



# MONASH University

## A Comparison of Multi Casualty Incident Management and Training Between Victoria's and Israel's Ambulance Services.

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Signed

BIANCA JACKSON

Date: 5 April 2019

## ABSTRACT

In 2004 I had my first exposure working in an ambulance when I volunteered in Israel's ambulance service, Magen David Adom. As part of this experience I was trained to be able to work alongside paramedics working for MDA to treat patients and I was involved in a mass casualty incident training(MCI) course. This training course gave me some insight into the process that occurs during Israel during a mass casualty incident.

On completing my paramedic qualification in Victoria in 2008, I was able to draw a comparison between the training that I had received in Israel and the training that I had received in Victoria. This led me to my initial research question, *"Are there lessons that Emergency Management Victoria and Ambulance Victoria can learn from the experiences of the Israeli system when it comes to training for and responding to mass casualty incidents or disasters?"*

An initial literature review was conducted to establish any comparisons previously done between Ambulance Victoria(AV) and Magen David Adom(MDA) with regards to MCIs, however, nothing was found in the literature. This gap in the literature prompted me to compare the processes, protocols and doctrine that guide MCI management between AV an MDA.

Due to the constraints of the MPhil and the many ambulance services that exist within Australia, only Victoria was analysed and compared to the Israeli system. In Israel, Magen David Adom is the national ambulance service and hence Ambulance Victoria's structure and training is compared to that of MDA.

Ambulance Victoria's governing documentation regarding the responsibilities held during a mass casualty incident were sought from government websites. These included but were not limited to Emergency Management Victoria, Ambulance Victoria and Victorian Government websites.

The doctrine and protocols of Magen David Adom were sourced directly from Magen David Adom. I translated these documents from Hebrew to English for use in the thesis.

To be able to answer the problem statement and the research questions, a comparative analysis was undertaken using the WHO Mass Casualty Management System document as a conceptual framework (1). A comparative analysis was done between Victoria and Israel comparing the methods used to train paramedic students and qualified paramedics in managing MCIs. A second comparative analysis was done analysing the similarities and differences between how each service responds to a mass casualty incident and disaster.

Interviews with emergency managers from Ambulance Victoria and Magen David Adom were conducted to clarify information from documents sourced from both agencies. Ethics approval was gained from both agencies for these interviews.



When I compared the two systems, I became aware of differences in the way the two systems operated and trained their paramedics. A document review between the two services identified differences between the services procedures.

From my personal experience I felt there was a lack of training in Victoria in the area of MCI management and I began looking for evidence in the research for the best way of educating first responders how to manage MCIs. With very little found in the literature, I began searching how Victorian paramedics train to be prepared to respond to MCIs.

In Australia, the governing documents outlining the skills and the essential training required for paramedic students and graduates includes; the Council of Ambulance Authorities "*Professional competency standards for paramedics*"(2); Paramedics Australasia's "*Australasian competency standards for paramedics*"(3); and the Council of Ambulance Authorities "*Guidelines for the assessment and accreditation of entry-level paramedic education programs*"(4). None of these documents has extensive analysis of mass casualty incident training. Fitzgerald et al.'s monograph "*teaching emergency and disaster management in Australia: standards for higher education provider*" (5) outlines the framework for standards to be established. Such a framework would enable staff who are at the forefront of responding to mass casualty incidents to have a set of skills they could apply when managing these incidents.

With the rising interest in mass casualty incident management, some of the challenges that exist for ambulance services are that students are trained at different universities and each conduct their training differently. Another challenge that exists for ambulance services is how to best conduct refresher training for their paramedics in MCIs.

As a result of this finding, I critically analysed the course content from the five Victorian universities that produces paramedics. The data collected included the course content and structure and the training designs. This information was analysed for its uniformity and its adequacy. The thesis then outlines the training that exists for paramedics graduates once they are employed by Ambulance Victoria through their induction process and graduate year. In addition, the thesis examines what refresher training is available to qualified ambulance paramedics as they progress through their careers with limited exposure to mass casualty incidents.

This data highlighted the variations between each university and identified the differences that students were being exposed to when training to be ready to respond to a mass casualty incident. Thus, I became aware of a second gap in knowledge which was the lack of a structured set of standards that would guide the education providers in teaching MCI management to paramedics in Australia.

These findings were then compared to how training occurs in the Israeli ambulance service. Given its volatile history, Israel has become accustomed to terrorist attacks and wars. As such, ambulance paramedics in Israel have become well rehearsed at managing mass casualty incidents and often more than one concurrently. Hence this thesis draws a comparison between the way AV and MDA paramedics are trained in MCI.

Having been a paramedic for twelve years with Ambulance Victoria, I was able to draw on my own experiences when managing mass casualty incidents, as well as my exposure to mass casualty incident training. To be able to compare my experiences to the processes that occur in Israel, I participated in a four day Emergency Management Seminar in Israel in November 2018 which allowed me to gain a first hand insight into the workings of the ambulance service in Israel. As part of this seminar I had the opportunity to meet with MDA leaders in emergency management and training and learn from them.

My personal experience together with my participation in this seminar as well as the desktop review conducted as part of this thesis led me be able to make recommendations to AV and the Victorian health care system about lessons that can be learned from the Israeli system.

Based on my findings from the data collected from the Victorian universities, AV and MDA and my personal experiences both in AV and MDA, recommendations have been made at the conclusion of the thesis. These include recommendations for AV to trial the technologies and doctrines that drive the Israeli emergency management plans and response to a MCI. Recommendations are also made to AV, EMV and the tertiary institutions to improve MCI training for paramedics by collaborating and utilising the Victorian Emergency Management Institute training facilities in Mount Macedon. Recommendations are also made for a standardised framework to be established to guide paramedic education and training for MCIs.

The thesis concludes that this research was an important first step in understanding how AV, EMV and the Victorian universities can improve MCI education and training, utilising lessons learned from the Israeli system.

The thesis also concluded that a common MCI framework that is understood by all agencies allows for a co-ordinated approach to an incident. The cornerstone to effective MCI management includes good communication frameworks, with common terminology and a good understanding of the roles and responsibilities held by each agency in a MCI. The key to achieving a well coordinated response is multi-agency training.

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## GLOSSARY

ACU:	Australian Catholic University
AEOC:	Ambulance Emergency Operations Centre
ALS:	Advanced Life Support
AV:	Ambulance Victoria
BLS:	Basic Life Support
CAA:	Council of Ambulance Authorities
CBRNe:	Chemical Biological Radiological Nuclear Explosive events
CCP:	Casualty Clearing Point
DHHS:	Department of Health and Human Services
EMT:	Emergency Medical Technicians
EMU:	Emergency Management Unit (at Ambulance Victoria)
EMV:	Emergency Management Victoria
EMS:	Emergency Medical System
ERP:	Emergency Response Plan
ETHANE:	Exact location; Type of incident; Hazards; Access and egress; Number of patients; Extra services needed
FEMO:	Field Emergency Medical Officer
GIS:	Geographic Information Systems
HAZMAT:	Hazardous Materials
HFC:	Home Front Command
IHC	Incident Health Commander
MCI:	Multi Casualty Incident
MDA:	Magen David Adom
MICA:	Mobile Intensive Care Ambulance
NEMA:	National Emergency Management Authority (Israel)
PA:	Paramedics Australasia
PPCS:	Paramedic Professional Competency Standards
PPE:	Personal Protective Equipment
SCC:	State Control Centre
SHC:	State Health Commander
SHERA:	State Health Emergency Response Arrangements

SHERP:	State Health Emergency Response Plan
SITREP:	Situation Report
TO:	Transport / Triage Officer
USAR:	Urban Search and Rescue
VEMI:	Victorian Emergency Management Institute
VU:	Victoria University
WHO:	World Health Organisation

## PROLEGMENON<sup>1</sup>

To be able to present this thesis, I want to acknowledge the ways in which my personal experiences have influenced my research journey. My personal experience and career as a paramedic in Victoria together with my connections to Israel have guided and shaped my approach to this research thesis. I recognise that there is subjectivity in shaping my research questions and the methodology I have selected to answer these questions.

This Prolegomenon aims to identify for the reader my background that has led to this research and influenced my interpretation of the information.

My thesis comes from a passion of mine that existed from when I first volunteered for Magen David Adom in Israel in 2004. This passion was in mass casualty incident management and training. Over the years I have been exposed to a number of different training courses as I embarked on the Monash University Bachelor of Emergency Health (Paramedic). My skills were further enhanced as I qualified as an ambulance paramedics for Ambulance Victoria in 2007 and my passions grew.

As a paramedic working for Ambulance Victoria I was involved with the Burnley Tunnel incident in 2008 in which a car accident within the tunnel caused a fire. In this incident, I was part of the first crew that arrived on the scene and it was my job, along with my partner, to initially co-ordinate the scene and to manage the three hundred patients that were walking towards us from within the tunnel. As a result of this experience, I started to question whether my training was adequate to be able to manage such an incident in the best way possible. I was also enrolled in a graduate diploma in emergency management at Monash University at the time and in both my undergraduate degree and this graduate diploma I had completed the Emergo train training module which was the most current way of training Victorian paramedics in Mass Casualty Incident (MCI) training. Despite this training I still felt ill equipped to manage these types of incidents well.

While working as an ambulance paramedic in Ambulance Victoria I was exposed to multiple mass casualty incidents in which I had to draw on the skills I had acquired through my university training and also my training within AV.

As an active member of the Victorian Jewish Community I have very strong ties with the ambulance service in Israel (Magen David Adom) and have very strong ties with the emergency management staff as well as the heads of departments within Magen David Adom. I have lived in Israel for the period of one year and visited the country on many more occasions both for holidays as well as for educational purposes. I have a great insight into the community in Israel as I have family living in Israel and have lived there myself. I have a good insight to Israel's emergency systems and their ambulance service through my educational

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<sup>1</sup> Prefatory remarks; specifically: a formal essay or critical discussion serving to introduce and interpret an extended work. <https://www.merriam-webster.com/dictionary/prolegomenon>

training, my volunteering experiences on road with MDA and also from my time living in Israel.

I also recently participated in an International Emergency Management Seminar in Israel where I learned the processes and doctrine that drive the MDA MCI response to a mass casualty incident. I was honoured to be invited to present at this seminar to a group of emergency doctors, nurses, paramedics and managers from around the world. The presentation covered the structure of Ambulance Victoria and the way AV responds to MCIs and how we currently train our paramedics to be prepared to respond to such incidents. I also presented the research that I had done to date on this thesis. As part of this four day emergency management seminar, I worked on-road as part of an ambulance crew responding to patients.

In addition to my Bachelor of Emergency Health (Paramedic), I have also completed the four unit Graduate Certificate in Emergency Health (Disaster Preparedness and Response) at Monash University. Within my MPhil I successfully completed two additional core research subjects MIR 5110 *Responsible Research Practices* Project management in the emergency and disaster setting and MIR 5120 *research and evaluation in disaster preparedness and management*. I have also completed the MPhil 'advanced professional development' requirement by completing the emergency management seminar in Israel in 2018 where I participated in a four day seminar including a MCI exercise. I have also regularly attended MUDRI HDR colloquia and quarterly Forums conducted at Monash University with my colleagues from the Masters program.

## Chapter One: INTRODUCTION

*This chapter explains the background that led to my research and how the problem statement came about. It identifies how the research questions were developed, and why it is an important piece of research for the profession.*

### 1.0 : Introduction to this study

The Australian climate and landscape is such that the country is subject to numerous natural disasters including bushfires, floods and storms. In recent times, Australia has also seen terrorism on its doorstep. As a practicing paramedic of over 10 years in Ambulance Victoria (AV), I feel that my experience and my training for responding to mass casualty incidents (MCI) such as these was not adequate.

The 2009 bushfires in Victoria were one of the worst natural disasters in Australia's history. The State Health Emergency Response Plan (SHERP) was activated by Ambulance Victoria early on, Victoria's Emergency Medical Response and the Burn Plan were tested by this natural disaster. The results of these fires were a small number of serious burns and community infrastructure was destroyed. However the health care system was not put under significant stress and coped well. (6) Had the health care system been forced to cope with the stresses placed on burns centres and emergency services during the September 11 terrorist attack, would it have been prepared?(7)

More recently, in November 2016 Victoria saw an episode of thunderstorm asthma overwhelm its emergency response capacity. This was evidence of an unexpected emergency that had a very rapid onset. During this emergency, Ambulance Victoria's resources were stretched and ten victims died waiting for ambulances to arrive and emergency departments were overwhelmed by patients arriving in respiratory distress. This event led me to question whether we could respond in a better way.

This thesis will identify how paramedics are trained in Mass Casualty Incidents, - both in their undergraduate training as well as in their graduate training once employed by AV. AV emergency managers were interviewed to gain an understanding of the ongoing training that occurs for paramedics through their careers to allow for the best response in a mass casualty situation. These results were compared to the training that occurs with Magen David Adom (MDA) in Israel and managers from MDA were interviewed to provide a comparison.

The elements of the Israeli emergency response system and disaster arrangements have been tested repeatedly. Over time, Israel has developed and implemented a successful framework and doctrine to deal with mass casualty incidents. MDA continue to update their protocols as they learn from the debriefs of actual MCIs. The Israeli emergency response is so well versed that medical teams from Israel are deployed on a regular basis to assist in managing major world disasters and incidents.

Koenig and Shultz note that “many countries and cultures conduct disaster exercises. In the United States, Federal Emergency Management Agency and DHS have conducted disaster and terrorism exercises several times that span all levels of government, involving thousands of leaders and responders. Few countries, however conduct exercises that involve not only all levels of government, health and medical responders, and the private sector, but also fully integrate the nationwide citizenry”(8). However training in disaster preparedness in Israel involves the entire country including its citizens.

In June 2004, the then Premier, Steve Bracks, announced an agreement between the Alfred Hospital in Melbourne and Jerusalem’s Hadassah Hospital. The aim of this agreement was to exchange medical and research knowledge with the hope of boosting the Alfred hospital’s preparedness for a terrorist attack (7). The same could apply to both ambulance services in Israel and Victoria.

### 1.1 My background

Having spent time volunteering in the Israeli Ambulance Service – Magen David Adom, it became evident to me that they are the experts in responding to mass casualty incidents and disasters. “There are lessons to be learned from countries, such as Israel, that have dealt with this on an ongoing basis”(7). As a result of its volatile history and the many terrorist attacks that have occurred on its soil, Israel has become accustomed to dealing with large scale disasters. Israel’s response to mass casualty incidents has become the everyday business of the emergency management response. My experience in Israel made me question the readiness of Victorian paramedics as well as emergency services to cope with major incidents.

After graduating from Monash University with my paramedic degree, I was employed by AV in 2007 and spent twelve months as a graduate paramedic working with a clinical instructor. In my time working as a paramedic, I have attended many minor mass casualty events. I have attended car accidents with multiple patients, I was involved in the evacuation of some nursing homes during one of Victoria heatwaves and I was involved with the Burnley Tunnel incident in 2008. It was as a result of being the transport officer during this incident that I started to question whether my training was adequate to be able to manage such an incident in the best way possible. I began to question how undergraduate paramedic students are trained as well as how graduate paramedics employed by AV are trained in their graduate year.

As a Qualified Paramedic, I enrolled in an emergency management graduate course through Monash University. In both my undergraduate and graduate courses I had completed MCI scenarios using the Emergo Train System (9) which was the most current way of training Victorian paramedics in MCI training at the time. Despite this training, I still felt ill equipped to manage these types of incidents effectively.

In November 2018, I participated in an international emergency management seminar in Israel. During the seminar I learned the processes and doctrine underlying the MCI response of the Emergency Medical Service (EMS) in Israel. As part of the seminar I had the opportunity to be involved in a real MCI scenario

whereby approximately thirty young children were shot at as they disembarked from a bus. Within this real life scenario I played the role of the incident commander, allowing me to put the processes of the EMS system in Israel into practice. This experience allowed me to be able to compare both the Victorian and Israeli MCI protocols. Having held the incident commander role at this scenario and having participated in emergo training in Victoria, after this seminar I felt confident to be able to compare the effectiveness of the training modules from both Israel and Victoria.

## 1.2 Problem statement

As a paramedic with many years of experience working on road for Ambulance Victoria, I began to question the readiness of our paramedic workforce to respond to MCIs. My professional experience led me to question whether paramedics could be better trained to manage the increasing MCI workload. Given my exposure to the system that exists in Israel I felt that the training received by paramedics in Israel as well as the emergency response to MCI in Israel was better than in Victoria.

In Victoria in recent times we have seen the Tullamarine plane crash, the Bourke street incident as well as a number of natural disasters such as Gippsland fires. Although these events are not common, they are important because their successful management from a health perspective is dependant on the actions taken by the first paramedic crew and the subsequent ambulance management. Because these events are uncommon there is a skills maintenance element that is a challenge to AV. The whole health system is dependant on the initial crew and the health commanders at the scene. These events are known to impact on the mental health of paramedics and this is an important part of the problem. Given the restrictions of the MPhil this aspect of managing MCIs will not be addressed in the thesis rather this is a recognition that this plays a big part in the process.

## 1.3 Aims

The aim for this thesis is to gain an understanding of the different approaches to the policies, doctrine and procedures as well as the training modules in MCI of both MDA and AV.

The second aim of the thesis is to do a comparative analysis of the training modules that exist in the Victorian Universities. I analyse the training that occurs within AV for its graduates and its paramedic staff and management. I will also outline whether there is any inter-agency training.

This thesis analyses the training available to undergraduate paramedics, graduates within AV and ongoing training for AV paramedics throughout their career. The need for additional training together with other emergency services will also be analysed, with the aim of being able to make recommendations based on my findings.

I will then compare this to how training is undertaken in Israel. The ultimate goal of this research is to underpin the development of a mass casualty incident



training program to be run at the Victorian universities and to improve the training that occurs within AV. The purpose is to be able to make recommendations for improvements to the Victorian approach to mass casualty incident management and training.

#### 1.4 Initial research question

The initial research question to be answered through this comparative analysis will be:

*“are there lessons that Emergency Management Victoria and Ambulance Victoria can learn from the experiences of the Israeli ambulance service when it comes to training for and responding to mass casualty incidents?”*

#### 1.5 Scope

The thesis will look at the Israeli system as a whole, however, due to the many differences that exist throughout Australian ambulance services, only Ambulance Victoria will be analysed and compared to the Israeli national system for this thesis. In terms of the disaster cycle, this thesis looks mainly at the response phase with some mention of the preparation phase including training for incidents and MCI. However due to the limitation of the project, recovery and debrief will be omitted from the thesis.

#### 1.6 Key definitions

According to the World Health Organisation, “a mass casualty incident is defined as an event which generates more patients at one time than locally available resources can manage using routine procedures. It requires exceptional emergency arrangements and additional or extraordinary assistance. It is also defined as any event resulting in a number of victims large enough to disrupt the normal course of emergency and health care services”(1).

Emergency Management Victoria’s State Health Emergency Response Plan defines a mass casualty incident as “an emergency involving such numbers and severity of casualties for which normal local resources for response may be inadequate.” (10)

A MCI is defined by MDA as an event whereby the resources of treatment capacity in the field are not sufficient for the duration of the required time to treat each person. (11)

For the purpose of the thesis, MCI definition will include WHO, EMV and MDA definitions where the need for resources outweighs the availability of resources to treat all the patients at the incident.

## 1.7 Structure of the thesis

Chapter one outlines the background that lead to the research questions. Chapter two describes the literature review process undertaken to begin the research. Chapter three outlines the research design chosen to collect data to analyse to answer the research questions. Chapter four describes the organisational overview of Ambulance Victoria (AV) and Magen David Adom(MDA) and gives a general background and understanding of the two services. Chapter five outlines the operation and response from both AV and MDA and chapter six discussed the education and training in MCIs between AV and MDA. Chapter seven reflects the discussion of the key finding from the research including recommendations. Chapter eight concludes the thesis.

*With an understanding of where the research has come from and the framework within which it will be explored, chapter two will outline the literature review that began the research project.*

## Chapter 2: LITERATURE REVIEW

*Chapter two details the initial search strategies used to search the literature for relevant articles and outlines where the documents were sourced from for the document review. The chapter outlines the revised research questions that are explored through the research.*

### 2.0 Introduction to the literature review

The idea for my thesis came from my previous experience within MDA as a paramedic volunteer and subsequently my working experience within AV as a paramedic. Given the exposure and training that I received in Israel from MDA to respond to MCIs I felt that more could be done within the Victorian space. Hence a research question developed. Prior to beginning my research I conducted an initial literature review to ascertain if there had been any research comparing the Victorian and Israeli ambulance systems. After a comprehensive search through Medline, PubMed and Embase no articles were found that compared the training of paramedics in MCIs between these two services. I further searched for this comparison in the grey literature searching google scholar using key words including Ambulance Victoria and Magen David Adom and Mass Casualty Incident and Training. I was unable to find any comparisons between the two systems in the literature. In recent times with the increase in frequency and the impact of natural disasters and terror attacks internationally, there has been an increased interest in how to train staff to be able to adequately manage MCIs. This preliminary review together with my experiences both as a volunteer for MDA and an ambulance paramedic for AV led me to establish my literature review question.

### 2.1 Literature review question

My literature review was established to answer the following questions,

1. What literature has been published comparing the Victorian and Israeli ambulance systems?

A search strategy was formulated to conduct the literature review.

### 2.2 Search Strategy

#### 2.2.1 peer reviewed literature

Smith et al's. article sought to identify where peer-reviewed publications describing disasters were to be found. The research identified that "peer-reviewed, event specific literature is published in a wide variety of multi-disciplinary journals, where the type of literature published depends on the type of disaster"(12). The article also identified that the journals in which these articles were published also differed depending on the type of disaster. Smith et al's article concludes that "while the majority of peer-reviewed, event specific literature is indexed in MEDLINE, comprehensive search strategies should

include EMBASE to increase yield”(12). Hence, the peer reviewed literature for this thesis will include a search of PUBMED, MEDLINE and EMBASE.

The MeSH terms used to search peer-reviewed literature will include:

Victoria / Israel / Ambulance / Emergency /crisis/ Disaster / Catastrophe / Event/ Hazard/Emergency Management system / Paramedic / SYSTEM / EDUCATION / Mitigation / response/ recovery / pre-hospital care / training program / EMS / terrorism / war / mass casualty incident / earthquakes / floods / hurricanes / tsunamis / natural disasters/ triage / surge capacity / decontamination / emergency shelter / emergency preparedness / disaster risk reduction /training

Articles were be limited to English and Hebrew articles were searched for separately.

### 2.2.2 Grey literature

A search on GOOGLE SCHOLAR was conducted to search for policy documents and governmental documents in the grey literature. By searching Google Scholar using keywords “mass casualty incident” and “Israel” a number of articles were found that looked at the lessons to be learned from Israel’s response to mass casualty incidents. A search was also conducted on GOOGLE SCHOLAR to search for mass casualty incident training and pre hospital. Of the articles found, none of them addressed the pre hospital setting.

### 2.2.3 Secondary search

A secondary search was conducted using relevant articles that were referenced in articles found in my search. Throughout my research I was also exposed to more articles and documents that were not found in the initial literature review. These articles and document have been analysed and included in the thesis.

### 2.2.4 Inclusion criteria / exclusion criteria

Articles were included if they were in English or Hebrew and mentioned Victoria and Israel and considered MCIs and outlined either or both ambulance operations and/or paramedic training.

## 2.3 Results of literature review

A search of comparative studies between Israel and Victoria’s ambulance service was conducted through Google Scholar however was unable to find any articles. Similarly when searching through PUBMED and MEDLINE and EMBASE no

articles were found using Magen David Adom “and” Ambulance Victoria as keywords.

Only twelve articles were found on MEDLINE using the keyword “Ambulance Victoria” with only one of those twelve relating to emergency management. This one article was not relevant to the topics being addressed in this thesis as it did not meet the inclusion criteria.

I was surprised to find such little information in the literature and hence given the lack of comparative studies that exist between the two services, this thesis draws comparisons between AV and MDA by using a desktop document review.

My aim for collecting data was to analyse the documents that exist from AV, EMV and MDA. I interviewed managers from AV and MDA to clarify and interpret the documents.

## 2.4 Revised research questions

The initial research question to be answered through this comparative analysis remained :

*“Are there lessons that Emergency Management Victoria and Ambulance Victoria can learn from the experiences of the Israeli ambulance service when it comes to training for and responding to mass casualty incidents or disasters?”*

With the further analysis of the information available to me, I revised my research questions to include the following secondary questions:

*What is the organisational setting of AV and MDA in which the emergency response occurs?*

*What is the MCI response in AV and MDA? Are there lessons to be learned from each organisations?*

*What training is done to prepare paramedics to respond to MCIs in AV and MDA? Are there lessons to be learned from each organisation?*

## 2.5 Summary

After conducting a thorough systematic literature review I was able to identify the gaps in the research that further contributed to my final research question. The literature review saw a desktop review of the documentation that governs the emergency response to MCI in both AV and MDA. These seemed to differ in a number of areas and I began to search for why this was the case. This led me to search for the way students in their tertiary education were being taught the theory behind MCI management. In addition to this I studied the different practical and tutorial elements that were conducted as part of the tertiary subjects that focussed on MCI management. From this information I understood why students arrive to AV as student graduates with different abilities and

strengths in MCI management as they embark on their ambulance career. From here I embarked on a search of AV's intranet to seek the possible training programs available to graduate and qualified paramedics to provide refresher training. As part of this search I also looked more broadly into the multi-agency training and found very few training events that involved AV paramedics.

*The findings of the literature review as well as the desktop comparison clarified the challenges that exist within the area of training students and qualified paramedics to be prepared to manage mass casualty incidents and disasters. The literature review and the desktop review developed my research methodology which are outlined in chapter three.*

## Chapter 3: RESEARCH DESIGN

*Chapter three outlines the conceptual framework and research methodology used for this thesis. Ethics approval was sought from both countries for this thesis and is outlined in this chapter.*

### 3.0 Conceptual framework

Utilising my personal professional experience in the setting of two ambulance authorities, AV and MDA, this thesis is a profession-based, applied research project.

The conceptual framework I have adopted for this thesis is the guiding principles of the World Health Organisation (WHO) Mass Casualty Management Systems document (1).

Comparisons between the two organisations were done using the WHO Mass Casualty Management System headings with one additional inclusion to these criteria. This thesis focuses on training in MCI and hence this heading is added as an additional heading (number eight). The headings are:

1. Clear lines of response
2. All hazard applicability
3. Scalability
4. Whole of Health
5. Knowledge base
6. Multi-sectorial
7. National Policies which enable local solutions / doctrine
8. Training in MCI management

I have chosen the WHO mass casualty headings (1) to use as a conceptual framework as the model suited the purpose of this research. These guidelines are an international standard used by countries around the world to structure their MCI systems and develop MCI plans.

Israel has an emergency management system and ambulance service that has been tested time and time again. From the disasters, terrorism and MCIs that occur regularly in Israel, MDA have been able to test and improve their systems. My previous experience volunteering on road with the MDA ambulance gave me insights into how the ambulance service responds to MCIs and how prepared they are due to their training and education.

Managers from MDA have been to Victoria and met with department members from AV's Emergency Management Unit. In 2008 I brought an elite group of MDA staff and managers who are well versed in emergency management and MCI training and response to Victoria to present at the Australian College of Ambulance Paramedics conference. They delivered on "how Israel and MDA

prepare and respond to terrorism and MCIs". Clear links and connections have been established between MDA and the Victorian Jewish and wider communities.

Due to the time and scope of the MPhil the comparison will only be between the two systems however further research can be done in this area Australia wide in the future.

The thesis will draw comparisons between the Israeli emergency management system and the Victorian emergency management system by using the above headings as a framework for comparison. The thesis is divided into two areas for comparison. The first is a comparison of the response that each organisation has to an MCI. The second is the training of paramedics in MCIs.

This thesis is an applied thesis based on professional experience. This thesis will not analyse the effectiveness of the way each service operates but will rather analyse what is being done in each service in terms of MCI training and response to MCI.

### 3.1 Methodology

The methodology used for this thesis involved four parts. Initially, I undertook a literature search to identify if there was any literature comparing the Victorian and Israeli systems with regards to MCI management. The literature review led me to revise the research questions and influenced the subsequent methodologies used throughout the thesis.

Second, given the lack of literature that existed on the topic, to be able to describe the MCI system in Victoria and Israel, a desktop review was done of relevant documents. The documents that were used to be able to analyse the two services were;

- 1) AVs Emergency Response Plan(ERP) (13)
- 2) SHERP (11) / SHERA (14)
- 3) Emergency Management Manual Victoria (15)
- 4) Magen David Adom Standard Operating Procedures. (11)

Thirdly, once the system in each country was understood, a desktop review of the policies and doctrine that govern the response to an MCI were explored. Documents that were accessed from AV and Government departments were all available in the public domain. These included but were not limited to SHERP, SHERA, EMMV and AVs policies and procedures. Some documents were requested by representatives from AV emergency management unit and clarification of content was sought with managers from the department. The documents that were required from Israel were restricted documents with no public access available. As a result, ethics approval was obtained in 2018. As a result of the ethics approval, the standard operating procedures were provided to me by Guy Caspi (Director of HAZ-MAT, Exercises and operational training Department of MDA). These were written in Hebrew and I spent considerable time translating them into English.



My experience as a paramedic at AV for the past thirteen years gave me the personal experience to be able to draw on with regards to the Victorian response to a MCI.

To be able to adequately compare this to the way MDA respond to MCI I attended an emergency management seminar in Israel in November 2018. The four day seminar included information delivered in a series of lectures about how MDA respond to MCIs. As part of the seminar I spent time working as part of the MDA ambulance crew responding to emergencies. The seminar also included the opportunity to participate in a live MCI drill where the MDA MCI response process was rehearsed. As part of this drill I had the opportunity to have the incident commander role where I was able to rehearse the MCI protocols used by MDA. This experience gave me the ability to compare the two services and identify the similarities and differences when responding to a MCI or disaster. As part of this seminar I was invited to present an overview of MCI management in Victoria and present my thesis to the seminar participants.

The fourth part of the methodology for this thesis was to understand how paramedics in Victoria and Israel are trained to be prepared to respond to MCIs. In Victoria this included the training for

- university students
- AV entry level graduates and the first graduate year
- qualified ambulance paramedics – refresher training and skills maintenance
- multi agency training

Information from Victoria was sourced from websites and university guides were sourced from course coordinators. I sought clarification regarding aspects of the course outline from course coordinators. All information that was accessed were documents that were available in the public domain in Victoria. A document review was performed. Where necessary, information was clarified with an appropriate representative from the agency. A critical analysis of a components of the undergraduate paramedic program was done.

National competency standards for paramedics as well as nursing standards were used to provide a comparison.

Information regarding training within MDA was sought mainly through an interview with the director of HAZ-MAT, exercises and operational training from MDA. Further information was also gained through lecture style material delivered during an emergency management seminar that I attended in Israel in November 2018.

Information about training and response with MDA and AV was clarified using interviews with heads of organisations. These include Justin Dunlop (Acting Emergency Management Director AV) and Guy Caspi (Director of HAZ-MAT, Exercises and Operational Training Department at Magen David Adom in Israel)

Both the interviewees were approached to participate in the research interview via an email addressed to their work email addresses. Each participant was provided with an Explanatory Statement (*attachment 3*) describing the research

and how the interview would be carried out and how the data collected would be used. Both interviewees signed a consent form (*attachment 4*).

The interview used an 'interview guide approach' so that each of the managers were asked similar questions (*attachment 5*). This allowed for an analysis of the differences that exist between the organisations. This was approved by the ethics committee.

Using this methodology, this thesis compares and analyses the doctrine and protocols governing emergency management response between AV and MDA. The thesis also compares the training for MCI between Victorian paramedics and how paramedics in MDA are trained.

### 3.2 Governance and ethics

In preparing the ethics application a risk assessment was undertaken because I was concerned and aware that there were dangers in travelling to Israel.

I worked through a structured risk assessment and risk management process through Monash University as part of the processes of gaining approval to travel to Tel Aviv as part of this research.

#### 3.2.1 ethics approval

Ethics approval was sought from both Monash University as well as from Magen David Adom in Israel.

##### 3.2.1a Australia (Monash University)

Ethics approval was granted by Monash University Human Research Ethics Committee (MUHREC 2014) on 22<sup>nd</sup> November 2018. (*attachment 1*)

##### 3.2.1b Israel (Magen David Adom)

Ethics approval was granted by Magen David Adom research committee on 5<sup>th</sup> May 2018 (0-2018-4701-000688). (*attachment 2*)

*To be able to compare the similarities and differences between the two organisations, first an understanding of the background of each organisation is needed. Chapter four will outline AV and MDA's organisational structure.*

## Chapter 4: ORGANISATIONAL OVERVIEW

*Chapter four outlines the background of AV and MDA to lay the background to understand how each organisations respond to MCIs.*

### 4.1 Ambulance Victoria

Ambulance Victoria services a population of over six million people, 4.6 million whom live in the greater Melbourne area”(16). Victoria’s population is centred around large urban areas. More than 70 per cent of the population reside in the greater Melbourne area. Ambulance Victoria has 260 different locations providing medical response in metropolitan, rural and remote areas. Paramedics respond to 1600 emergency incidents daily. 3400 paramedics as well as 1000 community emergency response team volunteers and community officers make up the Ambulance Victoria workforce (16).

#### 4.1.1 AV background

During the 2016-2017 financial year AV responded to almost 850,000 cases. For the same period the Emergency Response Plan (ERP) was escalated 1878 times including 56 orange and 4 red escalations (described in table two). Victoria has a number of hazards including:

- Bush and structural fires
- Heat wave
- Flood
- Storm
- Thunderstorm asthma
- Active armed offender/ terrorism
- Hazardous material
- Pandemic influenza
- Mine failure
- Electricity supply disruption
- Transport infrastructure emergency
- Earthquake
- Liquid fuel shortage” (13)

One of AV’s priorities outlined in the strategic plan is planning for, and responding to major events and emergencies. The ERP notes, “We have a unique role to work with our emergency management partners in critical events and emergencies. We will share our knowledge and expertise and learn from reviews, to contribute to planning for major emergencies, and build our capability to respond well.” (13)

Ambulance Victoria has the capacity to respond the following resources to a multi casualty incident if required:

- A single bed ambulance
- Single responder unit (that does not have the capacity to transport patients)
- Mobile Intensive Care Ambulance (MICA)
- Four Wheel Drive
- Complex Patient Ambulance Vehicle (this vehicle has the ability to transport bariatric and complex needs patients)
- Bicycle Response Unit
- Emergency Response Vehicle (This vehicle carries enough medical supplies and equipment to treat 200 patients. AV has two of these vehicles)
- Command and Communications Vehicle
- Health commander vehicle ( this provides a workspace and infrastructure for managers at the scene)
- Protective Equipment Vehicle
- Field Primary Care Clinic (this has the equipment to allow for a temporary GP clinic)
- Community Health assessment centre (this requires the involvement of Department of health and human services together with AV to be deployed)
- Air ambulance (fixed wing and rotary wing)
- Community emergency response team (CERT)

There are a range of staff that can be dispatched to a multi casualty incident. These include:

- Ambulance Paramedics (ALS)
- MICA Paramedics
- Flight Paramedics
- Clinical Support officers
- Referral service paramedics
- Ambulance Community Officers
- Community Emergency Response Teams
- Remote Area Nurses
- Retrieval Physician
- Ambulance Transport Attendant
- Patient Transport Officer
- Field Emergency Medical Officers

#### 4.2 Magen David Adom

Magen David Adom was established in 1930 as the National ambulance service in Israel. It was established to provide medical services to Jewish communities in Palestine. Today MDA in Israel is the national organization responsible for emergency pre-hospital medical care and blood services. They provide life

saving services to the people of Israel at sea, in the mountains and on the roads. MDA also coordinates the national blood bank.

#### 4.2.1 Background and structure of the EMS in Israel

According to the Central Bureau of Statistics, Israel's population stands at 8,972,000 as we entered 2019. (17) MDA provides the immediate medical response to the population during states of emergency and war times. MDA respond to a yearly average of 700,000 emergency calls. (18) "In the last 20 years, there have been approximately 100 terrorism-related MCIs caused by both explosions by suicide bombings and in close-range shootings"(19). Hence, MDA crews have a great deal of experience in dealing with mass casualty incidents (MCIs) as a result of terrorism. "During these incidents, MDA utilizes and amasses a considerable response, enabling the teams at the scene—including First Responders as well as ambulances—to evacuate all priority patients within 20 minutes of the first call received at the dispatch centre"(19).

MDA is divided into 10 regions. Today MDA is comprised of 1050 BLS ambulances and intensive care ambulances, 500 medi-cycles, 2 helicopters, 24 Multi casualty response vehicles, 2200 employees and 22,000 volunteers, 7500 first responders and 17000 life guardians.

**Life guardians** are medical professionals who have registered with MDA and can be contacted if they are seen to be one of the closest five people to where the patient is located. These individuals carry epipens in the event of an anaphylactic emergency. A similar program has recently been introduced in Victoria.

**First responders** are volunteers who take an MDA medical kit home with them and do one volunteer shift with MDA per week. These volunteers are given scooters to take home and are required to respond to at least one call per day. (20)

The Magen David Adom fleet is comprised of:

- Standard Ambulances (BLS)
- Mobile Advanced Life Support Units (ALS)
- Mobile Mass Casualty Incident Units (MMCIU)
- Command and Control Vehicle
- Ambulances equipped with 4 X 4 wheel drive
- All Terrain Vehicle
- MDA Helicopter
- ALS Motor cycles
- Advanced Life Support Motorcycles
- Supervisor Vehicle.

- Front Command Vehicle
- Tomcar (can evacuate from seaside, unpaved road, narrow passage)
- MDA have T3 vehicles which are small motorized vehicles, equipped with CPR and first aid equipment, which allow the crew member to stand 25 cm taller than the crowd
- In a MCI a supervisor vehicle can also be dispatched to the scene. This vehicle is equipped with a camera that can provide a live feed back to the dispatchers. The dispatch centre can control the camera to assist them with managing the incident.

“The **Command and Control Vehicle** is used for command and control during incidents and for medical aid in complex situations. On board the vehicle there is a special camera which can be remotely controlled from the control centre and which helps the Control Centre in handling a mass casualty incident, enabling personnel to obtain a view of the situation”(21).

Regular **BLS** ambulances are operated by a 2 emergency medical technicians (EMTs), or one technician and a National Service volunteer. The ambulance is equipped with Basic Life Support equipment, providing preliminary response to the wounded or sick individual until he is brought to the emergency room or until the intensive care ambulance arrives. The intensive care ambulances (**ALS**) have one driver and one paramedic (equivalent to Mobile intensive care paramedic in Victoria).

Magen David Adom also have a **Mobile Mass Casualty Incident Unit (MMCIU)**. This is a portable equipment storage unit, with contains large quantities of first aid equipment. The MMCIU is dispatched to the field during MCIs or when providing security to an event which is expected to be attended by many participants.

MDA also has a **Front Command Vehicle (FCV)** that was specially crafted to meet MDA requirements and can be positioned anywhere and serve as an independent Control Centre, allowing control of MDA forces in the field. The FCV is equipped with sophisticated radio systems, computers, telephones, fax and additional means of command and control.

There are a number of different treatment levels within MDA. These include:

1. First Aid

This is medical treatment based on basic knowledge from the population and can include opening airways and performing resuscitations, stopping external bleeding, fixing limbs and covering wounds and burns

2. Basic Life Support

This is medical treatment provided by a qualified emergency medical technician that can include CPR. These technicians are trained in airway management using respirators, oropharyngeal

airway, oxygen administration, intravenous cannulation, spinal fixation and normal delivery (labour).

3. Intermediate life support

This is treatment provided by a senior medic. Treatments include CPR, identification of basic arrhythmias and the use of semi-automatic defibrillators, all basic life support techniques as well as the identification of medication, and determining priorities for treatment and evacuation.

4. Advanced Life Support

This is medical treatment provided by a paramedic or physician which includes all basic and intermediate life support skills. However an advanced life support paramedic also has the capability to surgically open an airway, perform manual defibrillation, synchronised cardioversion, perform respiration with an electric or pneumatic respirator, decompress a chest, central venous catheterisation and drug therapies according to approved protocols.

MDA has the ability to use the Israeli Defence Force (IDF) to assist in their emergency response. Their tasks include;

- 1) to reinforce medial forces if required
- 2) assisting with medical treatment and evacuations if injuries are urgent or assistance is required to move casualties from difficult to access locations
- 3) paramedics can be flown to the scene with the assistance of the IDF. Blood products can also be flown to the scene.
- 4) Assistance with secondary relocation between hospitals if necessary
- 5) assist in command and control

MDA can also utilise the skills of the fire brigade in their response to extricate and rescue patients, treat in environmental risks, the treatment of hazardous substances and they can provide assistance in lighting and special equipment. Likewise in Victoria fire and emergency services provide similar support.

At a MCI, bystanders are an invaluable resource as they can often deliver life saving procedures immediately to those in need (for example opening an airway or controlling a haemorrhage). In Israel the population has a good sound basic medical training that they receive during their military training. This enables good bystander assistance as they have a good understanding of how to provide life saving skills in such circumstances. In MDA's emergency plans it outlines the procedures to allow bystanders on the scene to be able to administer advanced medical care, however due to MDA's rapid reinforcement of medical responders the need to delay evacuations is uncommon and casualties are generally evacuated rapidly to hospitals.(22)

There are many challenges faced in Israel today with regards to responding to MCI. The first challenge is that while most people live in the cities, Israel has a very large area in the south that is desert and if a MCI should occur in the south it can be difficult to get ambulances to the scene quickly and to evacuate the patients quickly. The second challenge is that Israel has begun to see that there are more than one terrorist at an individual scene making the scene very unsafe. Once chaos has been caused and rescuers arrive to help, the second terrorist will attack and kill even more people including rescuers. Another challenge is determining exactly what has occurred at the scene for example, is it a car accident or is the car ramming multiple victims along multiple locations along the street? Given how quickly first responders arrive to the scene of an incident, MDA is facing a challenge that these volunteers will arrive before police and hence the scene has not been secured by police.

During the seminar I attended in Israel, I learned about the “7 minute program” whereby members of the public are taught life saving procedures they can perform in a MCI while waiting (the average of seven minutes) for the ambulance to arrive. Those first minutes prior to the arrival of an ambulance are crucial. Regardless of one’s medical background the program focuses on the concept of early intervention and cooperating with medical professionals in MCIs. The skills taught to participants can mean the difference between life and death. The principles of saving the masses instead of focusing on one patient is emphasized. The program encourages utilising basic tools and common sense to ensure safety, rescue patients using simple procedures such as haemorrhage control and provide basic first aid. Similar approaches are being considered in Victoria

As part of the seminar I participated in a MCI drill where I held the position of incident commander. This drill was filmed using a drone that allowed a relevant debrief to occur after the drill. Being able to utilise the footage captured on the drone, allowed for analysis of the processes and decisions made to manage the scene during the drill. The footage provided a platform in which a discussion could occur with the entire group of participants as to what was done well and what could have been improved. It provided very relevant feedback to the incident commander but also allowed other participants who didn’t have this role to understand the decision making that occurred in real time by the incident commander.

#### 4.2.2 How does one become a paramedic in Israel?

In Israel from the age of fifteen, citizens are able to volunteer on the ambulances. Volunteers receive a thorough training course run by MDA and are often the second person on the ambulance along with an EMT.

After volunteering for a number of years a volunteer can choose to commence the EMT course and become a driver in the MDA ambulance service. The EMTs are BLS trained.

After some years of experience as an EMT, one can opt to commence the paramedic training which qualifies them to the level of ALS however these paramedics also have the equivalent of the MICA skills in Victoria.



### 4.3 Summary

While there are many similarities that exist between AV and MDA, there are also many differences. From the desktop review of the documents governing the response to an MCI as well as the training that occurs between each organisation in MCIs, I believe there are lessons that AV can learn from MDA. This is further discussed in chapters six and seven.

*With an understanding of AV and MDA's ambulance systems, chapter five will outline the MCI response from both organisations and will outline the training that occurs in each organisation in MCIs and disasters.*

## Chapter 5: OPERATIONS AND RESPONSE

*Chapter five outlines the operations and response to MCIs of both AV and MDA.*

Documents such as State Health Emergency Response Plan (SHERP) and Emergency Response Plan (ERP) were searched for and located on department websites. These included Emergency Management Victoria website, Department of Health and Human Services website, Ambulance Victoria website and includes Hebrew documents sent from managers from Magen David Adom in Israel. I spent considerable time translating these documents from Hebrew to English for use in this thesis.

University unit guides were sources directly from each university in Victoria that produces paramedics. Heads of courses were spoken to for clarification of information within the unit guides.

Further data from Israel was gained by participating in a mass casualty drill in November 2018 and ethics approval has been granted for this.

Managers from Ambulance Victoria and Magen David Adom were interviewed to collect other relevant data for analysis.

### 5.1 Ambulance Victoria

AV are part of the MCI response, often being the first part of the process as initial crews arrive on scene. AV's processes and protocols fit into SHERP and SHERA as part of a coordinated response.

#### 5.1.1 Operations (AV)

##### 5.1.1.1 SHERP / SHERA

AV works within the SHERP arrangements set out by the department of health and human services. EMV have released edition four of the State Health Emergency Response Plan (SHERP). SHERP outlines the arrangements that exist for the management of health emergencies within Victoria and covers all emergency health professionals working in this field including paramedics, doctors, nurses, and public health care workers. SHERP is a sub plan of SERP.

"The capability of ambulance services to manage the pre-hospital component of emergency management needs to be enshrined in our emergency management thinking, structure and procedures" (23).

SHERP is a document that outlines the arrangements for the management of health related emergencies within Victoria. SHERP describes the integrated approach required from the Department of Health and Human Services along with the emergency management sector, the health system and the community. AVs role at a MCI or disaster is outlined within this document.

SHERP defines a health emergency as “an incident or emerging risk to the health of the community members, from whatever cause that requires a significant and coordinated effort to ensure the health system can effectively respond and mitigate the adverse health consequences for communities”(10).

One of the objectives outlined by SHERP is that the document is intended to “provide clarity on roles, responsibilities escalation and communication channels to enable an effective, and efficient health emergency response” (10). Along with department of health and human services, AV are the lead agency responsible for a health emergency response. The plan outlines an integrated response to health emergencies whereby the health command is coordinated in the pre-hospital setting, the health coordination is provided by hospitals and health services and these two are in communication with public health command. Having a clear understanding of the role that each stakeholder provides in an emergency ensures that response coordination is clear.

SHERP embeds an “all communities, all emergencies” approach into its plan. This means that a resilience based approach can be achieved whereby disaster management is not the sole responsibility of the emergency services, rather it is shared by individuals, communities, businesses and governments.

The health emergency response capability relies on the Victorian Preparedness Framework 2017. This describes the “health emergency response capability as involving the planning, provisioning, response and coordination of pre-hospital and health emergency care, including triage, treatment and distribution of patients in a timely and structured manner using all available resources to maximise positive health outcomes”(24).

The SHERP document outlines in section 5.3.1 *Health service planning* that it is “important that health service providers develop and exercise their plans as part of normal business operations to minimise service interruption and health consequences for communities in the event of an emergency”(10).

The State Health Emergency Response Arrangements (SHERA) provides an outline of the arrangements between DHHS and the emergency management sector, the health system and the community. Day to day emergencies can be managed by the respective emergency organisations. However when a significant emergency occurs where a significant and coordinated effort is required to mitigate any adverse health outcomes to the community SHERA is used to allow for coordinated response by the health sector.

DHHS are the control agency for the following

- biological materials, including leaks and spills
- radioactive materials, including leaks and spills
- retail food contamination
- food / drinking water contamination
- human disease (including mass, rapid onset human disease from any cause).

**Other health emergencies** (for which DHHS is a support agency), such as:

- natural disasters with health impacts, such as bushfires, floods, storms or extreme heat
- deliberate acts resulting in casualties, such as warlike acts, acts of terrorism, hi-jacks, sieges or riots
- other mass or complex casualty situations, such as structure fires, drug overdoses or stampedes at mass gatherings or public events, and transport incidents.

The *Emergency Management Act 1986* and the *Emergency Management Act 2013* form the empowering legislation for the management of emergencies in Victoria.

“Under this plan, DHHS and AV work together as the key government agencies that lead a health emergency response. Hospitals, both public and private, also play a critical role in response to health emergencies. Depending on the nature of an emergency, a broader range of health service providers and experts may also be involved to achieve the best possible health outcomes for affected community members. For example, emergencies of longer duration or widely dispersed in nature, may require additional response capacity and capability and this may involve first aid agencies, general practitioners (GPs), community pharmacists, and field emergency medical officers or coordinators”(14).

The arrangements outlined in this document provide lines of communication between the three key health systems

- 1) health command (pre-hospital)
- 2) health coordination (hospital and health services)
- 3) public health command

The purpose of these outlines are so that roles and responsibilities for decision making and response coordination are clear and well understood by all stakeholders in a health emergency.

EMV works together with the emergency management commissioner to implement the emergency management agenda and strengthen Victorias capacity to prepare for, respond to and recover from emergencies (the before, during and after response).

The EMV is responsible for designing, implementing and monitoring integrated emergency management frameworks for Victoria. Under EMV's capacity and response banner, they are responsible for improving and developing better capacity and response through exercises and training strategies including training frameworks. The EMV also take responsibility for learning lessons from emergencies that occur and improve policies and procedures based on these learning's. EMV coordinate relief and recovery and are also responsible for sending out community warnings and alerts. EMV also manage the state and regional control centres.

According to the Emergency Management Act 2013 – Section three, emergencies are classified into classes. Class one emergencies include hazards such as “fire, or any other major emergency for which the Metropolitan Fire and Emergency Services Board, the Country Fire Authority or the Victorian State Emergency Service authority is the control agency under the state emergency response plan”(25). Class two emergencies are classified as “a major emergency which is not a class one emergency or a warlike act of terrorism whether directly at Victoria or part of Victoria or any other state or territory of the Commonwealth, or a hi-jack, siege or riot”(25). Class three emergencies relate to security threats.

For class one and class two emergencies, EMV are responsible for coordinating the activities of all agencies involved including outlining the roles and responsibilities for all agencies involved. EMV integrate the various organisations involved in a response to ensure effective and efficient response before during and after an incident or event. The common goal of EMV is to keep the community safe. The foundation underpinning the EMV goal is the principle of resilience. The capacity of the community to respond, recover and rebuild after an emergency is more important than the cause of the emergency.

All emergency management policies and processes are guided by legislation, specifically *The Emergency Management Act 2013*. The act sets the objective of an “all-hazards – all agencies” approach to emergency management. To achieve these goals, the approach must include networked arrangements and excellent interoperability.

“The Emergency Management Commissioner has overall responsibility for coordination before, during and after major emergencies including management of consequences of an emergency. The appointment falls under the Emergency Management Act 2013”(25) . The Emergency Management Commissioner is responsible for coordinating the emergency management system before, during and after the event for Class one and two emergencies. Class three emergencies which are security related are managed by Victoria Police. The Commissioner is also responsible for managing the State Control Centre, consequence management and coordinating recovery for all emergencies.

“As Victoria’s first Emergency Management Commissioner, Craig Lapsley believed the shift to an “all communities, all emergencies” approach to emergency management would ensure a systematic and coordinated approach before, during and after major emergencies. “It is an opportunity for the alignment of strategy, planning and investment across multiple agencies, to champion unified information systems, a culture of information sharing, and a sharp and deliberate focus on better decision making with the community as a central partner in emergency management”(26).

The Chief Executive of Emergency Management Victoria is responsible for the day to day management of Emergency Management Victoria, and the coordination of investment planning for large scale strategic projects for the responder agencies including major procurement and communications and information systems.

Relationships are critical for EMV’s effectiveness. Hence EMV work with communities, government, agencies and business to strengthen their overall capacity to withstand, plan for, respond to and recover from emergencies. This

ensures there is a well established and understood shared responsibility. Better community resilience will ensure a better post emergency recovery.

“By putting the community firmly at the centre they’re strengthening resilience, response and recovery plans, policy and operations before, during and after emergencies. Their collaborative approach ensures all agencies and departments have clear emergency management accountabilities, retain their identities core purpose and community relationships as we all work towards growing resilience. At the core of the sector’s strategies, programs and actions is building safer and more resilient communities. This is the foundation under which Victoria operates”(26).

In 2016 the Victorian Emergency Management Institute was established with the intention of emergency services, private sector, local government, volunteer organisations and many more institutions to utilise the facility and enhance their training capacities. “The Victorian Emergency Management Institute (VEMI) will give emergency management personnel more training and education opportunities to learn new skills and build capabilities in preparing, responding and recovering from emergencies. AV, CFA, Parks Victoria, Department of Health and Human Services, MFB, VICSES and many other departments, municipalities and agencies are expected to use the training facility. Set on six and a half acres, the VEMI includes a simulation centre, theatre and has enough room to accommodate almost 60 people” (26)

During class two health emergencies, under SHERP, AV is responsible for deploying Health Commanders to the relevant tiers to coordinate the health response. SHERP has a Health Impact matrix that utilises information gathered from hospitals, ambulances, general practitioners and other monitoring services to identify the level of the health impact as being low medium major or severe. This matrix assists in the escalation process and provides a framework in which to operate. “The matrix informs a number of decisions by the relevant functional leader to ensure the health system can effectively respond and mitigate the adverse health consequences of an incident”(26).

#### 5.1.1.2 Mass Casualty and pre hospital operational response plan

One of the sub plans of SHERA is the mass casualty and pre-hospital operational response plan. This document outlines the process that should occur when there is an incident in Victoria. It begins by outlining the role of the community in the health response and then defines that an incident health commander is established as medical professionals arrive to the incident. Specialist health and medical personnel can be dispatched to the incident scene at the request of the State Health Commander. The response plan outlines the ambulances role to manage the incident by allocating an incident health commander to the scene of the incident. The health commander’s role is outlined in this document. An incident strategy should be established by the incident tier in conjunction with the incident controller. The roles of the incident tier health incident management team are outlined here and incorporates the incident management system

principles of delegating the functions of operations, planning and logistics as the incident increases in size and complexity.

An example of the structure of the incident command can be seen in figure one below

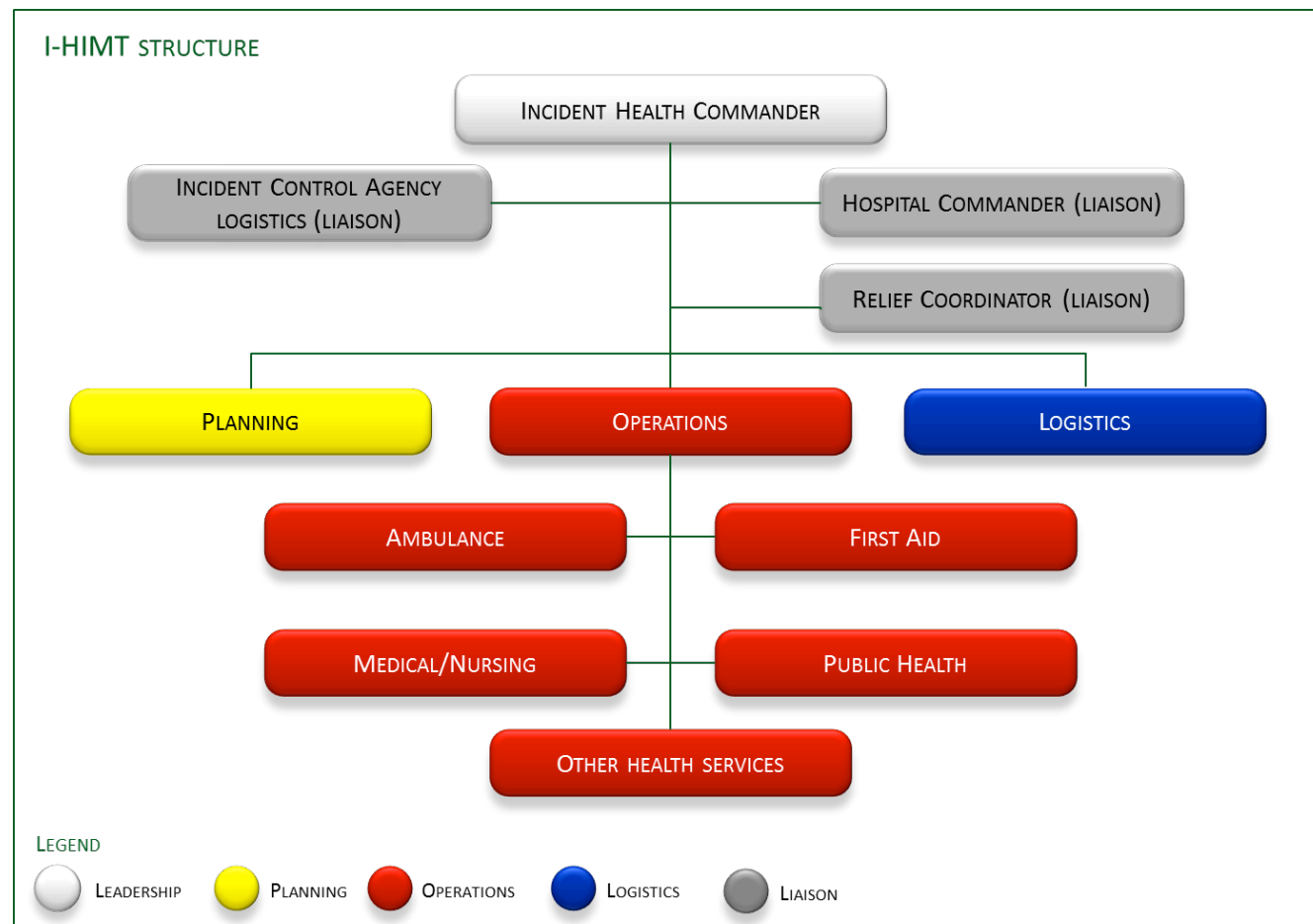


Figure 1: Example of Incident Health Incident Management Team (27)

In a complex incident the document outlines how to sectorize the area and allocate incident health commanders to each sector.

The plan outlines the ETHANE notification required from ambulance paramedics on scene and outlines scene management beginning with scene safety. The document then outlines how to “manage people” based on a triage system based on the sieve and sort triage method. The triage codes can be found in figure two below.






<b>Triage priority</b>	<b>Code</b>	<b>Comment</b>
Priority 1	Red 	Transport priority; move to a casualty clearing point
Priority 2	Yellow 	Delayed transport; move to a casualty clearing point
Priority 3	Green 	Walking wounded, potential to discharge at scene; move to a casualty clearing point
Survivor	Grey 	Not injured, potential for psychological support; move to a relief centre
Dead	Black 	No treatment; leave in place for the coroner

Figure 2: Triage sieve (27)

Once patients have been triaged and moved to a casualty collecting point (CCP) a more detailed triage can occur of the patients who have made it to the casualty collecting point. This triage is based on a “sort” method.

The health commander on the scene is responsible for designating the casualty collecting point and for delegating staff to it. Below is a diagram of how the CCP should be arranged.



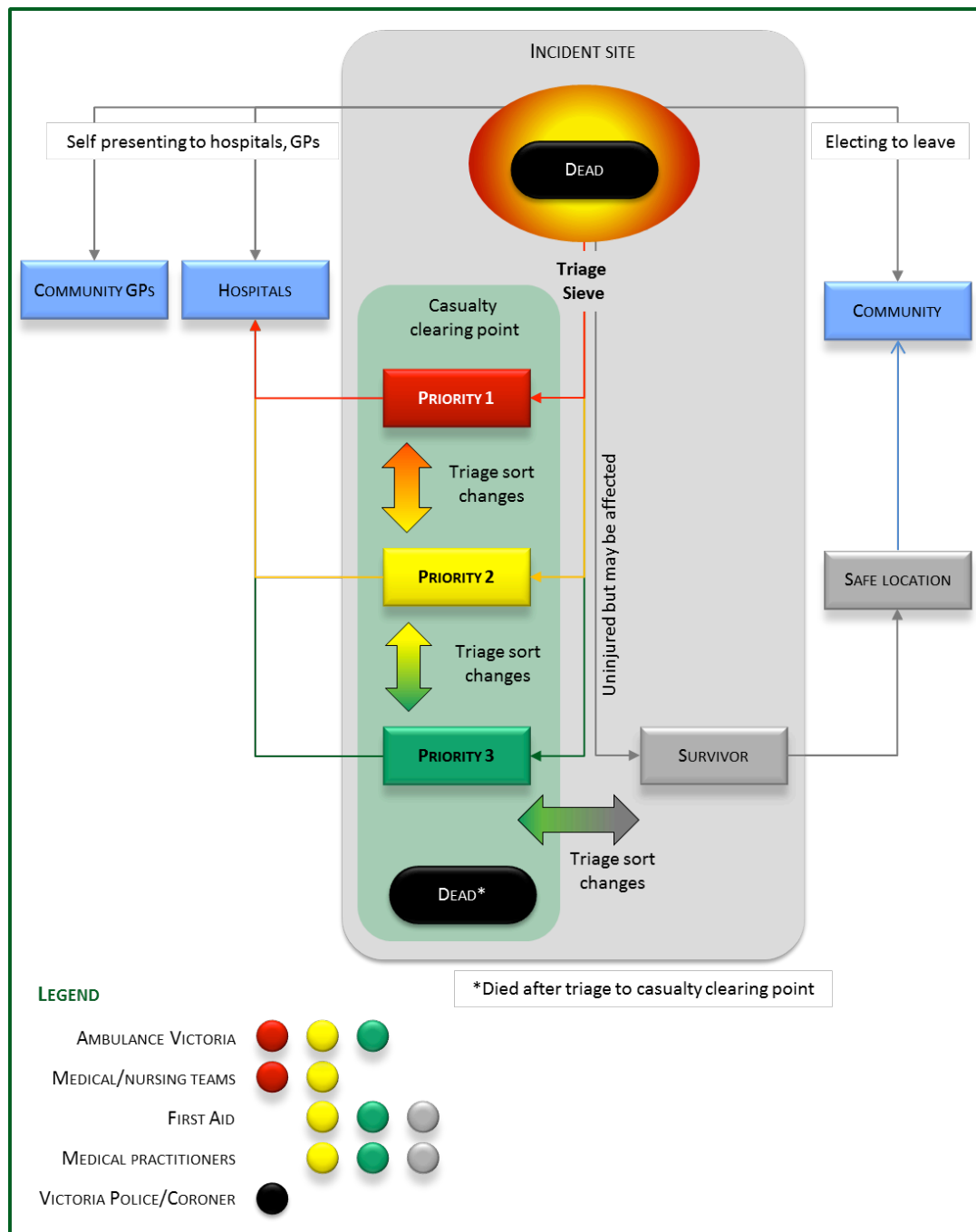


Figure 3: Casualty Clearing Point (27)

Other significant topics covered in this document are “relief and recovery arrangements”, “management of trauma”, “management of children”, “management of evacuation and relocation”, “field resources”, “receiving facilities”, “transporting patients from the scene” and “documentation”.

#### 5.1.1.3 SERP

The state emergency response plan (SERP) is part of the emergency management manual Victoria. The Emergency Management Manual

Victoria(EMMV) sets out the arrangements for the response and management of emergencies. The EMMV defines the roles and responsibilities within Victoria. During an emergency multiple agencies are required to work together to provide a coordinated response to the emergency. SERP outlines the arrangements that underpin this coordinated approach. This document is used in conjunction with the Emergency Management Manual of Victoria Part seven – *Agency Emergency Management Roles* which outlines each agencies role at an emergency.

The SERP has sub-plans for example SERP sub-plan for Bushfires and SERP sub-plan for Floods. These sub-plans outline specific roles when these emergencies occur.

The SERP document outlines the various tiers that operate during a response. These include state, regional and incident tiers. At each tier agencies must work together to coordinate the response. The arrangements for this coordinated approach at each tier are outlined in SERP. SERP outlines the coordination, control, command and consequence management and communication arrangements for each class of emergency. This allows for an integrated and coordinated approach to managing emergencies. SERP also outlines the arrangements for protecting communities and individuals before during and after an emergency. This includes providing warnings to communities, relocating and evacuating communities and providing relief to affected communities.

#### 5.1.1.4 AIIMS

The Australasian inter-service incident management system (AIIMS) is an established incident management system that is used in Australia. It involves seven main functions. These are; planning, public information, operations, logistics, intelligence, investigation and finance. The system is scalable and functions can be expanded or reduced. AIIMS is effective for a variety of incidents including flood, cyclone, search and rescue, earth quakes fire, disease outbreak and many more.

AIIMS provides a common management framework for which all agencies can use to be able to provide a coordinated approach to an emergency. This framework allows for more efficient control of incidents. Each agency will have their own set of protocols and procedures and the AIIMS frameworks allows these to be integrated into “a unified management system for resolution of the incident” (28). AIIMS promotes multi-agency inter-operability through use of common terminology and a structure that allows for good communication between agencies as well as a cohesive chain of command within a well understood structure.

AIIMS outlines the necessity of multi-agency training as the way to ensure an effective integrated approach to an incident occurs. AIIMS states “joint agency training and exercises will engender the greater understanding necessary for interoperability. Further joint exercises enable standing orders, standing operating procedures and protocol to be tested, re-evaluated and adjusted or improved.(28)”

AIIMS focuses on four areas – control, planning, operations and logistics. As the incident grows the tasks within these areas can be delegated. The incident controller has the overall responsibility for managing the incident however he/she will also manage the team of people who will be delegated tasks.

### 5.1.2 The Emergency Response (AV)

The WHO MCI guidelines (1), as outlined in section 3.0, are used here as headings to be able to compare the two services AV and MDA in the discussion chapter.

#### 1. Clear lines of response

There are three stages to an incident. During the “notification” stage the duty team manager decides if the case requires an escalation based on the ERP matrix (figure 4). The ERP matrix looks at the number of patients and the expected duration of the incident and uses this information to generate the type of response and escalation required. The response levels include

WHITE:	low impact on normal business
GREEN:	medium impact on normal business
ORANGE:	major impact on normal business
RED:	severe impact on normal business.

The level of the impact will trigger a different response. During the “response” phase, AV crews arrive on scene and provide situation reports (SITREPS) to the communications centre. The Duty Manager, the Ambulance Emergency Operations Centre(AEOC) and the regional health commander create links with external agencies and further resources are dispatched to the scene based on the scene’s complexity and specific requirements.

A major incident can be an incident that is spread over a large distance; is difficult to assess; has multiple patients and is not easy to immediately assess and control. Emergency Management Victoria now outline three stages of an incident as “before”, “during” and “after” instead of “preparedness”, “response” and “recovery”.

When the first AV ambulance arrives to the scene, paramedics have been trained to adopt the roles of triage officer (TO) and transport officer(TO). These paramedics will wear vests that clearly identify them in these roles. The most experienced paramedic on the ambulance should take the role of the triage officer. This person takes control of scene leadership with their main role being to perform triage according to the triage SIEVE used for MCI. Each patient is given a tag with their triage category on it and any other brief relevant information. The triage officer must provide regular sitreps to the incident controller as well as to the call centre. This paramedic will establish the scene layout with locations for casualty clearing point and loading points and holding points.

The role of the transport officer is to support the triage officer. This paramedic will undertake any patient management that is required and coordinate transport vehicles to ensure the appropriate patient is transported to the appropriate facility. The transport officer will keep a casualty movement log that records the number of patients that remain at the scene and the recording of the movement of patient to hospitals. The transport officer also ensures that the access and egress to the scene is appropriate. The transport officer should mostly be stationed at the casualty clearing point where ambulances will be directed to go to collect their patients. The only initial management that should occur during the initial triage are simple life saving interventions including opening an airway and haemorrhage control. Some of the simpler interventions can be tasked to bystanders to prevent paramedics from being held up with individual patients while trying to triage the entire scene.

AV have developed an Emergency management folder as well as small “cheat cards” for paramedics to use on the scene to assist with their management of the incident (see pictures 1,2,3,4 on page 58). The individual cards have reminders for the roles of the transport and the triage officer and the health commander role to assist paramedics at the scene who could be in this role for the first time in their careers. The folder provides relevant information including roles and responsibilities and maps of big venues where incidents are more likely to occur. The folder also contains information on triage and transport. AV ambulances also carry a small bag with triage tagging tools in it and AV are now trialling TrackMi in one region of the service. TrackMi is a digital tagging device which allows the patients triage tag to be scanned and information about this patient can be stored electronically. The principle of mass casualty triage is to deliver the best outcome to the most patients (13).

One of the roles of the first ambulance on scene is to give an early ETHANE Situation Report. If needed a separate radio channel will be established to manage the incident allowing for clear and uninterrupted communication. A command channel, an incident channel and a normal business channel will be established to allow for the best communication.

The initial approach to triage in AV is to use triage sieve. “Primary triage needs to be rapid simple safe and reproducible” (13) and for this reason triage sieve is what is used initially to triage patients. (see figure 5)

## Triage Sieve

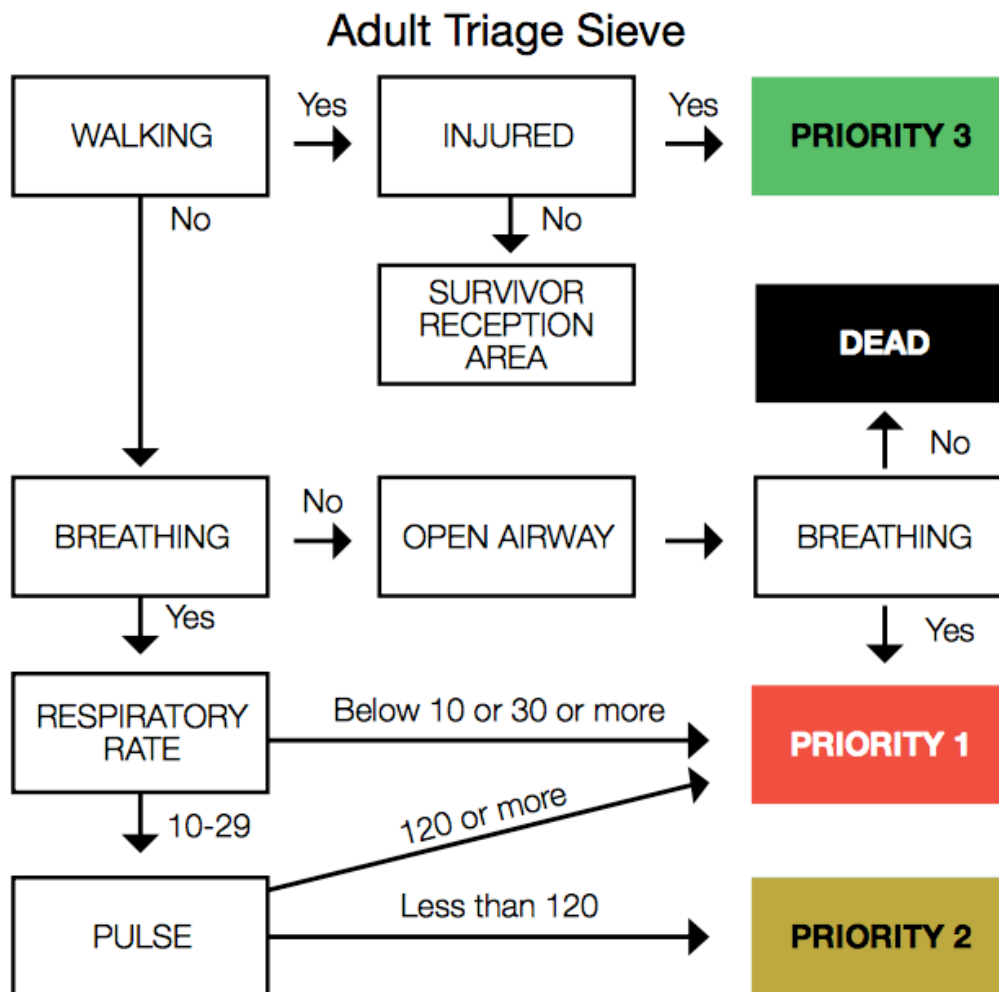


Fig 4: Adult Triage Sieve Image copyright: TSG Associates LLP

\* figure 4: image taken from Ambulance Victoria Emergency Response Plan Part 1 2017 (13).  
(Adult triage sieve image copyright: TSG Associates LLP)

The initial triage is based on the sieve method. This separates all walking patients who are injured into priority three category. Those that are not breathing post their airway being opened are considered “DEAD”. The rest of the patients are divided into priority one and priority two based on the severity of their respiratory rate and pulse.

When patients have been moved to the casualty collection point a more detailed triage can occur with triage SORT being used. It is based on scores given to the respiratory rate, blood pressure and the conscious state. These scores contribute to an overall score which is used to allocate triage priority (see figure 6).

<b>Eye opening:</b>				
Spontaneous	4			
To voice	3			
To pain	2			
None	1			
<b>Verbal response:</b>		+		
Orientated	5			
Confused	4			
Inappropriate words	3			
Uncomprehensible words	2			
No response	1			
<b>Motor response:</b>		+		
Obeys commands	6			
Localizes	5			
Pain withdraws	4			
Pain flexion	3			
Pain extension	2			
No response	1	=		
<b>Glasgow Coma Scale Total:</b>				

---

<b>Total Glasgow Coma Scale</b>	13 - 15	4		
	9 - 12	3		
	6 - 8	2		
	4 - 5	1		
	3	0	+	
<b>Respiratory Rate</b>	10 - 29	4		
	more than 29	3		
	6 - 9	2		
	1 - 5	1		
	0	0	+	
<b>Systolic BP</b>	90 or more	4		
	76 - 89	3		
	50 - 75	2		
	1 - 49	1		
	0	0	=	

---

12 = **Priority 3**  
 11 = **Priority 2**  
 10 or less = **Priority 1**

**Total:**   
**Time:**

Figure 5: Triage SORT Image Copyright: TSG Associates LLP

Figure 5: taken from Ambulance Victoria Emergency Response Plan Part 1 2017 (13). (Triage SORT Image Copyright: TSG Associates LLP)

When subsequent crews arrive to the scene they take direction from either the Health Commander (if one has arrived) or from the triage officer. Their role will be either to transport the most urgent patient or alternatively to assist in triaging or treating patients.

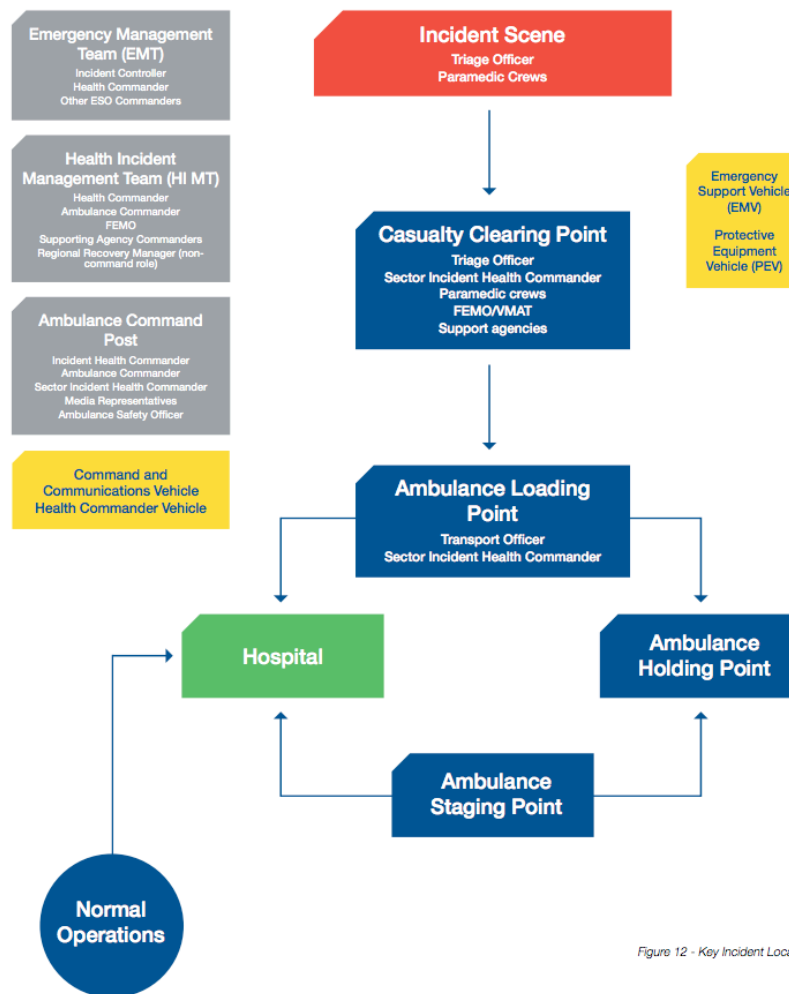


Figure 12 - Key Incident Locations

Figure 6: diagram of locations (13) ( taken from AV Emergency Response Plan 2017 part 1)

At an incident it is important to outline the geographical areas to organise the scene (see figure 7). The scene can be sectorized if the area spans a large geographical area.

The TO and TO remain at the **incident site**. The subsequent AV crews that arrive will be directed to the incident site to assist the initial crew on scene. The triage officer will determine a location for the **casualty clearing point** which is located a safe distance from the incident scene. Here patients are managed in their triage categories. Patients who are not transported immediately will have their treatment commenced in the casualty clearing point. Often an emergency support vehicle is sent to the casualty clearing point to assist with treating multiple patients prior to them being transported.

The Transport Officer will also designate an **Ambulance Loading Point** near to the casualty clearing point and this will be where ambulance will be loaded with patients. This location must have easy and clear access and egress from the

scene. The transport officer will also establish an **ambulance holding point** where ambulances will wait to be called into the loading point.

An **ambulance staging point** can be established by the AEOC as a place where resources are sent in order to restock ambulances during an incident. This location is managed by the Incident Health Commander (IHC). Vehicles will remain here until they are called forward. In an incident where decontamination is required, a **decontamination corridor** is established and will be managed by the fire services. This corridor will be located between the incident site and the casualty collection point. This will be the location for decontamination of patients and rescuers.

## 2. All hazard applicability

Ambulance Victoria train paramedics to use an “all hazards” approach to emergency management. “The EMMV takes an “all-hazards”, “all agencies” approach”(10)to MCI. Paramedics are also equipped to deal with HAZMAT and CBRNe incidents. Paramedics will wear appropriate protective gear and will withdraw to a safe area. Specialised paramedics have been trained in urban search and rescue as well as aquatic response and wilderness response. Certain paramedics are also trained in level A, B and C protective equipment to be able to respond to CBRNe events. These paramedics can be deployed to specific incidents that require their expertise.

## 3. Scalability

AV have an escalation matrix that assists in determining the level of escalation required for any given incident (table four).

If the incident has a large amount of patients or lasts for a period of time, an IHC can be dispatched to the scene. This is a paramedic who is a qualified infield supervisor or operational manager. This manager is responsible for emergency operations in the pre-hospital component of an incident. Depending on the type of incident, health command will operate at state, regional and incident tiers. At each tier the health commander will be an appropriate ambulance manager. When this individual arrives to the scene they take over the command of the AV resources and provide scene management. The IHC reports to the regional health commander giving situational awareness to those not on the scene. The IHC will decide if there is a need to create sectors within the scene and also assist with selection of the types and numbers of ambulances required at the scene. The IHC also assumes responsibility for assessing the need for additional staff (ambulance personnel, equipment, nurses and transport resources) as well as giving notifications to hospitals, assessing the need for psychological support at the scene, monitoring occupational health safety and wellbeing for all responding health personnel and liaises with the media. The IHC is also responsible for distributing the right patient to the right hospital. This decision is based on the availability of the hospital and the proximity of the hospitals to the incident. The decision will also be based on the type of injury the patient has as well as the acuity of the patient. In the case of a protracted incident a field



emergency medical officer (FEMO) may be sent to the scene to “develop a casualty distribution strategy” (13).

The larger the incident and the greater effect it has on normal business, the number of managers involved increases. As the response is scaled up more resources and managers are dispatched. The State Health Commander (SHC) is responsible for the pre-hospital response however from a state point of view only. He has the responsibility for the emergency management response of Ambulance Victoria and activates the AEOC and determines the AV response according to the ERP. The SHC supports the state controller and liaises with the state health and medical coordinator. Another role of the SHC is to recommend and provide leadership to the state-tier health incident management team. The Regional Health Commander (RHC) is an ambulance manager who is responsible for the pre-hospital response to an emergency in the regional tier.

Other roles that can be established if the incident is large include Sector Incident Health Commanders. This role is allocated if the scene is divided into multiple sectors. The role can be filled by a paramedic or manager and has the same role as the IHC within a given sector. An Ambulance Commander can also be established with the role of managing the AV resources at the scene. He provides on scene management of ambulance resources. It may be necessary to have an ambulance member fill the role of Ambulance Safety Officer, with responsibility to ensure safe work practices are in place at the incident site. He is also responsible for assessing all staff’s psychological and physical capabilities during an event.

In the event that an incident occurs, one of the key purposes of the above structure is to reduce the likelihood that the increase in workload will affect normal business. The AEOC exists to be able to manage the MCI to ensure that normal business is not affected. The AEOC will coordinate closely with emergency operations to ensure that normal service levels and response times are maintained. Since large incidents are uncommon, the ERP outlines that all processes used to manage these incidents must be the same basic principles as those used at smaller incidents.

Response Level	Description	Management summary
White	Low impact on normal operations.	Handled as normal business
Green	Medium impact on normal operations.	IHC responded. RHC coordinates. SHC notified (high profile, high consequence or atypical case).
Orange	Major impact on normal operations.	IHC responded. RHC advised. SHC managing. AEOC stood up.
Red	Severe impact on normal operations.	IHC responded. RHC advised. SHC managing. AEOC and AV Regions stood up.

Table 1 : ERP Level of response diagram (13)

The type of an incident is also used to determine the response level required.

Table below identifies the definitions AV use.

Type of Incident	Description
Simple	Incident where AV routine procedures apply.
Open	Where there are no issues regarding access to, and egress with patients
Restricted	Where access to patients is difficult due to hazards, environmental or security factors.
Controlled	Incident that has a Control Agency (e.g., Police, Fire etc.) or large number of personnel are deployed
Complex	Incident that is not routine or it is an infrequently used procedure (e.g. CBRNe, aquatic, airport emergency etc.)

Table 2: Type of incident table (13) (taken from AV Emergency Response Plan 2017 AV part one)

The ERP response matrix is seen below. This is used by the duty manager when the initial call is taken.

Number of Patients	>21					
	11-20					
	6-10					
	3-5	RHC				
	0-2		RHC			
	Type of Incident	Simple Open	Simple Restricted	Simple Open Restricted	Complex Controlled	
	Time	<1hr	1-2hr	2-4hr	4-8hr	>8hr
Severity of Incident						

Figure 7: ERP Matrix (13) (taken from AV Emergency Response Plan 2017 part 1)

Once an incident has been classified, AV sends out notifications that the incident has occurred and takes actions to coordinate the response. Depending on the escalation level various different managers and commanders are notified and dispatched to the scene.

Incident action plans are developed by IHC's or for the more protracted incidents it is developed at a regional and state level. These plans assist the incident by outlining the roles, the execution, command and communications as well as administration and logistics and safety of the incident. If an escalation occurs that is protracted, the AEOC will coordinate additional resources with the aim of reducing the impact on normal business.

The AEOC is responsible for coordinating the response to an incident. The AEOC will be directed either by the SHC or will be escalated as part of the ERP within AV. The AEOC are responsible for notifications during the incident, coordinating the deployment of resources and managers to the incident, producing the incident action plan, distributing sitreps, alerting all stakeholders and ensuring the correct resources are deployed to the incident. The state emergency communications centre, the referral service call centre, the flight coordination centre and the adult retrieval Victoria coordination centre support the AEOC in their responsibilities during an incident as it is scaled up.

#### 4. Whole of Health

At an incident that is protracted or requires other services involvement an emergency management liaison officer (EMLO) is sent into an emergency management team. These teams have representatives from all responding agencies and these teams meet regularly throughout the duration of the incident. This is where all inter-agency communication and planning occurs so that a whole of health approach is taken towards the incident. The ERP outlines that the more protracted incidents will involve first aid agencies, GPs, community pharmacists and FEMOs. "The continuity of health care service provision particularly to the vulnerable community members during and following an emergency is also a priority for the health system as a whole"(10). The ERP

outlines “shared responsibility for action” in an MCI or disaster includes individuals, communities, businesses and government (10).

### 5. Knowledge base

The Emergency Management Unit (EMU) at AV is trialling a new app (TrackMi) as a result of the review into 20 January 2017 Bourke Street incident. During this incident, it was found that there was low visibility around the numbers and status of patients once triaged. The application aims to improve the speed of triaging patients and provide real time visibility of the number, location and status of patients.

### 6. Multi-sectorial

The cooperation of many sectors is important for the success of a MCI response. The EMMV outlines the roles and responsibilities of all organisation and agencies responding to MCI. The SHERP document that is part of SERP outlines the command and coordination arrangements and roles and responses of all sectors when responding to health emergencies.

### 7. National Policies which enable local solutions / doctrine

The AV response plan is compliant with the following

- Ambulance Act 1986 and 2013
- Part three State Emergency Response Plan
- Part four State Emergency Relief and Recovery Plan
- Part seven Emergency Management Agency Roles
- State Health Emergency Response Plan 4<sup>th</sup> Edition.

### 8. Training in MCI management

Documents such as State Health Emergency Response Plan (SHERP) and Emergency Response Plan (ERP) were searched for and located on department websites. These included Emergency Management Victoria website, Department of Health and Human Services website, Ambulance Victoria website and includes Hebrew documents sent from managers from Magen David Adom in Israel. I spent considerable time translating these documents from Hebrew to English for use in this thesis.

University unit guides were sources directly from each university in Victoria that produces paramedics. Heads of courses were spoken to for clarification of information within the unit guides.

Further data from Israel was gained by participating in a mass casualty drill in November 2018 and ethics approval has been granted for this.

Managers from Ambulance Victoria and Magen David Adom were interviewed to collect other relevant data for analysis.

### University

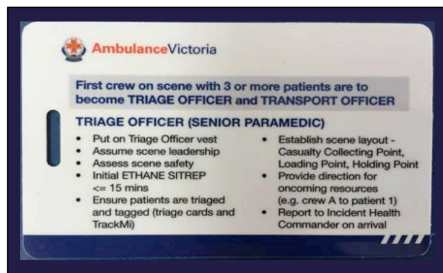
Each university has different course outlines for how they train for MCIs. All of the universities offered a theoretical component to teaching MCI processes and most of the universities utilised some form of white board training tool with some of the universities engaging AV to run the emergo train exercise. In addition in some years some of the universities engaged in drills to rehearse MCI skills however this was not done every year at every university. Apart from this some of the universities utilised practical sessions to practice skills such as triage.

### Induction / graduates

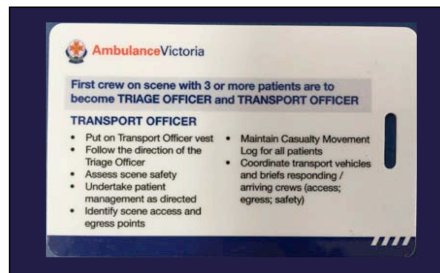
When students are employed by AV they receive a short lecture on MCI protocols at AV as well as completing a level C PPE training course. Students are also required to complete the virtual paramedic training module until they reach 100% accuracy with their triaging techniques. There is also a MCI learning module that students are required to complete as part of their graduate training.

### Ongoing

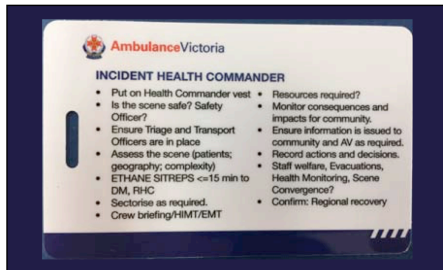
Paramedics have access to learning packages on MCI as well as the virtual paramedic program on the AV intranet. Other than this paramedics can be allocated to the regular Emergo train trainings that are done by AVs emergency management unit. There is very little multi-agency training that involves on road paramedics. These training days are used to train and rehearse the skills of the team managers and health commanders.



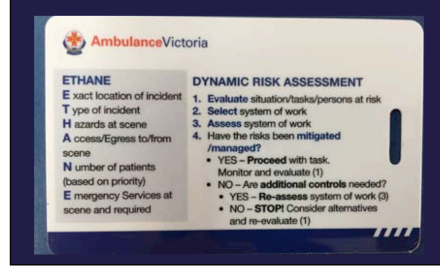
Picture 1: TRIAGE OFFICER



Picture 2: TRANSPORT OFFICER



Picture 3: INCIDENT HEALTH COMMANDER



Picture 4: ETHANE SITREP

*Picture 1-4 AV key cards – taken from AV operational aid memoir*

## 5.2 Magen David Adom

Guy Caspi portrays the view that MDA is part of a well coordinated and well rehearsed emergency management system. MDA's doctrine is well understood and integrated into other agencies plans so that the response to a MCI is timely and efficient with good communication between and within agencies (25).

### 5.2.1 Operations (MDA)

#### 5.2.1.1 What is the process in which Israel prepare themselves to respond to MCIs

MDA believe that the "efficiency of handling large scale incidents depends on command and control capabilities. This is especially true in ongoing incidents such as mega mass casualty incidents, fires, aviation accidents, train accidents, prolonged rescue operations during wartime and earthquakes"(22).

There are many roles that exist within MDA during a MCI. These include the headquarters of MDA. The headquarters are responsible for preparing the MDA doctrine for the treatment of MCI. They are also responsible for the preparation and publication of procedures, defining the training needs of the teams and functionaries and the performance and integration into exercises.

At the incident "the chain of command starts with the first EMT in the first ambulance. Command is passed to the first paramedic on scene and to the managerial staff if needed"(22). MDA paramedics and volunteers are trained in

the principles of control and command. On route to the incident paramedics will prepare command and control accessories and medical equipment as well as preparing the MCI triage tags. The most senior paramedic on the first ambulance to arrive on the scene will take on the role of “command 10” (refer to pg. 64) and assess the situation and provides, a situation report back to the regional dispatch centre. The situational report will include the nature of the incident, hazards on scene, the estimated number of casualties, arrival routes and egress routes and finally a declaration of the medical incident commander.

MDA has developed an integrated command and control system that allows the dispatcher to manage the scene in the most efficient way. Different modules exist that allow the dispatcher to receive critical information needed to make life or death decisions. Once the emergency call is received the dispatcher begins to question the caller and dispatches teams to the incident. Simultaneously the system is able to locate the caller using Geographic Information System (GIS) technology. This gives the dispatcher the exact location of the caller and allows the dispatcher to send the ambulance that is already en route the exact location of the incident. The GPS function on the “MDA Team App” is used to locate life guardians, volunteers and MDA personnel and send them a message requesting them to respond to the incident.

The mass casualty incident management system is embedded in the command and control system. This allows one or more simultaneous MCIs to be managed quickly and efficiently using an automatic working process. MDA implement an identical system in emergencies as used during routine times. The reason for this is that since the dispatcher is used to the system making challenging decisions quickly in an MCI is easier. The MCI module optimises resources based on information that is being received in real time. This assists in the dispatch of the most appropriate resources to the incident as well as to routine business. MDAs routine work continues while those injured in the MCI receive effective and rapid treatment. The MCI module is able to manage many automatic processes at the same time to allow for quick activation of MCI protocols. The module dispatches rescue vehicles, is able to receive information from the vehicles about when they have arrived to the incident and when they are loaded with a patient to hospital. Simultaneously the system send dispatch announcements over the loud speakers at the MDA branches and sends updates to MDA managers and hospital notifications are also given. The system also records the exact number of vehicles dispatched to the scene, the number of injured civilians and the number of people already evacuated and the types of injuries sustained. All this information is simultaneously sent to the managers using the MDA team application. This has huge benefits for MCI where response times are important for patient survival.

Being able to locate the patient within seconds of receiving the call and being able to send pictures of the exact injuries to the dispatch centre changes the way MDA can respond and ultimately the outcomes for the patient. This technology is able to locate a patients exact location even in remote areas. When the caller is only able to provide an estimated location, the dispatcher sends the caller an SMS with a link that has the possibility to share his location with the dispatcher.

After clicking on the link, the precise location appears on the GIS screen and resources are dispatched.

Being able to receive images and videos in real time from the scene through the MDA application allows the dispatcher to send the right resources to the patient. Having a good view of the scene allows the dispatcher to make some crucial decisions for example if the incident has a danger involved the dispatcher will notify police at the same time as the ambulance is dispatched. Similarly if there are multiple patients the dispatcher can send adequate resources in a timely manner. At this early stage if the dispatcher has information about the injury, the hospitals can be notified even before the ambulance has arrived to the scene. This improves the ability of hospitals to prepare for incoming patients. Information security is protected by every file being sent to MDA being proofed for viruses prior to entering the MDA system.

For individuals who already have the MDA application downloaded on their phone, they are able to dial for an ambulance using the MDA application and this automatically opens a video feed between the dispatcher and the caller. The dispatcher is then able to assess the type of incident prior to MDA crews arriving to the patient. The application also allows the dispatcher to watch what the caller is doing based on the guidance of the dispatcher. For example if a patient is in cardiac arrest the dispatcher is able to watch the CPR in progress. This will improve the way instructions are followed and improve the communities capacity to assist in emergency situations. The dispatcher can also find out important information at this point from the hospital for example if the catheterization laboratory is available.

This application is also used by ICU and Stroke Units at Israeli hospitals. The application is used to transmit ECGs to the cardiologist however it also allows the cardiologist to track the ambulances location and estimated time of arrival to the emergency department.

When a patient calls MDA the patient will receive an SMS with details of the caller and a link to a map showing the ambulances location and an estimated time of arrival "Research has shown that having this information calms the patient making him more willing to accept the treatment by the emergency team"(29).

#### [5.2.1.2 what is the procedure and process that is followed when an MCI occurs in Israel](#)

When the dispatch centre receive a call for a MCI they activate the MCI protocol. This involves sending all available crews to the scene, calling off duty paramedics via SMS or via the MDA application, informing the National Operation Centre and providing primary notification to the hospitals. Once a primary report is received from the scene a situation report is built and this report is disseminated to stakeholders and hospitals.

When a MCI occurs in Israel the dispatch centre divides. The regional dispatch centre handles the routine calls while the National dispatch centre handles the



calls to do with the MCI. There is a separate computer program that is used for the MCI that sets up the perimeters for the incident, the access and egress routes as well as the vehicle locations and status. The dispatch centre will activate the multi casualty incident plan of the system using specific checklists designed for these circumstances. Dispatchers assume the “worst case scenario” until it is indicated otherwise. This allows the system to prepare for the worst and can scale this back if the incident is not as severe as initially thought.

The first process that occurs is the collection of data and information from the scene. Information is collected from multiple calls being received by dispatch, from calls received by police through information sharing and from live footage from the scene and situation reports given by paramedics and first responders at the scene. An action plan is then developed. The second step is to dispatch forces to the scene. The dispatch sets off a chain of events that leads to organisation of the area through sorting and tagging, treatment and evacuation of the area. The information that is relevant to the operators centre include the precise location of the event, the possibility of dispersal of casualties in several arenas, the nature of the event (fire, road accident, explosion etc) and the scope of the event. The scope of the event takes into consideration the number of casualties present (ie. individual, tens, hundreds), and the environmental risks including hazardous materials, fire etc.

There is an initial surge response of personnel and equipment to the site of the incident. MDA has an on-call first responders unit which is staffed by paramedics and EMTs as well as being equipped with basic and advance life support equipment. These ambulances are dispatched to the scene by an automatic dispatching system. Volunteers, first aiders and off duty medics are all paged to assist in the event of a MCI. MDA has extra ambulances available to be used under such circumstances. Twenty-four multi casualty response vehicles exist with equipment to be able to give to medics and volunteers arriving at the scene of the incident to assist. These vehicles also contain basic life support and advance life support kits as well as backboards, stretchers and work desks.

The most senior paramedic on the first ambulance adopts the “command 10” role and each crew that arrives to the scene will report to them and will be allocated a task or a role. The role of the “command 10” is to collect information, give reports to the operator and make requests for additional resources. The “command 10” will define a point for the concentration of the injured who have not been evacuated early on. All casualties will be directed to this point. The “command 10” will allocate a staff member to be responsible for the treatment of these patient once more crews arrive. The “command 10” is also responsible for controlling all of the resources that arrive to the scene and must divide and allocate roles to each crew that arrive. The “command 10” will instruct crews whether to commence triage or commence treatment. All activities at the event are coordinated by the “command 10”. At all incidents, a meeting of commanders from all agencies will occur regularly. The “command 10” will attend meetings with commanders of other emergency services to coordinate the response to the incident.

Tagging during triage is a vital part of the triage system allowing others who arrive at scene to identify the most seriously injured patients. Evacuations are able to include one red patient and a few green patients who do not require immediate medical intervention into the same ambulance. This assists in clearing the scene rapidly. If there is a delay in evacuating patients or the incident is in a remote area either (or both) a casualty collecting post and a staging area can be established. If resources are scarce and evacuating the patients from the scene will be a lengthy process, remaining patients at the scene should be brought to the casualty collecting post and should remain in groups according to the severity of their injuries. I.e. green together, yellow together and red together. This will allow medical staff at the scene to treat the most severe patients first. By keeping the red patients together, life saving procedures can be done such as intubation in close proximity and resources can be shared to provide the best outcome for the most number of casualties.

The “command 10” will instruct the drivers of all the ambulances to leave the windows of the ambulances open and the keys in the vehicle. This prevents the ambulance from locking and allows anyone to drive the ambulance as needed as sometimes crews become split at the scene due to their qualifications. The ambulances will be parked in such a way to allow for the stretchers to be removed from the vehicles. Evacuation of victims is essential in saving the most lives. The principles for evacuation are that the most urgent and salvageable patients are transported first however they must be transported to the correct facility whereby the correct procedures can be carried out. Hence a role is allocated to a staff member to become the evacuation commander. This person will communicate with the operators centre about the injuries of each patient being evacuated and a decision about where to send the patient will then be made based on the capacity of the hospitals and the injuries of the patients leaving the scene. The operator will communicate with the driver of the vehicle indicating which hospital to go to based on the injuries of the patients they are transporting.

A MDA representative will be sent to each hospital that is within the sector and would most likely receive patients from the scene. Each hospital has two MDA kits in which the MDA staff can use to assist in identifying patients. The MDA representative will contact the director of the emergency department and update the MDA commanders about the hospitals ability and capacity to absorb patients. This information will also be transmitted to the national dispatch centre. The MDA representative will also inform the hospital about the patients that are expected to arrive at their hospital and their injuries. The representative will also indicate to the MDA crews whether they are to return to the scene or whether they are to continue back into daily business. The MDA representative is responsible for ensuring that all MDA equipment gets back to the MDA stations.

### 5.3 The Emergency Response (MDA)

Given the political situation in Israel, its history dictates that its emergency medical system must be ready for an immediate response to mass casualty incidents. “To be ready means to have a doctrine, standing operational procedures, protocols, knowledge and equipment” to be able to respond rapidly to a mass casualty incident. However it is not enough to have these frameworks

in place, the doctrine “must be well understood and rehearsed frequently through drills”. (22) The medical response on scene is only the beginning of the chain of survival for these patients. Coordination collaboration and good information flow between MDA and the hospitals is also vital for the chain of survival.

What makes Israel the experts in MCI management is a combination of factors. These include a very good EMS system, a state of the art command and control centre, technology that improves responses day to day but is also invaluable in a MCI and collaboration between all relevant players.

The WHO MCI guidelines (1) are used here as headings, as per section 3.0, to be able to compare the two services AV and MDA in the discussion chapter.

### 1. Clear lines of response

The driving force of how MDA will resource and manage the event will be dependant on the time until the end of the incident. MCIs are classified into two categories in MDA.

1) Category 1: Immediate response. This is where all the injured from the event will be evacuated to hospitals/medical facilities up to two hours from the moment the first crew arrives at the scene.

2) Category 2: Continuous or planned response. This is where all victims of the event will be evacuated for treatment in hospitals/facilities hours or days after the first crew arrive at the scene. This response is conducted at a national level. This response will include assistance from the health care system as a whole including IDF and community medicine.

The primary aim of the event is to maintain order in the chaos. The scene is set up with a command post and an ambulance collection area. This will give a picture of the situation that is able to be upgraded in real time. A snapshot is given of the situation to the decision makers to give them the ability to make appropriate decisions regarding the management of the event.

MCI is organised and managed by the operation centre. There is an activation for an MCI which triggers the process of MCI management to begin. The first process is to evaluate what the situation is. Resources are then mobilised and sent to the scene. In partnership with the MDA commander at the scene, constant evaluation occurs and action plans are created in the operation centre. Recruiting and cancelling resources occurs with discussion with the MDA commander at the scene. A plan for evacuation of the injured is constantly updated and discussions and communication among the team of MDA rescuers is ongoing. This operation process manages the event until such time as the event is completed and the MDA commander deems the event completed. The commander at the operators centre’s role is to provide a status update and report to the stakeholders. He will assist the operation centre by summoning the resources. He also assists with the deployment of patients to hospitals and provides up to date reports on what is occurring in real time to receiving hospitals.

When the commander in the operation centre deems the incident to be a category one response all available resources are sent to the scene under an “automatic response”. The first paramedic to arrive on the scene is deemed the commander of the event. He will identify himself on the radio by calling through that he is identifying as “command 10”. This individual will remain the commander of the event until a more senior manager arrives. If the manager deems that the paramedic has the scene under control the “command 10” will remain the role of the paramedic.

The “command 10” manages the incident. He is responsible for conducting an assessment of the situation and will command the MDA teams as they arrive to the scene. The “commander 10” has numerous roles at an MCI. He will:

1. give sitreps to the dispatch centre
2. ensure the safety of the crews that are at the event
3. divide the scene into sectors and activate staff
4. appoint various sub-commanders as they arrive at the scene
5. appoint ambulance parking commander
6. appoint evacuation commander and a medical commander
7. give instructions to the Israeli Defence Force who arrive to assist
8. organise evacuation of patients to hospitals.

When evacuating patients to hospitals, the casualties will be evacuated to various hospitals in order to distribute the patients across various hospitals to share the load. Specific injuries will sometimes dictate which patient will be transported to which hospital and occasionally secondary transport occurs between hospitals. This is conducted by MDA.

For planned or protracted events a treatment site will be established for the victims of the event. The treatment area will be divided into regions according to severity of the patients condition – emergency casualties and non-urgent casualties. The “command 10” at the scene will manage the resources and the evacuation of the casualties.

When the dispatcher sends subsequent crews to the scene he identifies that there is a “command 10” at scene and identifies his name. The team will be instructed to take security precautions such as putting on a bullet proof vest and helmet and will take their instructions from the “command 10” at the scene. The team will need to take the sorting and evacuation tags from their vehicle upon arriving at the scene. In addition equipment that will be used at the scene should be taken from the vehicle and include arterial blockages, triangular bandages, oropharyngeal airways, stretchers and ambulance beds. Each member of the team must wear their identification vests. The senior member of the team will report back to the operators centre prior to leaving the ambulance. The member will confirm the precise location of the incident, the nature of the incident, the number of casualties that can be estimated from the vehicle (ie. dozens or hundreds) and the arrival route to the event.

The operator will also create a conference call with the “command 10” and the national call centre and receive sitreps from the “command 10”. The dispatcher will communicate with the crews on their way to the event about access, egress, nature of the event, exact location, and security issues. The dispatcher will keep reports updated throughout the event and maintain communication between MDA and the hospitals. The commander in the operators centre will decide which hospitals to send which patients to and at the completion of the event will ensure crews return to their bases.

The national centre assists in ensuring that normal business continues by assigning a person to manage normal business separately to the incident. The national centre remain up to date on the events as they unfold by means of listening to the operators call reports as well as the open line listening to the communications network.

In a category two incident immediate reinforcements are activated in addition to the automatic response from the neighbouring region to support the area of need for normal business. The response sent to assist at the scene includes eight ambulances and two mobile intensive care ambulances from neighbouring regions.

Once subsequent crews arrive to the scene further assessments and treatments can occur. These include full body examinations to check for further injuries. Once this is complete the patient must be covered to maintain body temperature. The patient must also have their vital signs assessed including peripheral pulse, rhythm, intensity and regularity, breathing rhythm, depth and respiratory assessment and skin colour, temperature and humidity. These assessments are recorded on the classification and evacuation tags. Based on these assessments the “command 10” will decide who to evacuate first. Those patients who can not be evacuated immediately will receive further treatment such as infusions and intravenous needles inserted into their veins and fixation of limbs.

Medical care is divided into two stages – on scene and on route to hospital. Paramedics are trained to administer life saving procedures only on scene. These include airway control, intubation, chest decompression and haemorrhage control with direct pressure or tourniquet. The continuity of care for these patients occurs on route to hospital. These procedures can include the administration of fluid, placement of dressings and other medical procedures. All urgent casualties that are transported from the scene are escorted to hospital with paramedics that are trained and equipped with advanced life support equipment.

#### TRIAGE:

In Israel triage occurs according to a flow chart based on “SALT” and “START” triage. SALT is used in the initial triage to categorise the entire scene. Then the START triage tool is used on each patient in each category when time allows and more resources arrive to the scene. (see figure 8 and 9)

MDA bases its triage principles on “good and simple protocols”. The **RED** triage are those that require lifesaving procedures or evacuation and the remaining

patients are considered **GREEN**. Green patients are those who can walk. Using a loud speaker, the “command 10” will direct all walking wounded patients to a location determined by the “command 10”. The “command 10” will send a paramedic or EMT along with the green patients. The paramedic/EMT will be triage the green patients to ensure no life threatening injuries have been missed. Green patients can also deteriorate so the triage occurs on an ongoing basis. The triage protocol identifies that time is the essence for survival for the more urgent patients and hence prioritises these patients to be evacuated as soon as possible to hospitals. In each sector the crew is responsible for locating and removing casualties from the danger zone. Triage and life saving procedures are performed and marking with triage tags occurs. All information is reported back to the “command 10”.

The SALT triage tool is used to rapidly triage a scene with multiple casualties. SALT begins with a sorting process. This prioritizes the patients for individual assessments. Patients are divided into three categories with first, second and third priorities. This is based on whether a patient can walk (third priority), has purposeful movement (second priority) or are still with obvious life threat (first priority). Step two of the SALT triage is an assessment of the individual injured patients. This involves basic intervention for the most seriously injured patients. These interventions include ONLY:

1. Opening Airway
2. Haemorrhage control
3. Chest decompression

If after these initial interventions the patient is still not breathing they are considered DEAD. If the patient begins to breath after the interventions, the next level of assessment occurs. This includes the following assessment of each patient

1. Can they obey command and make purposeful movement?
2. Has a peripheral pulse?
3. Not in respiratory distress?
4. Major haemorrhage is controlled?

If the answer to any of these questions is NO, a decision about the likelihood of their survival given the current resources must be made. If they are likely to survive they are considered **IMMEDIATE**, however if they are unlikely to survive they are tagged as being **EXPECTANT**.

If the answer to the above questions is YES, if the patient has minor injuries only they are considered **MINIMAL** but if they have more than minor injuries they are considered **DELAYED**.

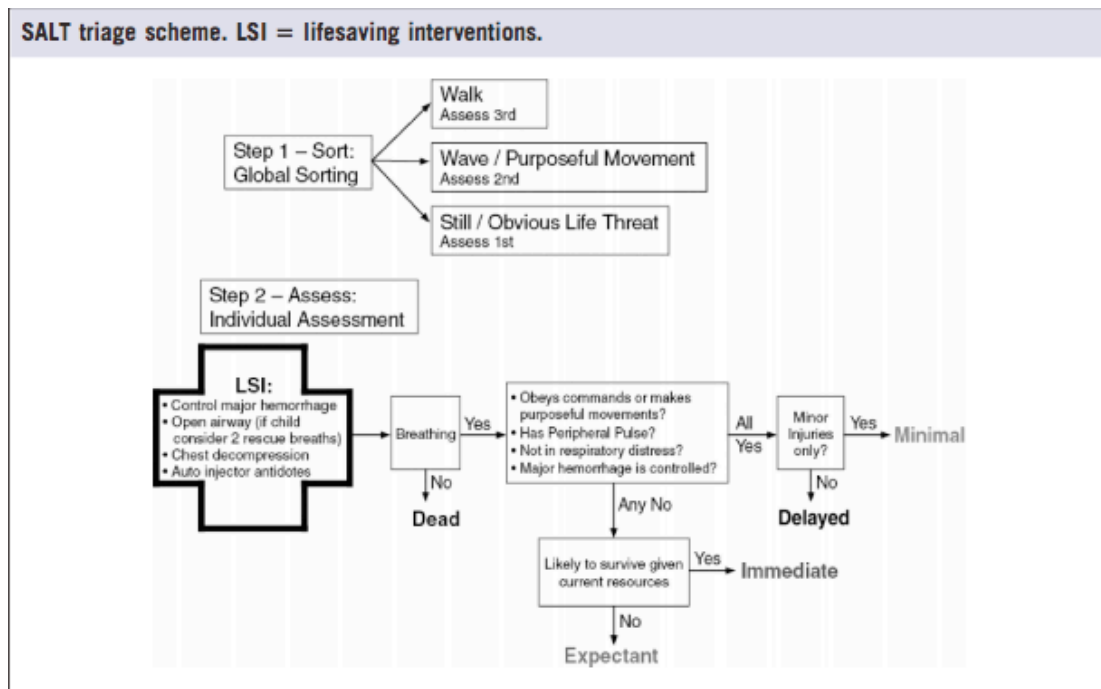


Figure 8: SALT triage tool (30)

Once patients have been triaged according to the SALT method, as more personnel arrive to the scene each patient is triaged according to the START triage method.

The START method stands for Simple Triage And Rapid Treatment. It is a concept developed in California and is a rapid approach to evaluate large numbers of casualties. The approach needs to be easy to remember and be step by step. The aim of the method of triage adopted by MDA is to have initial patient assessment and treatment for each patient done in under thirty seconds.

In the START model, a black triage tag is given to the “expectant” patient who are dead or who have lack of spontaneous respirations after the airways have been opened. Red triage is allocated to “**immediate**” life threat patients. These are patients who have life threatening but treatable injuries. These patients will require rapid medical attention.

Yellow triage tags are allocated to patients with potentially serious injuries but stable enough to be treated on the scene while waiting for evacuation. These patients are deemed to be “**delayed**” patients and are not expected to deteriorate over several hours.

Green triage tags are allocated to patients with minor injuries that can wait longer periods of time for treatment and are considered “**minor**”.

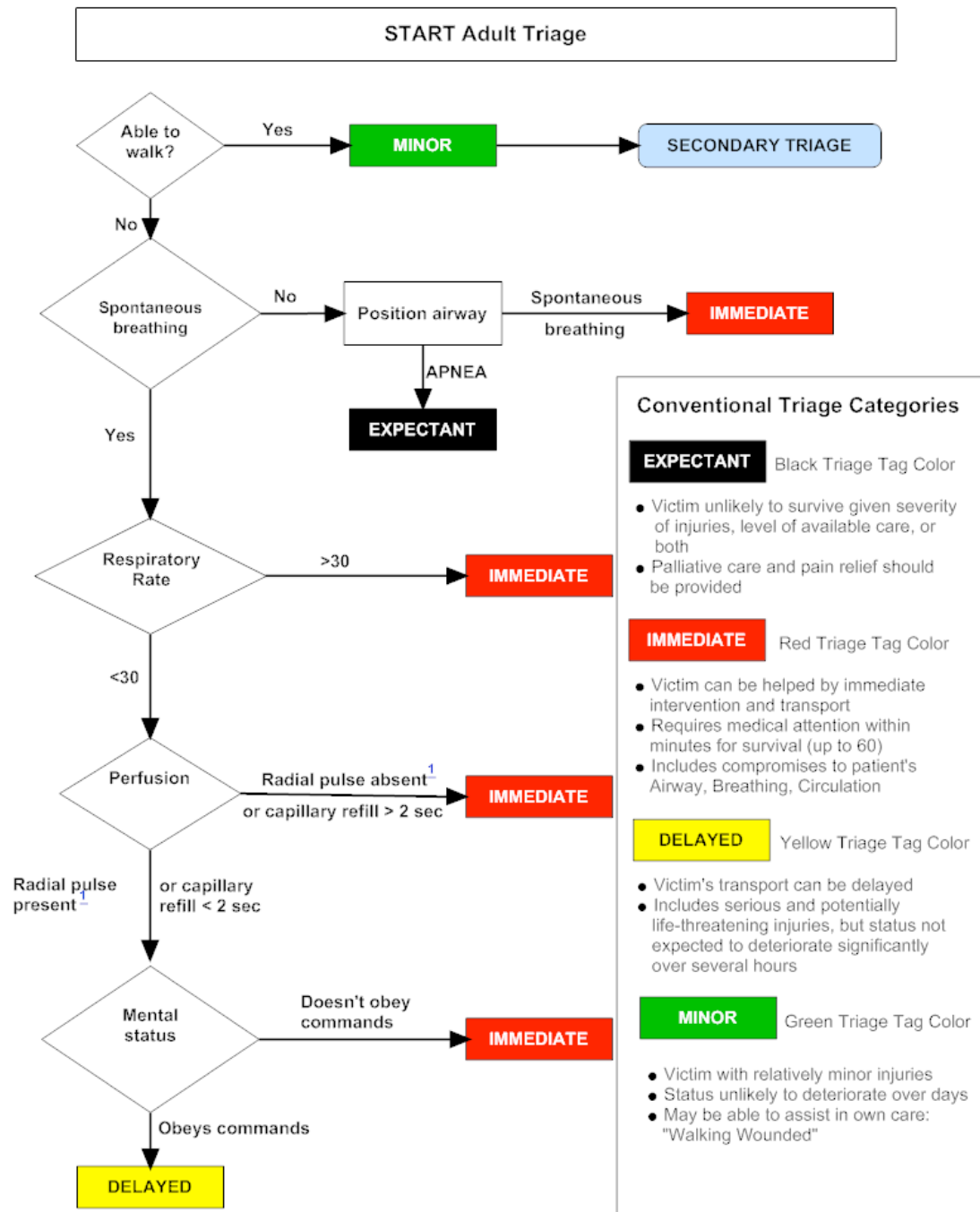


Figure 9: Triage START (31)



The image shows a triage tag form for the Magen David Adom (MDA) in Israel. The form is titled 'מגן דוד אדום בישראל' and includes a Star of David logo. It contains various fields for patient information, including name, age, sex, and medical history. There are also checkboxes for different types of injuries and conditions. At the bottom of the form, there is a color-coded section with the following text: 'A.L.S. נפטר' (Dead), 'A.L.S. אנוש' (Human), 'A.L.S. דחוף - יציב' (Urgent - Stable), 'דחוף' (Urgent), 'לא דחוף' (Not Urgent), and 'לא בוצע מיון' (Not Sorted).

Figure 10: MDA triage tag (32)

This is the triage tag used in MDA in Israel. Each of the colours are perforated and can be torn off to leave just the triage tag colour specific to the patients triage allocation. Space exists on the top of the triage card to add further details as the patient receives further assessment and treatment.

When deciding which patients to evacuate MDA states that it is important to look at futility. Once triage has occurred, decisions must be made as to which red patient is the most important to evacuate first. Sometimes it is better to send the most salvageable patient to hospital not the most severely injured. Other tools to help make these decisions include what assistance can be given on scene versus what procedures must be done in hospital. For example if there are two red patients, one who has a chest injury and one who has an abdominal injury both require transport to hospital. However, in the field chest decompression can occur but the abdominal injury requires ultrasound and most likely surgery so this patient should be the first to be evacuated. Equally as challenging a decision would be a conscious unwell patient versus an unconscious unwell patient. In this setting due to the likelihood of the conscious patient having a better outcome, this patient would be transported first.

The dissemination of casualties between hospitals is essential and this is managed in the control centres. Ambulances loaded with patients will be directed to the specific hospital by the dispatch centre based on the severity of the patient and the understanding of the load on each of the hospitals at the time. MDA communicate with hospitals to work on the most appropriate location for each patient so as to not overwhelm any particular hospital. MDA has identified that during MCI patients will also self present to hospitals and hence they are ready with processes in place to provide secondary relocation of casualties who self present to the incorrect hospitals.

## 2. All hazard applicability

According to Israel, effective coordination and communication is the key to successful MCI management. The national emergency authority formulate national emergency preparedness policies. Israel has adopted an “all hazards” approach to MCI management to simplify the process.

## 3. Scalability

Protracted and planned events are managed at a National level. If the number of casualties exceed five hundred then the event is differentiated from a MCI in that the scope and the complexity of the event require decision making and policy making from the national perspective. The event is managed by a home front command group. The event will begin as though it is a MCI and will be managed by MDA accordingly and then will be upgraded to the national level. Additional resources will be dispatched to the scene according to the national policies. In these situations a national police management centre will be opened and have the overall command of the event. For both protracted and planned events a treatment site will be declared and all the injured will be located here. The treatment site allows for the pooling of resources of the existing medical staff and equipment. The sorting procedures remain the same and an evacuation policy is established at the national level by the ministry of health. MDA teams will only evacuate urgent wounded patients to the hospitals. Non-urgent patients will be evacuated by priority by buses and other means to remote hospitals that are not trauma centres. This will free up the trauma centres to manage the large number of critical patients that will arrive for treatment. As soon as the incident is upgraded to be controlled at a national level, hospitals within an hours drive from the site are notified of the situation. When treating patients, if airway procedures do not allow the patient to breathe, the patient will be referred to doctors on the scene for further treatment. In these situations it can be difficult to evacuate all those who are injured from the treatment site due to lack of evacuation measures. Hence more treatment is required on the scene. In an ongoing event, the “command 10” will consider the operation of a medical team consisting of three medics with appropriate equipment to be able to manage patients in the treatment area while they wait for evacuation. As this is being conducted at a national level reinforcements will be arranged to support the forces on the ground as well as providing additional logistical support. MDA believe in dispatching all available resources to a MCI and will use neighbouring

regions to support normal business. In the event that the MCI is not large the response can be scaled back.

#### 4. Whole of Health

MDA bases their emergency preparedness model on basic principles. MDA doctrine is integrated with other emergency services. “Know your partners, their commanders and doctrine. Learn how to work together and practice scene response together”(22). MDA cooperates with other responding agencies including hospitals, Israeli National Police, Israeli fire and rescue, NEMA (national emergency management authority), emergency division of the ministry of health, Ministry of environmental protection, local authorities, the Israeli defence force, air force, home front command and medical corps and health carers in the community. MDA has clear guidelines and protocols that are well understood as well as plenty of medical supplies and command and control supplies should there be a need.

The integrated emergency response system helps the nation to coordinate responding agencies in multi-casualty scenarios and build coordinated response plans where all agencies work to save as many lives as possible.” (22)

#### 5. Knowledge base

When a mass casualty incident occurs there are complications and challenges that occur in regards to scene response. MDA understands that “chaos exists in the scene with a lack of immediate resources”(22). The management of those limited resources early on is critical to managing the incident.

“MDA’s multi casualty incident plan is based on five operational principles

1. rapid arrival of crews and first responders
2. rapid reinforcement of the scene with additional crews
3. the establishment of MDA medical command
4. triage protocols and lifesaving procedures
5. coordinated response from the national police, national fire and national emergency medical service.

MDA evaluate their response to each and every MCI they respond to. From each of these events, lessons are learned and doctrine, policy and procedures are updated to reflect the lessons learned. This improves emergency response.

MDA are committed to “an everlasting desire to improve and save lives”(11). MDA has worldwide relationships where they guide and help other organisations in how best to respond to MCI. MDA is constantly learning and they are proactive in changing protocols based on prior experience to allow the organisation to best deal with MCIs. MDA continue to adapt to the changes in their environment, constantly attempting to improve their response and their processes in managing MCI.

## 6. Multi-sectorial

MDA has identified that “time is life” and often getting patients out of a dangerous scene is paramount to their survival. As such response plans have been constructed to allow medical personnel to work together with bomb squad technicians at incident sites.

Plans and policies for all responding organisations and sectors are evaluated by a governing body and then disseminated to each organisation. This ensures that each organisation has integrated their response into each of the other responding agencies doctrine. This allows for a multi-sectorial approach.

NEMA is the National Emergency management authority that sits within the Ministry of Defence. NEMA is responsible for coordinating response protocols as well as preparing Israel’s homeland to successfully face emergency situations. NEMA does this by coordinating and directing government offices, local authorities and relevant organizations.

As part of NEMAs role, they coordinate and are responsible for evacuations and casualty management. They are also responsible for allocation of gas, supply of electricity, supply of food and water and the provisions of communications as well as providing infrastructure in times of emergency.

## 7. National Policies which enable local solutions / doctrine

The emergency management system in Israel differs significantly to that of Victoria. Within the ministry of defence in Israel, exists two groups that comprise the emergency managements system - the National Emergency Management Authority and the Home Front Command.

Since the beginning of the intifada (the Palestinian uprising against Israeli occupation of the West Bank and Gaza Strip) the Home Front Command has been the prime supplier of disaster related plans, products, equipment and social-psychological services to the Israeli population. “In its dealing with these events Conroy (2008) suggests the HFC has emerged as a trusted and credible messenger in terms of disaster preparedness instructions and preparedness related educational curriculum”.(33)

Since the existence of the state, Israel has had to contend with numerous mass casualty incidents. Many of these were caused by terrorism however also natural disasters have occurred such as building collapse and earthquakes. As a result Israel has developed national preparedness policies for responding to MCIs. Emergency management is coordinated by the supreme health authority that is part of the Ministry of Health in Israel. National policies exist that are designed to ensure a coordinated response to any incident based on an “all hazards” approach. “Israel’s emergency management system includes contingency planning, command and control, centrally coordinated response, cooperation and capacity building”. (34)

The response plans for MCIs are developed by committees and task forces that have expertise in each type of incident. The supreme health authority must

approve the recommendations made by the task force and once this has been done they will disseminate the policy to the relevant stakeholders as standing policy. Each emergency service and hospital must develop their own standard operating procedures however these must be submitted to the Ministry of Health for approval. Because this becomes a national policy, there is uniform terminology which facilitates collaboration between the hospitals agencies and other providers that respond to MCIs.

Contingency plans are integral to having a coordinated approach to MCIs. Of equal importance is the command and control of a scene. Israeli law gives the national police force authority to coordinate the activities of the first responders, EMS and the fire department.

Coordination of the event occurs through a centralised process that is coordinated by the Ministry of Health. Shared communication systems ensure coordination between organisations and agencies. Regular training exercises together also enhances the response. As part of capacity building the Ministry of Health coordinates national training exercises. These exercises include table-top, on the ground training and full scale exercises.

The home front command provide policies in which a protracted event will be run. MDA will work in coordination with the national bodies involved in handling the event. The screening of patients at such an incident will be performed by a senior medical staff member with additional staff members being allocated as sorters. Casualties defined as walking or non-urgent will be allocated to a designated area where a medical team will supervise and treat the non-urgent casualties.

The *National Emergency Management Authority (NEMA)* is “in charge of directing and coordinating preparedness and response of government offices, infrastructures and local authorities in case of emergency”(35). NEMA sits within the ministry of defence and they aim to reduce loss of life and damage to infrastructure and ensure social resilience in times of emergency. NEMA does this through creating plans for the improvement of the country’s preparedness. Additionally NEMA “maintains an infrastructure for international cooperation in the fields of information sharing and humanitarian aid”(35). NEMA is also responsible for improving the population’s resilience to emergency situations .

One of NEMA’s main tasks is to provide direction and coordination between multiple emergency organisations as well as with government offices, local authorities and other institutions. NEMA has the daily responsibility for assessing the national threat, researching and funding the area of emergency preparedness and is responsible for the preparedness level of local authority and government offices.

In times of emergency, NEMA operates the National Emergency Management Centre, coordinating the national response effort. Here real time analysis of national emergencies occurs where NEMA receives information from all emergency organisations in order to identify any gaps or overlaps in emergency response efforts.

### MDA APPLICATION

In Israel they have an application called "*My MDA APP*". This application on the mobile phone is useful in every day emergencies involving one patient. However it also provides invaluable information during MCI or emergencies. MDA has developed a smart phone application which allows the public to access emergency services at the touch of a button. The public download the application to their smart phone and when they press the button in the application they are connected to the MDA call taker. By using the application the call taker is able to see the exact location of the caller by utilising the GPS services on the smart phone. "A study conducted to examine the effectiveness of the system found that all of the calls received the appropriate response, even during peak times. Arrival times are reduced due to automatic locating and dispatching speed. The system also reduces potential human error"(36). The application also has the ability to automatically translate the conversation into the language of the callers choosing. This allows for better communication both to the call taker and back to the caller. It also assists those who are deaf. The application also has a feature which allows direct video links and photos from the scene to be sent to the call taker all of which assist in particular in MCIs to create an image of what is actually occurring.

In addition the application allows the user to store medical information which can also be passed to the call taker and to the arriving medical teams to help them to prepare for managing their patient. (picture five and six)

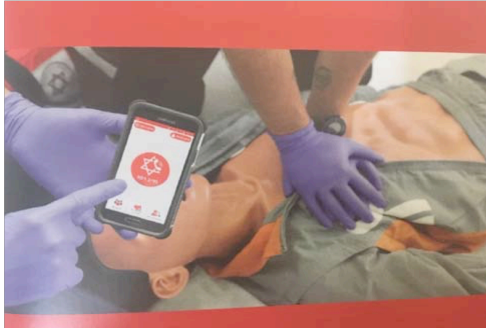
All MDA EMTs and paramedics have the MDA application. When an event occurs (even for a single patient) the dispatcher alerts the five closest off duty paramedics to the incident. The paramedic is not required to attend the incident however they have the option to lend assistance if they choose to. MDA emergency managers can use the application to remotely access the MCI scene through the video link.

All MDA ambulances are fitted with a dashboard camera. These cameras can be accessed by MDA managers from their application on their phones remotely. The manager is able to activate the ambulances dashboard camera and get an image in real time of what is going on at the scene of the incident. This gives invaluable information to the managers to assist them in making critical decisions remotely.

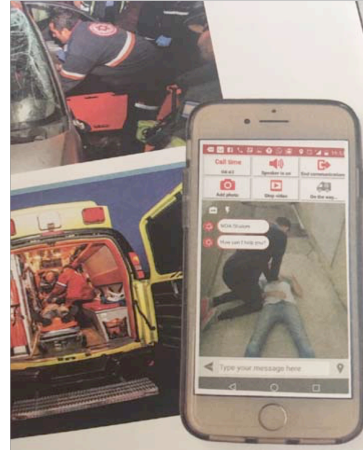
This piece of technology then allows the call taker to initiate a number of steps. To begin with the activation of the MCI protocols will happen immediately based on real time information. In the setting of a single patient with a nasty injury, the call taker is able to send the image directly to the hospital to ascertain the ability of the hospital to treat the particular injury. The information from the application including the patients recorded medical information can then be disseminated to the crew that have been dispatched to the scene.

Through using the MDA application MDA is able to collect a huge amount of data that they then analyse and use to improve systems and processes. "A recent study conducted by the JCT Lev Academic centre in cooperation with the Ben

Gurion University found that the system contributes to the reduction of decision-making time by approximately 30% and that all patients received the proper response due to the preparation of the volunteer first responders and ambulances". (36)



Picture 5: using the MDA APP to call for an ambulance



Picture 6: Communication occurring via typing text-through the application. MDA operations centre able to view CPR occurring on scene via the application

Picture 5 and 6 taken from "7 first minutes – a guide to first aid". Pamphlet by Magen David Adom (18)

## 8. Training in MCI management

Together with the Home Front Command, NEMA is responsible for organising national training exercises for emergency situations. These include courses for civil servants, first responders and municipal workers as well as search and rescue courses.

The Home Front Command in Israel is responsible for civilian safety and as such they conduct routine drills and exercises that test their preparedness. An annual drill called "turning point exercise" is run which focuses on the potential for terrorist attacks however in recent years, these drills have also included earthquakes due to risk assessments that indicate an earthquake is likely to occur in the near future. The National Emergency Authority ran a joint drill with the Homefront Command called turning point six in 2012 that tested Israel's preparedness for earthquakes. Turning point six was a nation wide drill that tested the system as a whole by involving police, fire, MDA, municipalities as well as regular citizens in preparation for a national emergency.

As part of the drill, civilians were notified via the nationwide broadcasting system of the scenario. This occurred via television, radio and mobile phones. The scenario was that two hospitals had collapsed due to earthquake and

tsunami. During the scenario paramedics triaged and treated thousands of mock patients. Rescue workers worked all night to dig patients out of debris from a collapsed hospital. The scenario used government estimated figures to replicate a real event. The Israeli Prime Minister and Cabinet evacuated and participated in the scenario also. The nation wide population of Israel participated in the scenario (37).

One of the most unique aspects of Israel's training is that they involve the communities. Individuals, organisations and municipalities are involved in regular training drills. In 2018 a large scale military exercise was run to practice and test the preparedness of emergency services and home front command in times of emergencies. The goal of the exercise was to improve the preparedness of everyone in Israel from the national level right down to the individual citizen. "The Israeli Defence Force said that the purpose of the general staff exercise is to train the main commanders in a variety of emergency and war scenarios, and to deepen the readiness and operational dialogue between the various command centres".(37) The drill involved sirens being sound across the country and individuals including education institutions such as kindergartens evacuating all individuals to a safe location.

Training, continuing education and drills is a large component of how MDA are ready to respond to MCI as well as being alert and ensuring that preparedness inspections are completed regularly.

To be able to save as many lives as possible it is imperative to have high performing emergency response systems that are prepared to respond to MCIs. In Israel compulsory emergency response training for all medical institutions as well as all medical staff exists as well as regular exercises for responding to MCIs.

The region manager is responsible for the readiness and the competence of the teams in their area of responsibility. This includes the management of MCI in his sector. The manager of the region is responsible for making sure that each of his staff members have participated in a drill every year. This ensures that the staff retain currency in the skills of running an MCI.

Paramedics receive approximately twenty hours of program time that includes MCI – definition, principles of command and control, collaboration with other agencies, scene set up, scene response, safety (including where an explosion has occurred), triage, medical treatment protocols for MCI, radio procedures, MCRV (multi casualty response vehicle) and case studies on incidents that have occurred in Israel. A table top drill will be run for all paramedics and they are also involved in a full scale live drill. All programs conclude with a test to evaluate the paramedics' readiness to respond to a MCI. Feedback is given to each paramedic on their performance in the drill and this is done via a debrief. An evaluation checklist exists to ensure the paramedic is competent in each part of the process.

EMTs receive five to six weeks of training and in this time they receive classroom education however no drills.



#### 5.4 Summary

This chapter outlined the response to MCIs that occurs between AV and MDA. The two services will be further compared in the chapter seven.

See attachment 7 (page 120) for a summary of the similarities and differences between MDA and AV.

*With an understanding of the MCI response between the two services, chapter six will outline how each agency train paramedics to be able to respond to MCIs.*

## Chapter 6 EDUCATION AND TRAINING

This section outlines the education and training provided to paramedics in Israel and Victoria to be prepared to respond to MCIs

### 6.1. Australian National Paramedic Competency Standards

*To understand how the course content was developed and why there were differences between each of the universities producing ambulance paramedics, the governing documentation was analysed. The three overarching documents that govern paramedic education include*

- The Council of Ambulance Authorities “*Guidelines for the Assessment and Accreditation of Entry-level Paramedic Education Programs*”.
- The Council of Ambulance Authorities “*Professional Competency Standards – Paramedic*”
- Paramedics Australasia “*The Australasian Competency Standards for Paramedics*”.

*These documents are outlined below and compared to the universities course structures.*

#### Guidelines for the Assessment and Accreditation of Entry-Level Paramedic Education Programs

This document was created to “facilitate the assessment and accreditation of entry-level paramedic education programs in Australia and New Zealand”(4). The document outlines the framework for universities to base their course structure and curriculum on. The document also outlines the accreditation process for the paramedic course. With the move from a skills based approach to paramedic education to a tertiary based education, it was clear that an evaluation of the education program together with an evaluation of the quality of the graduates it was producing was needed. These guidelines were established to ensure that the “workforce skills and competencies required to meet health care needs are properly reflected in paramedic education programs” (4). The guideline was intended to be used in conjunction with the paramedic competency standards. This document does not have any references to the skills required in MCI or disaster management.

#### Professional competency standards - Paramedic.

The CAA has produced a document outlining “Paramedic Professional Competency Standards”(PPCS). Within this document section 8.7 describes the competencies for Mass Casualty Incidents and Major incidents. The document outlines that paramedics must “demonstrate an understanding of the public health model for response to major incidents. Paramedics must demonstrate a working knowledge of the application of emergency medicine in a mass casualty

or major incident events and must maintain currency with organisational policy, directions, procedures and guidelines relating to ambulance major incidents”(2).

Other than ACU, none of the universities made any mention of these standards within their unit guides. Hence the question can be asked as to whether the universities are meeting the standards that are required of AV to respond to a MCI efficiently and effectively.

### The Australasian Competency Standards for Paramedics

Paramedics Australasia is the professional body that has a role in setting standards of practice for paramedics and includes the development of paramedic competencies “that inform the design of paramedic education programs”( 3 ).

This document outlines the overall standards expected of paramedics working within the Australasian region. The document develops the scope of practice for all paramedics and “ develop legislation that governs the roles, responsibilities and practices” (3) of practicing paramedics. This document does not specifically outline any specific standards for managing MCI or disaster situations.

### 6.2 Comparison of MCI competency standards for paramedics and nurses.

The first MCI course that was established was the “Major Incident Management System (MIMS) course. This described an ‘all hazards’ approach to a mass casualty incident in the pre-hospital setting. However the 9/11 terrorist attacks “provoked an increase in awareness and importance in nursing, resulting in calls for all nurses and primary health care workers to have a rudimentary level of mass casualty response training”(38). Like any skills taught to health care professionals, the “application of essential elements of disaster preparedness education should be practiced in a real or simulated situation”(39) . Simulation techniques allow student experiences “that would be difficult to replicate in the classroom or in a clinical setting”(40). Simulation of skills allows students to consolidate the theoretical knowledge gained in the classroom and cements the skills needed in the field. It is therefore important to incorporate this into the curriculums of all responding primary health care providers. Hence, in 2003 the international nursing emergency preparedness education coalition developed the “Educational Competencies for Registered Nurses Responding to Mass Casualty Incidents”(41).

The international council of nurses created a framework for disaster nursing competencies that was based on the disaster cycle (prevention/mitigation, preparedness, response, recovery/rehabilitation). Nursing competencies were developed using this framework. Ten competencies were established and are used as a framework to organise disaster education. Simulated training is included in the framework to enhance the student’s learning of the required competencies and meet the expected standards. The International council of nurses together with the World Health Organisation have compiled competency standards for disaster nursing. It is outlined in this document how nurses are at the forefront of disaster response and can hold many roles during such events.

These can include serving as “first responders, triage officers and care providers, coordinators or care and services, providers of information or education, and counsellors”(38).

Nursing already had two key disaster nursing competency documents. These were the “Educational Competencies for Registered Nurses Responding to Mass Casualty Incidents” and the “Core Competencies Required for Disaster Nursing” (38). The themes of these two documents were included in the competency standards for nurses. The importance of disaster and MCI training already existed for nursing prior to this document being produced. The aim of the document is to “strengthen the essential capacities of nurses to deliver disaster and emergency services within an ever-changing world with ongoing health threats and disasters” (38).

While the College of Emergency Nursing Australasia includes competencies for mass casualty preparedness, according to Currie et al, “there are still no standardised mass casualty educational packages for nurses” (42).

The Council of Ambulance Authorities produced a position statement in 2013 titled “*Ambulance services: a fundamental part of our health system. Disaster and Emergency Management – The Ambulance Role*”(23). This document was developed to provide information to policy makers and other health and emergency service organisations as to the capability of ambulance services in emergency situations. The role and the capabilities of ambulances must be well understood by all stakeholders and emergency services to allow for a coordinated approach to emergency management. The document states that paramedics and ambulance services are able to deliver “skilled health care in uncontrolled environments and they have the ability to manage pre-hospital care including its associated logistics in the field” (23). Despite this paramedics do not have a set of competency standards similar to nurses for MCI management.

## 6.3 Victoria

This section will outline the training and education of paramedics in Victoria in the setting of MCIs

### 6.3.1 Undergraduate Education

There are 5 universities in Victoria that produce paramedics. The five universities are

- Monash University
- Victoria University
- Australian Catholic University
- Federation University
- Latrobe University

Each of these universities are analysed below according to the following headings:

1. Subject that teaches Emergency and disaster management
2. Subject structure
3. Content covered in the subject
4. Number of hours spent practicing skills / drills
5. Governing documentation taught into the subject
6. Assessments

*Table one provides a comparison of the universities and more detailed information regarding each university can be found in attachment 6.*

University & subject code	Monash Uni (PAR3022)	Victoria Uni (HFB3226)	ACU (PARA305)	Federation Uni	Latrobe Uni (major incident management)
<b>Disaster cycle</b>	Planning Response Recovery	Planning Preparedness Response Recovery	Planning Preparedness Response Recovery	No mention of the disaster cycle	Prevention Preparedness Response Recovery All Hazards
<b>Roles/ responsibilities</b>	✓	✓	✓	✓	✓
<b>SHERP</b>	✓	✓ (+ ERP)	✓	✓	✓
<b>Other emergency services roles</b>	✓	✓	✓	✓	✓
<b>Triage Sort and Sieve</b>	✓	✓	✓	✓	✓
<b>Hours spent:</b> ○ <b>Theory/lecture</b> (ave. 12 week semester)	2hours lecture per week	1 hour per week	10 x 1 hour web based learning	2 hour lecture	Online videos + 1 week on campus
<b>TOTAL TIME: theory</b>	24 hours	12 hours	10 hours	2 hours	9 hours
○ <b>Practical</b>	3 hours fortnight <i>including logistical management, patient triage, simulated MCI situations including Emergo Train</i>	Every second week 1 tutorial 3 hour practical session weekly <i>Each student will practice TO/TO role once</i> <i>Opportunity to participate in study tour to Israel</i>	10 x 3hours prac + 8 x 1hour tutorial <i>TO/TO practice in scenarios</i> <i>+ 2 x Emergo Train exercises</i>	1 x emergo train exercise + full day SES simulation + half day university organised MCI simulation + MCI exercise in practical sessions	1 x emergo train + 1 mass casualty simulation
<b>TOTAL TIME: practical</b> (excluding Emergo Train)	18 hours	42 hours	38 hours	Aprox. 16 hours	16 hours
<b>Assessment:</b> ○ <b>Written Assignment</b>	✓ + 1500 word worksheet	✓ workbook scenarios	✓ + multimedia portfolio + group presentation	NIL assessments	✓
○ <b>Exam</b>	✓ written and practical (MCI simulation)	✓ written	✓ written	✓ written	Triage quiz

Table 3: Comparison of the Victorian Universities

The disaster cycle was addressed by all universities except Federation university. However each university had slightly different focuses. The roles and responsibilities associated with managing multiple patients or complex settings during a major health emergency was mentioned in each unit guide. These included health and incident controllers and spanned all tiers of the response. All five universities taught the SHERP document in their MCI units with Federation

university making special mention of the ERP and the AV sub plans. Each of the universities outlined that other emergency services roles were addressed in their units however no training is done at the universities to consolidate the coordinated response. Triage is taught in all units across the five universities with Monash, Victorian university and Latrobe referring to triage SORT and SIEVE as is used at AV. ACU outline a primary and secondary triage is taught but does not specify which triage tools are taught. At Federation university a two hour lecture is given to explain the roles of the TO and TO with reference to triaging. The hours spent on these subject and the split between lectures and practical time varied between each university as did the way the universities engaged with practical sessions and scenarios. All universities except Victorian university utilise Emergo train as part of the practical component to their training.

### 6.3.2 Induction training for AV paramedics to be prepared to respond to MCI

During a paramedics' induction into AV a face to face lecture is conducted by the Emergency Management department of AV introducing paramedics to the emergency response framework utilised by AV. Graduate paramedics will also undergo a level C Personal Protective Equipment (PPE) course and will be accredited at the end of their induction process. These students are also required to complete an online learning package on the AV intranet which outlines basic tasks a paramedic will perform as the TO and TO at an incident. This includes how to give a SITREP and how to perform triage sort and sieve. All paramedics across AV have access to an online training module called Virtual paramedic which is similar to a video game in which the individual is presented with a mass casualty incident and they must perform a triage sort with the patients they find on their screen. It is a highly developed, online training scenario that gives paramedics the opportunity to play out, in real time, a mass casualty event and see the impact of the decision they make in real time. It provides a safe space for practicing high impact skills that are infrequently used in day to day response (43). This process is timed and feedback is provided to the individual. Within the first five weeks of their employment paramedic students are expected to complete this training module as many times as necessary to achieve a 100% score for accuracy of their triage. The training program tests that the students are giving a SITREP however it does not measure the effectiveness nor accuracy of the SITREP given by the student.

### 6.3.3 Graduate year training for AV paramedics to be prepared to respond to MCI

Currently there are no milestones that a student must reach as they progress their way through their graduate training year.

### 6.3.4 Ongoing paramedic refresher training for AV paramedics to be prepared to respond to MCI

Paramedics have access to the 'virtual paramedic' game through the Emergency Management Unit page on the AV intranet.

As part of Ambulance Victorias' Learning Management System a module on MCI exists. It is titled 'mass casualty incidents' and as a paramedic navigates through the learning package, they are reminded of the roles of TO, TO as well as how to perform triage sort and sieve. This module will also direct a paramedic to documents such as SHERP and the Ambulance Victoria Emergency Response Plan however does not engage the paramedic in any tasks to do with these two documents. The module also explains the escalation process that occurs from when the call is received to when the first ambulance gives their initial SITREP and continues as each subsequent SITREP is given. The module explains how the matrix is used to escalate the incident and discusses the paramedics' safety. The smart triage pack used by Ambulance Victoria is outlined in this online module also.

In addition to the online modules, AV run Emergo Train training every two months. Paramedics will be randomly allocated to this training day by the rosters department and only 15 paramedics at a time will be involved in this training with a total of 90 paramedics being able to participate in this training module annually with only 12 paramedics getting the experience of being the TO, TO annually.

In 2018 AV ran a professional development day for all their staff members which included a component on mass casualty incident management. The material delivered outlined the new emergency management response and reminded paramedics of the TO, TO roles. Each paramedic had the opportunity to practice their skills in triage sort and sieve by walking into a room that had pictures of patients around the room with their vital signs written on it.

Team Managers at AV undertake a strategic command training course to allow them to perform the health commander role at an MCI. These paramedics are also trained using the Emergo Train training module as well as gaining practical experience at planned public events.

### 6.3.5 Multi agency training

Team managers are expected to have an understanding of the state arrangements that exist with other agencies and be able to communicate with managers from other emergency services during an incident. It is the team managers and health commanders that gain the experience in training in a multi-agency context. The Department of Human Services is responsible for running multi-agency training for MCI and AV utilise the Emergo train for their component of this training.

Victorian Police train their staff in counter terrorism training. For example in 2017 Galaxy was performed and AV were invited to participate. Managers from AV were involved with this training and utilised the Emergo train to practice their skills. The Hydra exercise was also run by the police that allowed for training in scenario based situations. An AV manager is sent to these exercises also. Other exercises are regularly performed such as a yearly drill at the Tullamarine airport. Local councils also regularly exercise to test their



emergency response plans and Health Commanders from AV are involved with these exercises.

In Australia each type of disaster is commanded by different organisations. The national command chain in VIC looks like this

Natural disaster →	Attorney general (national level) EMV ( state level)
Health Disaster →	Minister of health (national level) DHS (state)
Terror →	Minister of Justice/Attorney general (national level) Police (state)

Given that different types of incidents have different lead organisations training can be challenging as each organisation has its bias.

Over the recent years there has been an increase in frequency and impact of both natural disasters and terrorism across the world. This has brought attention to the first responders and their preparedness to respond to a MCI or disaster. Given that the skills required to manage such an incident are not well rehearsed in day to day work, these skills need to be taught and then maintained in meaningful ways.

*Staff that will be at the forefront of the response and who will be required to manage these events need education and ongoing training to keep their skills up to date. This will give responders greater confidence when holding management roles at a MCI or disaster. Fitzgerald et al. conducted research to develop a set of “standards and conceptual framework for higher education programs in emergency and disaster management” (5). This paper outlined the importance of tertiary education in the area of emergency and disaster management, “developing the capabilities within the workforce and leading to more effective emergency and disaster management”(5). WADEM has developed a conceptual framework based on the Bradt model which can be used to develop education programs. If tertiary institutions utilised this framework a more standardised approach would be seen in emergency management. Developing a generic standard to be used by all universities would contribute to a better understanding of the working environment with less confusion around roles and responsibilities. A standardised approach would also facilitate better understandings between organisations. “Developing generic standards for emergency and disaster tertiary programs strongly contributes to the establishment of a core curriculum which will enable an employer a sense of predictability and generic expectation of graduates” (5).*

## 6.4 Israel

Israel's history has meant it has had to be prepared to respond to MCI, terrorist attacks and wars on a regular basis. As such the EMS system has been put to the test and the doctrine and protocols that dictate the emergency response have been utilised and rehearsed. This section will outline how MDA educate and train their paramedics to be prepared to respond to a MCI.

### 6.4.1 Training for volunteers, EMTs and paramedics to be prepared to respond to MCI

In Israel volunteers can begin their training and be part of the ambulance crew from the age of fifteen. Once eighteen years old volunteers can be trained to be EMTs which is a six week course that involves MCI training. Once an EMT has become experienced, should he wish to, he can be trained to become a paramedic (which is the equivalent of MICA in Victoria). All volunteers, EMTs and Paramedics receive thorough training including in MCIs.

Paramedics receive approximately twenty hours of program time that includes : MCI - definition , principals of command and control, collaboration with other agencies, scene setup, scene response , safety( including a scene where an explosion has occurred), triage, medical treatment protocol for MCI , radio procedures, MCRV ( multi casualties response vehicle ) and case studies on incidents that have occurred in Israel. This will include lessons learned from previous incidents based on recordings of communication from the incident. A table top drill will be run for all paramedics and they are also involved in a full scale drill. All programs are concluded with a test to evaluate the paramedics readiness to respond to MCI.

The MDA doctrine outlines that most of the time when an MCI occurs it is the paramedic that will be the incident commander. In MDA most managers are paramedics and hence the managerial program is based on the paramedic training. In addition to this the course includes the subject of MCI from managerial perspectives.

When paramedics receive their training they receive not only classroom lectures but they also participate in table top drills and a secure internal exercise. These exercise are monitored by a facilitator and then feedback is given to each paramedic through a debrief. An evaluation checklist exists to ensure the paramedic is competent in each part of the process.

### 6.4.2 Ongoing refresher training for paramedics to be prepared to respond to MCI

All EMTs and paramedics must participate in a minimum of one MCI training scenario every year. The regional manager will allocate individuals to different drills that are occurring to ensure that each paramedic is well rehearsed in emergency situations.

As part of the ongoing clinical training for EMTs and paramedics, every two years a refresher training is given to paramedics. In these refresher courses

lessons learned from previous attacks in Israel are also addressed and updates delivered. All paramedics receive yearly reaccreditation in Level C PPE training.

### 6.4.3 Multi-agency training

Multiple drills exist throughout the country by multiple organisations. These include ministry of health, hospitals, the prison, EMS, police, Home Front Command, NEMA and many more. Each year a timetable of drills both nationally and regionally is established and all agencies participate in establishing an exercising / drill timetable. This allows all organisations to view the timetable for these drills and to be able to invite other agencies to be involved and participate in each others drills. Paramedics are allocated to all of the drills run throughout the country.

Training also exists for managers within MDA. Drills are coordinated and planned by the ministry of internal security that involve all emergency services and first responders. In the lead up to these drills a process of meetings occurs. Initially each organisation presents their planned response to the incident to allow other organisations a chance to understand their perspective on the incident. The next step is a table top drill performed with each of the organisations. Once this process has been completed the exercise can occur. This process allows for good communication and coordination between agencies. It also allows for each agency to understand the gaps leading into the exercise and to be able to discuss these and prepare for them together.

### 6.5 summary

Chapter six outlines the training that is done in AV and MDA to prepare paramedics to be able to respond to MCIs. There are many similarities, however, there are also many differences. A comparison of AV and MDA is done in chapter seven.

*With an understanding of AV and MDA's ambulance systems, chapter seven will summarise the key findings, answer the research questions, further compare AV and MDA's emergency management systems and make recommendations for AV.*

## Chapter 7: DISCUSSION

*Chapter seven outlines the key findings of the research and answers the research questions. This chapter outlines recommendations based on these findings.*

### 7.0 Summary and key findings

The desktop review, interviews and experiential phase compared the Victorian and the Israeli systems and as a result there are a number of lessons that could be learned by AV.

The strengths of the Israeli approach is that their doctrine and protocols are integrated between services and their training and drills are co-ordinated. There is a constant assessment of preparedness and a centralised dispatch system. Their guidelines and protocols are well rehearsed through training and experience.

MDA's MCI plans are based on simple processes. These are to get rapid arrival of crews and first responders to the scene. Following this, rapid reinforcement is required with additional crews and support agency involvement. A MDA command is established quickly and triage protocols are initiated rapidly. Lifesaving procedures are performed and rapid evacuation of casualties to hospitals is the key of MDA's success. According to Guys Caspi "What is not simple, simply won't be". Another strength of the Israeli system is their commitment to ongoing training for staff and volunteers both within the ambulance service but also integrated with all emergency services and hospitals. Staff from each of the emergency services together with the hospitals train together regularly in mandatory annual drills.

In Israel there is one national police force, one national emergency medical response (MDA) and one national structured fire system. The integrated emergency response system allows the nation to coordinate responding agencies in multi casualty scenarios and build coordinated response plans where all agencies work together to save as many lives as possible.

This thesis identified the way that Victorian paramedics are trained to respond to MCIs from their university training through to the training available to them once employed by AV.

The course content for most of the Victorian universities covered the disaster cycle, aspects of SHERP and AVs ERP and outlined the roles and responsibilities of AV paramedics who arrive at a MCI. Most of the universities involved their students in some aspect of practical training. These included Emergo Train or white board training or live drills using actors as patients.

The Australian national paramedic competency standards do not have a clear set of MCI standards and hence there were vast differences in exactly what was taught and how the skills were gained, rehearsed and assessed at each of the universities.

There was very little influence from AV on what the university course content should contain, and how the curriculum should be taught, and how the curriculum should be delivered.

Similarly, once employed by AV the information on how to respond to a MCI is available to paramedics in document format on the AV intranet. However, after the first graduate year of employment, there is little engagement with staff to train and refresh their skills in MCI. While the response to a MCI in Victoria is clearly defined through SHERP and AVs ERP, little is done to ensure that paramedics understand their role at MCIs as well as other agency roles at MCIs. Very little multi-agency training is conducted that includes AV paramedics.

## 7.1 research questions answered

The problem statement being researched, as outlined in section 1.2, was:

*“As a paramedic with many years of experience working on road for Ambulance Victoria, I began to question the readiness of our paramedic workforce to respond to MCIs. My professional experience led me to question whether paramedics could be better trained to manage the increasing MCI workload. Given my exposure to the system that exists in Israel I felt that the training received by paramedics in Israel as well as the emergency response to MCI in Israel was better than in Victoria”.*

The problem statement was answered by comparing the documents that guide the MCI response and training between AV and MDA, augmented by the interviews and my experience in Israel. There were many similarities in the way to two agencies responded to MCIs, however, there were also many differences. Some of the findings from the Israeli system would be beneficial if implemented into the Victorian system. Recommendations for AV have been made in section 7.3 addressing the learning's that AV should take from MDA with regards to response and training.

The primary research question outlined in section 1.4 was:

*“Are there lessons that Emergency Management Victoria and Ambulance Victoria can learn from the experiences of the Israeli ambulance service when it comes to training for and responding to mass casualty incidents?”*

Through this research it became evident that there is a lot that can be learned from the systems in Israel. The doctrine and guidelines that underpin the response to MCIs in Israel is embedded into National response plans that are well understood by all agencies. Technologies and equipment used by MDA emergency managers and paramedics are well understood and are also used in every day business. This means when these tools are needed during a MCI, staff are well versed in how the technologies, equipment and processes work. The MDA staff are educated to know how to respond to MCIs and their knowledge and skills are regularly tested and practiced in MCI drills. Much can also be learned about communication and multi-agency training to facilitate better

management of the scene with better understanding of each agencies roles at a MCI.

The secondary questions outlined in section 2.4 were:

*“What is the organisational setting of AV and MDA in which the emergency response occurs?”*

This question was answered in chapter four

*“What is the MCI response in AV and MDA? Are there lessons to be learned from each organisation?”*

This question was answered in chapter five and recommendations about lessons learned are outlined in section 7.3

*“What training is done to prepare paramedics to respond to MCIs in AV and MDA? Are there lessons to be learned from each organisation?”*

This question was answered in chapter six and recommendations about lessons learned are outlined in section 7.3

## 7.2 Comparing the two systems

The WHO Guiding Principles headings were used to compare the two systems – AV and MDA.

### 1. Clear lines of responsibility

Both AV and MDA have clearly defined the roles and responsibilities for those involved with the incident. In both AV and MDA’s guidelines and policies the response could be scaled up from local, to state and to national levels. Both organisations clearly outlined who was in charge at each phase of the response.

Despite these similarities, AV and MDA have different roles and responsibilities when managing MCIs. At AV, the first ambulance to arrive on the scene adopts a triage and transport role. Depending on the type of the incident and the number of patients, the dispatch center may choose to dispatch a team manager to the event to hold the role of the health commander. It is the health commander who manages the scene. If the incident is large enough, the AEOC will take over the management of the event remotely and will engage other stakeholders and dispatch further crews to the scene. The idea behind this is to reduce the impact on normal business.

In Israel the first paramedic to arrive in the first ambulance holds the role of the “command 10” which has similar functions to that of the AV health commander. In Israel, the first phone call to the dispatch center that indicates the potential for a MCI will trigger an automatic response to the incident. This includes the dispatch of all available resources to the scene. Managers will also be dispatched to the scene however if the “command 10” is in control of the scene he will remain as the “command 10”. The “command 10” will delegate roles to the subsequent paramedics who arrive on the scene including triaging the patients in each sector. The “command 10” will then organise the evacuation of patients from the scene to hospitals in conjunction with the operation center commander.

## 2. All-hazard applicability

In AV and MDA’s arrangements an all-hazards approach was taken so that no matter what the event, the organisations processes would remain the same.

## 3. Scalability

When comparing the two organisations for their abilities to scale up or down depending on the size and nature of the incident clear differences were evident. While both organisations have the capacity to scale their response, the approach to the scalability was different.

AV use an escalation matrix to determine the level required for any particular incident. Based on the initial information from the call taker and then the initial SITREP given by the first crew on scene, data on the number of patients at the scene and the severity of the incident are analysed to determine the level of the incident. The response level (white, green orange or red) is determined from this set of information and as such a management summary is applied and relevant stakeholders are notified. The level of the response will also trigger different managers and different agencies depending on the type of incident. The number of crews and support staff sent to the scene is dependant on the number of crews requested by the first crew that arrives to the incident.

In MDA a standardised approach is used immediately when the phone call is received. The experience in Israel has guided this approach and when a call is received ALL available resources are sent to the scene. This also includes first responders whose location can be identified via the MDA application and those nearest to the scene are requested to attend on their motorcycles. MDA will call in neighbouring resources from surrounding regions to back up their “normal business” while the crews in the region of the incident focus primarily on the patients at the scene. This model allows for the quickest evacuation of patients from the scene to the hospital. MDA have some incredible technologies being utilised at the scene of the incident that allow managers to make well informed decisions about the response needed and the extra resources required. In the event that the incident does not require the number of resources that have been allocated to the event, the response is scaled back. MDA believe it is easier to scale down the response than scale up and hence this is why they use this approach when responding to an MCI or disaster.



#### 4. Whole-of-health

AVs ERP outlines the approach to an emergency situation as being a whole of health approach. It outlines a “shared responsibility for action” in an emergency and this can start with the individual and include the community, businesses and emergency services. The ERP also discusses the involvement of first aid agencies, GPs pharmacists and FEMOs in the emergency response. SHERA outlines the ability to establish a health incident management team that liaise with each other to create a whole-of-health approach to the incident.

In comparison, MDA cooperates with other responding agencies according to their doctrine. These include hospitals, NEMA, the emergency division of the ministry of health, ministry of environmental protection, local authorities, the Israel defence force, the home front command, medical corps and health carers in the community. This is indicative of the whole of health approach.

Communication between fire, EMS and police commanders occurs on a regular basis (eg. Weekly). This means that in times of emergency all personnel are familiar with one another and the work flow is more effective. This occurs at a regional, national and local level. During these meetings information is shared as to what threats exist and intelligence is shared.

#### 5. Knowledge-based

A set of clear guidelines and protocols must exist that are based on knowledge. This needs to be clearly defined so that there is no debate while the emergency is in progress. Individuals are more likely to accept the guidelines if they are based on ethical principles.

Both AV and MDA outline that their protocols and doctrine are based on achieving the best outcome for the most people in the setting of a MCIs. Unlike day to day workload, in a MCI it is often the sickest patient who does not receive the most intervention. Given the lack of resources for the demands that an MCI will place on a service, there is a basic principle accepted in both organisations that definitive care should be given to the patient most likely to survive with interventions.

The way the two organisations go about this is slightly different and given this thesis did not analyse the effectiveness of each strategy it is difficult to comment on what is best practice. Instead comment is made here regarding the approach that both organisations take.

AV use a SORT and SIEVE method to triage the scene and have a designated paramedic assigned to triaging and a paramedic assigned to transport decisions. The life saving techniques used by AV through the initial triage are to open airways and provide haemorrhage control only.

MDA use the START and SALT triage tool. MDA have one paramedic assigned to “command 10” and this paramedic is the leader of the incident. This paramedic delegates the triage to subsequent paramedics that arrive on scene and can choose to sectorize the scene and hence will allocate a triaging paramedic to



each of the sectors. The life saving techniques used by MDA in their initial triage include opening airways and providing haemorrhage control however at MDA, paramedics will also decompress chests as part of the routine treatments provided in the initial triage.

MDA also emphasise the importance of quick evacuations of patients to the correct destinations. The “command 10” will designate a paramedic to consult with the hospitals and to coordinate the movement of patients to the correct hospitals. It is so vitally important to evacuate patients that ambulance crews will be split if need be to assist in more rapid evacuations. Staff will be allocated to the appropriate patient based on their skill level as opposed to keeping crews together.

MDA base their responses, doctrines and protocols based on the experienced gained from attending the many MCIs that occur in Israel. Lessons are learned through debriefs from real events and these lessons influence the knowledge in which the protocols and doctrines are built and updated.

## 6. Multisectoral

The EMMV in Victoria outline the roles and responsibilities of all agencies responding to an MCI. The SHERP document outlines the command and coordination arrangements for all sectors when responding to an emergency. EMV have many strategies in place to improve emergency management response. This includes building resilience through fire management strategies, community resilience frameworks and recovery strategies. EMV also sustain infrastructure by developing Victorian information network for emergencies (VINE) and emergency management common operating picture (EMCOP) and emergency management operational communications (EMOC). The visions, goals and values of the EMV aim for a sector-wide approach. This would enable all agencies, departments, industry business and all levels of government and community to work together to achieve the same goal of minimising damage, injury and harm to the community post an event. To be able to respond and recover together, these agencies, communities and governments need to work together on a daily basis so that when an emergency occurs they are used to working together. Training and familiarity with different agencies and governments departments allows for a smoother response and recovery to an incident.

Much of MDAs success in responding to a MCI is attributed to a coordinated approach to an incident at all levels of the community including the government. This is evident in the Nation wide drills that are run across the country that see involvement from kindergartens to the Cabinet of the Israeli government. MDA cooperates with other responding agencies according to their doctrine. These include hospitals, NEMA, the emergency division of the ministry of health, ministry of environmental protection, local authorities, the Israel defence force, the home front command, medical corps and health carers in the community. This is indicative of their whole of health approach. These other agencies are responsible for communications, transportation, law and order, security, water and sanitation and social services.

## 7. National policies which enable local solutions

EMV base their principles on shared responsibilities. This means that preparedness begins with the community taking actions to prepare for potential emergencies, for example, bushfires. The responsibilities to be prepared also extend to the emergency services with information being assessed regularly into the likelihood of an emergency occurring. The AV response plan guides the emergency response and these plans are compliant with the Ambulance Act 1986 and 2013 as well as the State Emergency Response plans.

MDA uses an emergency management continuum to manage emergency preparedness. This includes three phases. These are prevention and mitigation to reduce risk, preparedness through training drill and exercises, an integrated doctrine with standard operating procedures to be able to manage the response and recovery. Within each step of the continuum there is leadership engagement, an all hazards assessment, training and exercises, capability improvement and performance assessment.

Israel has two groups that make up the emergency management systems – the National Emergency Management Authority(NEMA) and the Home Front Command. The Home Front Command are responsible for supplying disaster plans, products, equipment and socio-social services to the Israeli population. NEMA is in charge of coordinating response and preparedness plans for government offices, infrastructures and local authorities. NEMA is also responsible for improving the population's resilience to emergency situations. The supreme health authority is part of the ministry of health in Israel and is responsible for developing national preparedness policies for responding to MCIs. In Israel the response plans are developed by committees and task forces that have expertise in each type of incident and the supreme health authority must approve these plans before they are disseminated to relevant stakeholders.

## 8. Training in MCI management

Ambulance Victoria are not involved with the training of tertiary paramedics in the area of MCIs. At only one Victorian university AV are requested to conduct an Emergo training exercise with the final year paramedic students. When graduates are employed by AV they have access to the Virtual Paramedic training tool and are required to complete MCI learning packages. As a paramedic progresses through their career there is no obligation to refresh nor rehearse the skills required to be used should they attend an MCI.

AV is involved with multi agency training only when AV are invited to participate in a drill or exercise by another agency. AV will send a manager to these exercises and will often use the Emergo Train tool as part of the multi agency exercise. AV train their team managers in strategic command courses so that they are equipped with the skills to hold the health commander role at a MCI. Live drills and exercises are not a component of the strategic command course.

In comparison, MDA are responsible for all the training that occurs with volunteers, students paramedics and qualified paramedics. Throughout their training, paramedics are exposed to many opportunities to rehearse the skills required of them during a MCI. This continues through to qualified paramedics. Each paramedic is required to attend at least one exercise or drill on a yearly basis. The team managers of MDA ensure that each of their team members are trained and rehearsed by ensuring that they attend these exercises as well as participating in refresher classroom training every two years.

The system in Israel believes in an integrated doctrine and rehearsed protocols and hence multi agency training is a huge component of the training and refresher training that occurs within MDA. Most organisations, municipalities, facilities, emergency services and airports are required by law to conduct their own drills. At each of these drills a group of MDA paramedics will conduct the emergency response as part of the drill. This is where working together is practiced and specialised skills required at a MCI are rehearsed. MDA's training regime is based on having well understood doctrine and guidelines. MDA train their staff to know how to use the equipment required in a MCI, they educate personnel to know how to respond and then paramedics practice these skills in drills.

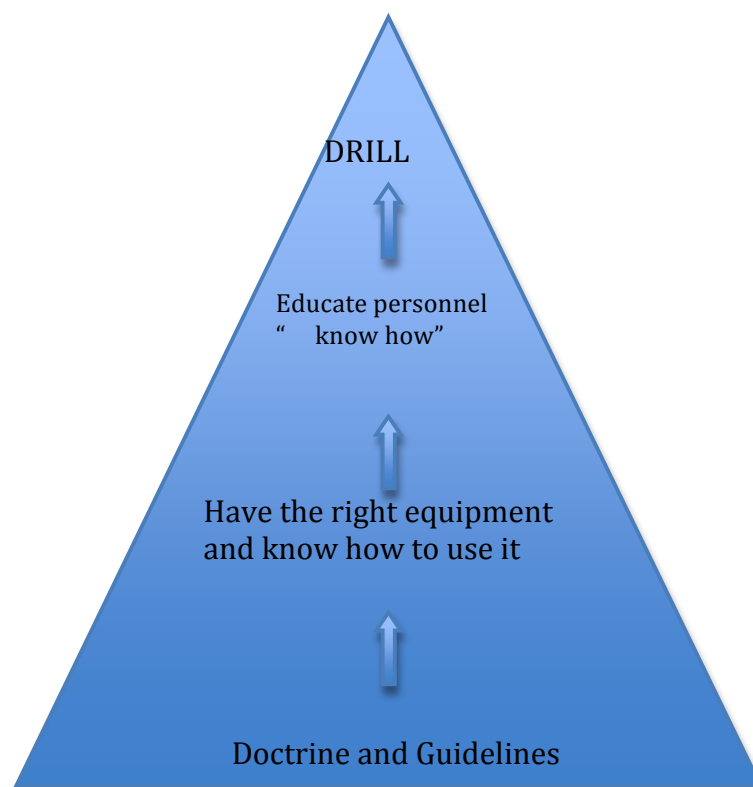


Figure 12: MDA training structure

### 7.3 Recommendations

1. The evidence from this thesis indicates that there is a lack of consistency between the Victorian universities on how they educate paramedic students in MCI management. Due to the lack of discussion about MCI in the competency standards, the universities are not guided by a common set of standards. As a result the training and education received by students from the five universities varies. Since all paramedic students attempting to gain employment as paramedics in Victoria will all work for Ambulance Victoria as it is the only ambulance service in Victoria, a common training standard is recommended. The training of paramedics in MCI response would be improved if paramedic students trained in the same way as one another and collaboratively in the same drills. The SHERP document in section 5.3.2 *health service planning*, outlines “the importance to develop and exercise plans as part of normal business operations”(10). In accordance with this training for MCI could be improved from tertiary level through to qualified ambulance paramedic level. I would recommend a collaboration between the universities to set up a common one day per semester dedicated to MCI scenario training in which all universities participated. In this setting first year paramedic students could act as the patients in the scenarios where second year paramedics had the opportunity to practice the roles of TO and TO as well as practice using the triage SORT and SIEVE. Subsequently the second year paramedics could act as patients for the third year students and the third year students could act as patients for AV staff.

The rehearsal of skills in a real live scenario consolidates learning that has been developed in the classroom. Like all skills required by a paramedic, practice is important in maintaining skills.

The Victorian Emergency Management Institute (VEMI) has a new training facility in Mount Macedon that was established to facilitate training opportunities for the emergency management sector. This facility should be utilised to set up scenario based training for the universities in collaboration with the emergency services. “VEMI’s programs and activities provide the emergency management sector with greater opportunities to learn, acquire new skills and build capabilities in preparing for, responding to and recovering from emergencies”(44). It would be more cost effective to implement this training proposal whilst paramedic students were still enrolled at the universities because it would be unachievable and cost prohibitive once they become employed. Alternatively, a one day scenario based training at VEMI during the induction program for newly employed paramedics might be an effective compromise.

The training day should also evaluate the benefits of live training drills. This can be done by providing students and paramedics with a questionnaire at the beginning of the day to evaluate the basis of

paramedics understanding of their role within an MCI. At the completion of the training day, an evaluation of the course should be done by repeating the same questionnaire to evaluate the individual's learning.

In addition, to provide feedback to individual paramedics as they practice the roles on TO/TO, body cameras can be worn or drones can be used to record the individual's response to the incident. The video feed is an invaluable tool that can provide feedback to the individuals on how they progressed through the drill and allows the individual to recall their actions and analyse their own response and its effectiveness in triaging and clearing the scene.

These videos can also be used as invaluable tools in the classroom. For students to be able to watch in real time how a TO/TO would perform the role in a drill provides wonderful information for the visual learner as well as for the new generation of learners that are accustomed to new technologies.

2. A collaboration of university course coordinators at the VEMI facility to participate in a "train the MCI trainer" training program would streamline the training occurring across the universities.
3. The research for this thesis also produced results showing that minimal multi-agency training occurs in Victoria. A training day such as the one recommended above would also allow for multi-agency collaboration. Police and fire trainees could be involved in these scenarios with the universities also and would allow for rehearsal of incident management teams. A collaborative approach would also allow for a better understanding of where each agency fits within the emergency response. Better understanding and better communication allows for better emergency response.
4. In analysing the Australian national paramedic competency standards, there was evidence that MCI education and training is not detailed in these documents. The training for MCI at the tertiary level should be guided by a standard set of competency standards used by all tertiary universities in Victoria. This would guide the content and the requirements to rehearse skills required by paramedics at a MCI . A set of competencies standards would ensure that all paramedics coming out of Victorian universities would have a core set of competencies that can be used in MCI management .
5. The WHO Mass Casualty Management Systems strategies and guideline headings (1) were used to compare AV and MDA ambulance services. The document was chosen based on its use internationally to establish emergency management systems. Hence the recommendation is for paramedic competency standards to be reviewed and revised to align with this document. Currently there is no mention of transport and triage

officer roles in the competency standards and there is no mention of MCI training in these standards either. The Victorian system should also be reviewed and revised to align with the WHO standards of MCI management as this is not currently the case.

6. Since this research was not an analysis of best practice I can not make recommendations based on evidence. However, my professional experience and exposure to the system of training in Israel through MDA tells me that the potential benefits of live drills and exercises should be investigated. Exposing on-road paramedics to more opportunities to rehearse their skills in MCI in a drill or exercise setting will refresh and consolidate their knowledge and make for a better emergency response.
7. In both ambulance services the crew of the first ambulance that arrives to the scene establishes a command structure. In AV this required the first ambulance crews to adopt the transport and triage officer roles. However, in Israel, paramedics are trained in incident command and hence can initiate this role early on. Having paramedics trained in the incident command role means that the management of the scene begins from the time the first paramedic arrives on scene and a manager does not have to be dispatched to the scene. All paramedics in AV should have the opportunity to complete the incident command course allowing more people across the service to hold the health commander role at an incident and initiate a command structure from the outset of the incident. An additional benefit would be if more paramedics were trained in the health commander role they would also be able to help facilitate the on site health commander achieve their responsibilities.
8. My research found no literature comparing the emergency response between AV and MDA. Given the increasing rate of MCI and the increasing amount of terrorism that is occurring globally more research should be done in this area. Given the exposure Israel has to MCIs, and the increasing exposure in AV, more literature and evaluations of the response to MCIs would guide best practice in the setting of MCI training for first responders.
9. In times of emergencies each agency has their own tasks, however, the key to a good response is to have all agencies working together in an integrated doctrine. This requires multi agency training both in the field but also in the classroom. Training together for mass casualty incidents together in the classroom allows for each agency to understand each others roles at an incident. It is recommended that more multi-agency engagement and training occurs between the various agencies involved in a MCI response in Victoria.

10. The technologies that have been implemented in the Israeli system to assist with day-to-day activities but also during MCIs was an invaluable tool. Citizens in Israel have access to an MDA application on their phone that allows them to call for an ambulance. When the patient calls for an ambulance MDA are able to see their exact location. This functionality allows for the quickest response time. Part of this application also allows the patient to keep medical records including previous ECG's recorded in the application. This information can be sent to the responding paramedic crew while they are on their way to the patient. This information is invaluable allowing for the correct resource to arrive to the correct patient. This information can also be disseminated to hospitals to allow them to prepare for the arrival of a patient. In the setting of MCI, this application has the ability to send real live footage to the dispatcher and management team via the camera on their phone. The dispatcher is able to access the callers camera and see the scene in real time assisting with decisions about the appropriate response. MDA staff (including managers) also utilise the MDA application on their phones and this allows them to be able to manage the incident remotely. Since they have access to real time footage from the scene, decisions can be made from where-ever the manager is remotely located. Since this technology is used in day-to-day business it is well understood and in an MCI can be used seamlessly to provide necessary information.

Another technology that exists in MDA are the dashboard cameras that are on every ambulance. This allows the dispatch centre as well as the emergency managers to access the dashboard camera and use it to get a better understanding of what is occurring in real time at the scene. This technology greatly improves the emergency response as well as the managers ability to make clearer decisions.

AV has part of these technologies already with AV staff being able to access their clinical guidelines through an application on their phone. AV also has body cameras worn by some paramedics throughout the service. These technologies could be improved slightly to include the applicability of the MDA technology. This would see better emergency responses and decisions in the event of MCIs and AV should examine how these technologies could be integrated in the AV system.

11. Given that this thesis did not analyse the effectiveness of the two systems, I recommend that evaluations of the effectiveness of the response to MCI be undertaken. I have seen MDA operations in practice during my time in Israel. Trials should be run here to undertake impact evaluations of MCI interventions to investigate if these interventions actually improve emergency response in AV.
12. In MDA part of the management in the initial triage is to decompress the patients chest. Since this is a new skill that has been included in the scope of practice for ALS paramedics in Victoria, AV should include it as a routine management done along with opening an airway and haemorrhage control. It is a simple, life saving procedure that can make a

big difference to the outcome of an individual if initiated early on in the triage of the scene.

13. I would recommend that a group of AV leaders in the Emergency Management field participate in the Emergency Management Seminar conducted in Israel to gain further skills in MCI management and training. I would also recommend that AV leaders in the Emergency Management field enrol in the E.M.P.H in Emergency and Disaster Management conducted at Tel Aviv University in collaboration with WHO collaborating centre for Disaster and Emergency Medicine and Management and Research. This international course fosters expertise in managing disasters and develops global leaders in emergency management. The course offers practical applications including drills.

#### 7.4 Strengths and limitations

This research had its limitations. These include that the research was largely based on a desktop review and was a descriptive study, hence there was no analysis of what is best practice. Rather, a comparison was drawn between what the two countries do differently.

Given the scope of the MPhil and the size of Australia and its many ambulance services, this research was restricted to Ambulance Victoria only.

#### 7.5 Possible future research

Leading on from this research it would be beneficial to gain the perspective of other Victorian paramedics to understand if my professional experience has been shared by others. It would be a valuable exercise to evaluate the current knowledge held by Victorian paramedics in the area of MCI management and the comfort levels of paramedics to perform the roles of TO and T0.

I hope to see the development and implementation of a program to train paramedic students and qualified paramedics as mentioned in the recommendations. An evaluation of what works best in training could then be concluded and a measure of its effectiveness can be conducted.

Further research could be done to identify the training regimes and response processes in the other states of Australia to gain an understanding of what is being done across the country.

Included in the above recommendations are a number of proposals for future research and evaluations in MCI management and training.

#### 7.6 Dissemination

I intend to forward this thesis to

- the Emergency Management Departments at both AV and MDA
- the Victorian universities that provided data for this thesis.



- the Council of Ambulance Authorities
- Paramedics Australasia

I can not criticise the lack of literature on this topic without contributing myself and hence, I will also seek to publish a structured paper of the key findings from this thesis in the paramedic journal - Australasian Journal of Paramedicine and I will attempt to present my findings at the Australian paramedic national conference.

## Chapter 8: CONCLUSION

*This chapter outlines the conclusions drawn from the research conducted.*

### 8.0 Conclusion

This research was an important first step in the process for gaining background knowledge and an understanding of what is occurring both in Ambulance Victoria and Magen David Adom.

In considering the problem statement that I had a belief that I was not adequately trained to respond to MCIs, I have ascertained through this research that training in Victoria could be done better and aspects of response could be improved. The lessons that I learned in Israel regarding training and emergency response can be used to improve the Victorian system.

It is important to have a common framework that is understood by all emergency service agencies to allow for a co-ordinated approach to an incident. Common terminologies used within a flexible framework that can be tailored to different situations is the cornerstone of having a co-ordinated approach with an effective outcome in an incident.

For MCIs to be able to be managed efficiently and effectively many agencies and personnel are required to perform multiple tasks and roles in a coordinated response. For multi-agency coordination to be smooth and successful a set of principles are required for all agencies. These principles require good communication frameworks, a good understanding of each others roles and responsibilities within the coordinated response and a common set of definitions and terminologies.

Having a common terminology for functions, processes and facilities will reduce confusion and inefficiency and allow for a more rapid and effective response. Having a common structure for roles and responsibilities allows for personnel to interchange between roles with a handover. This will allow for better information flow and a better understanding of the event.

Every structure needs to be flexible enough to be able to be applied to all levels and types of events. The better integrated agencies are with one another the more cohesive the response and the more flexible the coordinated response can be. If all agencies contribute to a consolidated action plan, the response will be effective with each agency understanding the required contribution towards the coordinated response.

Communication within and between agencies is one of the most important components to multi casualty incident management and disaster response. For communication to be effective, effective information sharing is imperative. Common communication plans are essential to be put into place to allow for standard procedures, common communication means with common terminologies. With a common communication point for all agencies comes a more successful and coordinated response across all response agencies.

For emergency services to be able to achieve a coordinated response with effective and common response and communication plans, common training must occur. Personnel in key positions as well as the staff responding to such events require ongoing training to practice and refresh their skills. The experience in performing roles is invaluable to achieving an effective response. Having common training including all organisations enhances personal relationships between agencies and allows for familiarity when working together at multi casualty incidents and disasters.

“For emergency management doctrine to be effective the doctrine needs to be supported by robust education, training and professional development”(45).

Robust education can begin in the university system. Good strong links between the emergency management department of ambulance services should be made with the universities in an attempt to influence the education and training being delivered to undergraduate paramedics. The doctrine used by the ambulance services should inform training and ensure that the correct content is being taught.

According to New Zealand’s Critical Incident Management System “experience has shown that doctrine is not applied during a response if personnel have not received sufficient training”. (45)

A set of competency standards for paramedics should be developed and a framework for the education of paramedic students in mass casualty incidents needs to be established. With a set of competencies, MCI training programs can be developed that teach students the skills required to respond in a MCI to an expected level of the industry.

Programs for educating students in mass casualty incident management must outline the theory of mass casualty incidents including what needs to occur before the incident, during the incident and after the incident. While the theory can be delivered through lectures, it is important for skills to be practiced through labs and tutorials. From the evidence it is clear that simulation based training allows students to experience the chaos that can not be taught in lectures. The simulation training using live actors consolidates the students theoretical knowledge and is an important component to a MCI training program. The simulation allows students to “draw from interactions with the learning environmental to form their own understanding”(42). “Clinical simulation also offers an ideal opportunity for inter-professional activities, which has been shown to increase confidence and knowledge and appreciation of the differences and similarities between different professional groups” (42).

“To be ready means to have a doctrine, standing operational procedures, protocols, knowledge and equipment” to be able to respond rapidly to a mass casualty incident. However it is not enough to have these frameworks in place, the doctrine “must be well understood and rehearsed frequently through drills”. (22)

## ATTACHMENTS

### Attachment 1: Ethics Approval (Monash University)



Monash University Human Research Ethics Committee

#### Approval Certificate

This is to certify that the project below was considered by the Monash University Human Research Ethics Committee. The Committee was satisfied that the proposal meets the requirements of the *National Statement on Ethical Conduct in Human Research* and has granted approval.

**Project ID:** 17804  
**Project Title:** Paramedic Education in Victoria and Israel  
**Chief Investigator:** Emeritus Prof Francis Archer  
**Approval Date:** 22/11/2018  
**Expiry Date:** 22/11/2023

**Terms of approval - failure to comply with the terms below is in breach of your approval and the Australian Code for the Responsible Conduct of Research.**

1. The Chief Investigator is responsible for ensuring that permission letters are obtained, if relevant, before any data collection can occur at the specified organisation.
2. Approval is only valid whilst you hold a position at Monash University.
3. It is responsibility of the Chief Investigator to ensure that all investigators are aware of the terms of approval and to ensure the project is conducted as approved by MUHREC.
4. You should notify MUHREC immediately of any serious or unexpected adverse effects on participants or unforeseen events affecting the ethical acceptability of the project.
5. The Explanatory Statement must be on Monash letterhead and the Monash University complaints clause must include your project number.
6. Amendments to approved projects including changes to personnel must not commence without written approval from MUHREC.
7. Annual Report - continued approval of this project is dependent on the submission of an Annual Report.
8. Final Report - should be provided at the conclusion of the project. MUHREC should be notified if the project is discontinued before the expected completion date.
9. Monitoring - project may be subject to an audit or any other form of monitoring by MUHREC at any time.
10. Retention and storage of data - The Chief Investigator is responsible for the storage and retention of the original data pertaining to the project for a minimum period of five years.

Kind Regards,

Professor Nip Thomson

Chair, MUHREC

CC: Professor George Braitherg, Ms Bianca Olstein

#### List of approved documents:

Document Type	File Name	Date	Version
Supporting Documentation	consent form	16/11/2018	1
Supporting Documentation	EXPLANATORY STATEMENT	16/11/2018	1
Supporting Documentation	Interview Questions	16/11/2018	1
Consent Form	consent form	18/11/2018	1
Supporting Documentation	Interview Questions	18/11/2018	1
Supporting Documentation	invitation	18/11/2018	1
Explanatory Statement	EXPLANATORY STATEMENT	20/11/2018	2

## Attachment 2: Ethics Approval (Magen David Adom)



HEADQUARTERS

המרכז

PR & Training Division  
November 22<sup>nd</sup>, 2018  
O-2018-4701-000688

Attention: Ms. Bianca Jackson

Dear Ms. Jackson,

RE: Research Committee Decision

The Magen David Adom Research Committee in its meeting of May 5<sup>th</sup>, 2018 discussed your research request within Magen David Adom (MDA). The Research Committee has decided to confirm your research request as it was presented to the committee.  
Guy Caspi will join the research as an instructor on behalf of MDA.

As per your report to the committee your due date for the research is January 2019.

I ask that you update the committee in case of any delay.

Please note that you should submit your research to the committee by e-mail or in 2 physical copies. Should the committee be interested in your research and its results you will be required to present your findings to the committee in person during one of its scheduled meeting as will be coordinated with you, but no later than 6 months from your submission date.

I wish you much success in your research.

Sincerely,

Dr. Eli Jaffe  
Deputy Director General – Community  
Chairman, Research Committee

Copies:  
Research Instructor  
Research file

### Attachment 3: Explanatory statement for interviews



#### EXPLANATORY STATEMENT

**Project Title:** Paramedic Education in Victoria and Israel  
**Project ID:** 17804  
**Chief Investigator:** Emeritus Prof Francis Archer  
**Email:** [francis.archer@monash.edu](mailto:francis.archer@monash.edu)

**Researcher:** Bianca Jackson  
**Phone:** 0402915005  
**Email:** [bianca.jackson@monash.edu](mailto:bianca.jackson@monash.edu)

**You are invited to take part in this study.**

I am a currently practicing paramedic in Victoria, undertaking a Master of Philosophy at Monash University.

Please read this Explanatory Statement in full before deciding whether or not to participate in this research. If you would like further information regarding any aspect of this project, you are encouraged to contact the researchers via the phone number or email address listed above.

*The project aims to:*

- Identify how paramedics are trained both in Victorian Universities as well once they are employed by Ambulance Victoria with regards to managing a mass casualty incident;
- Compare the above with the process and training that exists within Magen David Adom (MDA);
- Identify if there are ways for Ambulance Victoria to improve processes and training for paramedics and students to improve response to mass casualty incidents.

**Why were you chosen for this research?**

You have been selected for an interview to assist with this research as your knowledge and skills in the area of training, operations and exercises would be valuable in helping me to answer the research questions.

### **Documents provided for thesis**

Ethics approval has been received from Magen David Adom, Israel to collect, analyse and utilise material from policy and procedural documents regarding responding to Mass casualty Incidents. No further documentation is required from the participants however the researcher will be seeking clarification of these materials during the interviews.

### **Source of funding**

Funding has been sought for this study tour from Monash University (Melbourne Victoria). Funding has been provided by Magen David Adom in Victoria in support of the research.

### **Consenting to participate in the project and withdrawing from the research**

Once you have read this material, and if you agree to be interviewed the consent form must be signed. Interviews will be audio recorded. When you consent to participate you are consenting to be audio recorded.

Throughout the interview, the project investigator present will also make detailed field notes to compliment the audio data collection. These notes will document the social context of the interview.

### **Possible benefits and risks to participants**

There should not be any risk to the participant by completing this interview

### **Confidentiality**

If the individual consents to the interview any information given in the interview will be used within the thesis. Please indicate if there is any sensitive material that you would prefer not be included in the thesis. You may withdraw from the interview and the research at any time.

### **Results**

The results will be published in the thesis. A summary of the research will be disseminated to all organisations involved and will be publically available through conference presentations and a peer reviewed publication.

### **Complaints**

Should you have any concerns or complaints about the conduct of the project, you are welcome to contact the Executive Officer, Monash University Human Research Ethics (MUHREC):

Executive Officer

Monash University Human Research Ethics Committee (MUHREC) Room 111, Building 3e

Research Office

Monash University VIC 3800

Tel: +61 3 9905 2052 Email: [muhrec@monash.edu](mailto:muhrec@monash.edu) Fax: +61 3 9905 3831 Thank you,

**Bianca Jackson.**

Attachment 4: Consent form for interviews

CONSENT FORM

Project ID: **Paramedic Education in Victoria and Israel**

Project title: **17804**

Chief Investigator: **Emeritus Prof Francis Archer**

**I have been asked to take part in the Monash University research project specified above. I have read and understood the Explanatory Statement and I hereby consent to participate in this project.**

<b>I consent to the following:</b>	<b>Yes</b>	<b>No</b>
<b>Being interviewed for the thesis comparing policies and training modules in mass casualty incident training between Israel and Victoria</b>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Information from this interview being used within the thesis</b>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Having my name and opinions quoted within the thesis</b>	<input type="checkbox"/>	<input type="checkbox"/>

**Name of Participant** \_\_\_\_\_

**Participant Signature** \_\_\_\_\_ **Date** \_\_\_\_\_



## Attachment 5: List of interview questions

### Interview Questions:

Thank you for agreeing to meet with me. Can I confirm that you have read and understood the Explanatory Statement? Do you have any questions? Can I confirm that you have signed and given me your consent form? We can pause this interview any time you request.

1. How do you train your paramedics/volunteers to train for mass casualty incidents?
2. How often do your paramedics receive refresher training
3. In your opinion what makes Magen David Adoms response to mass casualty incident so effective?
4. Do you have a university system that trains your paramedics?
5. Do your paramedics have access to real life scenario based training?
6. Who co-ordinates / funds / organizes / is responsible for mass casualty incident training?
7. Does MDA have multi-agency training with other emergency services? If so how regular is this training and does it involves paramedics or only managers?
8. I read in article <https://afmda.org/mda-mass-casualty-expert-tours-northeast/> that you pioneered many emergency response techniques that are now used around the world. What were these?
9. Where do you get funding from to train for mass casualty incidents?
10. Do you collaborate for training and funding purposes with other emergency services and / or hospitals?
11. Are you governed by legislation and policy? If so can I access these?
12. Thank you for the relevant education / training and operational document you have generously provided - can I clarify the following.....
13. Have there been any formal evaluations of the training program conducted by MDA, specifically their impact on clinical outcomes? Have any of these evaluations been published in the peer review literature or are they publicly available?
- 14.

Again thank you for this interview. If I have any follow-up questions of clarification may I contact you again?

## Attachment 6: Course content for MCI subjects from the five Victorian Universities.

### Monash University

Monash University in Melbourne has in the recent past had two entry pathways to becoming a paramedic. The first is the paramedicine degree and the second is a double degree whereby the student receives a nursing and paramedicine degree.

#### 1. Subject name

Within the paramedicine stream, PAR3022 *clinical education and leadership in paramedic research and practice*.

This subject was not done in the double degree and hence students who choose to complete the double degree and now work for an ambulance service will not have had training in the skills associated with running a mass casualty incident scene.

#### 2. Subject structure

The course content is taught through lectures and the skills taught are practiced in tutorials. On completion of the subject a white board MCI simulation is performed.

#### 3. Subject content

This unit PAR3022 focuses on the paramedic being a clinical leader in major incidents and disasters. The disaster cycle including planning, response and recovery are covered in this unit as are the roles and responsibilities of a paramedic in a major incident. This includes managing multiple patients or complex scenes during a major health emergency or during a humanitarian disaster.

In completing this unit students are expected to understand the responsibilities of the paramedic as well as the responsibilities of other emergency services at a multi casualty incident. The unit will give students a sound understanding of how management of major incidents differs between rural, remote and complex environments compared to that of the urban environment. Theoretically

students will understand the structure of the major incident control system in the Australian context and understand the role of the paramedic in emergency management, planning and preparedness. This includes both in local and international settings. Students are expected to be able to “demonstrate effective logistical management, patient triage or participation in a response team during a simulated mass-casualty situation or major incident” (46)

#### 4. Number of hours

Students spend two hours a week over eleven or twelve weeks on this subject through lectures and will spend a further three hours a fortnight completing tutorials where their skills in mass casualty are rehearsed.

#### 5. Governing documentation

These assessments are specific to Victorian guidelines and principles however the general principles of mass casualty triage are universal and the principles outlined and assessed for triage are those of a “sieve” and “sort” principle.

#### 6. Assessment

These skills are assessed through a written assignment, a worksheet and a final examination. In addition to this students will participate in a MCI simulation receiving a pass or fail mark. The mass casualty simulation is a practical exam that involves maps and whiteboards. The student must answer questions specific to the roles of the paramedics at the scene and the setup of a mass casualty incident response. The written assignment involves the student picking a weapon of mass destruction and selecting a location in Melbourne. The assessment requires the student to outline Ambulance Victoria’s response to this attack.

### Victoria University

#### 1. Subject name

Victoria University runs a unit within their paramedic degree HFB3226 called *Major Incidents*.

#### 2. Subject structure

Victoria University offers an on campus and off campus option for this subject. The off campus students do not get the hands on experience like the on campus students receive.

Students will have a chance to practice their skills in tutorial classes as they respond to mass casualty incident scenarios set up in the classroom. These occur every second week where students will practice the TO/TO roles (explained in chapter four). The students who are not allocated a TO/TO role will be a patient. The patients have cue cards with their vital signs and injuries.

These tutorial are less about what to do in an emergency and more about understanding that there is a system in place which is designed to work for the best outcome for the best number of patients. Students are taught to work within the chaos.

### 3.Subject content

This unit will prepare students for major incident management and recovery with the focus being on pre-hospital emergency response to a major incident. The theoretical component of this subject will prepare students to understand the principles behind the disaster cycle including planning, preparation, response and recovery as well as the principles of coordinating a mass casualty incident. The unit will also teach the history of major incidents. The students will also gain an understanding of the interaction that paramedics have with other emergency staff and support agencies at a mass casualty incident including police, fire services, health, state emergency services and other support agencies.

Students will be taught the principles of major incident management including command and control, the incident command system and how to triage patients at a mass casualty incident. These roles are taught specifically for the Victorian environment with the sort and sieve concept utilised however students will use international protocols as a comparison to be able to understand the desired outcomes to be able to function as better clinicians.

The unit also covers how to formulate strategies for addressing sociological and psychological impacts of major incidents on the community. These include survival, bereavement and post traumatic stress. Students will learn about epidemics, pandemics, terrorism, bioterrorism and natural disasters.

Unique to Victoria University is the opportunity that they give a select few of their final year paramedic students to travel and train in Israel. VU has an ongoing relationship with Magen David Adom and every year Victoria University

send a delegation of final year students to Israel for a three week study tour. In Israel the students complete observer shifts on the MDA ambulances being exposed to their case load and occasionally attending a MCI. The students also participate in a week long lecture series in the home front command learning how Israel's emergency services respond to MCI.

#### 4. Number of hours

The semester runs for approximately ten to twelve weeks and hence where lectures are delivered weekly. Five to six scenarios are run per group in this time during tutorials. Hence each student will have one turn at performing the TO/TO role.

#### 5. Governing documentation

As part of this unit students will learn the roles and responsibilities of emergency services at a major incident. Students will focus on Victorian protocols and will utilise documents such as SHERP however they will be exposed to international perspectives as well to use as a comparison. The goal is to have the student understand not only the Victorian perspective in managing mass casualty incidents but to also understand the principles behind why things are done a particular way and the intended outcomes. AV is consulted for their model of practice to be able to teach students the operational and clinical skills required to be operationally competent to work within AV. The 'emergency response plan' from AV are used to assist in teaching this subject.

#### 6. Assessment

Students are required to demonstrate the application of pre-hospital response to a major incident through scenarios. Students will work through workbook exercises where specific scenarios are given to the students and they must answer questions such as "what is the best access and egress for ambulances in this scene?" "What hospitals will the patients be transported to?" "What are the roles of other emergency services?", "What are the hazards at the scene?", "Who takes the role of the transport officer and triage officer?" and so on. The aim of the workbook is to allow students to test their understanding of mass casualty incident management. A written examination and written assignment are also components used to assess students' knowledge of managing mass casualty incidents.

### 1. Subject name

Australian Catholic University offer two streams in which a student will receive a paramedic qualification: Bachelor of Paramedicine and the Bachelor of Nursing/Bachelor of Paramedicine double-degree. In both of these streams the university run a subject called PARA305 Pre-Hospital Major Incident Management.

### 2. Subject structure

The content for this unit is delivered through a number of ways - tutorial, practical and online lessons. The unit is completed in the final semester of the students' final year allowing students to apply their knowledge from a range of subjects.

### 3. Subject content

This unit outlines the principles of major incident and disaster response and management with an emphasis on the implementation of major incident response plans for large scale multi-casualty incidents. Students will also be taught the principles of the disaster cycle including planning, preparedness response and recovery.

This unit will explore scene control and teach students mass casualty incident triage principles including primary and secondary triage utilising the sort and sieve method and learn to establish a casualty clearing post and use a casualty movement log similar to that of AV. Students learn the transport and triage roles as well as how to deliver a situational report over the radio using the ETHANE mnemonic (Exact location of the incident, Type of incident, Hazards at scene, Access and egress into and out of the scene, Number of patients and Extra resources needed). Students from Victoria are exposed to and practice with the same 'Smart' triage tags that are used within AV.

Students will gain an understanding of where other emergency services fit within the context of managing a mass casualty incident. Students will also gain an understanding of the psychological and sociological effects that occur for communities as the result of major incidents. On completion of the unit students should be able to define what makes a major incident, disaster and mass casualty incident and be able to describe and understand the roles and responsibilities of the emergency services during a major incident as well as have a good

understanding of the principles of control and command.

Students will gain skills in utilising the radio to communicate effectively in a mass casualty incident as well as skills to employ risk assessment strategies. Navigation and map reading as well as compass bearing are skills taught within this unit. Students are taught about maps, coordinates and global position system (GPS) however students are also taught the skill of using a street directory.

The specific skills that are taught in this unit include scene management, multiagency roles and responsibilities, triage, treatment, transportation, regulatory frameworks, communication, debriefing and psychological factors. Students are also taught the skills of scene assessment risk minimization and management and how to perform a risk assessment.

### 1. Number of Hours

The content of this unit is delivered through case scenarios that will guide the learning of the unit. Other teaching methods include lectures, tutorials, clinical laboratories, simulated skills and practice in laboratories and computer-assisted learning. In this unit students will participate in eight one hour tutorials as well as ten three hour practical sessions and ten one hour web based learning activities. A two week online component is also required.

### 2. Governing documentation

The content for this unit is delivered nationally and as such is not specific to AV's policies.

Within the course outline for this subject, ACU detail the council of ambulance authorities paramedic professional competency standards that the students will be graded against.

### 3. Assessment

To assess the students' learning outcomes, a variety of assessments are used.

These include a multi-media portfolio, a group presentation and a two hour written examination. The multi-media portfolio asked students for examples to examine and critique the emergency services response to the 2009 Black Saturday bushfire in Victoria. The group presentation requires the participants to identify a population group that would be vulnerable in a disaster and propose a risk reduction strategy for this group.

Recently ACU also ran a simulated disaster at their Ballarat campus. Students conducted the simulation of a major gas leak. The paramedic students were required to implement major incident response plans while managing a multi casualty incident. Drama students were utilised to play the role of the patients suffering from the gas leak. The country fire authority (CFA) were involved and assisted in making the scenario appear “real” using smoke machines. They also assisted with freeing the trapped and injured patients.

Paramedic students were able to utilise the knowledge and skills they had acquired over the previous four years to locate, triage, extricate, treat and evacuate multiple casualties from the scene, with the aim of doing the greatest good for the greatest number. “Two Ambulance Victoria observers, who are both designated Health Commanders, were extremely impressed with the scene organisation and the ability of the students to triage the injured, clear the scene and set up and run a casualty clearing station.” (47)

Each of the ACU students involved in this scenario would receive the Major Incident Medical Management and Support (MIMMS) commander qualification following the disaster simulation and successful completion of assessments.

## Federation University

### 1. Subject name

Federation university run a nursing to paramedic conversion. There is no specific subject addressing Mass casualty incident and disaster management, however the concepts are taught within the course

### 2. Course Structure

Within one two hour lecture, the roles of the transport and triage officer are covered as well as other roles they may have to perform at the scene including



incident and health commanders. The students will also learn about the different levels of activation and who responds depending on the level of the incident.

An emergo train exercise is run for the students by Ambulance Victoria which allows the students to practice their skills in mass casualty incident management. Students will also participate in a major incident simulation with the SES as well as a mass casualty incident scenario organised by the university.

### 3. Course content

Within this conversion course the students are taught the principles of mass casualty incident management.

### 5. Governing documentation

Within this degree the students will investigate SHERP as well as being taught the emergency response plan from Ambulance Victoria.

### 6. Assessment

Students participate in practical sessions whereby mass casualty incident scenarios are conducted. In these scenarios actors are used as patients and the Ambulance Victoria triage packs are used as part of the scenario so that students become familiar with these.

## Latrobe University

### 1. Subject name

Latrobe University conduct a fourth year subject in their bachelor of paramedic practice course titled Major Incident Management.

### 3. Subject Structure

Most of the content for this subject is delivered online with an on campus component in the final week involving an emergo train exercise as well as a mass casualty simulation. The emergo train exercise involves other key stakeholders

such as Bendigo Health emergency department doctors and nurses as well as ICU staff, FEMO team, media staff and other emergency services. The cohort of students each year is up to forty-five and from these only four students will have the opportunity to actually practice the TO TO role during the emergo Train exercise. The other students only get theoretical knowledge and a triage quiz to complete.

### 3. Subject content

In this subject the concepts of command, control, team work and leadership are taught. These concepts will be applied to disasters, major incidents, and sentinel events. “Events that have the capacity to stretch the ambulance and health resources as a community, state and national level will be examined”. (48) The content for this unit teaches the students about what makes a major incident as well as understanding the components of a major incident including prevention, preparedness, response and recovery. This unit explores an all hazards approach. “Students will learn the principles behind risk management gaining tools and strategies in a variety of routine and challenging circumstances” (48). The concepts of humanitarian aid will also be addressed as part of this unit.

Within this unit students will learn the principles of triage, treatment, casualty movement logs, paperwork and managing volunteers at a scene. Radio communication and dealing with the media is taught in this subject as well as the psychological impacts that occur as a result of an incident. Students are given an understanding of operational orders as well as issues to consider in mass gatherings.

At the completion of this subject students should be able to “recognise and develop strategies to mitigate the potential impacts of disasters and major incidents at both a personal and organisational level”.(48)

The intended learning outcomes of this subject include:

- “Utilise effective leadership and command and control abilities in a variety of mass casualty and emergency incident scenarios
- Be able to apply a wide range of communication skills to simulated major incident and complex emergency situations involving a variety of population groups
- Assess risk and formulate effective event plans for major incidents and emergency response scenarios
- Describe and critique emergency management frameworks and emergency response procedures at organisational, state and federal government levels”. (48)

### 4. Number of hours

This course is solely online with 1 week on campus where students participate in one emergo train exercise and one mass casualty simulation

### 5. Governing documentation

The students will learn about SHERP including the roles and responsibilities of each of the stakeholders.

### 6. Assessment

Students are assessed using a triage quiz

## Attachment 7: Comparison of similarities and differences between AV and MDA

	Ambulance Victoria	Magen David Adom	Recommendations to AV
Geographical area	227,594km <sup>2</sup> (Victoria)	20,770 km <sup>2</sup> (Israel)	
Population	Over six million people	Almost nine million people	
Emergency response	850,000 calls yearly	700,000 calls yearly	
workforce	3400 paramedics and 1000 community emergency response team volunteers	2200 paramedics 22,000 volunteers 7500 first responders 17000 life guardians	
Clear lines of responsibility	<p>Outlined in SHERP/SHERA</p> <p>During an escalation, the incident is run from the AEOC with normal business continuing from the call centre.</p> <p>Incident, state and regional health commanders are established to manage the incident at each tier.</p>	<p>Outlined in MDA doctrine. All emergency services doctrines are integrated</p> <p>The headquarters of MDA prepare the MCI doctrine, define training needs and integrating the needs of the response into exercises.</p> <p>MDA paramedics are trained in the principles of control and command and the first paramedic to arrive on scene adopts the command of the scene.</p> <p>The mass casualty incident management system is embedded into the command and control system of MDA.</p> <p>The MCI module allows for many automatic processes to occur simultaneously to allow for quick activation of MCI protocols.</p>	<p>There is a greater need for integration of agencies policies and these need to be regularly rehearsed together.</p> <p>Automated response through the call centre enhanced by the MDA application</p> <p>More paramedics to be trained in Health Commander role.</p>
All Hazards	All hazards, all agency approach	All hazards approach	
Scalability	An escalation matrix is used to scale the response up or down depending on certain factors	<p>An event is scaled up to the national level if the number of patients exceeds 500.</p> <p>The initial response to an incident is to send all available crews. This is an automated process. Once more information is received about the incident the response can be scaled down.</p>	Do not wait for a SITREP before sending in crews, rather scale down the response if it is not needed.
Whole of health	<p>Inter agency communication and planning occurs to allow for whole of health approach.</p> <p>ERP outlines “shared responsibility for action includes individuals, communities, business and government”.</p>	<p>MDA doctrine is integrated into the plans of other agencies.</p> <p>“know your partners, their commanders and their doctrine”.</p> <p>Israel has an integrated emergency response system</p>	
Knowledge base	<p>Improvements made based on reviews of incidents</p> <p>Trackmi application trial</p>	<p>Based on experience.</p> <p>Policies procedures and doctrine upgraded and adapted with lessons learned from each</p>	<p>Learn from incidents world wide as well as locally.</p> <p>Update policy and</p>

		incident  MDA are in a constant state of learning and sharing information	procedure based on actual experiences.
Multi-sectorial	SHERP outlines command and coordination arrangements and roles and responses of all sectors when responding to health emergencies	All plans and policies for all responding sectors are evaluated by a governing body and these are disseminated to all sectors to all for multi-sectorial coordination.	
National policies	<ul style="list-style-type: none"> <li>- Ambulance Act 1986 and 2013</li> <li>- Part three State Emergency Response Plan</li> <li>- Part four state emergency relief and recovery plan</li> <li>- Part seven emergency management agency roles</li> <li>- State health emergency response plan</li> </ul>	<p>NEMA:</p> <p>National preparedness policies for MCI</p> <p>Assesses daily national threats</p> <p>HFC:</p> <p>Disaster plans and policies for protracted incidents.</p> <p>Responsible for civilian safety</p> <p>All plans are approved by the Supreme health authority.</p> <p>Ministry of Health approve all agencies standard operating procedures.</p>	Integrated policies at a national level and practicing the coordination of these policies would improve inter-agency coordination.
Training for MCI	<p>University training: theory and white board/desk top exercise with some universities using emergo train and live drills</p> <p>Graduate paramedics complete level C PPE course and complete an online training module in MCI management as well as a virtual paramedic game used to train students in the triage process</p> <p>Paramedics have access to the virtual paramedic game and the online learning module. Some paramedics have access to emergo training exercises.</p>	<p>MDA believe “to be ready means to have a doctrine, standing operational procedures, protocols, knowledge and equipment. However the doctrine must be well understood and rehearsed frequently through drills”.</p> <p>The Ministry of Health coordinates regular coordinated training exercises at a national level.</p> <p>HFC and NEMA also coordinate national drills and exercises.</p> <p>National drills include civilians.</p> <p>MDA deliver all content and training to paramedics and volunteers within MDA. MDA are responsible and run regular drills to train and maintain skills in the area of MCI.</p>	<p>Multi agency training should occur both at a university level and at a professional level.</p> <p>These trainings should be conducted at VEMI and should include multi-agency training.</p>
triage	SORT and SIEVE	SALT and START	
Initial life saving treatment	<p>Open Airway</p> <p>Stop Haemorrhage</p> <p>Decompress Chest</p>	<p>Open Airway</p> <p>Stop haemorrhage</p>	Add decompression of chest to initial management

## REFERENCES

1. Mass Casualty Management Systems. Strategies and guidelines for building health sector capacity. World Health Organisation. April 2007. Available from: [https://www.who.int/hac/techguidance/tools/mcm\\_guidelines\\_en.pdf](https://www.who.int/hac/techguidance/tools/mcm_guidelines_en.pdf)
2. The Council of Ambulance Authorities. *Professional Competency Standards-Paramedics. Version 2.2* Paramedics Australasia. Melbourne Victoria. Available from [https://www.caa.net.au/images/documents/resources\\_for\\_universities/Paramedic\\_Professional\\_Competency\\_Standards\\_V2.2\\_February\\_2013\\_PEPAS.pdf](https://www.caa.net.au/images/documents/resources_for_universities/Paramedic_Professional_Competency_Standards_V2.2_February_2013_PEPAS.pdf) [cited 27 Jun 2018]
3. Paramedics Australasia Ltd. Australasian Competency Standards for Paramedics. 2011. Available from: [https://paramedics.org/wp-content/uploads/2016/09/PA\\_Australasian-Competency-Standards-for-paramedics\\_July-2011.pdf](https://paramedics.org/wp-content/uploads/2016/09/PA_Australasian-Competency-Standards-for-paramedics_July-2011.pdf)
4. The Council of Ambulance Authorities. Paramedics Australasia. Guidelines for the assessment and accreditation of entry-level Paramedic Education Programs. January 2014. Available from : [https://www.caa.net.au/images/documents/resources\\_for\\_universities/PEPAS\\_Guidelines\\_2014.pdf](https://www.caa.net.au/images/documents/resources_for_universities/PEPAS_Guidelines_2014.pdf)
5. Fitzgerald G, Rego, Ingham V. et al, 2017. Teaching emergency and disaster management in Australia: Standards for higher education providers, Australian Journal of Emergency Management, Monograph No. 1. Available online at [knowledge.aidr.org.au/monograph](http://knowledge.aidr.org.au/monograph). Published by Australian Institute for Disaster Resilience.
6. Cameron, P. Mitra, B. Fitzgerald, M. Scheinkestel, C. Stripp, A. Batey, C. Niggemeyer, L. Truesdale, M. Holman, P. Mehra, R. Wasiak, J. Cleland, H. *Black Saturday: the immediate impact of the February 2009 bushfires in Victoria, Australia*. Med J Aust 2009; 191(1)11-16
7. Rosenfeld JV, Fitzgerald M, Kossmann T, Pearce A, Joseph A, Tan G, et al. Is the Australian hospital system adequately prepared for terrorism?.[Erratum appears in Med J Aust. 2006 Jan 16;184(2):67 Note: Joseph, Andrew [corrected to Joseph, Anthony]]. Med J Aust. 2005;183(11-12):567-70.
8. Koenig and Schultz's Disaster Medicine. Comprehensive principles and practices. Second edition. Cambridge Medicine. American College of Emergency Physicians. Cambridge University Press. United Kingdom. Published in 2016
9. Emergo Train System. Available from <https://www.emergotrain.com> [ cited 3 April 2019]
10. Emergency Management Victoria. State Health Emergency Response Plan. Edition 4. Published by the Victorian Government Melbourne September 2017

11. Magen David Adom. Standard Operating Procedures. Published by Magen David Adom 2018. *Hebrew document translated by Bianca Jackson.*
12. Erin Smith JW, Ayan Sen, Frank Archer, Fredrick M Burkle. Three decades of disasters: A review of disaster-specific literature from 1977-2009. *Prehospital Disaster Medicine.* 2009;24(4):306-11.
13. Ambulance Victoria. Emergency Response Plan Part 1 2017. Ambulance Victoria Staff Intranet. Available from: [Ambulance.vic.gov.au](http://Ambulance.vic.gov.au)
14. Emergency Management Victoria. State Health Emergency Response Arrangements. Victorian state Government. 2017. Available from: <http://www2.health.vic.gov.au/emergencies/shera>
15. Emergency Management Manual of Victoria. State of Victoria. Emergency Management Victoria. 1997-2018. Available from <https://files-em.em.vic.gov.au/public/EMV-web/EMMV-Parts-1-8-combined.pdf>
16. Strategic Plan 2017-2022. Outstanding emergency health care every time. Available from: [Ambulance.vic.gov.au](http://Ambulance.vic.gov.au)
17. Israel's population nears 9 million of eve of 2019. By Stuart Winer. Times of Israel. Available from <https://www.timesofisrael.com/israels-population-nears-9-million-on-eve-of-2019/> [cited 3 April 2019]
18. Dr. Eli Jaffe, Itamar Abramovitch. Written and edited by Netanela Cohen and Anat Rappaport. "7 first minutes – a guide to basic first aid". Published by Steimansky books. October 2017
19. Jaffe, E. Strugo, R. *Magen David Adom provides nationwide EMS response in Israel. Friday June 1, 2018* JEMS Available from:  
<https://www.jems.com/articles/print/volume-43/issue-6/features/magen-david-atom-provides-nationwide-ems-response-in-israel.html>
20. Magen David Adom in Israel. "Preparedness and Response to MCS." 3<sup>rd</sup> international workshop on anti-terrorism. University hospital "St. Marina" Varna – June 8 2016. Lecture material delivered by Guy Caspi.
21. Rescue vehicles in Magen David Adom. Magen David Adom. Available from: <https://www.mdais.org/en/about/rescue-vehicles>
22. Triage and Trauma care on the run. From the sidewalk to the operating theatre: Response to terrorism and mass casualties. Magen David Adom Israel. Lecture material delivered by Guy Caspi. Magen David Adom. December 2018.
23. Position statement. Ambulance services: a fundamental part of our health system. Disaster and Emergency Management – the Ambulance Role. The council of Ambulance Authorities. October 2013. Available from [www.caa.net.au](http://www.caa.net.au)
24. Victorian Preparedness framework. Emergency Management Victoria. May 2018 Update #1. Available from: <https://files-em.em.vic.gov.au/public/EMV-web/VictorianPreparednessFrameworkMay2018.pdf> [cited 27 July 2018]

25. Emergency Management Act 2013 – Section 3 Definitions. Available from: [http://classic.austlii.edu.au/legis/vic/consol\\_act/ema2013190/s3.html](http://classic.austlii.edu.au/legis/vic/consol_act/ema2013190/s3.html)
26. Emergency Management Victoria. Website available from <https://www.emv.vic.gov.au> authorised by the Victorian Government Melbourne September 2017
27. Mass Casualty and Pre-Hospital operational response plan. State Health Emergency Response Arrangements. Versions 1 – October 2017. Victorian State Government. Available from <https://www2.health.vic.gov.au/>
28. Australasian Inter-service Incident Management System. A management system for any emergency. Third Edition. Version 1 (3 April 2004). Published in 2004 by Australasian Fire Authority Council. Available from <https://training.fema.gov/hiedu/docs/cem/comparative%20em%20-%20session%2021%20-%20handout%2021-1%20aiims%20manual.pdf>
29. Magen David Adom in Israel. National EMS organisation. [www.mdais.com](http://www.mdais.com)
30. SALT Mass Casualty Triage. Received for publication May 17, 2008; accepted July 9 2008. American Medical Association and Lippincott Williams & Wilkins. Disaster Medicine and Public Health Preparedness. 2008 Dec;2(4): 245-6. Available from:  
  
[https://www-cambridge-org.ezproxy.lib.monash.edu.au/core/services/aop-cambridge-core/content/view/528F1CFB1B326458DF1377D98C1F48A9/S193578930000118Xa.pdf/salt\\_mass\\_casualty\\_triage\\_concept\\_endorsed\\_by\\_the\\_american\\_college\\_of\\_emergency\\_physicians\\_american\\_college\\_of\\_surgeons\\_committee\\_on\\_trauma\\_a\\_american\\_trauma\\_society\\_national\\_association\\_of\\_ems\\_physicians\\_national\\_disaster\\_life\\_support\\_education\\_consortium\\_and\\_state\\_and\\_territorial\\_injury\\_prevention\\_directors\\_association.pdf](https://www-cambridge-org.ezproxy.lib.monash.edu.au/core/services/aop-cambridge-core/content/view/528F1CFB1B326458DF1377D98C1F48A9/S193578930000118Xa.pdf/salt_mass_casualty_triage_concept_endorsed_by_the_american_college_of_emergency_physicians_american_college_of_surgeons_committee_on_trauma_a_american_trauma_society_national_association_of_ems_physicians_national_disaster_life_support_education_consortium_and_state_and_territorial_injury_prevention_directors_association.pdf)
31. START adult triage algorithm. Radiation Emergency Medical Management. US department of health and human services. Available from <https://www.remm.nlm.gov/startadult.htm>
32. Triage tag from Magen David Adom. Collected from Guy Caspi during an interview in Israel in December 2018.
33. Rozdilsky, Jack L. EMERGENCY MANAGEMENT IN ISRAEL: CONTEXT AND CHARACTERISTICS. Available from:  
  
<https://training.fema.gov/hiedu/downloads/compemmgmtbookproject/comparative%20em%20book%20-%20em%20in%20israel-%20context%20and%20characteristics.pdf>
34. Bruria Adini and Kobi Peleg. On constant alert: Lessons to be learned from Israel's Emergency Response to Mass – Casualty Terrorism incidents. Mass Casualty Terrorism Incidents *Health Affairs*, 32, no 12 (2013):2179-2185. Available from <http://content.healthaffairs.org/content/32/12/2179.full.html>



35. Civil protection in Israel. PROMEDHE. Available from <http://www.promedhe.eu/israel>. Co-financed by the EU civil protection mechanism and European civil protection
36. *The Israeli EMS command and control system creates a fast & highly effective emergency Response*. Ambulance Today. Special edition: Volunteer ambulance care of the Israeli frontline. Summer 2018. Issue 2. Volume 15. P.14-15
37. Israel begins nation-wide emergency preparedness exercises. 10/04/2018 Arutz Sheva. [israelnationalnews.com](http://www.israelnationalnews.com/News/News.aspx/242990) Available at <http://www.israelnationalnews.com/News/News.aspx/242990> [cited 4 October 2018]
38. ICN Framework of disaster nursing competencies. World Health Organisation Western Pacific Region. International council of nurses. 2009. Available from [http://www.wpro.who.int/hrh/documents/icn\\_framework.pdf](http://www.wpro.who.int/hrh/documents/icn_framework.pdf)
39. S. .W. Kuntz, P. Frable, K. Qureshi, L.L. Strong Association of community health nursing educators: disaster preparedness white paper for community/public health nursing educators. Public Health Nurs., 25 (4) (2008), pp. 362-369,
40. M. Carter, S. Gaskins. Incorporating bioterrorism content in the nursing curriculum: a creative approach J. Nurs. Educ., 49 (7) (2010), pp. 406-409
41. Alfred D, Chilton, J., Connor, D., Deal, B., Fountain, R., Hensarling, J., Klotz, L., 2015. Preparing for disasters: education and management strategies explored. Nurse Educ. Pract. 15 (1), 82-89
42. Currie Jane, Kourouche Sarah, Gordon Christopher, Jorm Christine, West Sandra. Mass Casualty education for undergraduate nursing students in Australia. Nurse Education in Practice. 28 (2018) 156-162.
43. Information taken from clinical matters newsletter Ambulance Victoria Intranet. Issue 15: April 2018. Ambulance Victoria. [Ambulance.vic.gov.au](http://www.ambulance.vic.gov.au)
44. Victorian Emergency Management Institute. Emergency Management Victoria. Available from <https://www.emv.vic.gov.au/VEMI>
45. The New Zealand Coordinated Incident Management System (CIMS) 2<sup>nd</sup> edition. Safer communities through integrated emergency management. April 2014. Published by Officials' committee for domestic and external security coordination department of Prime Minister and Cabinet. Wellington New Zealand. Available from <https://www.civildefence.govt.nz/assets/Uploads/publications/CIMS-2nd-edition.pdf> [cited 4 October 2018]
46. Unit guide PAR3022. Monash University. Provided by Paul Toll. Department of Community Emergency Health and Paramedic Practice. Monash University Frankston. [Paul.toll@monash.edu](mailto:Paul.toll@monash.edu)
47. Major disaster simulation. Australian Catholic University. Tuesday 28 July

2015. Available from

[http://www.acu.edu.au/connect\\_with\\_acu/newsroom/news/media\\_releases/year/2015/major\\_disaster\\_simulation](http://www.acu.edu.au/connect_with_acu/newsroom/news/media_releases/year/2015/major_disaster_simulation) [cited 27 June 2018]

48. Major Incident Management Unit guide. Latrobe University Unit Guide. Susan Furness. Senior Lecturer Paramedicine Course Coordinator La Trobe Rural Health School College of Science, Health, and Engineering La Trobe University, Bendigo. S.Furness@latrobe.edu.au

49. Unit guide HFB3226. Victoria University. Provided by Adam Pilmore.

( [adam.pilmore@vu.edu.au](mailto:adam.pilmore@vu.edu.au)) unit outline available from

<https://www.vu.edu.au/units/HFB3226>

50. Unit guide PARA305 Australian Catholic University. Provided by Matthew Rose [matt.rose@acu.edu.au](mailto:matt.rose@acu.edu.au)

51. Victoria University Website. Available at

[http://www.acu.edu.au/connect\\_with\\_acu/newsroom/news/media\\_releases/year/2015/major\\_disaster\\_simulation](http://www.acu.edu.au/connect_with_acu/newsroom/news/media_releases/year/2015/major_disaster_simulation))

52. Continuing Professional development. 2018. Clinical handbook. Clinical day one. Available from [curriculumdevelopment@ambulance.vic.gov.au](mailto:curriculumdevelopment@ambulance.vic.gov.au)

53. Israel begins nation-wide emergency preparedness exercises. 10/04/2018 Arutz Sheva. [Israelnationalnews.com](http://www.israelnationalnews.com) Available at

<http://www.israelnationalnews.com/News/News.aspx/242990> [cited 4

October 2018]

54. MDA Emergency Preparedness. Lecture delivered by Guy Caspi Magen David Adom in Israel. December 2 2018