsible for the management of the ambulance parking point. He/she will direct vehicles and staff forward to the Ambulance Loading Point as required (HMCAS, 2014).

Ambulance Parking Point (s); point(s) designated at the scene of a Major Incident where incoming ambulance resources report and are held in readiness for forward deployment, thus avoiding congestion at the entrance to the site or at the Ambulance Loading Point (HMCAS, 2014).

Ambulance Safety Officer; an officer appointed to ensure the safety of all AS & medical staff working within the incident boundary and that they are correctly dressed in PPE (HMCAS, 2014).

Ambulance Tactical Advisor; an Emergency Planning Advisor appointed to assist and advise the Silver Commander on Major Incident protocol (HMCAS, 2014).

Casualty Clearing Officer; an Ambulance Officer who, in liaison with the Medical Incident Officer, supervises assessment/labelling of casualties for evacuation in accordance with triage priorities (HMCAS, 2014).

Casualty Clearing Station; an area set up at a Major Incident by the Ambulance Service in liaison with the Silver Medical Commander to assess, treat and triage casualties and direct their evacuation (HMCAS, 2014).

Casualty Evacuation Complete; the term is used to indicate that treatment and removal of casualties from the scene is complete (HMCAS, 2014).

Cold Zone; the control zone for a hazardous materials incident; contains the Incident Command Post and other incident support facilities (HMCAS, 2014).

Co-ordinating Group; the Gold/Silver Commanders of the emergency services who convene to consider/review strategy/tactics relating to the co-ordination of activity at a Major Incident (HMCAS, 2014).

Command; the act of directing, ordering, or controlling by virtue of explicit statutory, regulatory, or delegated authority (HMCAS, 2014).

Command Staff (Officer); in an incident management organization, the Command Staff consists of the Incident Commander and the special staff positions of Public Information Officer,

Safety Officer, Liaison Officer, and other positions as required, who report directly to the Incident Commander. They may have an assistant or assistants, as needed (HMCAS, 2014).

Communications Unit; an organizational unit in the Communications Department responsible for providing communication services at an incident or an EOC. A Communications Unit may also be a facility (e.g. a trailer or mobile van) used to support an Incident Communications Centre (HMCAS, 2014).

Critical Care Transport; an ambulance transport of a patient from a scene or a clinical setting whose condition warrants care commensurate with the scope of practice of a Critical Care Paramedic, a qualified physician or registered Intensive Care Nurse (HMCAS, 2014).

Emergency Control Vehicle (ECV); specially equipped communications vehicle sited at the scene of a Major Incident to operate as the Ambulance Control Point (HMCAS, 2014).

Emergency Operations Centre (EOC); operations Console/Room which receives, collates and co-ordinates all demands for the Emergency Service in the geographical area covered by the Ambulance Service and allocates resources accordingly (HMCAS, 2014).

Emergency Support Vehicle (ESV); vehicle equipped with specialist patient care equipment, Major Incident stocks of stretchers, blankets, patient care backpacks, inflatable tents, emergency lighting *etc.* (HMCAS, 2014).

Equipment Point; point where bulk supplies for first aid equipment, blankets and stretchers made available (HMCAS, 2014).

Estimated Time of Arrival (ETA); the estimated time it will take for a unit (vehicle), officer, staff member, equipment or patient to arrive at a destination (HMCAS, 2014).

Forward Ambulance Control Point; a selected point near or at the scene where the Silver Commander/Forward Incident Officer can direct the operation (HMCAS, 2014).

Forward Control Team; a radio operator trained member of NCC staff who assists the command team with radio communications and records the Silver Commander log (HMCAS, 2014).

Function; function refers to the five major activities in an Incident Command System: Command, Operations, Planning, Logistics, and Finance/Administration. The term function is also used when describing the activity involved, e.g. the planning function. A sixth function, Intelligence, may be established, if required, to meet incident management needs (HMCAS, 2014).

General Staff; a group of incident management personnel organized according to function and reporting to the Incident Commander. The General Staff normally consists of the Medical Sector Commander, the Operations Sector Commander, the Support Sector Commander, and Hazardous Operations Sector Commander (HMCAS, 2014).

Hospital Liaison Officer (HLO); an officer responsible for providing liaison with the hospital control team staff, the officer is based at the hospital (HMCAS, 2014).

Hot Zone; the area that immediately surrounds a CBRN incident; normally extends out in a 360-degree radius around the incident scene and far enough to prevent adverse effects from hazardous materials release to personnel outside the zone. Also referred to as the exclusion zone or restricted zone (HMCAS, 2014).

Incident Action Plan (IAP); an oral or written plan containing general objectives reflecting the overall strategy for managing an incident. It may include the identification of operational resources and assignments. It may also include attachments that provide direction and important information for management of the incident during one or more operational periods (HMCAS, 2014).

Incident Command Post (ICP); the field location at which the primary tactical-level, on-scene incident command functions are performed. The ICP may be located with the incident base or other incident facilities and is normally identified by a green rotating or flashing light (HMCAS, 2014).

Incident Command System (ICS); a standardized on-scene management construct specifically designed to provide for the adoption of an integrated organizational structure that reflects the complexity and demands of a single or multiple incidents, without being hindered by jurisdictional boundaries. The ICS is the combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure, designed to aid in the management of resources during incidents. It is used for all kinds of emergencies and is applicable to small as well as large and complex incidents. The ICS is used by various jurisdictions and functional agencies, both public and private, to organize field-level incident management operations (HMCAS, 2014).

Incident Commander (IC); the individual responsible for all incident activities to include the development of strategies and tactics and the ordering and the release of resources. The IC has overall authority and responsibility for conducting incident operations and is responsible for the management of all incident operations at the incident site (HMCAS, 2014).

Inner Cordon; Surrounds the immediate scene and provides security for it. (HMCAS, 2014)

Joint Emergency Services Control Centre (JESCC); the point from which the management of the incident is controlled and coordinated. All Emergency Services are represented at this location (HMCAS, 2014).

Liaison Officer; a member of the Command Staff responsible for coordinating with representatives from cooperating and assisting agencies (HMCAS, 2014).

LINC Worker; listening, Informal, Non-judgmental, Confidential peer support (HMCAS, 2014).

Local Authority Emergency Planning Officer; co-coordinator of a local authority's response to Major Incidents *etc.* (HMCAS, 2014).

Major Incident; major Incidents are incidents which present a serious threat to the health of the community and/or cause disruption to the service by becoming protracted in their management, either as a result of their size and/or complexity, or by exceeding or overwhelming the capabilities of the Ambulance Service and hospitals (HMCAS, 2014).

Major Incident Cancelled; the term used to cancel a Major Incident Alert (HMCAS, 2014).

Major Incident Declared; the term used to prefix messages to confirm a Major Incident (HMCAS, 2014).

Major Incident Standby; the term used to prefix messages indicating that an incident may have or has occurred which could result in a large number of casualties (HMCAS, 2014).

Marshalling Area; an area to which resources and personnel are not immediately required at the scene, or be held for further use, can be directed to stand by (HMCAS, 2014).

Mass Casualty Incident; an incident resulting from man-made or natural causes resulting in injuries that exceed or overwhelm the Ambulance Service and hospital capabilities of a locality, jurisdiction or region. A mass casualty incident is likely to impose a sustained demand for health and medical services rather than a short, intense peak demand and for these services typical of multiple casualty incidents (HMCAS, 2014).

Media Centre; central contact point for media enquiries, providing communication and conference facilities and staffed by spokespersons from all agencies involved (HMCAS, 2014).

Media Liaison Officer; the officer that is responsible for the initial release of information from the scene of the incident and liaison with other services at the Medical Centre (HMCAS, 2014).

Media Liaison Point (MLP); rendezvous and initial holding area located at or near the scene, designated for use by accredited media representatives prior to establishment of a media centre (HMCAS, 2014).

Medical Incident Officer (MIO); the medical officer with overall responsibility works in close liaison with the Silver Commander, for the management of the medical resources at the scene of the Major Incident (HMCAS, 2014).

Mobile Emergency Response Incident Team (MERIT); is a medical team attending the incident to assist with both the triage and the treatment of casualties. The ambulance service will alert and organize transportation for the team to the incident site (HMCAS, 2014).

Multiple Casualty Incident (MCI); is an incident involving multiple victims that can be managed, with a heightened response (including mutual aid, if necessary), by a single ambulance service agency or system. Multi-casualty incidents typically do not overwhelm the hospital capabilities of a jurisdiction and/or region, but may exceed the capabilities of one or more hospitals within a locality. There is usually a short, intense peak demand for health and medical services, unlike the sustained demand for these services typical of mass casualty incidents (HMCAS, 2014).

National Command Centre (NCC); multi-agency Emergency Communications Centre including Ambulance Service Emergency Communications (HMCAS, 2014).

Outer Cordon; seals off an extensive area to which unauthorized persons are not allowed access. (HMCAS, 2014)

Operations Section; the section responsible for all tactical incident operations. In the Incident Command System this section will normally include subordinate departments, sections, and/or units. (HMCAS, 2014)

Personnel Accountability; the ability to account for the location and welfare of incident personnel. It is accomplished when supervisors ensure that ICS principles and processes are functional and that personnel are working within established incident management guidelines (HMCAS, 2014).

Post-Traumatic Stress Disorder (PTSD); stress caused as a direct result of a traumatic event causing both physical and psychological symptoms (HMCAS, 2014).

Primary Triage Officer; officer responsible for the co-ordination of the triage sieve of casualties at the incident site (HMCAS, 2014).

Production; providing resources and other services to support incident management (HMCAS: MIR Plan, 2014).

Production Section; the Section responsible for providing facilities, services, and material support for the incident (HMCAS, 2014).

Public Information Officer (PIO); a member of the Command Staff responsible for interfacing with the public and media or with other agencies with incident-related information requirements (HMCAS, 2014).

Receiving Hospital; any hospital listed as having facilities to receive and treat patients who are seriously injured or critically ill resulting from a Major Incident, on a 24hour basis. Should have facilities for provision of Bronze Doctor and MERIT at request of ambulance service (HMCAS, 2014).

Rendezvous Point (s); a point usually nominated by the Police, as a safe area to which all vehicles and personnel must report before proceeding to the incident site or parking points. A Rendezvous Point (RVP) will generally be identified at any high risk location for the initial mustering of Emergency Service Vehicles (Airport, COMAH site **etc.**) (HMCAS, 2014).

Safety Officer; a member of the Command Staff responsible for monitoring and assessing safety hazards or unsafe situations and for developing measures for ensuring personnel safety (HMCAS, 2014).

Secondary Triage Officer; officer responsible for the triage sort of casualties at the Casualty Clearing Station (HMCAS, 2014).

Sector Commander; the organizational level having responsibility for a major functional area of incident management, e.g. Medical, Operations, Support, Hazardous Operations. The sector is organizationally placed between the tactical level (Bronze) and the Incident Command (HMCAS, 2014).

Sieve (Primary) Triage; the initial prioritization of casualties in respect of their injuries right where the patients lay (are found) on scene. On this basis an effective casualty evacuation plan will be implemented (HMCAS, 2014).

Sort (Secondary) Triage; the second stage in the prioritization of casualties in respect of their injuries, completed at the Casualty Clearing Station. This is a more comprehensive assessment of each casualty and becomes the first step in the treatment of patients (HMCAS, 2014).

Span of Control; the number of individuals a supervisor is responsible for, usually expressed as the ration of supervisors to individuals. (Under the National Incident Management System (NIMS), an appropriate span of control is between 1:3 and 1:7) (HMCAS, 2014).

Staging Area; location established where resources can be placed while awaiting a tactical assignment. The Operations Section manages Staging Areas (HMCAS, 2014).

Survivors Reception Area (SRC); secure premises to which those who have been directly involved in the incident and are uninjured can be taken (HMCAS, 2014).

Transport Unit; an ambulance capable of transporting patients from the scene. Minimum staffing will be at least two Basic Life Support (BLS) qualified staff one of which is released as an Attendant in Charge (HMCAS, 2014).

Triage; the prioritizing of casualties in respect of their injuries. On this basis an effective casualty evacuation plan will be implemented (HMCAS, 2014).

Trauma Centre; a specialized hospital facility distinguished by the immediate availability of specialized surgeons, physician specialists, anaesthesiologists, nurses, and resuscitation and life support equipment on a 24-hour basis to care for severely injured patients or those at risk for severe injury (HMCAS, 2014).

TRiM; trauma Risk Management Scheme offered to staff via the Peer Support Worker scheme (HMCAS, 2014).

Warm Zone; area where personnel and equipment decontamination and hot zone support takes place; includes control points for access corridor. Also referred to as the decontamination, contamination reduction, or limited access zone (HMCAS, 2014).

1.11 Conceptual Framework

Qatar, over the years, has developed numerous programmes to enhance safety related to MIR. These programmes are aligned to the UNISDR and are translated into the Qatar National Vision 2030 and the National Health Strategy 2011-2016 (General Secretariat for Development Planning QNV, 2008). In order to understand why Qatar and HMCAS started moving towards disaster mitigation and preparedness one has to understand the various programmes and plans. Further it is unknown to what extend HMCAS staff members have acquired and retained its organisational MIR plan. The conceptual framework below will facilitate in understanding the research problem by focusing on knowledge, skills dispositions and lifelong learning. This

framework will further assist in improving the acquisition and retention of knowledge and skills of HMCAS staff members of the organisational MIR plan (University of Phoenix, 2017).

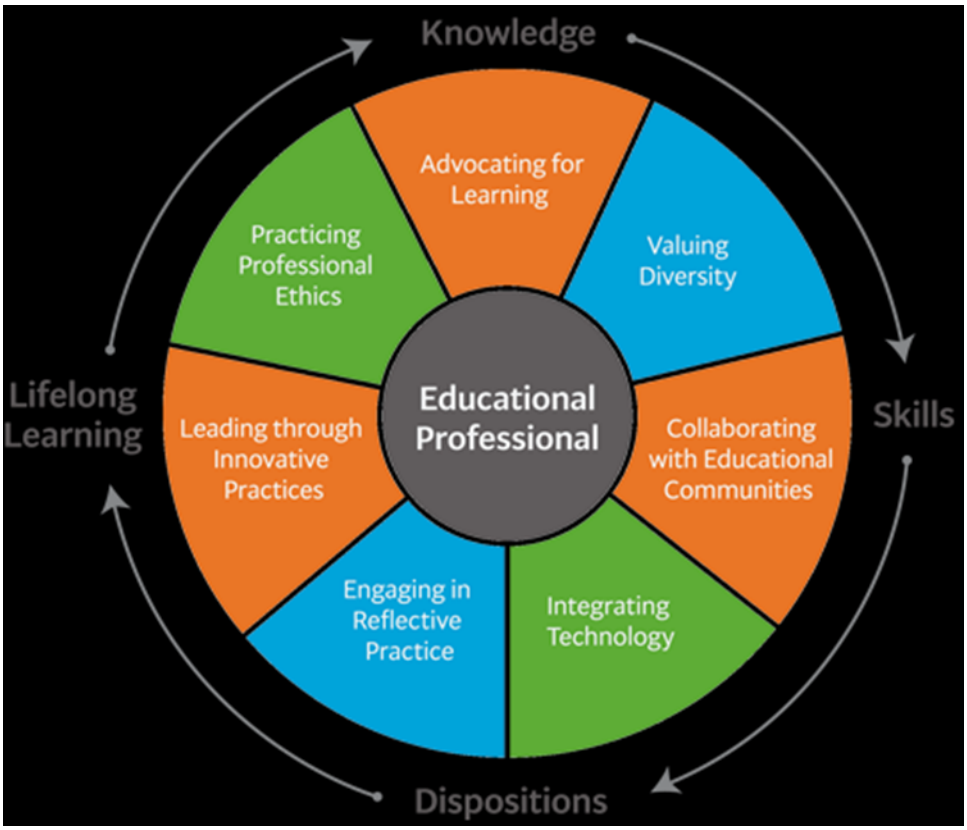


Figure 1.3 Conceptual framework

Source: University of Phoenix

1.11.1 Qatar National Vision 2030

The Qatar National Vision 2030 is a document that builds on the present to enhance the future. It speaks about transforming Qatar into an advanced country by 2030, providing a high standard of living and enhancing development for the people that live and work in the State of Qatar (General Secretariat for Development Planning QNV, 2008).

1.11.2 National Health Strategy 2011-2016

Qatar's National Strategy 2011-2016 encompasses many different projects including HMCAS MIR plan (NHS, 2010). Aspects of the Qatar's National Strategy 2011-2016 includes road safety and emergency preparedness;

Road safety; Death due to road traffic accidents (RTA) is high in Qatar. (QRSSC, 2016) RTAs, is one of the leading causes of death in Qatar for people between the ages of 10 and 34 years of age (QRSCC, 2016). HMCAS is responsible for providing emergency medical care to RTA victims. The number of people that are involved in RTAs daily in Qatar can vary from 1 patient in a single vehicle accident to a bus rollover with an increased number of patients (NHS, 2010).

The NHS speaks about new directions being followed and one of the focus areas is to ensure that HMCAS has appropriate geographical coverage with the aim being to have a timeous response to RTA victims.

Emergency preparedness; Qatar is home to big names in the oil and gas sector which includes land and offshore drilling and refineries. This comes with its own threat to man-made disasters (NHS, 2010). Due to this threat the NHS has included emergency preparedness to major incidents/disasters in its strategy. Qatar has recently had an overhaul in its Health sector with the introduction of the Ministry of Public Health (MOPH) in 2016. MOPH has since taken emergency preparedness plans from different sectors and has come out with one strategic multi agency response plan.

Qatar's current emergency preparedness and response plans are supported by the different committees responsible for various sectors (NHS, 2010). However, the Disaster Committee which is governed by the Ministry of Interior (MOI) is responsible for disaster management in the State of Qatar.

The new recommendations set out by the NHS 2011-2016 are:

- A framework for disaster response.
- Disaster response planning to include scenarios.
- Multi-agency and sector participation.
- Early warning systems to inform the public of any potential hazard or risk.
- Shelters in the event of major incidents/disasters.
- Ensure stockpiles are in place (medication, food and water etc.).
- All plans must be available and communicated to the different stakeholders.

HMCAS is the National Ambulance Service in the State of Qatar, and is responsible for both emergency and non-emergency care and transportation. Recently HMCAS has stepped up with both preparedness and response to major incidents.

The HMCAS response guide places an emphasis on the preparedness and response phases in the possibility of a disaster/major incident occurring; therefore, it is important in gaining and understanding whether or not paramedics in HMCAS understand incident command systems, triage, communications and how to relay a report back to the command centre/control room in the event that help or assistance is needed. The understanding of the areas mentioned will assist EMS personnel in the daily management of major incidents or disasters.

1.12 Limitations

Due to participants being from different countries and only undergoing an orientation to the MIR plan, difficulties might arise, e.g. South Africa uses 'Staging' for vehicles, Americans use the terminology "Parking". The majority of the operational staff is first language Arabic speakers. Language itself could be a limitation to the study.

1.13 Delimitations

1.13.1 Involvement of Non HMCAS operational staff.

HMCAS has approximately 1800 staff members working in different sections. Although the MIR plan is HMCAS specific, non-operational staff can be deployed to assist. The study mainly focused on the emergency services division of HMCAS. However, this study can be used in other divisions within HMCAS if they receive an orientation to major incident response.

1.14 Research Structure

This mini dissertation is divided into five chapters.

Chapter 1 introduces the study and presents the study objective, aim and limitations.

Chapter 2 explores the empirical literature related to MIR.

Chapter 3 discusses the research methodology. In this chapter the research process is presented.

Chapter 4 presents the findings of the study. The interpretations of these findings are highlighted.

Chapter 5 is the concluding chapter of the mini dissertation. Study conclusions are highlighted.

Chapter 2: Literature Review

2.1 Introduction

This chapter will look into communications, command and control, triage and Hazmat. These topic areas were specifically chosen as it ties in directly with the questionnaire as well as the role and responsibilities expected from HMCAS first responders at the scene of a major incident. The HMCAS Major Incident response guide covers the topic areas in detail.

The literature that was looked into highlights the importance of education and training as well as the importance of having standards for health care workers and health organizations to safely prepare and respond to Major Incidents.

The chapter cover the history of EMS as it is important to lay a foundation as to where EMS has started and their evolvement. The chapter then covers aspects that are needed by EMS personnel to understand when they respond to major incidents and finally, it will investigate the importance of training by disaster management organizations as well as by different authors that are interested in education and training in disaster management/major incident response.

2.2 Emergency Medical Services in Disaster Management

2.2.1 History

EMS history dates back to around 1500BC in Egypt as well as with the documented use of ambulances during the Vietnam War and on the fighting fields of Crimea. It was during the Vietnam War that interventions and protocols geared towards trauma were established. This in turn started to shape pre-hospital care and a resemblance to today's paramedic. Napoleon's surgeon Baron Dominique Jean Larrey, who is known as the "father of modern military surgery", is also known for the first ambulances to be in service. These ambulances called "ambulances volantes" or horse drawn carts were used during the Crimean War around 150 years ago (Rifino & Mahon, 2016).

Clara Barton also known as the "Angel of the Battlefield", during the Civil War in the United States (U.S), was responsible for relief work during disasters both in the U.S and the rest of the world. This is important due to it being the starting point of EMS involvement in disaster management (Rifino & Mahon, 2016).

Strong leadership amongst EMS professionals exist (Rifino & Mahon, 2016). This leadership includes traits in preparedness, triage, communications, care and transportation of patients (Catlett *et al*, 2010).

EMS over the years has experienced rapid evolvement. Internationally disasters continue and will continue to happen. Both natural disasters such as Hurricane Katrina, 2005; Haiti, 2010 and the Tohaoku Earthquake in 2011, as well as man-made disasters such as the 9/11 attacks in the U.S are examples of disasters that have happened over the past years. These disasters have highlighted the need for an efficient EMS response to disasters, highlighting both preparedness and training (Rifino & Mahon, 2016).

Together with the skills and training required for EMS personnel to be successful as responders it is important that a structure be in place for disaster response to be effective. A prime example of a negative communication and structure is the 9/11 attacks where the New York's City's Office of Emergency Management (OEM) located on the One World Trade Centre. The collapse of the Seven World Trade centre resulted in a disruption of radio communications between emergency services. The disruption in radio communications resulted in ineffective triage and transportation of victims (Rifino & Mahon, 2016).

In the Article titled 'The World Trade Centre Attack: Lessons Learned', Ronald & Teperman (2001) emphasises on lessons that were learned from that disaster. Highlighted were communication, coordination and triage with patient movement being ineffective.

In the early 1970's the Incident Command System (ICS) was developed. In 1980 the ICS was recognised by the U.S federal officials and incorporated to help with disaster response. The reasons cited for needing a structured ICS according to Rifino & Mahon (2016) is:

- Different terminology being used amongst emergency agencies.
- The incident objectives being vague.
- Planning coordination amongst agencies being unclear in relation to structure.
- Incident information being unreliable.
- Authority line being obscure.
- Organizational structures are different between all responding agencies in the same area.
- Multiple personnel reporting to one supervisor/manager and
- Communication that is incompatible.
- The lack of standardization has the potential for an increase in morbidity and mortality.

Natural and man-made disasters will happen again, so it is important that lessons be learned from previous disasters. Preparation will save lives and resources (Ronald & Teperman, 2001).

Okumura *et al,* (1998) discussed EMS involvement in disasters after the Tokyo Subway Sarin Attack, which was said to be the biggest attack using chemical agents. In Tokyo emergency medical care is under the responsibility of emergency services which looks after a radius of 1, 750km squared. Post the subway Sarin attack in Tokyo problems were analysed and they were (Okumura *et al,* 1998):

- There has to be cooperation and integration between all services and the best way to achieve this is through drills and training exercises.
- There has to be established real time communications methods in place.
- Establishment of multiple communication channels.

Specific to HAZMAT/CBRNe incidents highlighted by Okumura *et al,* (2008) were:

- Chemical resistant suits, boots and respiratory protection must be available for EMS personnel.
- Poison Centres must act as a mediator for all toxicological information.

The National Association of EMS Physicians in 2010 highlighted the roles that emergency medical services should play in the event of a disaster. These are:

- In a community the local EMS must take the lead in disaster response. The EMS should be able to have a communication system with other emergency services with a unified command system.
- EMS personnel must play a role in all phases of disaster management for the community they are tasked responsibility over. These phases are mitigation, planning, response and recovery (view table 1.1).
- EMS personnel must work within a command system as they are best positioned for disaster response. This command system must take into consideration other emergency services that would be part of the response in the event of a disaster.

2.2.2 The Disaster Management Continuum and EMS.

The disaster management cycle or continuum can be viewed as a disaster risk reduction phase incorporating preparedness, mitigation, prevention as well as the post disaster recovery phase incorporating response, recovery and development.

Figure 2.1 Disaster Management Continuum

Source: FEMA, 2004

Worldwide EMS is the initial contact for people that face a medical or trauma emergency. The World Health Organisation (WHO), views EMS as an important component of a health care system. It is important therefore that EMS be involved in all phases of disaster management since they are able to bring a sense of structure in a situation where there is chaos (Rifino & Mahon, 2016).

2.2.2.1 Planning and Prevention Phase

Planning and prevention identifies potential hazards in a community. The main objective is to decrease adverse events and prevent loss. This process must make use of an appropriate hazard vulnerability assessment tool (HVA). The categories that are used are preparedness, risk and probability (Rifino & Mahon, 2016).

Probability in disaster management is used to critically evaluate the known risks by using data and statistics. Undertaking of a risk assessment is meant to give definitive totals among legal and financial stature, property and lives. This will enable an overall assessment that will be able to structure a plan that will incorporate common factors that will allow EMS to think of components dealing with preparedness to appropriately plan for a disaster or major incident (Rifino & Mahon, 2016).

2.2.2.2 Preparedness

Preparedness is a component of the disaster management continuum. Being prepared for major incidents or disasters can decrease the loss of life and property damage. EMS in their preparedness phase must ensure training and education is included for both EMS personnel and the community (Rifino & Mahon, 2016). Preparedness must include training of personnel, drills and exercise coordination and the evaluation of responses (Catlett *et al,* 2010).

2.2.2.3 Response

When a disaster does occur there is a multi-agency response. This response will include fire services, police, army and both government and private EMS. The response from multiple agencies can be confusing and often work will be redone or overlooked. It is therefore important that there is a single command system/ structure. This structure must be able to grow as the need arise i.e. multiple incident zones or a large scale disaster that needs a large scale coordinated response (Rifino & Mahon, 2016).

The establishment of the ICS must be done early. Responders at the disaster site or responding to the disaster must have familiarity to the ICS. This will enable a manageable span of control. In the event of major incidents or disasters there should be a single scene commander or incident commander (IC). There should be divisions for each responsibility and a leader for each division. In the U.S these are operations, finance, logistics and planning. The IC is responsible for the delegation of these divisions and who will be responsible. This ensures role definition;

leadership and those critical tasks are not overlooked. Additional roles in EMS will include triage, treatment and transport of people that are injured by the disaster. Under the IC the different division commanders can exercise their own span of control. EMS under the response phase must ensure that there are objectives set and met for that disaster/major incident as well as effective information sharing (Rifino & Mahon, 2016).

2.2.2.4 Recovery

EMS generally does not play an active role in recovery processes post disasters/major incidents. However, the recovery phase includes analysis. The analysis phase is important for both improvement and reassessment of the EMS systems that are geared towards disasters and major incidents. Highlighted in the analysis post incident can include the effectiveness of the command and control structure, communications, triage, treatment and transport. Included in the recovery phase specific for EMS are the crew's psychological state and logistics. The recovery phase allows for a review of EMS system weaknesses with the aim being to improve in the future (Rifino & Mahon, 2016).

Following the disaster management continuum allows for EMS to be effective in a disaster or mass casualty/major incident situation. This enables EMS in their role as pre hospital service providers to enable and maximize their care towards those in need. Having a coordinated structure enables a coordinated response in a disaster.

2.2.3 Disaster Management: Aspects EMS should know

Disaster management training and education are vital to EMS preparedness, however no research has gone into training and education for disasters/major incidents involving mass casualty for EMS (Catlett *et al,* 2010). With the absence of training in EMS towards disaster management further highlights the difficulty faced by EMS in preparedness towards disasters. To mitigate this, managers must ensure that there is training established in emergency preparedness (Catlett *et al,* 2010).

Previous EMS performance measures, apart from response times, include out of hospital cardiac arrest survival, success rates of rapid sequence intubations by paramedics, transportation of patients by air versus ground. Newer performance measures, apart from those mentioned, include disaster response. Part of disaster response performance measures include

triage, treatment and transportation of patients to appropriate hospitals that are suitable for decreasing victim mortality (Catlett *et al,* 2010). Reilly *et al,* (2007) points out that EMS must be prepared to respond to WMD and health emergencies, however training was lacking as per a survey done by the U.S Health Resources Service Administration.

Reilly *et al,* (2007) survey also highlighted a lack of training in terrorism and disaster response for EMS. Training for EMS personnel that exist has been shown to be effective in disaster response. For EMS providers to be at ease when rendering care to patients at a disaster, training and education must be provided.

Standards need to exist when training programs are developed to provide knowledge to health care providers. EMS educational competencies can be fashioned by emerging current EMS educational standards/guidelines with new disaster responses for students in health professions (Reilly *et al*, 2007).

Having an EMS that is trained and prepared is important to respond to public health and disaster emergencies, this will ensure that mortality and morbidity due to disasters are decreased (Reilly *et al,* 2007).

2.2.3.1 Incident Command

The Incident Command System (ICS) is there to assist organizations to effectively manage an incident. It was developed following fires that occurred in California in the 1970s. The aim of the ICS is to assist emergency services managers to properly manage an incident (Giordano & Loesch, 2016).

FEMA (2008) describes the incident management system as an incident management tool that is both efficient and effective that has to consider equipment, personnel, facilities and communications that has an organised organisational structure. FEMA recommends that the ICS be used for both small and large scale incidents as well as simple or complex incidents.

ICS goals are to provide accountability, information and to maintain a span of control at incidents. The principles of ICS are to have effective command and control of both staff and equipment in response to an incident.

Post September 11 attacks, attention has focused on ICS. ICS's must be seen as a tool that assists with pre identifying resources that can respond to an incident (Perry, 2006). The model

developed by FIRESCOPE for ICS addressed issues such as communications that are not integrated, difference in terminology, actions plan not being consolidated and the inability to increase or decrease both personnel and equipment (resources) that is required at incident sites (Giordano & Loesch, 2016).

Disasters and major incidents differ. This highlights the importance of a tool that is used in emergency management for ICS to be highly effective no matter how complex an incident or disaster. Organisations such as the Federal Emergency Management Agency (FEMA) focus on aspects that are widely used by different agencies in training personnel on ICS. These are:

Common Terminology; when major incidents do occur, it becomes important the personnel speak the same language. The use of common terminology will prevent miscommunication. The use of common terminology should be used in everyday operations to ensure personnel speak the same language (FEMA, 2008).

Unified Command; at major incidents/disasters there are responses from different agencies. This multiple agency response must all function together whilst each agency still maintains their own structure. Having a command that is unified allows for effective coordination, authority and accountability (FEMA, 2008).

Management by Objectives; the objectives that are needed to ensure a smooth running of a major incident/disaster must be done by the command staff within the ICS structure. Having a clear set of objectives will ensure an appropriate span of control and the appropriate protocols and procedures being developed (FEMA, 2008).

Chain of Command and Unity of Command; chain of Command is the embedded organized structure that is within the ICS whilst Unity of Command is an individual's direct supervisor who is at the incident site. Both the chain and unity of command are there to achieve the objectives as well as maintenance of personnel (FEMA, 2008).

Modular Organizations; the size and complexity of the incident will determine the ICS structure that is required to effectively manage an incident (FEMA, 2008).

Predesigned Incident Locations and Facilities; different facilities and incident locations should have names and functions that are predetermined (FEMA, 2008).

Integrated Communications; the working together of multiple agencies should ensure the proper use of communication channels between agencies. The individual agencies should

however have a robust communications channel/s that can ensure effective communications at the incident (FEMA, 2008).

Manageable Span of Control; following span of control (ideally 3 to 7 people) ensures effectiveness of an agency at the incident (FEMA, 2008 & HMCAS, 2014).

Transfer of Command; major incidents/disasters can be prolonged. This will entail that personnel at the incident would need to change. There should be a briefing to ensure that both incoming and outgoing staff are fully aware of the current situation or potential changes (FEMA, 2008).

Deployment; in many services, management are usually "on call". This on call personnel should understand that they should not self-dispatch to an incident as this can cause both confusion and duplication of work (FEMA, 2008).

The ICS and the points mentioned above require planning and training. It is important that personnel take the responsibility of ensuring that they learn their ICS structure and the roles and responsibilities that is associated with the role that they are tasked with. Pro ICS supporters have attributed poor ICS performance due to training being inadequate or non-existent due to ICS principles not being followed. Training in ICS will ensure performance by the organisation in which personnel are required to respond to disasters and major incidents (Lindell & Lutz, 2008).

Lindell and Lutz (2008) adds that having regular drills, exercises as well as responding to major incidents, both big and small, will allow personnel to develop their skills in the duties they have to perform. The use of ICS in everyday small scale incidents assists an organisation to better prepare for a potential bigger incident by learning from the outcomes of the smaller incidents that they attend.

In A Meta-Analysis of Crew Resource/Incident Command Systems Implementation Studies in the Fire and Emergency Services by Griffith *et al,* (2015) showed that this type of training in ICS was effective. FEMA (2008) highlighted that having a standardised ICS structure does not limit the flexibility of the ICS. The ICS can expand from a small incident using a smaller structure to a larger structure in the event of a larger incident.

Figures 2.2 and 2.3 shown below demonstrate the ICS used by HMCAS for both a small (level 0) incident as well as the upgraded structure of a larger (level 1) incident.

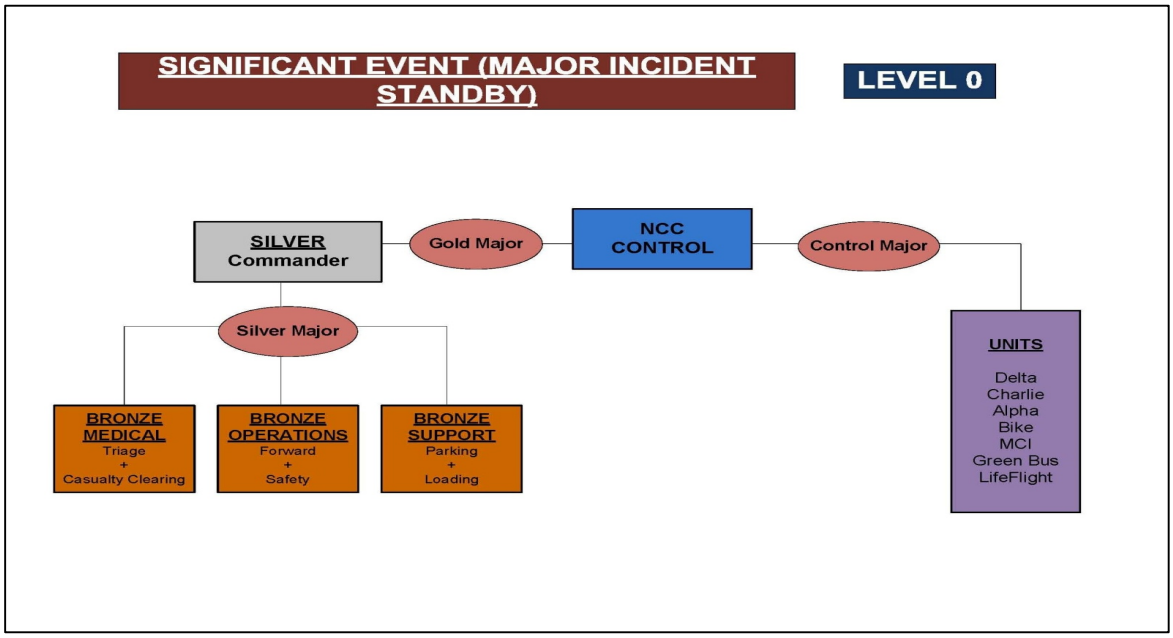


Figure 2.2 Example of a Small ICS Structure

Source: HMCAS, 2014

EMS must play an active role in leadership when it comes to the development of objectives for the care of patients in disasters. Efficiency by EMS in mass casualty events can be maximized if EMS is part of a command structure. A post report on the 2007, I-35W (Mississippi River) bridge collapse in the U.S by the Fire Administration of the U.S documented that EMS must be part of an ICS, if patients are involved, to ensure that the injured are taken care of (Catlett et al, 2010).

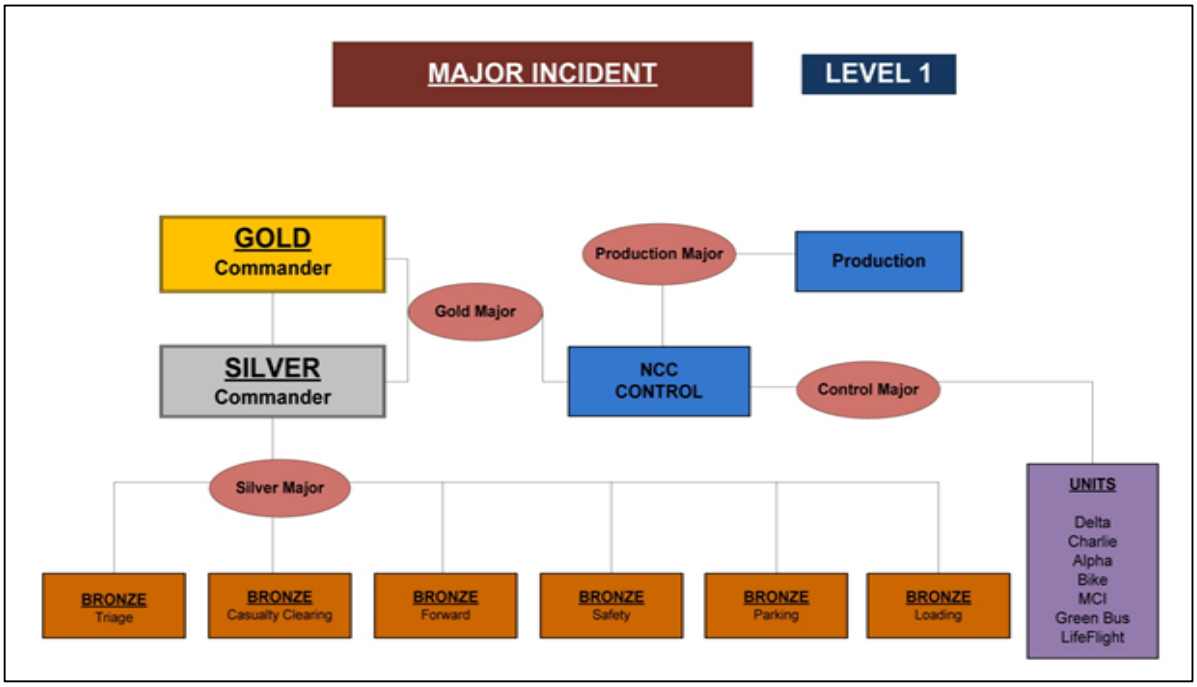


Figure 2.3 Example of a Large ICS Structure

Source: HMCAS, 2014

2.2.3.2 Triage

Triage is derived from the French Trier, meaning '*to sort or sieve'*. To sort and to sieve is the process of sorting patients in order of priority for receiving treatment and transportation. Triage is a continuous process with the outcome being to "*do the most for the most*" by rendering the correct treatment and care in the correct place and time (Smith, 2012).

Triage was developed for the use by the military but it has shown to be beneficial in use at disasters and for EMS use in major incidents with multiple patients. The aim of *"triage"* is to render care for those that need it urgently and delay treatment and transportation for those patients that are not seriously injured. Triage is also used at disasters to ascertain if patients that are severely injured really need treatment due to the severity of their injuries. This is usually done in extreme circumstances where resources are scarce or depleted and where there are many more salvageable patients (Smith, 2012).

It must be remembered that when a patient is assessed, it is a view of the patient's condition shown at that moment. Triage is therefore a *"dynamic*" process and therefore should be a continuous process to fully appreciate the patients' overall condition. Triage must be done

quickly, accurately and must be reliable. Therefore, the triage tool chosen at disasters/major incidents must be able to reflect this (Smith, 2012).

Smith (2012) in his article titled *"Triage in mass casualty situations"* said that there is no "gold standard" for the measurement of triage systems. Countries like South Africa during the world cup in 2010 used the triage sieve and sort method. This triage tool uses different parameters that will assist medical personnel and triage officers to identify patients needing treatment (Smith, 2012).Shown below are examples of triage tools (Figure 2.4 & Figure 2.5).

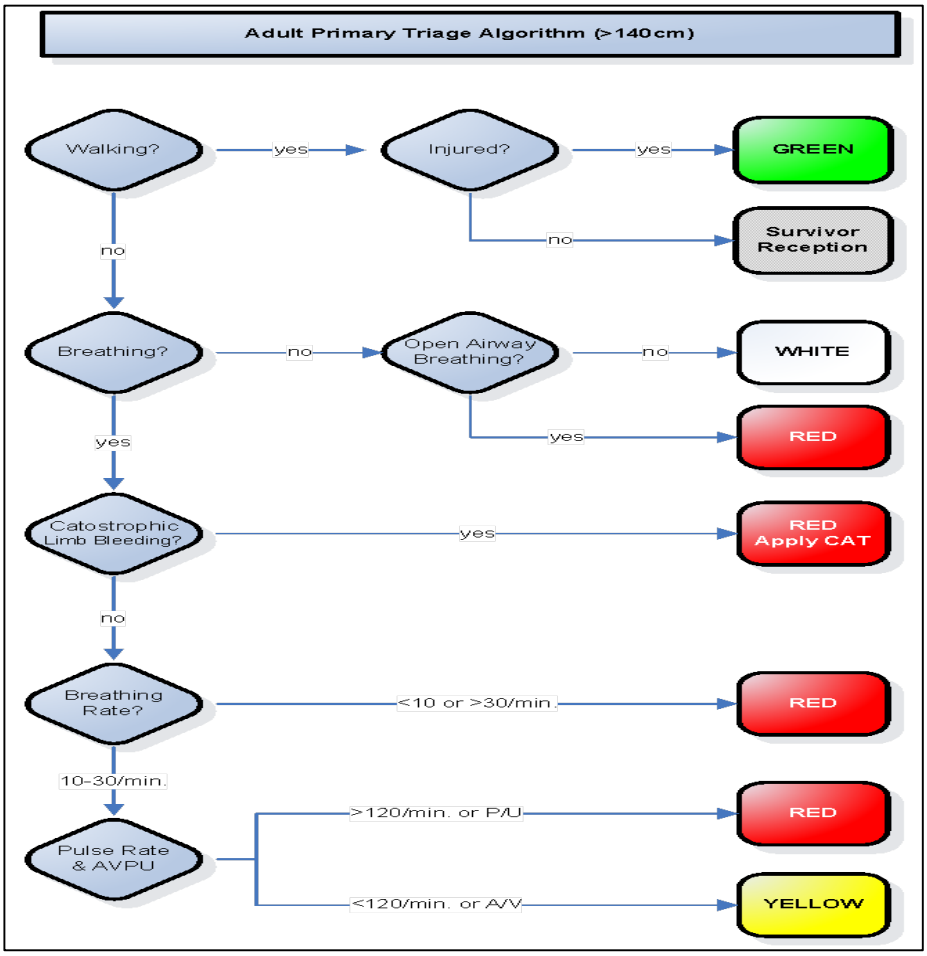


Figure 2.4 Adult Primary Triage (>140cm) Algorithm

Source: HMCAS, 2014

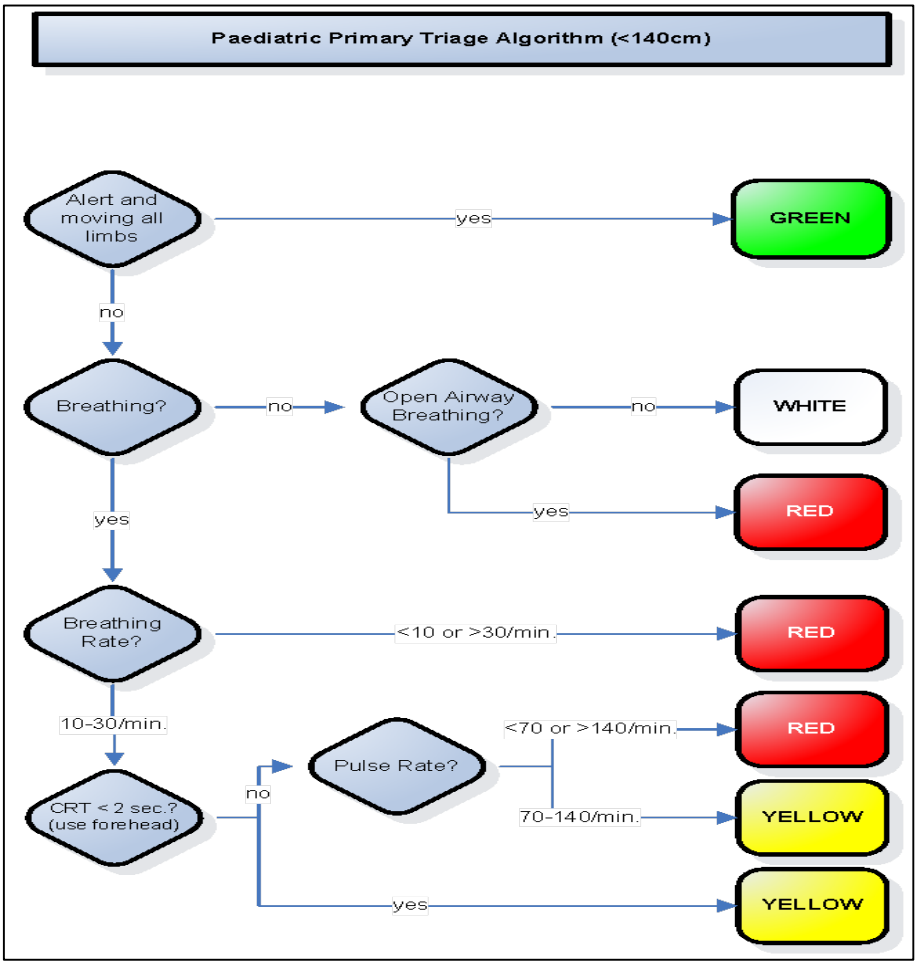


Figure 2.5 Paediatric Primary Triage (<140cm) Algorithm

Source: HMCAS, 2014

Table 2.1 Example of a Secondary Triage Card

Physiological Variable	Measured Value	Score	Measured Value	Score	Insert Score	
	ADULT		PAEDS			
Respiratory Rate	10 – 29	4	10 – 24	4	A	
	> 29	3	25 – 35	3		
	6 – 9	2	> 35	2		
	1 – 5	1	< 10	1		
	None	0	None	0		
Systolic Blood Pressure	≥ 90	4	> 90	4	B	
	76 – 89	3	70 - 90	3		
	50 – 75	2	50 - 69	2		
	1 – 49	1	< 50	1		
	No BP	0	No BP	0		
Glasgow Coma Scale	13 – 15	4	14 – 15	5	C	
	9 – 12	3	11 – 13	4		
	6 – 8	2	8 – 10	3		
	4 – 5	1	5 – 7	2		
	3	0	3 - 4	1		
Triage Revised Trauma Score					A+B+C	
Revised Trauma Score	**PRIORITY**		**PRIORITY**		**ADULT**	**PAEDS**
	Priority 1		**Immediate**		1 - 10	2 - 11
	Priority 2		**Priority 2**		11	12
	Priority 3		**Priority 3**		12	13
	Priority 0		**Priority 0**		0	1

Source: HMCAS, 2014

Triage in disasters requires both a primary and secondary triage (Table 2.1). Primary triage is done at the patient site i.e. where the patient is actually found. The primary triage is best done by a junior or first response ambulance crew. The secondary triage is done when the patient is taken from where they are found to a casualty clearing site as well as at the hospital, this is best done by an experienced/senior advanced life support/critical care paramedic or an experienced clinician (Smith, 2012).

The person that is tasked to undertake triage in mass casualty situations i.e. TRIAGE OFFICER (TO) should ideally have the following traits:

- Be recognisable/visible.
- Able to work under pressure and stress.
- Have a knowledge and understanding of present and available resources.
- Be able to make good judgement calls.
- Be able to lead and direct personnel.
- Problem solver.
- Be clinically experienced.
- Know the triage tool that is being used by the service that they work for.

EMS systems across the world have varied triage categories. These categories can vary within countries. Countries often use one of two systems. Treatment (T) or Priority (P) systems are basically the same however also included is the expectorant category (Smith, 2012).

Table 2.2 shows the triage categories used by HMCAS. These categories are explained as follows (Jones, 2011):

- **RED**: A patient who requires immediate treatment due to their life being in immediate danger; e.g. a patient with an airway problem or with severe breathing or hemorrhaging problems.
- **YELLOW**: A patient who is not in immediate danger but requires urgent medical or surgical intervention, within 2 to 4 hours; e.g. a patient with multiple complicated fractures.
- **GREEN**: A patient with minor injuries that will require treatment, i.e. a delayed urgency; e.g. a patient with minor lacerations and abrasions.
- **WHITE**: A patient that is not breathing with NO pulse.
- **BLUE**: A patient that has severe and extensive injuries and cannot be saved with the resources available. The **BLUE** category is regarded as the most challenging both from an emotional and ethical view.

Table 2.2 Triage Categories HMCAS

URGENCY	PRIORITY	COLOUR	DESCRIPTION
Immediate	P1	**Red**	Life-threatening
Urgent	P2	**Yellow**	Serious
Delayed	P3	**Green**	Minor
Dead	P0	**White**	Not breathing
Expectant	P4	**Blue**	Potentially un-survivable injuries

Source: HMCAS, 2014

In a disaster or major incident when patients receive a triage priority it is important for accurately tagging the patient (Figure 2.6). This tagging of patients is done to prevent duplication of work, decrease confusion and accurately report on the patient's injuries and vital signs. EMS worldwide use various types of labelling tags (see example Figure 1.10), however the key for it being used successfully depends on the triage officer knowing the tag that is used by the EMS they work for (Smith, 2012).

Triage in disasters and major incidents are important as doing it accurately will affect the success of EMS response to the disaster (Frykberg, 2005). Inaccurate triage will result in two types of errors. Error 1, being over triage error 2 under triage. Under triage can lead to adverse medical conditions due to the delay in receiving the appropriate medical treatment. Over triage will result in overtreatment and use of resources that could possibly be used for others. Data published from 12 mass casualty incidents due to terrorist bombings has shown a direct relationship between over triage and the mortality of survivors (Frykberg, 2005).

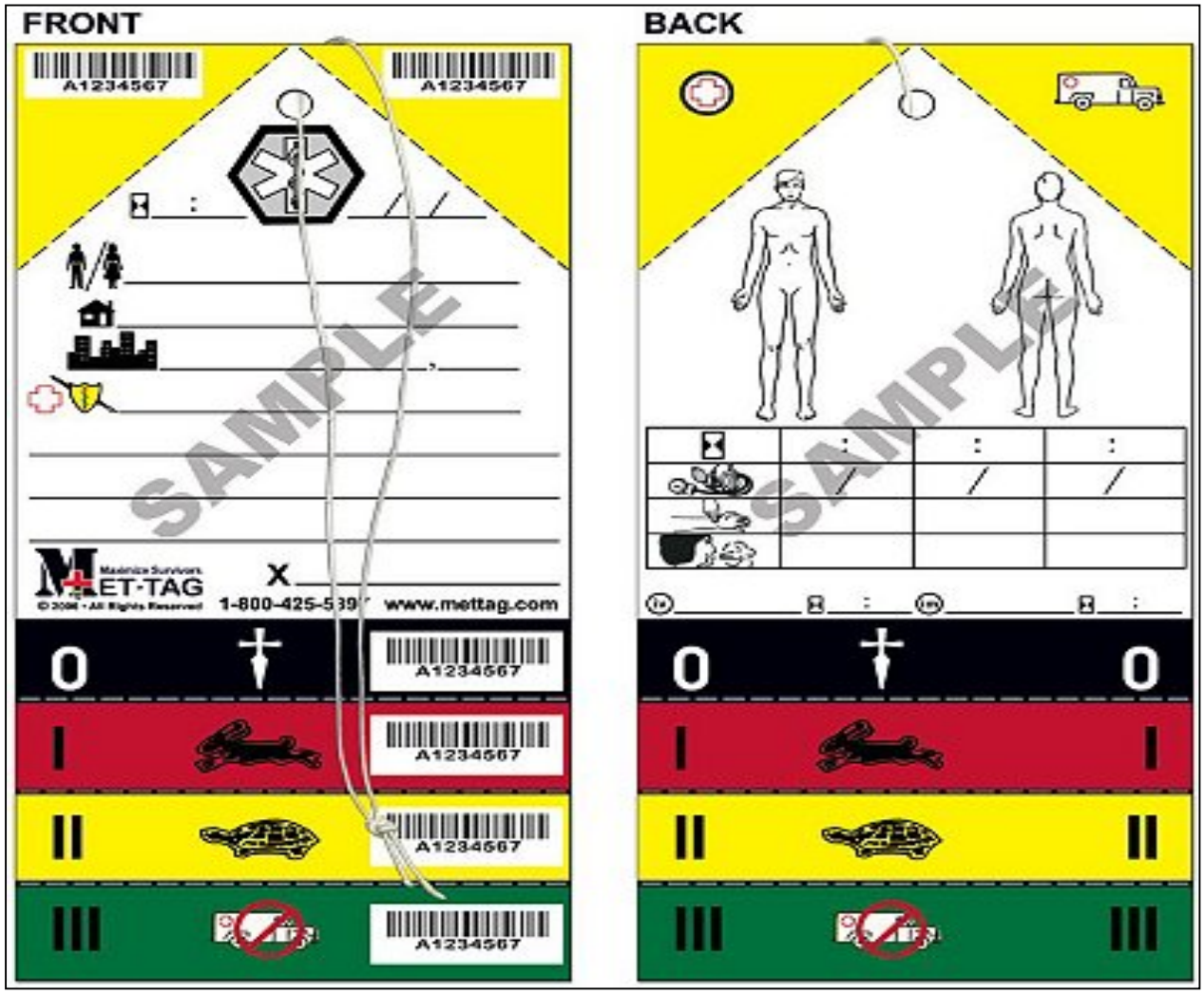


Figure 2.6 MET-TAG Triage Tag

Source: HMCAS, 2014

To prevent both over and under triage in mass casualty incidents, triage must be quick and accurate. Triage in mass casualty incidents is probably one of the most important aspects in emergency management. Therefore the triage officer must have both the clinical knowledge and training of triage systems in mass casualty incidents (Frykberg, 2005). EMS personnel to be effective as triage officers must have the educational knowledge to be accurate in triaging patients (Frykberg, 2005). Authors of triage methodologies have also advocated the use of triage in HAZMAT/CBRN incidents. Medical managers should also apply their attention to training of triage skills in EMS because EMS personnel have the responsibility of determining patient priority (Catlett *et al,* 2010).

2.2.3.2 HAZMAT

There are different agencies across the world that has resources available to assist both EMS and communities to better prepare for disasters/incidents related to HAZMAT. The Emergency Responder Guidelines is one such resource that assists by providing training to improve response to HAZMAT incidents. The ERG concentrates on three levels i.e. awareness, performance and management (Rifino & Mahon, 2016).

- Awareness level: this level is best suited for police officers, firefighters and first response basic qualified paramedics that are first at the incident site. The arrival of management personnel allows them to take over the incident scene whilst the awareness level staff then takes on a supportive role at the incident. The awareness level allows for a better understanding of operational needs and actions that one has to follow to manage the scene safely, which can include calling for extra resources (Rifino & Mahon, 2016).
- Performance level: the performance level also known as operator's level are generally for advanced life support/critical care paramedics and those emergency personnel that are involved in search and rescue. The ICS for these personnel must be fully understood as they have to perform their regular duties in addition to requests given by their respective IC at the incident. This performance level training highlights the communication aspects of Hazmat incidents, multiple agencies coordination, triage, treatment, decontamination and transportation of victims (Rifino & Mahon, 2016).
- Planning level: personnel involved in this type of training are generally managers, shift supervisors and officials from emergency management. The aim of this training would be to teach personnel to effectively manage resources and use their leadership skills to manage the Hazmat/CBRN incident (Rifino & Mahon, 2016).

The role that EMS has to play in CBRN incidents is developing (Reilly *et al,* 2007). EMS personnel are expected to treat patients who may require decontamination, and often times many don't understand or receive the appropriate training that is expected in Hazmat/CBRN situations (Reilly *et al,* 2007).

For EMS personnel to be both effective and comfortable in a Hazmat/CBRN environment it is imperative that they receive the appropriate training. This training must include the appropriate decision making skills in choosing the appropriate protective gear in the event that EMS personnel are required in a Hazmat/CBRN incident (Reilly *et al,* 2007).

Post September 11th, the possibility of terrorist attacks has increased. The greatest cause of an increased casualty number due to terrorism is explosions. Previous research has shown that explosives are the most common form of terrorism; however there has been a marked increase with terrorists trying to develop CBRN weapons (National Academy of Sciences, 2006).

Table 2.3 CBRNe Examples

Chemical	Biological	Radiological	Nuclear	Explosives
Mustard Ricin Sulphur Sarin Gas	Plague Anthrax Smallpox	A dirty bomb	A Nuclear Bomb	Explosion oil and gas refinery. Airports Suicide Bomber

Source: National Academy of Sciences, 2006 (Examples have been Adapted)

Table 2.3 shows examples of chemical, biological, radiological, nuclear and explosives. These examples highlight the different threats possible ultimately ensuring that the correct type of protective gear and response used is appropriate to the incident (NFPA 472 Hazardous Materials Awareness Training, 2015).

In a report by the New York University titled “Emergency Medical Services: The Forgotten First Responder”, key issues were highlighted specifically towards CBRNe incidents. The key issues raised were (Centre for Catastrophic Preparedness and Response NYU, 2005):

- Of all the EMTs and paramedics in the US just over half had received less than 1 hour training towards CBRNe incidents.
- A staggering 20 percent received no training towards CBRNe incidents.
- Less than 33 percent had taken part in exercises specifically geared towards CBRNe.
- There are no bioterrorism EMS specific standards.
- There are no data indicating the number of EMS personnel that should have protective equipment.
- Of all the States, 25 had said that 50 percent or even less had sufficient equipment in response to a chemical or biological attack.

The role highlighted by the Strategic National Guidance on the decontamination of people exposed to Chemical, Biological, Radiological or Nuclear (CBRN) substance or Material, highlighted the following reasons why EMS will need both involvement and training in CBRN incidents, these are:

- Ensure as many lives are saved as possible.
- Ensure that a focal point is provided for the arrival of medical resources.
- Render treatment to the injured.
- Both the safety and health of the first responders are taken care off.
- Be able to triage patients, ensuring the correct priority of evacuation of the injured patient.
- Ensure that the receiving hospitals are updated and prepared for patients being transported by EMS as well as for self-presenting patients.
- Ensure appropriate crew and vehicles for the transportation of the patients.
- Medical decontamination of patients.

2.2.4 Disaster Management/Major Incident Education and Training

This section will highlight some recommendations that different disaster management organisations recommend for being prepared in the event of a disaster. It will take into account the previous sections that show the importance of communications, triage, and special circumstances e.g. Hazmat/CBRN that EMS would generally have to know to be effective in major incident response.

Hameed *et al,* (2006) said that there is a need for the development of guidelines to ensure standardization towards training and education, this must be developed using evidence, training and education and must include all partners in a healthcare system.

The absence of consistency leads to two types of issues in when it comes to disaster management training. Gillet, Meualemans, Lebaupin and Stroobants (2010) wrote;

- The different type of training does not produce training and skill development at the same level and
- Different organizations and authorities cannot use acquired knowledge and skills as standards.

An important part of disaster preparedness is the education and training of medical staff that would be involved in the response to major incidents/disasters (Montan *et al,* 2014).

The reason that a response can fail is due to poor coordination and communications between all units involved in disaster response. For disaster response to be effective it is important that all that are involved in the response must be trained in all components of disaster response to include command and control, scene, transportation and the response of the hospital to include all levels (Montan *et al,* 2014).

The World Association for Disaster and Emergency Medicine in 2004 developed an Education Committee Working Group. This working group looked at healthcare and developed standards and guidelines that looked into both training and education of healthcare personnel to appropriately respond to major incidents. The group highlighted that the response and management of major incidents should be done by health services that possess knowledge, experience, skills and have the appropriate resources to manage major incidents daily be it a small or large incident (WADEM, 2004).

Education and training together with a response plan for an incident as well as running exercises that include aspects of the actual call being taken, the proper dispatching of crew to the incident, the correct ambulance or team sent, should be part of the training and exercises for EMS. The type of major incident that the EMS would respond to would have to include a person with expertise in the incident type as well as the resources available to manage the incident (WADEM, 2004).

Bradt, Abraham and Franks (2003) model emphasises the importance of having frameworks which can be beneficial in training for disaster medicine. These can be best seen in the diagram below (Figure 2.7).

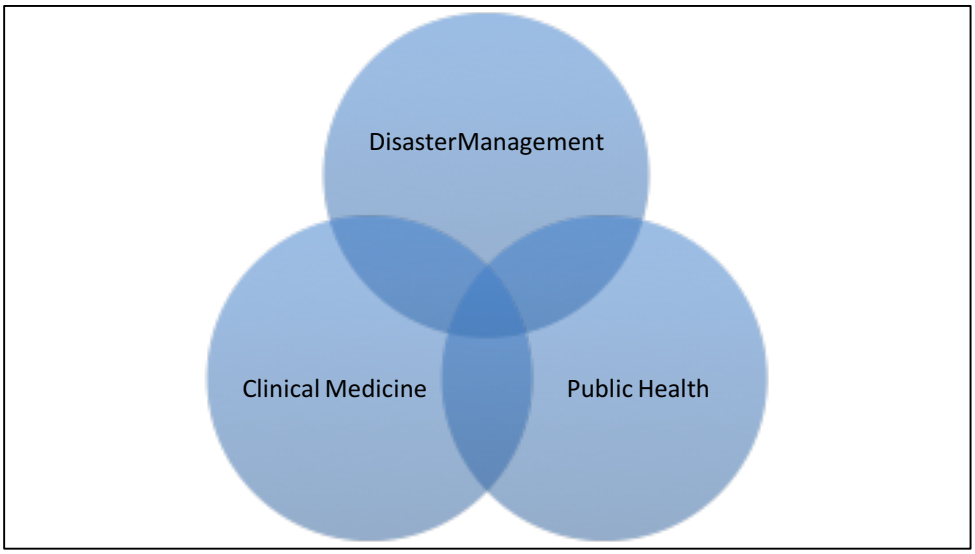


Figure 2.7 Conceptual Model showing a relationship between Disaster Management, Public Health and Clinical Medicine.

Source: A Strategic Plan for Disaster Medicine Australasia, 2003

The model highlights that having the ability to be competent in all 3 spheres are important however individuals lack the skills. Bradt, Abrahams and Franks highlighted the following which must be considered as part of training for the effective management of disasters.

WADEM (2004) used figure 2.7 as well as table 2.3 (shown above), to broaden the principles used by Bradt, Abraham and Franks (WADEM, 2004).

- Clinical Medicine: this included all clinical disciplines i.e. nurses, medicine and EMS (paramedics).
- Disaster Management: this was understood to include the phases of major events that must include risk management.
- Public Health: this includes all aspects that plays a role in public health i.e. infection control, the monitoring of disease and epidemiology.

WADEM (2004) in an issues paper titled: International Standards and Guidelines on Education and Training for the Multi-disciplinary Health Response to Major Events which Threaten the Health Status of a Community places emphasis on the development of standards and guidelines to assist in the education and training of health services highlighting the importance of standards and guidelines in disaster response for health services which included EMS (Table 2.4).

Table 2.4 Domains of expertise contributing to disaster medicine

Specialty	Competency
Emergency Medicine	• Triaging patient's pre-hospital. • Appropriate tagging of patients for the correct treatment. • Transportation. • ED triage and stabilization of the injured. • Referral to appropriate department/facility for further care.
Public Health	• Hazmat safety. • The monitoring of environment health. • Investigation of disease outbreaks.
Disaster Management	• Security at the disaster site. • Incident Command. • Emergency Operations Centre management. • GIS management. • Management of Resources and their availability. • Media and Public Relations

Source: A Strategic Plan for Disaster Medicine Australasia, 2003

This was backed and quoted by Hsu *et al,* (2006) which looked at the competencies of healthcare workers for disaster training. Hsu *et al,* (2006) also highlighted that the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) places emphasis on effective and rapid training in disaster response for healthcare workers at all levels.

The WADEM committee brought about a reference for disaster training and education. These were centred on the Bradt Model. The Bradt model for disaster health education has two levels of specialist qualifications in the field of disaster health (WADEM, 2004):

- Core disaster health for practitioner and
- Specialist in disaster health for managers

The WADEM working group (Education Committee Working Group), agreed that having guidelines and standards in place would be beneficial for a coordinated response to disasters (WADEM, 2004).

The Levels of training shown in Table 2.5 highlights the training levels and who should receive what type of training. Of importance are the highlighted boxes in yellow recommending that all first responders (basic and advanced) receive a level 3 and 4 training respectively (WADEM, 2004).

Table 2.5 Levels of Training for Disaster Health

Category	Target Group	Description
Level 1	Community	Civilian/community based
Level 2	First Responders: Basic	Primary responders all disciplines Categories: Bronze/Silver/Gold Basic Emergency Preparedness (HMC AS-AP)
Level 3	First Responders: Advanced	Primary responders all disciplines Categories: Bronze/Silver/Gold Advanced Emergency Preparedness (HMC AS- CCP)
Level 4	First Responders: units towards a course goes towards a diploma or bachelor's degree	Content must be evaluated for additional courses towards a diploma or bachelor's degree.
Level 5	Professional : Master's Degree	Formal education training/courses done at a professional level.
Level 6	Specialist Consultant/ Masters with practical experience	Masters level with practical experience with content being adapted to meet local/national/international standards
Level 7	Researcher/National Leader/Doctoral	To add formal training in research/education/management. adapted to meet local/national/international standards

Source: WADEM, 2004

Archer and Fischer (2003) said that standards and guidelines must include training and education, and programs must have continued education practises. They also highlighted the importance of commonality in language amongst professions and being flexible in delivering methods to teach healthcare workers (Archer and Fischer, 2003).

Highlighted in Hsu *et al*, (2006) discussion was the issues of culture, and educational backgrounds, previous training and experience. These factors influence the standards required for disaster training and education. These factors were also highlighted by The International Federation of the Red Cross and Red Crescent Society as well as WADEM, 2004. They said that aspects that must be considered if not included in education and training for major incidents/disasters by healthcare service are:

- Cultural, Religious, legal and ethical issues.
- The ability to make decisions.
- The ability to manage information.
- Professionalism.
- Teamwork and the ability to collaborate.
- Communication skills.
- Public Relations and
- Accountability.

For disaster response to be effective, healthcare workers must be trained and equipped with the ability to make specific decisions. This can only be achieved by specific skill training with modifying educational content to suit health workers (Hsu *et al,* 2006).

To grow essential knowledge and the skills required by healthcare workers to work both individually and in a team, training has to be given. This training must be adapted to the skills that is required to be used i.e. the training of Hazmat staff to use appropriate PPE when working in a Hazmat incident (Hsu *et al,* 2006).

The importance of developing “best practice” and the development of standards and guidelines internationally for health services in the event of major incidents specifically towards education and training must reflect the following (WADEM, 2004).

- Understand that disaster medicine as we once knew it is constantly evolving.
- Training and education must consider the stages of disaster management i.e. preparedness, response and recovery.
- International assistance and collaboration is important.
- Take into consideration the community that the health service is responsible for. The aspects of needs, communities’ vulnerabilities and coping capacity must be considered.
- Current principles and concepts in major incidents must be considered.

- Education and training must highlight the response to major incidents/disasters by health services.
- Evidence based practice to major incidents i.e. previous incidents/case studies.
- New programs in training and education.

The Commission on Accreditation of Allied Health Education Programs which has standards and guidelines for the EMS professions has been quoted by WADEM (2004) as being one of the best standards and guidelines that can be adapted and used for disaster response as it is closest to the field of disaster medicine (available on http://www.caahep.org/caahep).

Hsu *et al,* (2006) highlighted competencies that healthcare workers should be taught as part of their training and education program. Together with the competencies are objectives that will provide a multi-disciplinary training method as well as unify disciplines and enhance skills which ultimately bring about standardization in disaster training.

These competencies are:

- Healthcare workers should be able to identify a critical event and thus implement initial actions: this will entail the healthcare worker being able to identify triggers and report to the appropriate personnel. This early action will allow for an appropriate response both from responding services and the use of an action or disaster plan. By recognizing the critical event/disaster early and reporting appropriately allows for organisations to ensure business continuity e.g. HMC AS uses a METHANE report. This report allows for the first crew or personnel that arrive at an incident to appropriately evaluate the scene and report the information to the NCC. This is done using the pneumonic METHANE (Wallis, 2010 and HMCAS Major Incident Response Guide, 2013).

- M - MAJOR INCIDENT DECLARED *at appropriate LEVEL 1/2/3*
- E - EXACT LOCATION *with map reference if possible*
- T - TYPE OF INCIDENT *with details of structure and/or vehicle types*
- H - HAZARDS *present and potential*
- A - ACCESS ROUTES *and suitable Rendezvous Point (RVP)*
- N - NUMBER OF PATIENTS *and severity*
- E - EMERGENCY SERVICES *present and required.*

- Healthcare workers must be able to successfully know and apply the principles that are involved in critical event management: this allows for healthcare workers to fully understand the terminology that is used in disaster management. Having an understanding of the phases of disaster management i.e. mitigation, preparedness, response and recovery will enable healthcare workers to be effective in major incident response.
- Healthcare workers must understand safety principles: understanding safety principles enables the healthcare worker to appropriately choose the correct PPE for themselves thus ensuring that they are safe as well as the scene. This is especially important in Hazmat scenarios.
- Healthcare workers must understand and know their organisations' emergency operations plan.
- Be able to be competent in critical event communications.
- Healthcare workers must understand the incident command system and they must be able to know and understand their role in the system: review figures 1.4 and 1.5 as examples of HMCAS incident command system with identified roles.
- Healthcare workers must be able to possess the knowledge and skills required to undertake specified roles: e.g. being able to triage patients appropriately.

The Centre for Disease Control and Monitoring talks about the *'10 Essential Public Health Services",* these are basically a set of performance standards for healthcare workers and educators (CDCP, 2014).

The core competencies that are used by public health professionals are skill sets that can be best described by the 10 essential public health services diagram (Figure 2.8). These standards are frameworks that can be used by public health educators (Yeager et al, 2015). These core competencies have been designed so that training, research, workforce development and health education can be improved. The core competencies are active so that they can be adapted to constantly evolve to meet the needs of a community by public healthcare workers (Yeager et al, 2015). One of the fundamental aspects of public health is communication, Yeager et al, (2014) said that *"these competencies must be embedded in public health schools and become part of the foundation for today's evolving public health education and disaster management".*

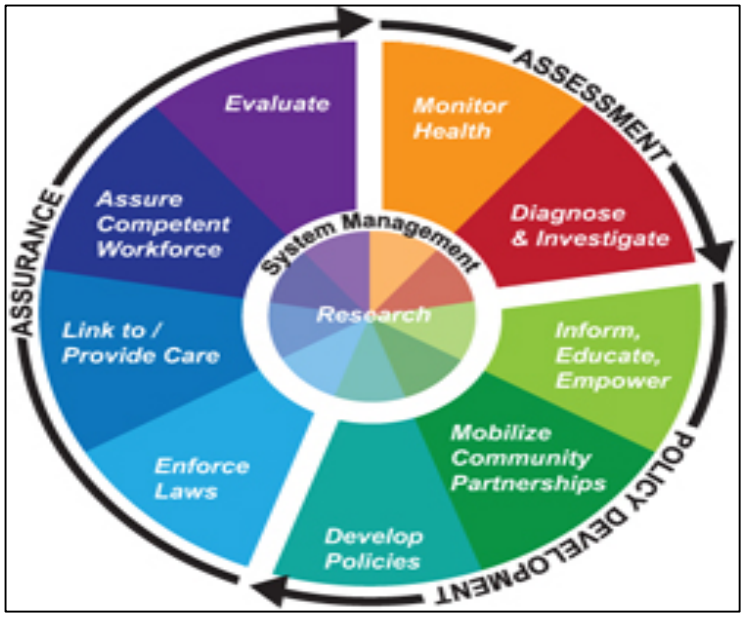


Figure 2.8 10 Essential Public Health Services

Source: Carson City, 2014

The World Health Organization together with 11 other countries developed Benchmarks, Standards and Indicators for Emergency Preparedness and Response in 2007. The WHO, 2007 describes benchmarking as *"a strategic process that is used by organizations/businesses to measure performance and to evaluate best practice in the sector that they are involved in".*

The benchmarks were categorized as follows:

1. Human Resource development, training and education.
2. Planning
3. Legislation and policy
4. Funding
5. Vulnerability assessment
6. Information systems
7. Surveillance
8. Absorbing and buffering capacities and response
9. Patient care
10. Coordination

In the draft version of the document by the WHO, benchmark 1 speaks about human resource development, training and education. This can be further explained as it being a legal framework that ensures a mechanism is in place for an organization structure that must involve all stakeholders (WHO, 2007). In the context of education and training for disaster management, it can be further said that organizations must ensure that a structure exists with defined roles for both preparedness and response to man-made or natural disasters (WHO, 2007).

Benchmark 2 calls for health organizations to regularly update their disaster plans to incorporate disaster preparedness. The standard associated with benchmark 2 says that *"drills and simulations"* must be done and tested. The results of these drills and exercise or simulations must be assessed and the risks must be taken into consideration (WHO, 2007).

The Humanitarian Charter and Minimum Standards in Health Services on page 268 of the Sphere handbook talks about the supervision and training of staff. The Sphere handbook goes on to say that health workers must be given or have the appropriate training which is related to their responsibility in an organization. Agencies have a responsibility to ensure that their staff is up to date with the relevant required knowledge, this is especially important for staff who have not had continuous education. The Sphere project further says that training programs should be standardized and must have a link with national programs (Sphere, 2004).

When faced with emergencies, education is key in providing skills (Price, 2011). Kahn (2006) said that both disasters and the management of it is problematic. This is due to the loss of life, the political instability it causes; human suffering that is associated with it and the financial implications (Kahn, 2006). Ingham *et al,* (2012) reviewed Kahn's article and said that a possibility exists to draw from previous studies to develop knowledge in disaster management. The key in knowledge building in disaster management according to Ingham *et al,* (2012) is the integration of relevant disciplines, and each discipline must have a role.

Organizations involved in emergency preparedness have started to show a need for standards in emergency management specifically towards training and education (Alexander, 2003). The need for such training is important to safeguard and uphold international learning aimed at emergency planning and fieldwork amongst emergency workers (Alexander, 2003). Alexander (2003) further writes that although there are some standards, none of them speak to educating and preparing emergency workers.

2.2.5 Summary

HMCAS over the years have evolved in leaps and bounds. The inclusion of a major incident response guide to assist with major incidents has shown the seriousness that HMCAS has in saving lives in the event of a major incident. Due to the geographic location of Qatar, HMCAS would have to be self-sufficient in the event of a major incident until help arrives from neighbouring GCC countries. HMCAS being the National Ambulance Service in the State of Qatar brings with it responsibility in the event of a major incident. Over the years literature has shown that EMS has a broader role to play in major incidents and this includes command and control, triage and Hazmat incidents. The literature covered, shows a lack of training and education or standards that are required for health organizations to prepare and respond effectively should the need arise in a major incident. Although there are some models and training recommendations that do exist, none however is internationally accepted.

HMC AS with the development of the major incident guide shows that major incident response is important to them, however more important is the understanding and expectations expected from those staff that are first responders or leaders in major incident response and scene management.

Chapter 3: Research Methodology

3.1 Introduction

Research can be best described as the building block of any profession that wishes to enhance knowledge. The lack of knowledge and research leads to the demise of a profession (Brink, Van der Walt & Van Rensburg, 2012).

Professionals must recognize that research is an important component in *"education and management*". This however must be incorporated in training from the beginning of a healthcare professional's career, and this must come in the form of evidence based practice (Brink, Van der Walt & Van Rensburg, 2012).

Chapter 3 discusses the methodology for this study. The research design, population sample, the collection of data, validity, ethics and the analysis of data collected are highlighted.

3.2 Research Design

Research design is described as the sequence that the researcher has followed to answer the research question (s) asked in the study. Research design ultimately establishes the methodology utilized to gather analysis and interpret data. This study was prospective in nature. The descriptive study design was utilized to address the aim of this study. This type of design is said to be very valuable in the generation of knowledge in situations where it would be unethical to use and experimental methodology (Brink, Van der Walt & Van Rensburg, 2012).

The quantitative descriptive study or design was a consequence of the terms being used in research i.e.:

- A descriptive design according to Brink, Van der Walt and Van Rensburg (2012) is used in those studies that require more information in a chosen field. It can be used so that current issues can be highlighted to determine the current practice or to identify and develop theories that are being used by professionals in the same field or situation. The researcher in this study aims to highlight the probability of a training gap that exist in understanding and retaining the knowledge with the HMCAS major incident response guide.
- A quantitative design was the choice by the researcher as the researcher would aim to investigate a gap that could exist between first responders and training in major incident response. Questionnaires were used in the study to determine the understanding and acquisition of the HMCAS major incident response guide with the aim of determining if a gap does or does not exist with MIR training and response in HMCAS.

3.3 Research Techniques

Descriptive designs, as mentioned in paragraph 3.2, are used when more information is needed from a population. There different types of descriptive research methods i.e. observational, case study and survey method (Hale, 2011). The survey method in the form of a self-addressed questionnaire was used to gather data from first response ambulance paramedics, critical care paramedics and managers who respond and manage a MIR.

Open ended questions provide the participants with the freedom for different responses, whereas close ended questions allow for a limited response by participants but can be analysed easier (Hale, 2011).

For the survey to be reliable, closed ended questions was used with the questions being composed of in an easy to understand context (Hale, 2011). This was done to allow those taking part in the survey to have suitable options that best match an answer.

3.3.1 Advantages of a questionnaire

HMCAS employs approximately 1800 staff members; only 700 are first responders. Advantages of using a questionnaire include the ability to reach many people with a significant low cost (Jones *et al,* 2008). The benefit of a questionnaire is that the same *"stimuli"* is administered to all participates volunteering in the study without the influence of the researcher, and this enables the data to be analysed effectively and efficiently (De Vos, Strydom & Fouche, 2005).

3.3.2 Disadvantages of a questionnaire

Questionnaires as a data collection tool have limitations (De Vos, Strydom & Fouche, 2005). This becomes apparent if the questionnaire is too long and complex with unclear open ended questions. Those that have agreed to participate in the study may not always complete the questionnaire, space provided time as well may be an issue for some (De Vos, Strydom & Fouche, 2005).

To mitigate the disadvantages, the researcher, allocated 20 minutes for the questionnaire to be completed. This proved beneficial in getting the participants to answer all questions and not leave any blanks.

3.4 Population and Sample

Brink, Van der Walt & Van Rensburg (2012) investigated definitions by various authors regarding population. Their definition included "*the population is the entire group of persons or objects that is of interest to the researcher*" (Brink, Van der Walt & Van Rensburg, 2012). This can be best explained as the researcher choosing a particular group of people that the researcher is interested in for the purpose of the research study. It is important that the researcher has criteria for including and excluding participants in the study (Brink, Van der Walt & Van Rensburg, 2012). Population is a term that is best described as "setting boundaries". This is due to individuals having a specific set skill that the researcher wants to research (De Vos, Strydom & Fouche, 2005). The target population for this study included HMCAS staff members responding to major incidents. All non-HMCAS staff members and those HMCAS staff members who do not respond to major incidents were excluded from the study population.

A study can only hold validity both internally and externally if the study sample is described properly (Zulle *et al,* 2007). A sample is made up of fundamentals of the population that are included in the study. The sample is studied to enable the researcher to understand the population that the sample is taken from (De Vos, Strydom & Fouche, 2005). A sample that is insufficient will show poor results in the findings of the research, therefore an adequate sample must be inclusive of all the elements of the target population (Brink, Van der Walt & Van Rensburg, 2012).

The target population included the 700 HMCAS staff members who respond to major responses. Further a power calculation was completed to determine the sample size for the study. A final sample size of 130 HMCAS staff members was calculated to be representative of the target population. The researcher included HMCAS (999 Emergency Service Division) that has the core responsibility of being first responder in the convenient sample. The target population for this study included first responder APs, CCPs and managers which comprised of 130 participants of mixed qualifications, roles and responsibilities within HMCAS. Of the 130 participants required all completed the questionnaire resulting in a return rate of 100%.

3.5 Data Collection

Brink, Van der Walt and Van Rensburg (2012) claim that data collection should incorporate the what, when, why, how and who when the researcher is planning the data collection process. In the context of health, data collection can be defined as *"the ongoing systematic collection, analysis, and interpretation of data necessary for designing, implementing, and evaluating prevention programs"* (WHO, 2016). The self - addressed questionnaires were distributed via the respective HMCAS managers to the prospective participants. The questionnaires included an information letter and consent. Consenting participants completed the questionnaires anonymously in a specifically allocated data collection venue which was specially marked to prevent interruptions. Once the participants completed the questionnaires, the questionnaires were placed in a sealed data collection box. Only the researcher had access to open the box. Once a total 130 completed questionnaires were collected by the researcher the distribution of questionnaires was stopped. The questionnaires were then collected and analysed.

3.5.1 Validity and Reliability

Instrument validity talks to whether an instrument is correctly measuring what it has been set out to measure (Brink, Van der Walt & Van Rensburg, 2012). To ensure certainty that the objectives can be met from the study, the instrument was validated by experts in the field. Internally by HMCAS consultants (x 2 staff currently undertaking their PhD, 1 x PhD staff and 1 x professor of simulation) and externally it was submitted as part of the proposal to DiMTEC at the University of the Free State where this research would be submitted. Validity was ensured by the researcher doing an in-depth assessment on disaster management/major incident response and training in the form of a literature review.

It is infrequent to attain unflawed reliability. However, there are measures that can be used to increase the reliability of a study. These measures are replications, pilot studies, pre-tests, the multiple uses of indicators, conceptualize constructs and increase the level of measurement (De Vos, Strydom & Fouche, 2005). Reliability refers to the degree in which the same instrument will yield the same results if it is tested under similar situations (De Vos, Strydom & Fouche, 2005). Researcher factor was omitted by the researcher not giving his personal contribution to the participants. There was no manipulation by the researcher in

respect to the way the questionnaire was being answered. There is a relationship that exists between reliability and validity (Brink, Van der Walt & Van Rensburg, 2012). The researcher considered both qualities when the research instrument was chosen.

3.6 Data Analysis

The questionnaires that were collected were captured into Excel spreadsheets by the researcher. The data was then analysed to express descriptive statistics. Simple statistical methods were used in analysing the data that was received for this study. The data was displayed in the form of tables, graphs, charts and figures.

3.7 Ethics

Permission to conduct this study with HMCAS was sought and received from the Medical Research Council (Appendix E). The participants received a detailed letter from the researcher outlining the reasons for undertaking such a research as well as contact details for the UFS and the study leader should any ethical standards be breached (Appendix D).

- **Recruitment:** Participants, who were recruited to participate in this study, did so on their own free will. No individuals were coerced or compelled to participate in the research study. Individuals not wanting to participate were respected for their decision.
- **Participation:** Participants' anonymity was maintained throughout the research. All personal information gathered was kept private, with only the researcher and the supervisors having access to this information.
- **Protection from harm:** No physical, psychological or work related harm was brought onto the participants.
- **Informed consent:** Consent letters (Appendices D) were signed by the participants of the study prior to participation. Each contained details on the purpose of the research, the length of participation, potential benefits and harms, assurance of anonymity and assurance that the results of the study would be communicated to them.
- **Sharing results:** The results of this research study will be made available to all participants via peer reviewed journal articles published in SAPSE and ISI

journals. A copy of the dissertation will also be placed in the UOF library. This research study will add to the wealth of knowledge.

This study made use of various references and all have been given credit for the use of their work. This study can be used for academic purposes if needed.

3.8 Methodology Summary

This chapter on research methodology discussed aspects of quantitative research that the researcher used. The researcher used Principles of Research, Fundamentals of Research as well as Research at Grass Roots as reference tools to discuss research design, research techniques, population sample, data gathering, validity, reliability, data analysis and ethics. The following chapter will allow the researcher to display the findings of the results from the questionnaire.

Chapter 4: Data Analysis and Interpretation of Results

4.1 Introduction

This chapter presents the results of the study. The study achieved a response rate of 100% as 130 of the subjects surveyed completed and returned the questionnaire. The results of the questionnaire were obtained from critical care paramedics, ambulance paramedics as well as operations officers and managers working operations (frontline) in HMCAS who respond to major incidents.

4.2 Analysis and Interpretation

4.2.1 Gender

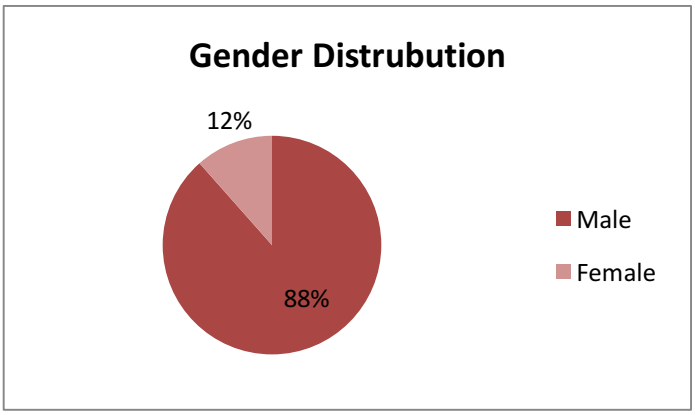


Figure 4.1 Gender Distribution

Of the 130 subjects sampled 88% (115) were male and 12% (15) were female (Figure 4.1). This finding is consistent with other gender distribution studies done in emergency services such as the one done by Wilson (1999) on professionalization and gender in local emergency management.

4.2.2 Age

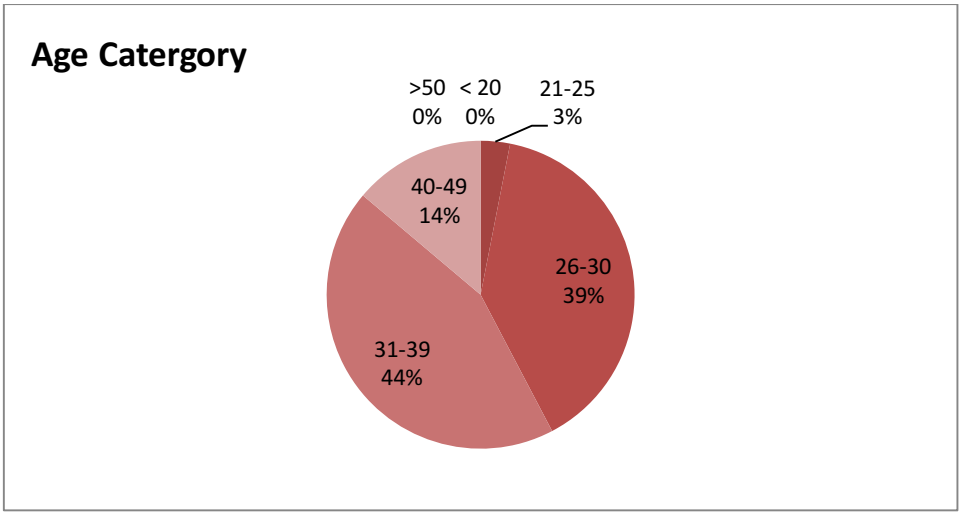


Figure 4.2 Age Category

Majority of staff within HMC AS are expatriates. In 2004 Qatar hosted the Asian Games and this brought about a change and growth within HMCAS. In the past 5 years there has been an influx of both critical care paramedics as well as ambulance paramedics. This can therefore be represented by the age groups represented in Figure 4.2. The majority is those in the 31-39 year age group (44%) and closely followed by the 26-30 year group which represented 39% of people that answered the questionnaire.

4.2.3 Qualifications

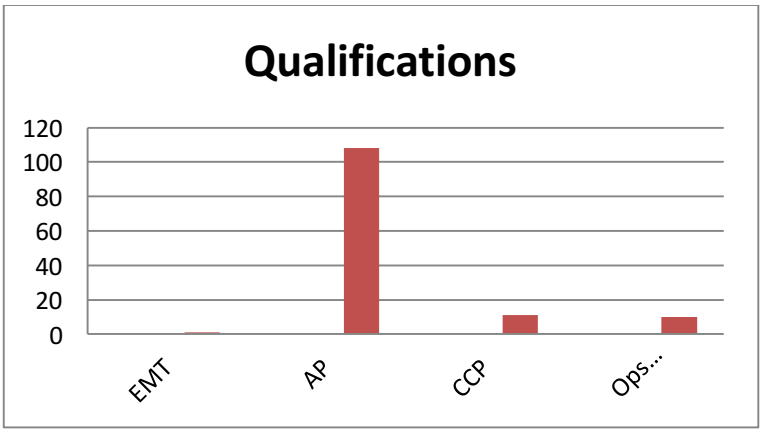


Figure 4.3 HMCAS Staff Qualifications that undertook the Survey

Most staff that undertook was APs staff members (Figure 4.3). This is one hundred and eight (108) of the sample population. There was 1 EMT, eleven (11) CCP and ten (10) managers. This is in line with the working population within HMCAS as there are more AP staff employed than CCP staff.

4.2.4 Staff Experience

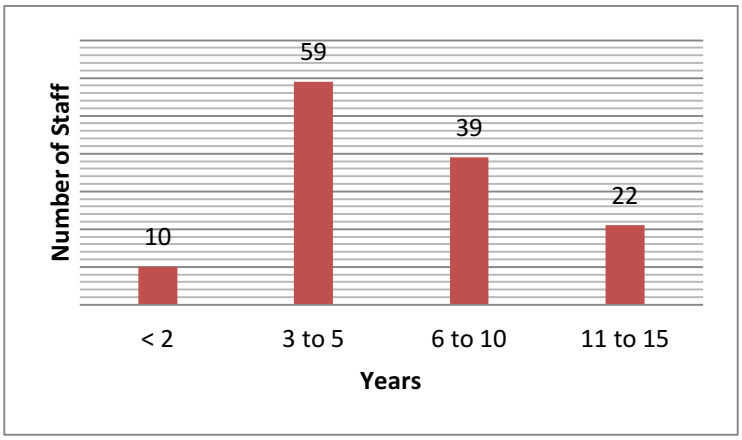


Figure 4.4 Staff Experience in HMCAS

Figure 4.4 displays the experience within HMCAS. This is important as majority of staff within HMCAS came with previous medical qualifications such as nursing, physiotherapy or aesthetic assistants and underwent AP training within HMC AS, therefore no previous major incident or mass casualty training in the field were done or EMS/pre-hospital work. The 11-15-year experience 16% (22) is indicative of staff that arrived in HMC AS for the 2004 Asian games. The biggest group 3-5 years indicate those with the least experience in EMS (Figure 4.4).

4.2.5 Staff Confidence at a Major Incident

Under the question of confidence when working at major incident 63% of staff was nervous but sure of what they were doing at a major incident. 37% answered being calm and collected. A possible conclusion to the staff being confident is due to the experience of the operations officer's access and operations officer's effectiveness (frontline clinical managers) that are experienced in managing major incidents and render guidance to other frontline EMS staff at significant or major incidents.

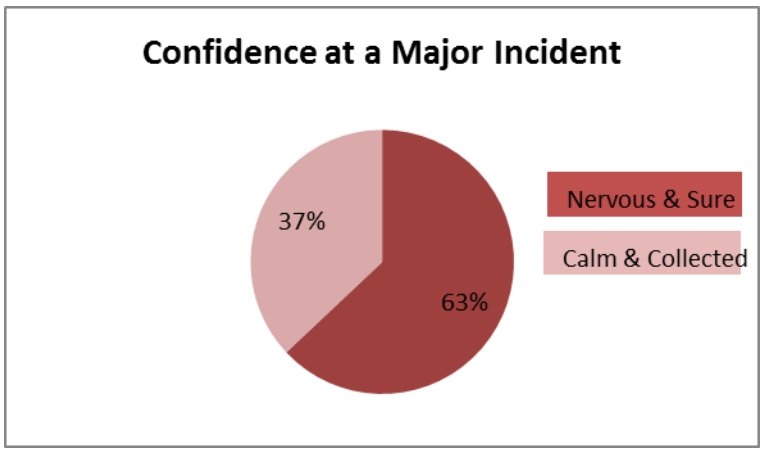


Figure 4.5 Staff Confidence at a Major Incident

4.2.6 Staff Confidence with the MIR Plan

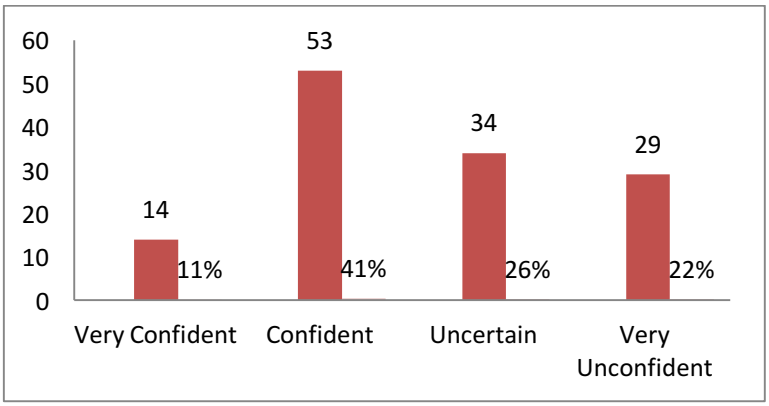


Figure 4.6 Staff Confidence in the Major Incident Response Plan.

Figure 4.6 demonstrates the confidence that the staff has in the MIR plan. This plan highlights various topics that were discussed in detail in chapter of this study. 52% were either very confident or confident with the MIR plan and 48% of the respondents were either uncertain or very unconfident with the plan.

4.2.7 Methane

On arrival of the first HMCAS unit at a major incident, staff must update the NCC using the METHANE report.

Table 4.1 Methane Report

Methane Report Reporting	Number	Percentage	Familiar with what a Methane Report is	Number	Percentage
Very Comfortable	33	25%	Yes	86	66%
Comfortable	63	48%	No	44	34%
Uncertain	34	26%			

Of all that responded to the questionnaire 73% were either comfortable or very comfortable with a METHANE report whilst 66% were familiar with what a METHANE report is (Table 4.1). The uncertainty of a METHANE report was 26% whilst 34% answered **NO** to being familiar with what a METHANE report is. Whilst there are discrepancies with the individual question response (difference of 10) between being uncertain and answering no, the possibility exist that staff did not know what the individual letters in METHANE stood for. This was evident when staff was asked to write down what the individual letters in METHANE was. 61% answered correctly whilst 39% were incorrect.

4.2.8 Triage

Figure 4.7 shows the results of staff being comfortable in undertaking triage at major incidents. 46% were comfortable and 26% were very comfortable. Of concern is the 28% that were uncertain with triage process.

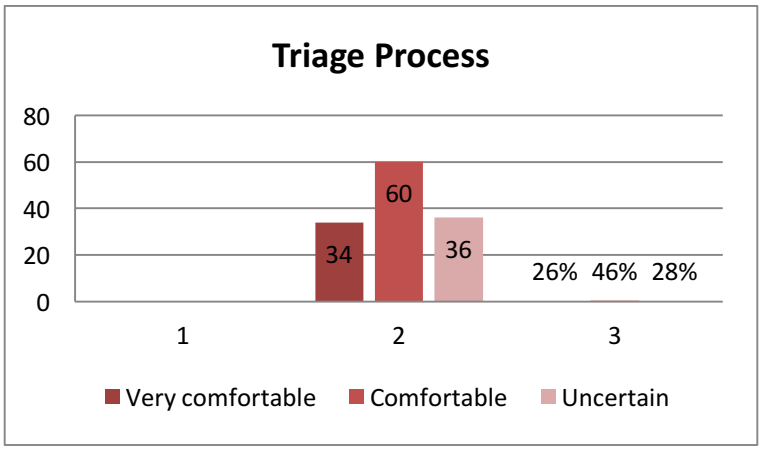


Figure 4.7 Triage Process

4.2.9 Average Monthly Response

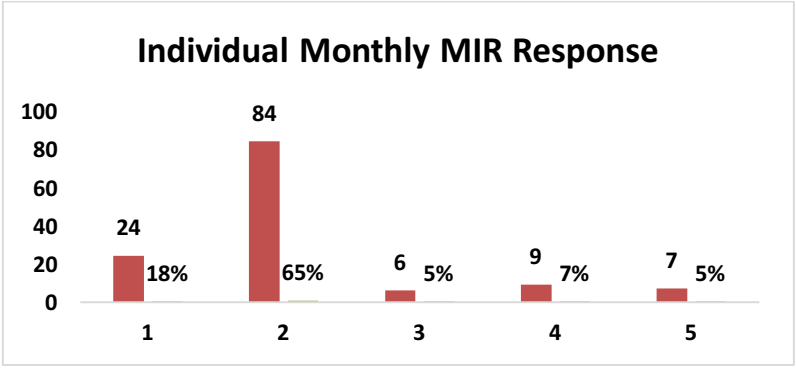


Figure 4.8: Individual Monthly Response to Major Incidents

As presented in figure 4.8, majority of staff did 2 responses per month (65%). This is important as it exposes staff to working at a scene that requires command and control or triage to be practiced. A major incident in HMCAS can be a level 0 incident that is defined in the MIR guide being used.

4.2.10 Command

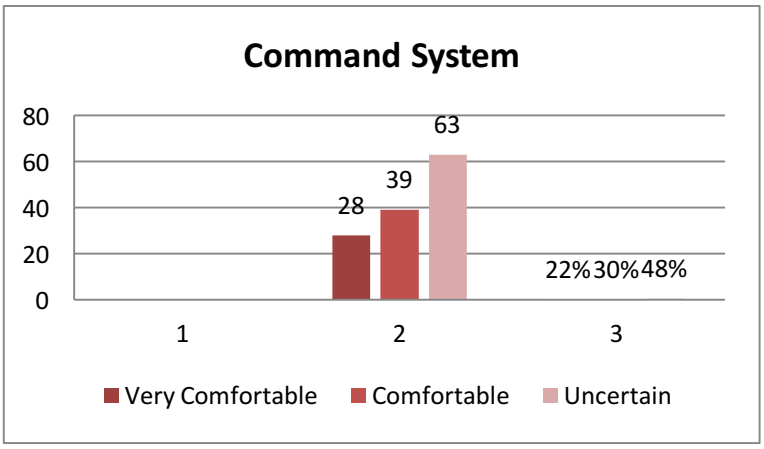


Figure 4.9 Command Systems.

The command system HMCAS MIR guide refers to scene safety, scene size up which includes a METHANE report as well triage that is made up of both a primary and secondary triage. More than sixty percent (63%) answered that they were uncertain with the command system whilst 39 % and 29% were either comfortable or very comfortable (Figure 4.9).

4.2.11 Scene Commander

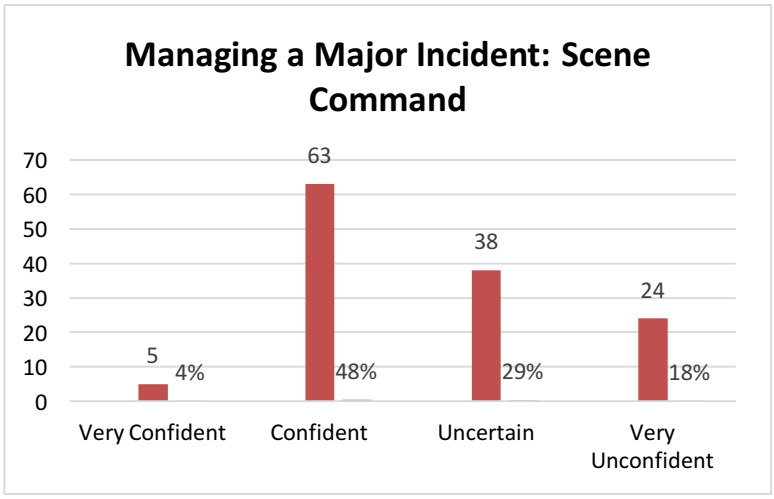
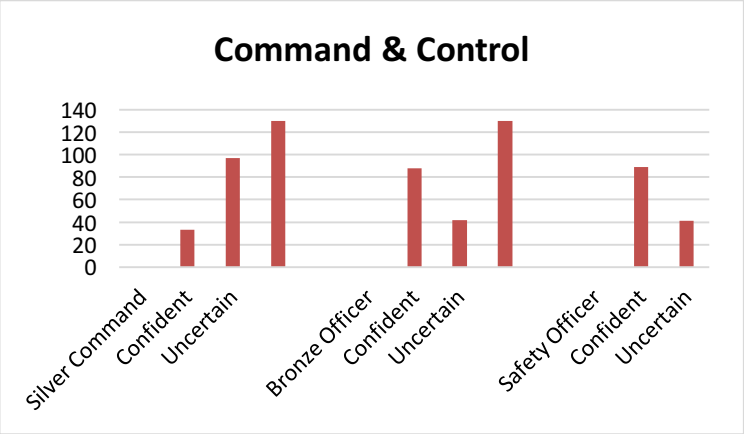


Figure 4.10 Managing a Major Incident as a Scene Commander

The duty of the first arriving unit (ambulance or first response car) has a specific function to perform at a major incident. This function is dictated by action cards within the MIR guide. Staff

on the first arriving unit takes the role as scene commander until someone more senior/experienced arrives and they can hand over the responsibility of scene commander. Graph 4.10 revealed that 48% of staff was confident in this role whilst 29% and 18% were uncertain or very unconfident respectively.

4.2.12 Command and Control



Graph 4.11: Confidence in working as Leaders in the Command & Control Structure

Staff within HMCAS, when working at a major incident, will be responsible in different roles and responsibilities. HMCAS MIR guide simplifies this into various command roles i.e. Silver Command and bronze officers. Safety at major incidents is another important role that must be considered in the event of a HAZMAT incident. 75% answered that they were not confident in the role as silver command whilst 68% were comfortable in the various bronze officer roles. 68% of staff was comfortable with working as a safety officer at a major incident.

4.2.13 Major Incident Response Guide

The MIR guide is detailed in its approach to the managing of major incidents. The guide consists of various sections that cover role and responsibilities, terminology, triage, scene layout, HAZMAT incidents and various other topics. This can be overwhelming to staff who are not familiar with major incident response therefore time has been taken to simplify details with the aim that staff use the guide in managing everyday incidents or a major incident as an ambulance service. Respondents (81%) answered that the MIR guide is understandable whilst 24% said that it was difficult.

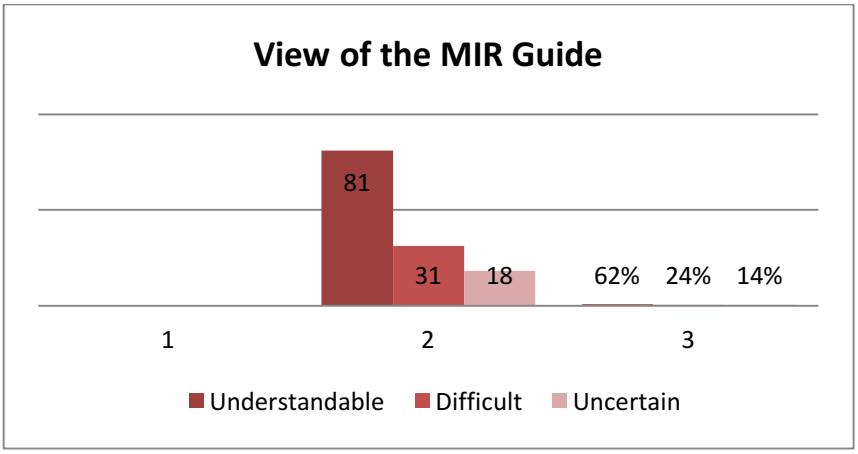


Figure 4.12 View of the Major Incident Response Guide

4.2.14 Updates/Training and Practical Exercises

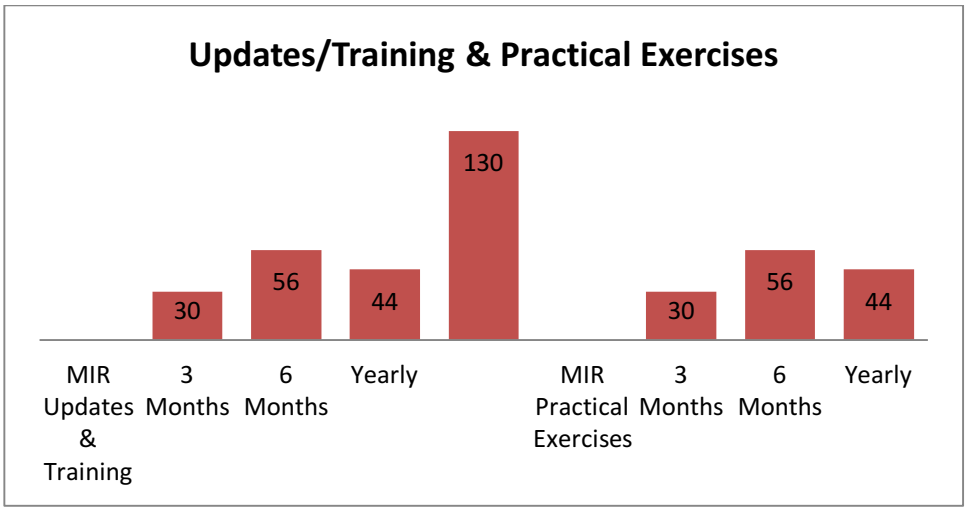


Figure 4.13 Frequency of Updates/Training and Practical Exercises

Figure 4.13 represents the answers to two questions. The results were consistent in both questions probably due to the similarity in the questions. 56 staff in both questions requested updates, training and exercises every 6 months which is greater than the yearly major incident response training that is suggested by agencies such as FEMA and the IFRC.

4.2.15 Training

Figure 4.14 Areas identified for Specific Training

In chapter 2 of this study various topics were discussed that are pertinent in major incident response. Figure 4.14 investigates the outcome of these topics with the inclusion of radio use because of HMCAS using different channels that can be used simultaneously in the event of major incidents. The results were equal across three of the areas (CBRN 32%, Triage 30% and Command 32%) requesting training in the specific areas whilst only 5 % identified radio use as requiring training.

4.2.16 Action Cards

Table 4.2 investigated the use of action cards during major incidents. An action card is a document that can assist staff in an orderly manner of what steps that needs to be followed in carrying out their assigned role (See Appendix E). Table 6 represents data that was collected from three questions on the use of action cards. 88 respondents (68%) had never used action

cards in the field whilst 92 (71%) said that they will use action cards if available. Interestingly 55% relied on memory as the reason for not using action cards.

Table 4.2 Action Cards

Use Of Action Cards During Major Incidents	Number	Percentage	Action Cards NOT Being Used During Major Incidents	Number	Percentage	Will Staff Use Action Cards	Number	Percentage
Always	10	8%	**Memory**	12	9%	**Yes**	92	71%
Sometimes	16	12%	**Use Experience**	71	55%	**No**	38	29%
Uncertain	8	6%	**Uncertain**	47	36%			
Not Often	8	6%						
Never	88	68%						

4.3 Conclusion

The data showed that there is a mixed response in the understanding of the major incident response guide. Triage, command and control and use of action cards showed that some staff understands the components that can be used to enable a response to major incidents effective. However, the results also showed that much work needs to be done with new staff that has joined HMCAS, as well as with the less experienced younger group. There are areas that show more can be done to make staff better understand the guide, preparedness and response to major incidents. The recommendations will be investigated in the proceeding chapter.

Chapter 5: Conclusion and Recommendations

5.1 Introduction

Various literatures indicate that EMS should be involved in disaster management and MIR. Education and training in disaster management is important (Alexander, 2006). The purpose of this study was to investigate the acquisition and retention of the HMCAS MIR plan by the organisations staff members.

This study concentrated on frontline HMCAS staff members that must be prepared to respond to major incidents daily. The study investigated concepts of MIR and training i.e. mitigation, preparedness, response and recovery. However, emphasis was placed on the response phase and what needs to be known and done at major incidents by HMCAS frontline paramedics.

The analysis of the data made a clear distinction of areas that need attention for the paramedics to learn and understand. These areas are command and control, triage, use of action cards and response to HAZMAT situations. There are also areas that highlighted the importance of staff training, education and practical work in major incidents. The study made it clear that there is room for improvement with staff understanding the major incident response guide and what steps need to be taken to make it easier for them to work at major incidents.

5.2 Conclusion

Conclusion 1: Factors contributing to non-acquisition and retention of the major incident response plan identified

An introductory course of the MIR plan alone is not sufficient for HMCAS staff members to grasp and understand in a single session. Staff members that join HMCAS are from different Nationalities and have different medical backgrounds when joining HMCAS. Staff experience played an important role in this study, as it showed in chapter 4, Figure 4.4 that older experienced staff 11-15 year working experience (*n-22*) were fewer than those in the 3-5 year working experience.

Conclusion 2: Current retention strategies are ineffective

Staff that undertook the survey indicated that there should be more practical training exercises/updates that must be incorporated into the MIR plan. This ideally should be done every 6 months with specific areas to concentrate on are command and control, triage, communications and HAZMAT. Currently when staff comes into HMCAS they undergo an orientation as well as training to either become AP or CCP certified in the State of Qatar. However, the major incident response component is an overview of what HMCAS must respond to major incidents and not a theory and practical component that is required for new staff to understand.

Conclusion 3: Need for Co-ordinated and an understanding in the ICS

Information gathered from this study regarding ICS indicated that staff were unclear with what an ICS is and the roles and responsibilities of an ICS. Staffs often arrives on scene to a major incident but end up taking orders from the commander on scene or a senior manager monitoring and giving orders over the radio. ICS have been in use in EMS for years but it is still not clearly understood and it lacks agency training or is deemed to be too easy. Training in ICS will assist to irradiate the weak understanding of ICS and unified command as discussed in detail in chapter two.

Conclusion 4: Failure in Communications

In any EMS organisation the number one cause for concern is communication. The hardware in any system will do what you as the end user will want it to do but getting EMS personnel to use it effectively is important. HMCAS uses various radio channels for its daily operations and if there is a major incident staff are expected how to navigate to the talk group that they are required to use. Communication requires EMS staff be willing and confident in knowing when and how to share information in major incidents.

Conclusion 5: Teaching, Learning and Exercises

Failure of HMCAS EMS staff to learn or understand the MIR plan drawn from this study is due to the failure or lack of systems to recognise and to propagate lessons. This is due to a lack of a systematic approach in teaching MIR. Areas covered in this study that staff within HMCAS needs to know to understand MIR will be covered in the recommendations. Not practising MIR within HMCAS by staff means that staff will revert to the way in which they understand response to MIR, and this may not always be the correct way or what is expected by HMCAS. Not practising MIR does not enable HMCAS to work out problems that may arise in an actual scene. An important factor that must be considered is exercising response to a major incident. This will enable staff to practise and management to refine responses to actual incidents. Training is covered in chapter 2 as well as in the recommendations of this research.

5.3 Study Limitations

To meet the objectives of this study a specific target population was chosen. The chosen population in this study were frontline EMS staff from HMCAS whose primary role is to respond to both critical and non-critical calls/cases in the State of Qatar. These frontline staffs are of different nationalities and have different years of experience and qualifications in EMS as discussed in chapter one. This population group was specifically chosen by the researcher due to frontline or first responders being the 'first' to arrive at a major incident.

In this study, a total of 130 questionnaires were answered which yielded a response rate of 100 percent. This was possible due to inviting participants to an orientation lecture as seen in Appendix A and an explanation of the study as seen in Appendix D. The researcher acknowledges that this study could have been extended to other divisions within HMCAS to include a larger target population.

5.4. Recommendations

The recommendations for this study flow from the findings. This will include areas that need training as a direct result of the findings of the study. The researcher also has extensive experience in the EMS environment specifically related to MIR. It is also recommended that

current international best practices be taken into consideration when teaching/training is used in MIR within HMCAS, as presented in chapter two.

Due to the lack of training in MIR as highlighted in the data analysis a MIR training course would need to be developed in conjunction with HMCAS training department.

This training or curriculum must involve the training educators so that a broader spectrum of staff can be reached (i.e. personnel from other departments within HMCAS) such as communications staff, HAZMAT staff, mobile doctor services, Life Flight and transfer and retrieval staff.

The training must include both theory and practical components and it must be suited for different levels of staff (qualifications/areas of responsibility) within HMCAS. The MIR guide must be used for training purposes so that staff are familiarised with aspects that they will need to be aware of and know what to do in the event of a major incident.

The command and control (Gold, Silver and Bronze), triage and hazmat are specifics that must be developed into the training program for all within HMCAS but it must be taught according to staff areas of responsibility. The executives and senior management must be taught gold and silver command structure, whilst at operations officer and supervisor level certain aspects of silver command and all aspects of bronze command must be taught. The AP and CCP training must concentrate on the first responders being able to declare a major incident understand what a METHANE report entails and being able to relay the report to the NCC. The appropriate use of the radio channel that is allocated by the command centre, use of actions cards and fully understanding how to undertake triage (primary and secondary) must be taught and understood for MIR to be understood or effective.

The main objectives that must be covered in training HMCAS staff to understand the response to major incidents must be done so that staff is able to:

- Recognise a major incident
- Declare a major incident at the appropriate level as stipulated in the HMCAS MIR guide
- Set up an appropriate/relevant command structure as per the MIR guidelines
- Be able to understand how to use the correct talk group and radio channel
- Be able to give a METHANE report
- Be able to undertake primary triage and in the case of a CCP undertake a secondary triage

- Understand the logistics behind managing a major incident
- Know that there is a pre-determined attendance (PDA) that is used in the event of a major incident
- Know that MIR staff are operational 24/7 in HMCAS and that they have a role to set up equipment/tents to assist frontline staff
- Be able to use the action cards
- Be involved in post major incident activities e.g. debrief

The development of a major incident training plan to incorporate the points mentioned above will assist staff within HMCAS to better understand the guide and use the guide as intended for appropriate major incident management use.

The practical component of training at major incidents as suggested by the answers received should be every 6 months and should include all aspects of the theory components. Fortunately, with the new establishment of the Ministry of Health in Qatar, all healthcare workers are mandated to register if they wish to practise their profession in the State of Qatar. This comes with a requirement of continued professional development (CPD) requirements, therefore by establishing a training module and having it CPD accredited will ensure that HMCAS staff will undergo training at least every 6 months.

Data from this research will be able to assist HMCAS executives and senior managers to use this information to better to better understand training requirements for themselves in managing major incidents as well as assisting staff to manage major incidents. Post development of a training module that can be used in conjunction with the MIR guide and the teaching of all frontline staff this research questionnaire should be repeated and an evaluation done to highlight any comparisons made if any in the development the understanding and perceptions of the major incident response guide in HMCAS paramedics.

The recommendations highlighted in this research are like the ones highlighted in the WADEM, 2004 document which are:

- The levels of response and role description
- The scope at what each level would need training to Should there be a competency requirement?
- Structure of the curriculum

- The mode and method of the delivery of the content i.e. lecture and practical exercises.
- Accreditation of the staff delivering the lectures
- Benchmarking against International standards and guidelines

Scott *et al.* (2010) points out the inadequate training objectivity and clarity when it came to understanding and training of health workers in disaster response. In assessing lessons learnt WADEM (2004) and Scott *et al.* (2010) agrees with the points mentioned below;

- Health workers should be able to know the importance of having to acquire disaster management knowledge and skills.
- This be able to be reproducible anywhere the healthcare worker practises.
- The content of the course should be able to be understood by any medical practitioner so that a complete 'interdisciplinary experience' can be developed.
- Training should be performance centred.

Of importance are the different sectors that disaster management/major incident response training should concentrate on as seen in Table 5.1.

Table 5.1 Competency Fields

Competency Fields
Incident Command
Safety of Personnel and PPE
Communications
Triage
Decontamination
Definition of a Disaster

Source: Scott, Carson & Greenwall, 2010

These recommendations should be incorporated within HMCAS training of new AP/CCP as well as those AP's and CCP's already in the system. The training received should ultimately

be geared towards all staff so that in the event of a major incident HMCAS staff is prepared and confident to respond to the incident.

This study highlighted that there is indeed a gap that exists in the acquisition and retention of the major incident response plan that is used by HMCAS paramedics. The MIR guide is a useful tool that was developed to assist in managing major incidents but it cannot be used in isolation. Training and education and its lack in disaster management/major incident response were highlighted by drawing comparisons from different authors and articles. Best practise and international recommendations were looked at and conclusions drawn from these studies/reviews were that EMS must train their staff in disaster management/major incident response.

This study investigated specific components from the HMCAS major incident response plan and the results indicated both positive and negative aspects when it came to staff understanding the major incident response plan within HMCAS. This study also provided opportunities to improve HMCAS staff capabilities by investigating areas that can be improved to better respond and manage major incidents should they occur in the State of Qatar.

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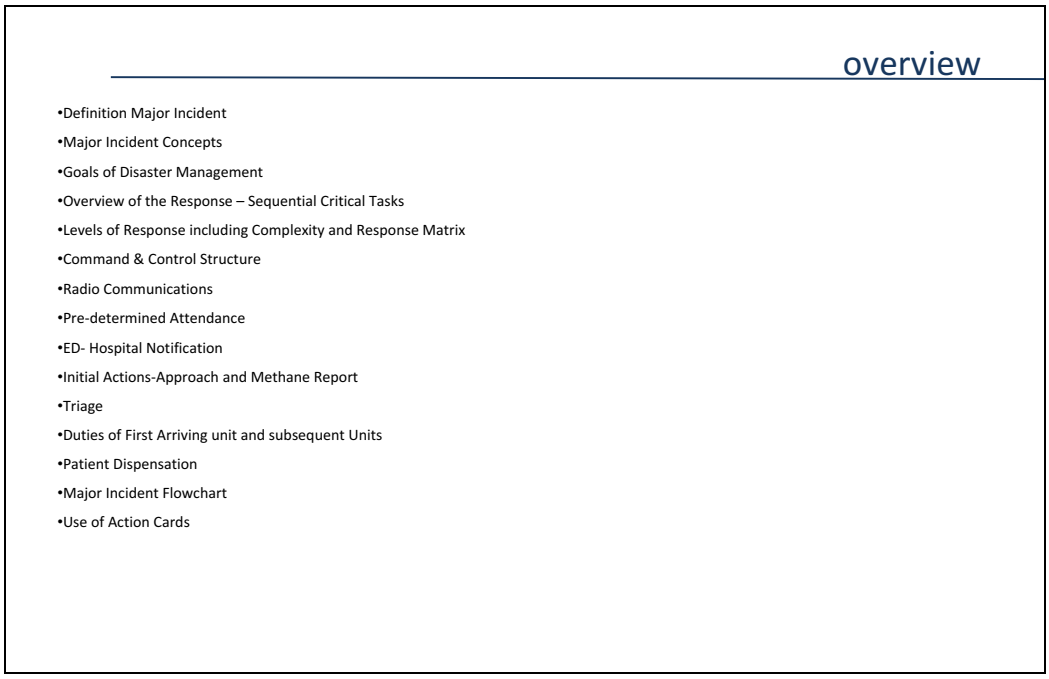
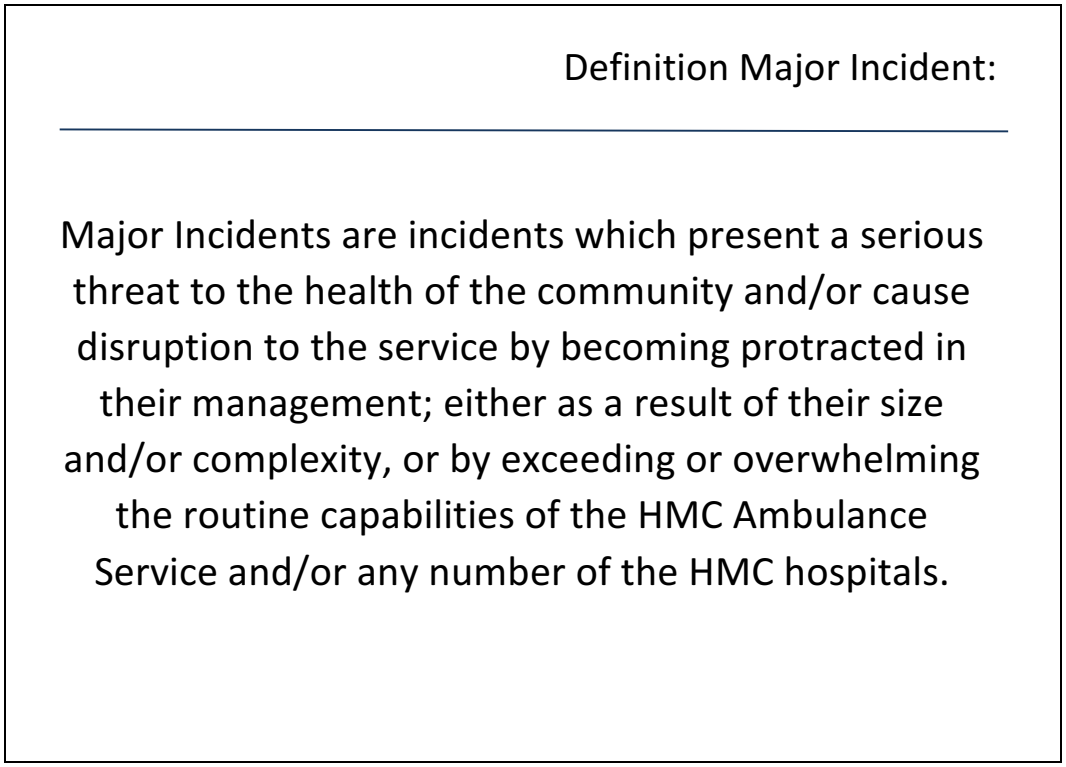
List of Appendices

Appendix A: Orientation Lecture: Major Incident Response



Slide 1



Slide 2

Major Incident: Concepts

Key Concepts

•The management of Major Incidents must be separated from normal business.

•Levels of response are used as indicators to determine what initial predetermined attendance is required and also what command and control structures need to be implemented.

•Escalation processes must be in place to respond to identified and/or growing needs on scene, or to deal with multiple incidents simultaneously.

•Organisations must have structured processes in place involving all departments in preparation for dealing with major incidents.

Slide 3

There are three primary goals of Major Incident Management:

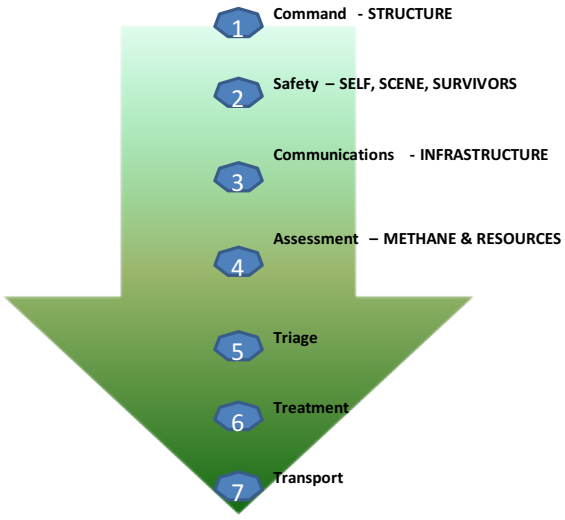
•Do the greatest good for the greatest number.

•Manage scarce resources.

•Do not relocate the disaster.

Slide 4

Overview of the Response – Sequential Critical Tasks



Slide 5

Levels of Response

ESCALATION	IMPACT	DESCRIPTION	SIGNIFICANCE
LEVEL 0	NONE	Significant Event	Routine/none
LEVEL 1	MILD	MajorEvent	Local Level
LEVEL 2	MAJOR	Disastrous Event	NationalLevel
LEVEL 3	SEVERE	Catastrophic Event	InternationalLevel

Slide 6

Response Matrix

NUMBER OF HIGH ACUITY PATIENTS	RED(P1)& YELLOW(P 2)	ESCALATION LEVEL				
	>100	LEVEL 3	LEVEL 3	LEVEL 3	LEVEL 3	LEVEL 3
	51-100	LEVEL 2	LEVEL 2	LEVEL 3	LEVEL 3	LEVEL 3
	21-50	LEVEL 2	LEVEL 2	LEVEL 2	LEVEL 3	LEVEL 3
	11-20	LEVEL 1	LEVEL 1	LEVEL 2	LEVEL 2	LEVEL 2
	6-10	LEVEL 0	LEVEL 1	LEVEL 1	LEVEL 2	LEVEL 2
	3-5	LEVEL 0	LEVEL 0	LEVEL 1	LEVEL 1	LEVEL 2
COMPLEXITY LEVEL		None	Low	Moderate	High	High
Time		<1hr	1-2hrs	2-4hrs	4-8hrs	>8hrs

Slide 7

Complexity Levels

COMPLEXITY LEVELS	DESCRIPTION
High	Not routine or it is an infrequently used procedure (e.g. CBRNe, airport emergency, etc.).
Moderate	Multi-agency (e.g. Police, Fire, etc.) or large numbers of personnel are deployed.
Low	Access to patients is difficult due to hazards, environmental or security factors.
None	Unobstructed access to and egress from patients

Slide 8

Command & Control Structure

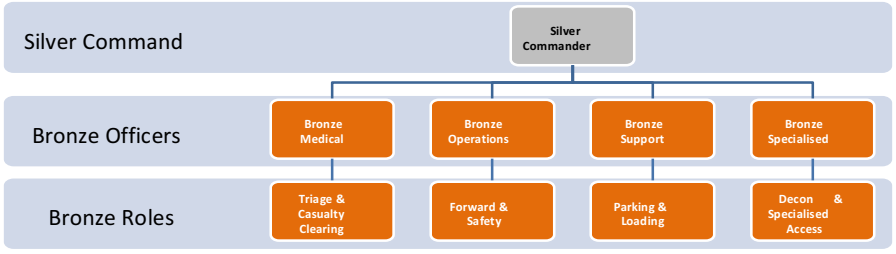
GOLD: (Strategic)
•Gold Command

SILVER: (Tactical)
•Incident Commander
•Sector Commander roles: Medical,Operations,Support and Specialised

BRONZE: (Skill)
•Triage/Casualty Clearing/Forward/Parking/Loading/Safety Zone •Bronze will report to Silver command under the respective silver command roles

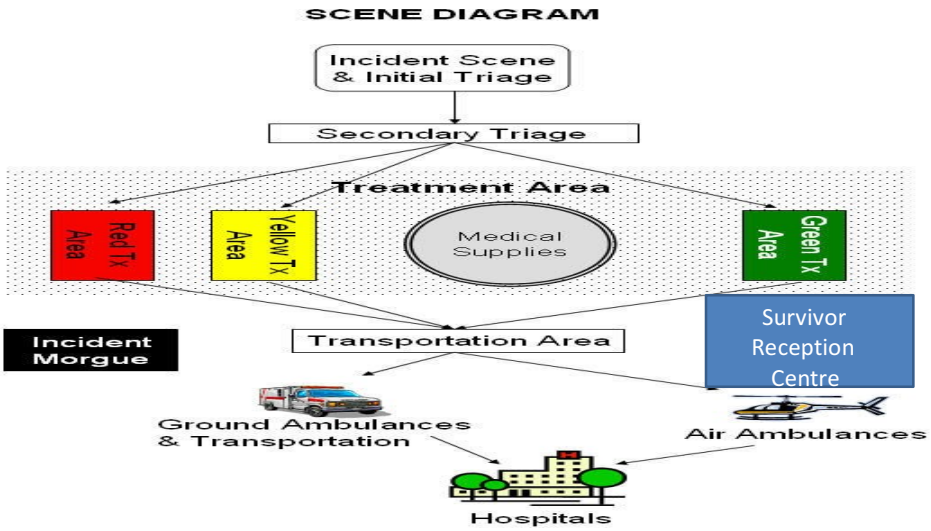
Slide 9

Command Structure: Level 0



Slide 10

Scene Layout



Slide 11

Radio Communications

- Command Structure will have 2 radios
- Radio channels will be Silver Major for command roles.
- MCI channel will be used for other roles.
- Command vehicle will carry a pool of radios
- Pg 44-46 of MIR guide discusses future radio channels.

Slide 12

Initial Actions-Approach

First Arriving Unit Responsibilities

It is the responsibility of the First Arriving Unit to establish Command and to perform the Initial Scene Size-up using the METHANE mnemonic and reporting the information to their Dispatcher:

M- MAJOR INCIDENT DECLARED *at appropriate LEVEL 1/2/3*
E -EXACT LOCATION *with map reference if possible*
T -TYPE OF INCIDENT *with details of structure and/or vehicle types, size, number*
H -HAZARDS *present and potential*
A -ACCESS ROUTES *and suitable Rendezvous Point (RVP)*
N -NUMBER OF PATIENTS *and severity*
E -EMERGENCY SERVICES *present and required, including equipment*

Slide 13

Triage

URGENCY	PRIORITY	COLOUR	DESCRIPTION
Immediate	P1	Red	Life-threatening
Urgent	P2	Yellow	Serious
Delayed	P3	Green	Minor
Dead	P0	White	Not breathing
Expectant	P4	Blue	Potentially un-survivable injuries

Slide 14

First Arriving Unit

•First Unit either as an Ambulance or first responder assumes initial Incident control (driver) and Incident Command (attendant) responsibilities until relieved by more senior commanders.
•First crew on scene should not attempt to rescue/treat casualties until relieved of their initial ‘first on scene’ roles by ambulance supervisors or managers.
•Pg 115-118 of MIR guide.

Slide 15

Second Arriving Unit

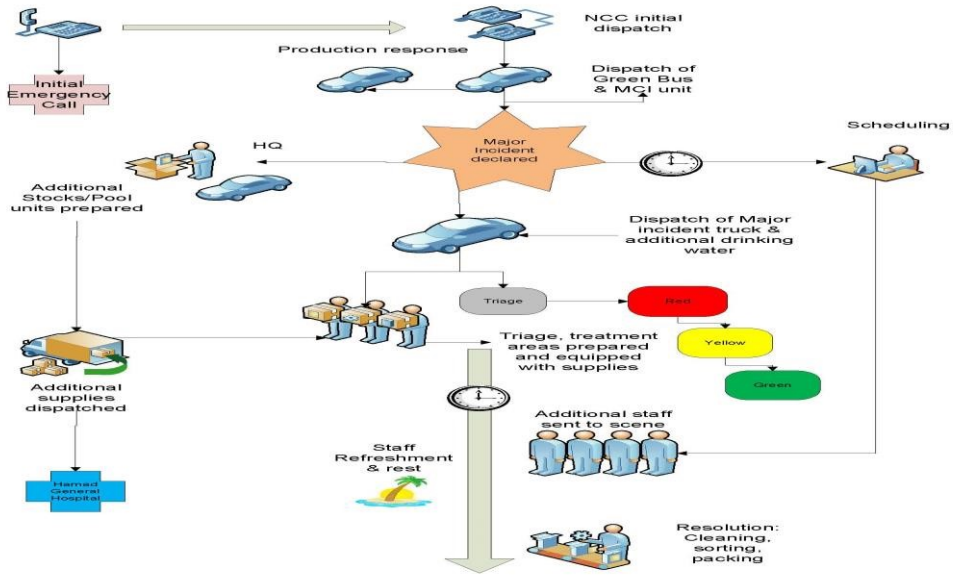
•Second arriving unit either as an Ambulance or first responder assumes initial Bronze parking (driver) and Bronze Primary Triage (Attendant) responsibilities until relieved of by more senior staff.

•Do not attempt to rescue/treat casualties until relieved of your initial ‘first on scene’ roles by ambulance supervisors or managers.

•Pg 115-118 of MIR guide.

Slide 16

Major Incident Flow Chart



Slide 17

The End

•Questions ?

Slide 18

Appendix B Questionnaire

INVESTIGATING THE ACQUISITION AND RETENTION OF THE MAJOR INCIDENT RESPONSE PLAN BY HAMAD MEDICAL CORPORATION AMBULANCE SERVICE PARAMEDICS

Thank you for answering the questions below, please mark only **ONE** answer per statement/question

Section A: About You

1. Gender of participant

Code	Option	Tick (√)
1	Female	
2	Male	

2. Age category of the participant in years

Code	Option	Tick (√)
1	21 to 25	
2	26 to 30	
3	31 to 39	
4	40 to 49	
5	> 50	

3. Qualifications of the participant

Code	Option	Tick (√)
1	EMT	
2	AP	
3	CCA	
4	CCP	
5	Manager	

4. Experience in HMCAS (years)

Code	Option	Tick (√)
1	< 2	
2	3 to 5	
3	6 to 10	
4	11 to 15	
5	16 to 19	
	> 20	

Section B: About the HMCAS Major Incident Response Plan

How would you describe yourself when working at a major incident?

Code	Option	Tick (√)
1	Calm and collected	
2	Nervous but sure	
3	Nervous and unsure	
4	Completely unsure	

How confident (*in no doubt*) are you with the HMCAS major incident plan?

Code	Option	Tick (√)
1	Very confident	
2	Confident	
3	Uncertain	
4	Little unconfident	
5	Very unconfident	

Section C: Regarding METHANE

How comfortable are you in giving a METHANE report?

Code	Option	Tick (√)
1	Very comfortable	
2	Comfortable	
3	Uncertain	
4	Uncomfortable	
5	Very uncomfortable	

Are you familiar with what a METHANE report is?

Code	Option	Tick (√)
1	Yes	
2	No	

If yes: Please write down what the individual letters in METHANE stand for (please DO NOT ask for help

M	
E	
T	
H	
A	
N	
E	

Section D: Regarding Triage

9. How comfortable are you in the Triage Process?

Code	Option	Tick (√)
1	Very comfortable	
2	Comfortable	
3	Uncertain	
4	Uncomfortable	
5	Very uncomfortable	

Section E: Regarding Command and Control

Your average major incident response in a month?

Code	Option	Tick (√)
1	None	
2	1	
3	2	
4	3	
5	4	
6	5 or more	

How comfortable are you in establishing a command System?

Code	Option	Tick (√)
1	Very comfortable	
2	Comfortable	
3	Uncertain	
4	Uncomfortable	
5	Very uncomfortable	

Are you confident in running a major incident as scene commander until someone more senior takes over as scene commander from you?

Code	Option	Tick (√)
1	Very confident	
2	Confident	
3	Uncertain	
4	Little unconfident	
5	Very unconfident	

13. Concerning your confidence in the command and control structure? Assuming the role as Silver Commander

Code	Option	Tick (√)
1	Very confident	
2	Confident	
3	Uncertain	
4	Little unconfident	
5	Very unconfident	

14. Concerning your confidence in the command and control structure? Assuming the role of Bronze Officers

Code	Option	Tick (√)
1	Very confident	
2	Confident	
3	Uncertain	
4	Little unconfident	
5	Very unconfident	

Section F: Regarding Action Cards

Have you used the action cards as an aid in running your post in a major incident?

Code	Option	Tick (√)
1	Always	
2	Sometimes	
3	Uncertain	
4	Not often	
5	Never	

If you do not use any action cards, what do you do?

Code	Option	Tick (√)
1	Use memory	
2	Rely on personal experience	
3	Uncertain	

Section G: Regarding the Major Incident Response Plan and Training

What is your view of the major incident response plan?

Code	Option	Tick (√)
1	Understandable	
2	Difficult to understand	
3	Uncertain	

How often do you feel you will need an update/training in major incident response according to the new plan?

Code	Option	Tick (√)
1	3 Months	
2	6 Months	
3	Yearly	

Doing more practical (in the field) major incident exercises?

Code	Option	Tick (√)
1	3 Months	
2	6 Months	
3	Yearly	

Which Section of the Plan do you think you will need more training on?

Code	Option	Tick (√)
1	CBRNe	
2	Triage	
3	Command structure	
4	Radio channels during MIR	

Do you feel that having action cards on you will assist you in managing a major incident?

Code	Option	Tick (√)
1	Yes	
2	No	

Thank you for completing this questionnaire. Please place the completed questionnaire in the sealed box.

Naven Pullian.
Senior Operations Manager: Specialised Emergency Management.
Hamad Medical Corporation Ambulance Services
Mobile: +97466255682
Email: NPullian@hamad.qa

Appendix C: Letter of Consent

INVESTIGATING THE ACQUISITION AND RETENTION OF THE MAJOR INCIDENT RESPONSE PLAN BY HAMAD MEDICAL CORPORATION AMBULANCE SERVICE PARAMEDICS

Letter of Consent

I ..... (Print name) fully understand and have been briefed on the contents of this study. I am aware that my participation in this is voluntary and may withdraw my consent at any time. I have no obligations to participating in the study.

Please √ (tick) below

☐ I agree to take part in the survey

Division: .....

Date……../……../.....

Signature……..

Contact:

Naven Pullian.

Senior Operations Manager: Specialised Emergency Management.

Hamad Medical Corporation Ambulance Services

Mobile: +97466255682

Email: NPullian@hamad.qa

Appendix D: Information Letter

INVESTIGATING THE ACQUISITION AND RETENTION OF THE MAJOR INCIDENT RESPONSE PLAN BY HAMAD MEDICAL CORPORATION AMBULANCE SERVICE PARAMEDICS

Dear Paramedic:

The aim of this study is to investigate the acquisition and retention of the major incident response plan by Hamad Medical Corporation Ambulance Service Paramedics.

Why is this study being done?

HMCAS has recently undertaken a major role in major incident response in the State of Qatar. The major incident response guide has been re-written according to latest research as well as due to the expansion of the HMCAS it has become even more important to have a unified response system in place to deal with major incidents. The major international sporting events that Qatar will be hosting demands as the National ambulance service we have a duty to be the best in what we do and understand why we do it.

What are the risks and discomforts of this study?

To maintain anonymity no personal details will be discussed or any other information will not be used so no one can identify you – so all of your responses are anonymous, and nothing that you answer could put yourself or your job at risk in any way. Your participation is voluntary. The questionnaires will be kept in a secured office accessible only by the research assistant and the principal researcher of the study. Only the principal researcher will view and document findings.

What will happen if you decide to take part in the study?

This should take about 15-20 minutes and the results of this study will be available after the all data is analyzed and the concluding findings of study written up.

Who do I speak to (or contact) if I have any questions about the study?

Please contact the principal researcher if you have any questions about the research. If you have any questions or concerns about your rights or welfare related to this research please

feel free to contact the University of the Free State, DIMTEC department (dimtec@ufs.ac.za/+27514019864).

Contact:

Naven Pullian.
Senior Operations Manager: Specialised Emergency Management.
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Mobile: +97466255682
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Appendix E: MIR Action Card

خدمة الإسعاف
Ambulance Service

مؤسسة حمد الطبية
Hamad Medical Corporation
HEALTH • EDUCATION • RESEARCH صحة • تعليم • بحوث

HMC Ambulance Service Major Incident Response Guide	MIR ref: 003
FIRST UNIT ON SCENE	**RADIO CALL SIGN** SILVER COMMAND

KEY ROLE	First arriving Unit either as an Ambulance or First Responder assuming initial Incident Control (Driver) & Incident Command (Attendant) responsibilities until relieved by more senior commanders

REPORTS TO:	**RESPONSE LEVEL**	**COMMANDER**	**RADIO CHANNEL**
	LEVEL 0 or 1	Gold Command	Gold Major
	LEVEL 2 or 3	Gold Command	Gold Major

NO.	TASK	COMPLETED ✓	COMPLETED ×
	FIRST AMBULANCE OR RESPONSE DRIVER		
1	Book 'On Scene' with NCC on designated channel		
2	Park as near to the scene as safety permits; do not leave vehicle		
3	Don high visibility clothing, safety boots & safety helmet		
4	Assume role of Silver Control (Call-sign: SILVER CONTROL)		
5	Leave flashing Emergency lights & Hazard warning lights 'ON'		
6	Maintain comms link between attendant & NCC		
7	Provide initial METHANE report to NCC from vehicle base radio		
8	Request additional resources as required		
9	Hold all staff at your vehicle until briefed by SILVER COMMAND		
10	Ensure all arriving staff wear PPE & bring triage packs		
	If first ambulance attendant on scene is alone (single crewed) then he/she will be responsible for carrying out the ATTENDANT duties described below >MIR 003(2)		
	MIR 003(2).....		

NOTES/ COMMENTS:

PUBLIC SAFETY SENSITIVE

MIR 003(1)