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Casualty Survival ⁘ Prioritised

Responding to multiple casualties in remote industrial locations

MILITARY AMBULANCE INDUSTRY POLICE NGO HOSPITAL

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A discussion document

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Introduction

In this paper we will explore the response to multiple casualty incidents (MCI's) in remote industrial settings, particularly with regard to the oil and gas industry.

The authors will draw on existing guidance, best practice and our considerable combined hands-on experience of pre-hospital, military and remote area industrial medical care and emergency planning.

We will review the definitions of multiple and mass casualty incidents; the overall aims of the response; the particular challenges and opportunities that prevail in remote industrial settings; current guidelines within and outside the industry in order to highlight the significant gaps in the industry's guidelines and preparedness for such events compared to current practice in conventional medical systems; issues of duty of care and liability and the human element of responding to an MCI.

We will make proposals for discussion regarding best practice guidelines for planning, initial reporting from the scene, primary triage and immediately necessary life-saving treatment, secondary triage, paediatric triage, communication pathways and specific competencies and equipment scales.

Background

Definitions

A multiple casualty incident (MCI) is, obviously and simply, an incident causing more than one casualty. An MCI may, due to numbers and/or severity of casualties, overwhelm, or threaten to overwhelm, the available medical resources. This situation is sometimes called a mass casualty incident. Such events are usually due to physical trauma but can be associated with “medical” causes such as infectious disease.

“Remote” refers to locations where the medical evacuation of an ill or injured person to a hospital cannot be guaranteed to be achieved within four hours in foreseeable circumstances [1].

The aim of an MCI response

The aim of any response to an MCI is to minimise mortality and morbidity by maximising the efficiency of available resources.

We believe that success in achieving this deceptively simple aim is ultimately dependent on the existence and use of appropriate best practice guidelines. Such guidelines exist in the conventional and military environments, but it remains to be seen whether the oil and gas industry can match these.

MCI's in remote industrial locations

Multiple casualties in conventional and military environments are a relatively frequent occurrence and, because of the capacity built into the relevant medical systems, rarely outstrip the available resources. However, in remote industrial locations very low numbers of casualties, especially if severely injured, have the potential to overwhelm the limited immediately available medical resources leading to potentially avoidable morbidity and mortality.

It is crucial to note that we are not considering here solely catastrophic events such as the Piper Alpha or Deepwater Horizon disasters, but events producing only a handful of patients. In remote areas a multiple casualty incident, or even mass casualty incident, can simply be more than one seriously injured person. The reasons for this are summarised in Box 1.

Box 1: Factors potentially exacerbating MCI's in remote industrial locations

Limited numbers of trained medical personnel on-site: often a single "medic".

Infrequent opportunities for the medic to manage severely injured patients leading to skill decay.

The pressure on the medic to perform several roles primary and secondary triage, treating patients, managing First-aiders, liaising with on-site management including providing information on casualties, liaising with the "topside" doctor*, input into organising evacuation of the casualties, preparing casualties for evacuation.

Limited availability of medical investigations and treatment on-site.

Geographical isolation, environmental conditions and security situation leading to delays in providing on-site medical care.

Geographical isolation, environmental conditions and security situation causing delays in providing, or prolonging, evacuation of the patients to definitive care.

* also known as "reach-back" or "on-line medical control"

Despite the extra difficulties in managing an MCI associated with remote industrial locations, this situation also affords some benefits and opportunities as outlined in Box 2.

Box 2: Opportunities associated with MCI's in remote industrial locations

Close-knit team of medical and non-medical personnel who work together on a daily basis.

Non-medical personnel who can be trained in primary triage.

Non-medical personnel who can be trained to support the medic.

Communications likely to be used and tested daily.

Opportunities to exercise and test plans.

Personnel likely to have intimate knowledge of the geography of the location.

Understanding the human element of response

In many MCI's the responders will have limited experience of such events and will be subjected to numerous pressures faced with a casualty load heavier than their resources. An excellent example of an individual's response to an MCI was noted by one of the authors whilst teaching in the USA. One of his students had been involved in responding to both military and civilian incidents, as well as having been a casualty in an MCI himself. He described his thoughts and feelings about the initial response as below;

"We have to remember that when dealing with an MCI, we are sending the least experienced people to perform the duties of triage and treatment in the first few minutes. With the adrenaline that is released as the rescuers go into the scene, triage has to be something that can overcome the tunnel vision and loss of fine motor skills that are common with an adrenaline release" [2].

We need to keep this human element firmly at the forefront of our minds when planning and training for MCI's.

Do MCI's actually happen in remote industrial locations?

Despite the rigorous health, safety and environment regimes prevalent in industry the potential for MCI's persists and they still occur.

In addition to headline catastrophes less publicised incidents and near-misses persist [3,4,5].

Causes of such incidents unsurprisingly include motor vehicle collisions and other transportation events, fires, interpersonal violence including terrorism, environmental hazards, and toxic releases.

Even in the developed World increases in deaths in the oil and gas industry have been reported [6]. However, pushing the geographical boundaries of exploration and production can only increase both the hazards we face and the complexity of responding to incidents. For instance, motor vehicle collisions (MVC's) remain a global problem and there has been no recent fall in deaths Worldwide [7]. Furthermore, the probability of dying following an MVC is higher in the undeveloped World, where many remote industrial projects are located, compared to the developed World with its more advanced medical systems.

War and terrorism are increasingly affecting the industry with the In Amenas attack being the most obvious example[8].

MCI's can, of course, affect not just industry employees but the local population as well, and personnel may be called to respond on a humanitarian basis to incidents such as MVC's or fires, including pipeline fires which can cause hundreds of casualties.

Duty-of-care and liability

Companies operating in remote locations have a duty-of-care to their employees and others working on their sites [9, 10].

The gap, which we will describe below, in medical planning and preparation for MCI's compared to conventional and military operations, leaves companies particularly exposed. Following a multiple casualty incident, should survivors or relatives consider that arrangements were inadequate and thereby caused avoidable morbidity or mortality, litigation is almost inevitable. In addition, the authors are acutely aware from our own experiences, and the experience of others, that responding to an MCI is psychologically stressful and the absence of appropriate planning and preparation can exacerbate that stress.

As has been seen by our colleagues in the security sector, the fact that loss of life has occurred in a far-off land is no bar to multi-million dollar law suits by bereaved relatives if they believe that proper measures have not been put in place [11].

MCI best practice guidelines outside the oil and gas industry

There is a continual effort in first World countries to provide highly effective systems to support the planning and preparation for, and response to, MCI's. The examples below show the high level of planning and preparation against which industry planning can be compared.

In the UK the civilian lead is the National Ambulance Resilience Unit (NARU). Their comprehensive strategic guidance documents and activities aim to ensure that each ambulance service in the UK has a unified and consistent MCI response. The NARU Major Incident Initial Action Cards , for instance, set this out in detail and provide extensive coverage of action cards, scene reports, forms, terminology, and triage methods[12].

The Advanced Life Support Group's Major Incident Medical Management and Support courses, covers the management of major incidents, including MCI's, at scene and their hospital and chemical, biological, radiation and nuclear versions, are widely taught and set standards for planning, response and training [13].

In the USA the Federal Interagency Committee for Emergency Medical Services (FICEMS) has published the 'National Implementation of the Model Uniform Core Criteria for Mass Casualty Incident Triage'. This document gives strategic guidance for a standard system of primary triage throughout the USA[14].

Also in the USA the National Disaster Life Support Foundation, Inc. "oversees the National Disaster Life Support courses, a series of educational programmes to better prepare health care professionals and emergency response personnel for mass casualty events."

In the conventional civilian environment, as well as National guidance on MCI's, local, detailed, planning and preparation by ambulance services and hospitals specifically for MCI's is routine.

In the British Army one in four soldiers are trained as "team medics". They have additional training in primary triage and have suitable equipment for this.

The overriding drive of all these standards and guidance is to provide organisations and individuals who may have limited experience of responding to MCI's framework to employ a plan or skill within their local environment.

The structures and guidelines focus on:

- Risk assessment
- Planning and preparation for responding to MCI's
- Set actions for key personnel responding to the incident
- Standardised scene reports with terminology people can understand and therefore use to make decisions
- Standardised primary and secondary triage methods
- Consistent levels of equipment embedded throughout their systems appropriate to role

MCI best practice guidelines in the oil and gas industry

In contrast to the level of standards and guidance outside the oil and gas industry described above, the industry guidelines on MCI's that we have been able to find tends to be outdated and sparse. Our relevant findings are outlined below, not for the purpose of negative criticism, but to highlight the lack of adequate guidelines in the industry relative to the civilian and military benchmarks against which they might be judged.

In the UK Health and Safety Executive document "*Offshore medic training and qualifications for the purposes of The Offshore Installations and Pipeline Works (First-Aid) Regulations 1989 a guide for training organisations*" the relevant entries are limited to:

In Appendix 1: Roles and responsibilities of offshore medics: "to understand their role in emergency plans and to co-operate with the duty holder and others involved in implementing the plans"

In Appendix 2: Roles and responsibilities of offshore first-aiders: "The main responsibilities of the offshore first-aider are as follows: ...to assist in the management of serious incidents involving multiple casualties..."

In the UK "*Health care and first aid on Offshore installations and pipeline works Offshore Installations and Pipeline Works (First-Aid) Regulations 1989 Approved Code of Practice and guidance*" the sole relevant entries are:

In Appendix 1: Assessment of first-aid and basic health care needs:
"...additional facilities required for handling multiple casualties according to the emergency plan....."

In Appendix 3: Roles and responsibilities of offshore first-aiders:
"...to assist in the management of serious incidents involving multiple casualties..."

In the UK Industry guidelines for first aid and medical equipment on offshore installations December 2000 the sole relevant reference is in under "Reference Material", along with text books and fluid balance sheets, and is to the number of triage cards required for differing levels of Persons on Board. There are no recommendations for the required characteristics of these triage cards.

In the Oil and Gas UK Guidelines for the Management and Training in Emergency Response for Offshore Installations February 2010, medical roles are specifically excluded.

In the OGP-IPIECA document "Managing field operations in oil and gas activities, a guide for managers and supervisors in the oil and gas industry 2011", whilst there are considerably more detailed guidelines on medical emergency response planning than in the above documents, the references to multiple casualty response are:

In medical emergency management:

"To manage medical emergencies, each location should develop a site-specific medical emergency response plan (MERP), taking into account the potential for individual and multiple casualties…"

In drills, review and revision:

Drills: ….."The extent of resource deployment during drills should be predetermined by management and company-designated healthcare professionals. This should include scenario planning, as well as simulated events addressing triage for multiple cases, followed by a thorough debriefing."

The 2013 Institute of Remote Health Care document "Remote Healthcare for Energy and associated Maritime activities" echoes the OGP-IPIECA guidelines above, stating "the MERP (medical emergency response plan) needs to take into account the potential for individual and multiple casualties, describing the response to various medical emergency scenarios based on the health risk assessment, and utilising available resources".

However, this document takes things further. Under the training requirement for designated first-aiders a need for awareness of triage and multiple casualty situations is mentioned. In addition, it recommends that on-site health professionals should be skilled in triage.

As with the OGP-IPIECA document further general guidance on medical emergency response planning is included in the document but not specifically for MCI's.

A "triage tent" is listed as a requirement, but no other equipment relevant to the management of MCI's is mentioned.

Proposals for discussion

We suggest that the industry needs best practice guidelines in the field of MCI response, particularly regarding planning, initial reporting from the scene, primary triage and immediate life-saving treatment, secondary triage, communication pathways, specific competencies and equipment.

Planning

All organisations have their own approach to planning for emergencies including MERP's.We recommend that all MERP's include specific planning for multiple casualties which should include the following:

Command

A comprehensive, written, emergency plan, based on a local risk assessment, with action cards for all personnel/roles are essential parts of the command system. This may include the provision of a Medical Incident Officer to take overall command of medical issues if such a person can be deployed e.g. from shore-side for an offshore incident.

There must be a command structure for both the incident response as a whole and the medical response itself. All personnel must be familiar with the role or roles they will be expected to play and be appropriately trained and equipped.

On most projects, due to the small number of medical professionals available, command roles will have to be fluid and the medical professional will have to prioritise their own activities.

In the case of large projects with hundreds or thousands of personnel it may be necessary and possible to set up a traditional Gold, Silver and Bronze command structure [15].

A crucial part of the command function is a system that can be used to record and update both the number, type and triage category of the casualties overall as well as an overview of each patient together with their current location and intended destination.

Safety

The response must be as safe as possible and the 1-2-3 principle of safety must be followed i.e., the safety priorities for rescuers are self, then scene, then survivors.

Safety will depend on a continuing risk assessment, control or avoidance of hazards, use of appropriate PPE, restricting access to the site etc.

Communication

Failure to communicate in general and the failure of actual telecommunications are the commonest problems identified in the aftermath of a major incident.

Call signs, radio frequencies and telephone numbers that might be used in a major incident must be collated and made available to all who might need them. This information must be regularly checked and updated and kept with each copy of the plan. Appropriate call signs and telephone numbers should be recorded on individual action cards together with the correct radio frequencies.

Personnel must be familiar with the operation of radios and telephones. The radios and telephones themselves must be checked and confirmed to be working and charged at appropriate regular intervals. Technical problems with communications, or even failures, can be expected. Communication with in-country and international offices, especially regarding the condition and evacuation of casualties, is labour-intensive and must be planned and managed.

Communication pathways themselves are discussed in more detail below.

Assessment

The number, type and severity of casualties must be assessed initially and at intervals during the incident.

Similarly risks must be assessed throughout the incident.

Responses must be adapted on the basis of these assessments.

Triage

This is the prioritisation of casualties, initially for treatment and later for evacuation. The condition of casualties will change, as may the care available, so triage must be dynamic. Triage is covered in more detail below.

Treatment

Initial treatment may have to be restricted to immediately necessary life-saving first aid administered by the triage team (see below). Subsequently treatment will be carried out along conventional lines, albeit prioritised as per dynamic triage.

It may be necessary in advance to designate a “casualty clearing area” in addition to the “sick bay”, where patients can also be treated.

Advanced care will be carried out by medical professionals on-site, during transport to the casualty clearing station, in the casualty clearing station and during evacuation.

Transport

Means of transporting casualties from the site of the incident to the casualty clearing station must be planned and practised in advance, e.g., in addition to ground ambulances adapting vehicles to carry recumbent casualties by removing seats.

The use of helicopters and fixed-wing aircraft requires much advanced planning. Medical personnel responsible for the MERP must liaise closely with the project’s aviation contractors to ensure that appropriate air support can be provided quickly and safely. It must be agreed beforehand what types and numbers of casualties can be carried. Landing sites and destinations must be agreed in advance. The continuing transport and care of patients once they reach the destination landing site or airport must be planned.

It is equally important to determine the conditions or situations in which flights will not be provided e.g., night time.

Aftermath

After the incident response has been stood down rescuers must be given the opportunity to “unload” and rested. Facilities must be cleaned and equipment re-stocked.

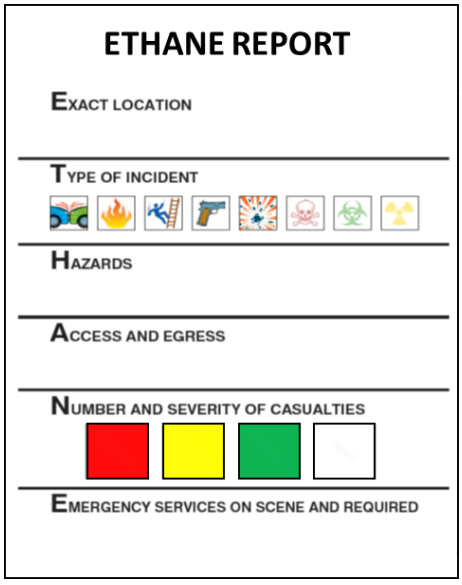
Debriefing should be carried out to review any lessons learned regarding what went well and what might be done better in the future.

Initial reporting from the scene

During the London Bombing on July 7th 2005 each ambulance crew arriving first at each separate location used the same structure of scene report when providing initial reports. This allowed control rooms to assess the information in a structured manner and allocate additional resources based on the key information being received. The uniform nature of each report made it easier and faster to make critical decisions, ultimately reducing the time from injury to definitive care for the casualties. It can only be speculated how difficult this job would have been had each crew provided information on a non-structured basis.

There are numerous structured scene reports in use but the “ETHANE” format has been used for many years in UK civilian and military operations and works well under the pressures of a multiple casualty incident.

We recommend that this, or a similar format, is adopted for initial reporting from the scene in remote industrial areas:



Primary triage and immediately necessary life-saving treatment

Triage has been defined as the art of categorisation of patients according to severity of illness or injury to allow the greatest benefit for as many as possible [16] .

An alternative definition is that triage is a temporary prioritisation of critical care [17] .

Primary triage of patients at multiple casualty incidents is done before any patient treatment is started because it prioritises patients for treatment and is the priority medical activity at the incident site.

It is widely accepted that any primary triage system should not only be based on an objective physiological assessment, but be such that it can be carried out reliably and effectively by non-medical personnel with a minimum of training.

There are various systems that have been shown to do this such as the Triage Sieve used in civilian systems in the UK, Australia and Holland and throughout NATO, and Simple Triage and Rapid Treatment (“START”) used in the USA.

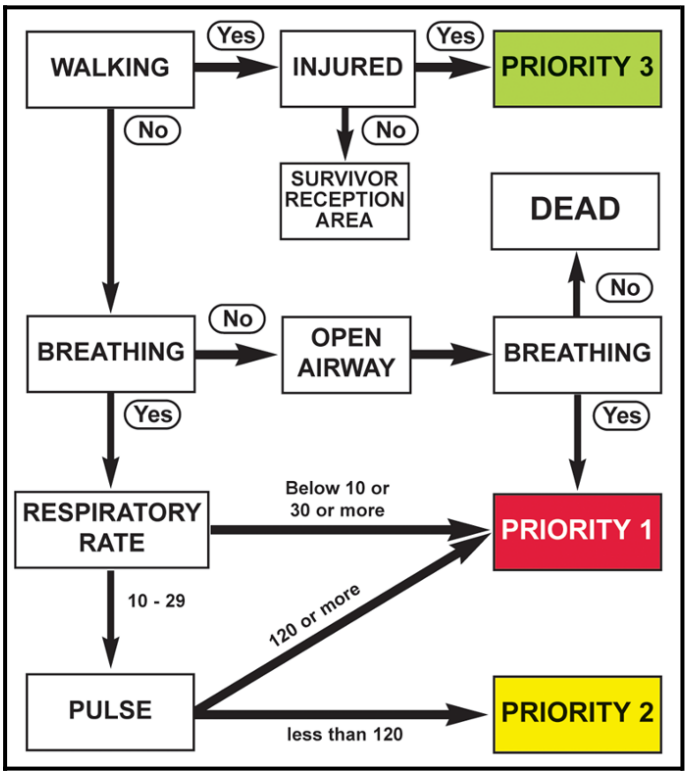
We recommend that the Triage Sieve should be the method by which first-aiders and medical personnel in the oil and gas industry perform primary triage.

Any first-aider or medical professional carrying out primary triage is likely to feel pulled into treating patients, rather than the overall more important task of completing triage.

Any such treatment should be limited to that which will be immediately life-saving, such as, for a first-aider, arrest of catastrophic external haemorrhage and basic airway care, including use of the recovery position.

Where possible such tasks should be delegated to another first-aider allowing the person doing primary triage to move on to next casualty.

Diagram 1 - Triage Sieve



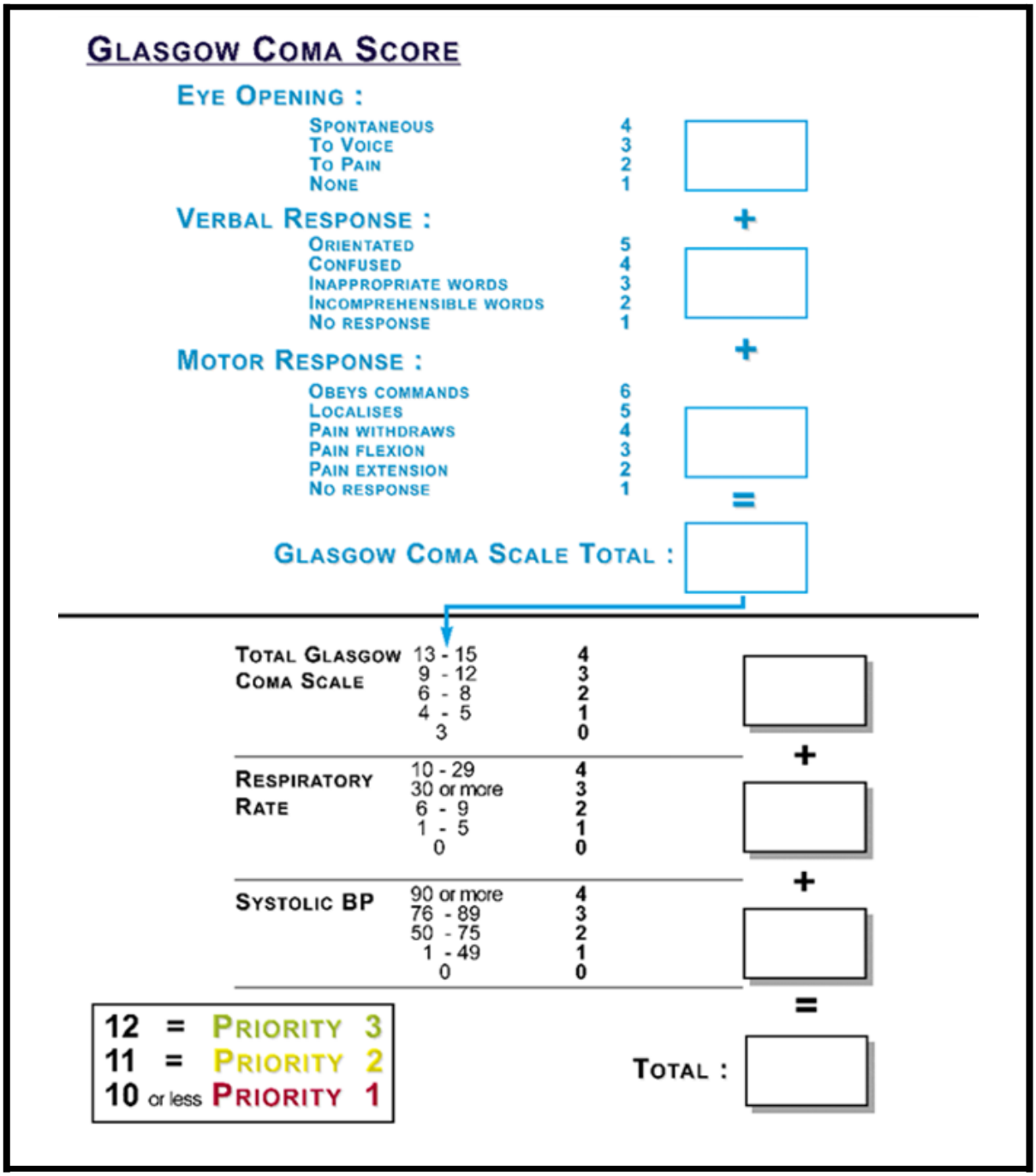
Secondary triage

The secondary triage of patients is a more prolonged process and can take place after initial resuscitation. It will usually be done away from the point of injury e.g., in the sickbay or “casualty clearing station”.

The “Triage Sort” is the most widespread, quantifiable method of performing secondary triage and is based on the formal physiological trauma scoring system known as the Triage Revised Trauma Score (TRTS). Assessment of the patient’s physiological status (conscious level, respiratory rate and systolic blood pressure) can give an accurate prediction of the expected mortality associated with that patient’s injuries.

The Triage Sort, along with an anatomical assessment of injuries, will help on-site medical personnel and Topside determine the need for further treatment, priorities for evacuation to definitive care and choice of the most appropriate mode of transport. Further considerations in planning patient evacuation are to be found in Appendix 1.

Diagram 2 - Triage Sort



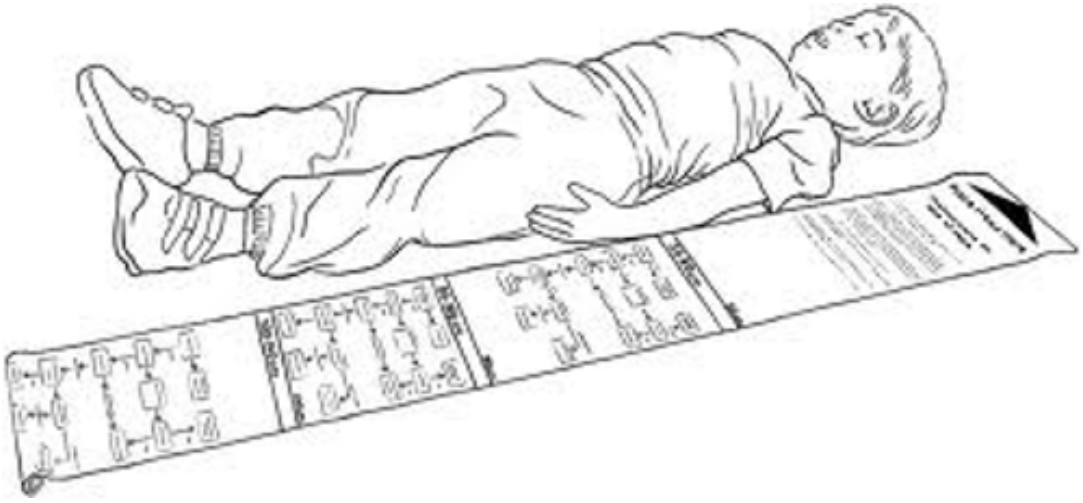
Paediatric triage

Although remote industry personnel in general will deal with an adult population, there will be instances where children may be involved in an incident. The response to numbers of seriously injured children will be daunting for even experienced providers. Nevertheless, if industry providers might be faced with this scenario they need a practical and safe solution to assist in their decision-making.

A child's physiology is not the same as an adult, so the application of the adult triage sieve will not be appropriate and if used will produce inaccurate results. As a child develops their physiology will change proportionally with length, so no one set of parameters will fit all children. Finally, we also need to work out when a child is mature enough to allow us to revert to using adult parameters.

The Paediatric Triage Tape[18] has been developed to address these issues. It provides an evidence-based practical tool to assist paediatric triage decisions based on the child's length and therefore its physiology and normal vital signs. The tape is unrolled and laid next to the child and the responder simply follows the age-adjusted triage sieve algorithm corresponding to the length of the child.

Diagram 3 - Paediatric Triage Tape



Communication pathways

Communication always presents a challenge in the management of multiple casualties, given the complex and dynamic natures of both the incident and the response.

Dysfunctional communication can result in transportation assets and evacuation being delayed, the wrong type of transport arriving, hospitals not being prepared or casualties being evacuated to the wrong level-of-care.

Ensuring that the right casualty gets to the right place in the right time frame is heavily driven by effective communications.

Incident communications is a subject on its own.

This paper will not attempt to cover the complete spectrum of communication issues, but will focus on reviewing communication pathways between the various parties involved in responding to the incident.

The following table outlines the probable lines of communication that exist as the medical part of controlling an incident with the parties involved, the information they need to pass to each other and the means by which that can be done (this table is written on the assumption that the medic can and will attend the scene of the incident, although it is recognised that this sometimes may not be possible e.g., due to difficulties in getting to the site or because seriously injured casualties requiring his/her management have already arrived or are en-route to the “sick bay” or triage area).

Table 1 - Communication pathways

Pathway	Who	How	Critical information
1	First-aiders to Control Room.	Radio, phone	ETHANE message.
2	Control Room to Medic.	Radio, phone	ETHANE message.
3	First-aider to medic, on scene.	Face to face	Update on casualty status, which patient most in need of medic's attention and their location.
4	Medic to First-aider, on scene.	Face to face	Advice on continuation of triage, treatment and evacuation from scene.
5	Medic to Control Room.	Radio, phone	Update on numbers in each triage category transportation requirements.
6	Medic to Topside.	Phone	Incident background. Casualty numbers and severity. Resources on-scene and ability to cope. Specific definitive care requirements.
7	Topside to Medic.	Phone	Confirmation on event characteristics. Specific casualty medical advice. Evacuation requirements.
8	Control Room to Medical Evacuation Provider.	Phone	Number and type of evacuation assets required and medical resources to attend on them.
9	Topside to Hospitals.	Phone	Advice on casualty numbers, type, severity and ETA. Specific requirements for definitive care.
10	Personnel with a command role e.g. in Control Room or Medical Incident Officer if deployed.	In writing	Maintain a log of key actions.

As can been seen, there are numerous communication pathways that have to transfer a great deal of information from people who most likely will be multi-tasking and under considerable stress. These pathways should be recognised and practised in advance of an incident.

Specific competencies

The particular competencies required for the successful management of an MCI vary between the roles and levels of personnel involved as defined in the OGP- IPIECA document Managing Health for Field Operations in Oil and Gas Activities [19] .

First-aiders and security personnel: Basic/Level 1 or Advanced/Level 2 first-aiders who are most likely to be closest to the scene and available in numbers.

The "medic" or on-site doctor: Level 3 or 4 health-care professionals who will be the first advanced medically trained person closest to the scene.

Medical personnel arriving on transportation: Level 3 or 4 health-care professionals: as casualty evacuation means arrive medical personnel may arrive on-scene to offer additional resources as well as acting as a medical escort on the transportation.

On scene management: the closest management to the incident. It is important to note that the medical management of the scene will only be one of their responsibilities; plant security, containment and possible fire suppression are all issues they may be dealing with simultaneously.

The Topside Doctor: offering medical advice and guidance on on-site treatment and evacuation decisions.

Hospital staff: Level 5 health-care professionals providing definitive care.

The competencies these personnel must include are scene assessment, communication, primary triage, immediate life-saving treatment, secondary triage, patient management skills, knowledge of the MERP, ability to teach relevant skills to other members of the team and understanding of hospital emergency plans.

These are covered in detail in the table on the next page:

Table 2 - Specific competencies

Person	Tasks required
Site first aid teams and security personnel.	Apply and communicate an ETHANE scene report. Use a radio. Perform primary triage. Apply immediately necessary life-saving treatment.
Site medic/doctor.	All of above. In-depth knowledge of MERP, including MCI response. Ability to teach primary triage and immediately necessary life-saving treatment to first-aiders and security staff. Ability to train management in aims and limitations of medical response. Understand secondary triage skills.
Site management.	Understand the MERP, including the MCI plan, ETHANE and all relevant terminology, and especially the triage categories and the implications of these.
Medical personnel arriving on evacuation transportation.	Interpret the medical scene assessment. Appropriate medical skills for types, numbers and severity of casualties and length of transfer.
Topside doctors.	Understand the site MERP plan and associated terminology. Understand all aspects of secondary triage and give advice on casualty management and evacuation decisions. Understand the pressures created by the specific location of the incident and casualty load. Understand the location, transport times and arrangements (e.g. secondary transfers), capability and capacity of definitive care facilities.
Hospital staff.	Understand the medical scene assessment and terminology within it. Have skills and facilities that match the casualties arriving. Understand how to initiate a hospital surge plan.

Equipment

The choice of equipment for responding to an MCI will depend on the outcome of a local risk assessment, the potential scale of the incident, and the unique circumstances of the operation including security, climate and geographical remoteness. Equipment should be:

- "Embedded" so it is available as close and as soon as possible to a scene
- Relevant to the pre-assessed expected injury profile
- Available in appropriate quantities
- Appropriate for the skills of personnel using it
- Appropriate for the environment
- Transportable

An overview of equipment required for critical tasks is laid out in the table below:

Table 3 - Equipment

Critical task	Equipment required	Notes
Scene reporting and primary triage. All equipment. Make and communicate a scene assessment.	ETHANE aide memoire/record.	Appendix 2 The ideal triage card.

Critical task	Equipment required	Notes
Perform primary triage. Count and communicate number and severity of casualties. Immediately necessary life-saving interventions. Moving non-mobile casualties.	Algorithm and triage tags. Counting card. Equipment for control of catastrophic haemorrhage and basic airway management. Rugged, lightweight, compact stretcher system.	
Secondary triage. Set up a temporary casualty treatment area. Perform secondary triage assessments. Continued medical management of the casualties	Appropriate shelter/protection from the environment. Area marking tape. Triage tags with Triage Sort. Relevant medical supplies in sufficient quantities.	Any temporary shelter must be storable for long periods and be readily transportable close to the scene. Sheltering should take into account weather and potential length of time on-scene.

Critical task	Equipment required	Notes
Command and Control. All MCI roles. Interpreting scene reports and communicating both internally and externally regarding key areas such as availability of evacuation resources, patient destinations, and a list of the dead and missing.	Action cards and role identification tabards. Pre-prepared management boards or notes for logging key information and activities. Simple writing materials that will withstand adverse environments. Copies of the MERP and MCI plans in a rugged, practical layout.	To give access to key information and guidance that will enhance critical decision-making.

Summary

Multiple casualty incidents can occur at remote industrial locations. Even a limited number of seriously injured casualties can threaten to overwhelm the limited medical resources on-site.

There is a duty-of-care, with subsequent liability, to prepare for such events. It can be argued that such preparation in industry does not always measure up to that in conventional environments.

We welcome discussion and comments on our suggestions in order to develop best practice guidelines in the critical areas of planning, initial reporting from the scene, primary triage, immediately necessary life-saving treatment, secondary triage, communication pathways, specific competencies and equipment.

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Appendix

Appendix 1 - Considerations in planning patient evacuation

- Is the patient's condition time-critical?
- Can the patient be further resuscitated on-site?
- Should the patient go to an in-transit or definitive care facility?
- Are such facilities accessible?
- What are the capacity, availability and suitability of the procurable transport?
- Could the patient be harmed by a road journey?
- Is air evacuation available and a better option?
- Can air evacuation be provided in time?
- Is the patient safe to travel by air at the altitudes involved?
- Can other patients travel with this patient?
- Is medical supervision available for the journey?
- What medical equipment and drugs are required for the journey?
- What treatment is required during the journey?
- Does the person accompanying the patient understand how to care for the patient and does he have written instructions?
- Is there a copy of the clinical record to go with the patient?
- Is the evacuation planned and confirmed from departure to arrival?

Appendix 2 - The ideal triage card

- Highly visible day or night
- Durable and waterproof
- Readily and securely attachable around a limb
- Triage categories can be changed up or down
- Indicates categories by number and colour
- Provides aide memoire for triage methods
- Has space for clinical notes
- Can indicate dead and expectant categories
- Each card uniquely numbered
- Facilitates counting of casualties in each triage category

Declaration of interest

TSG Associates www.smartmci.com designs, manufactures and distributes equipment for multiple casualty management, including triage, and also provide training in these areas.

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