



MEDICAL GUIDANCE NOTE

Title: PROVISION OF MEDICAL CARE IN AN AUSTERE ENVIRONMENT, SPECIFICALLY IN A CONFINED SPACE
Last revised: January 2011

1. Background

1. The USAR environment presents the USAR medic with an array of ethical, cultural and environmental circumstances which could have an adverse affect when providing patient care.
2. This document aims to outline considerations specific to the provision of medical care in an austere environment, specifically confined space.
3. It is accepted that the healthcare provider will adhere to clinical practices as stipulated in their home country or in their framework of competence, and as governed by their professional code of conduct and scope of practice and will only divert from this in exceptional circumstances where a life is under threat.
4. While the individual's responsibility regarding their scope of practice remains in full effect, this document serves to provide guidance as how standard accepted practice may need to be adapted to accommodate the environment in which it is being applied.
5. It is recommended that evaluation of the victim commence as soon as contact has been established.
6. It is recommended that treatment begin as soon as the patient can be accessed.

2. Guiding Principles

As a guiding principle, prior to performing any clinical management consider the following:

- Discussing action plans with colleagues, team managers or other professionals when considering deviation from standard practise;
- Seeking guidance from OSOCC and or LEMA for sensitive interventions (e.g., amputation or dismemberment);
- Ask yourself the following key questions:
 - Do you or don't you?
 - Do you have the mandate to provide clinical management;
 - Is it safe to do so consider-self, team, patient;

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- What is the likely outcome following your intended actions;
- Do you have the required resources available within the team, the wider USAR community and from the local infrastructure;
- Is there any ethical considerations evident;
- Is there any cultural considerations, both for the team and the victim, evident;
- Can you or can't you?
 - Do you have the required and continual access to the patient;
 - Is the required clinical intervention within your scope of practice and competency framework;
 - Do you have the required resources available within the team, the wider USAR community and from the local infrastructure;
- Will you or won't you?
 - What is the patients triage status;
 - How long will it take to achieve your objective and what implications will that have on the time to extrication;
 - Does the benefit of your intended action outweigh the foreseeable risk to self, team and patient;
- How to?
 - What is the safest option;
 - What is the least invasive option;
 - What is the least resource-intensive option;
 - Consider the implications of your intervention/s on patient egress;
 - Consider the implications for ongoing management during and following extrication;
 - Consider the use of technical search and rescue equipment to assist with patient assessment and evaluation (e.g., use of search camera to visualise parts of patient's body obscured by rubble).

3. Airway and Breathing Considerations

- Consider the most suitable option for managing the airway based on the given circumstances;
- You may not be able to achieve a definitive airway (e.g., intubation) so consider using more basic manoeuvres and airway devices (e.g., supraglottic airway device) as an alternative;
- Consider whether your chosen method can be safely sustained for the duration of the extrication;
- Consider that you may only have temporary access to the patient;
- You may not be able to make use of lateral position;
- Consider handheld/manual suction devices over mechanical devices as they are generally more portable and don't require auxiliary power;
- Consider having access to small/portable battery operated monitoring equipment e.g., SpO₂/End Tidal CO₂;

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- Consider that you may not have access to another pair of hands due to restricted patient access;
- Your decision to assist with ventilatory support will be influenced by your ability to access the airway;
- Consider that you may not be able to provide the required ventilatory support via your chosen technique (e.g., maintaining an adequate seal with a BVM) and therefore you may have to resort to an alternative airway technique (e.g., supraglottic airway device);
- Consider the risks versus the benefits regarding drug-assisted intubation;
- Consider the duration of the whole extrication process when managing the airway with reference to:
 - Whether you have adequate supplies of medicine to keep the patient in the desired clinical state (e.g., sedated or anaesthetised);
 - The feasibility of manual ventilation (e.g., BVM);
- If you consider performing an emergency cricothyroidotomy, a Sellinger technique is preferable over a surgical airway;
- Medical Oxygen Considerations in USAR:
 - Consider the dangers of oxygen delivery in a confined space during rescue operations due to:
 - Potential fire risk;
 - Potential explosion risk;
 - Consider the non-availability of oxygen due to:
 - Aviation transport restrictions when deploying to the affected country;
 - Refilling restrictions (limited availability) in the affected country;
 - Regulator incompatibility;
 - The use of oxygen is likely to be the exception rather than the norm;
 - Consider the use of an oxygen concentrator as an alternative source of oxygen;
- Mechanical ventilation in USAR:
 - This capability exceeds the expected minimum requirements;
 - If a team elects to include a mechanical ventilator in its equipment cache consider the following:
 - Select air-driven mechanical ventilators with built-in compressor;
 - Consider using the least technologically advanced alternatives;
 - A USAR team deploying with a mechanical ventilator should develop a Standard Operating Procedure (SOP) and Clinical Practice Guideline (CPG) for its use within the team.

4. Circulation Considerations

4.1 Fluid Management

- Fluid administration routes:

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- Consider the following methods of venous access:
 - Peripheral;
 - Intraosseous;
 - Venous cutdown;
 - Central (consider the risks associated with central venous access within a confined space);
- If intravenous access is not possible, consider alternative routes of fluid administration:
 - Orogastric;
 - Nasogastric;
 - Rectal;
 - Subcutaneous;
 - Intraperitoneal.
- Fluid volume:
 - Consider rate and timing of administration:
 - Volume replacement as required;
 - Fluid loading prior to removal of compressive load;
 - Maintenance administration;
 - Consider the available fluid resources;
 - Consider the ability to monitor haemodynamic status and fluid output in relation to fluid administered:
 - Urination:
 - Inform patient to tell you when they need to urinate (if possible);
 - Encourage patient to urinate;
 - Make note of times patient urinates;
 - Observe colour of urine, if possible;
 - It is not generally advisable to attempt bladder catheterization within a confined space. As an alternative consider the use of a condom catheter;
- Intravenous Fluid type:
 - If available, consider fluids that are either low or free of potassium and or lactate in patients suspected of having crush syndrome;
 - Preferably use isotonic solutions;
 - For fluid maintenance, consider alternating fluid types (e.g., NaCL and Dextrose);
- General considerations:
 - Consider insulating fluids to avoid extremes of temperature;
 - Consider the use of pressure infuser devices in conjunction with rate control devices to aid with fluid administration. Caution: Monitor volume administered carefully to avoid fluid overload;
 - Consider using adequate / circumferential strapping to secure IV sites;
 - Consider use of IV extension tubing to facilitate easier administration of fluid and medication;
 - Consider more than one site of access as security in case one site is dislodged;

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- Adhere to sterile procedures as far as circumstance allows;
- Maintain security of IV tubing and bag.

4.2 Resuscitation

- CPR: One should carefully consider the implications prior to initiating CPR as it is generally not considered a viable option within the context of USAR and confined space;
- Defibrillation: One should carefully consider the implications prior to defibrillation as it is generally not considered a viable option within the context of USAR and confined space. There are several theoretical risks for consideration e.g.,:
 - Combustible environment;
 - Conductive elements (e.g., fluid; metal);
 - Inadequate patient access to safely perform the procedure;
- If you elect to perform advanced cardiac life support, it is recommended that the patient be rapidly extricated to a point that will enable good patient access in the safest possible environment.

4.3 Haemorrhage Control

- Consider that your chosen method of haemorrhage control may not be practicable either during disentanglement and or patient egress;
- Due to limited patient access, consider the potential role of tourniquets and haemostatic agents.

4.3.1 Tourniquets

- The use of a tourniquet requires access to a limb which may not always be possible within the confined space environment;
- Teams should have the capability to apply tourniquets to victims that may require an amputation. The tourniquet needs to be placed such that it remains in situ during extrication and transport;
- There may be circumstances following an acute injury where a tourniquet provides the most effective means of haemorrhage control. When used in this setting, careful consideration must be given to the technique and time of application;
- There is a theoretical role for the use of a tourniquet to facilitate a rapid release of a compressive load;
- If a tourniquet has been applied then it should be clearly visible with the time of application recorded.

5. Disability and Drugs

5.1 Disability

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- It may be difficult to determine whether a patient's clinical presentation is due to a spinal cord injury or a crush syndrome. In an effort to try and differentiate between a spinal cord injury and crush syndrome consider the following:
 - Are the signs focal or generalised;
 - Does the patient experience a lack of proprioception;
- If unable to determine whether it is a spinal cord injury or crush syndrome, consider opting to treat for crush syndrome primarily.

5.2 Drugs

- Teams are requested to carry the required medications to enable the treatment of the conditions listed in the **INSARAG Guidelines Section F11 Medical Care** and in accordance with their standard scope of practice;
- Although it is not the practice of the MWG to recommend specific practice or drugs, the consensus of the group is that the advantages provided by Ketamine argue strongly for its inclusion in the medical cache to provide as it provides:
 - appropriate and safe analgesia in the trauma patient;
 - appropriate and safe anaesthesia for trauma and surgically related procedures in both humans and search dogs;
- While intravenous access is the administration route of preference, if this is not possible due to restricted patient access, consider the following alternative routes of administration:
 - Oral;
 - Sublingual;
 - Inhalation;
 - Intranasal;
 - Intramuscular;
 - Intraosseous;
 - Subcutaneous;
 - Rectal.

6. Environment and Exposure

- Consider the environmental hazards impacting patient management:
 - Dust;
 - Noise;
 - Smell;
 - Light (lack of);
 - Vibration;
 - Water (e.g., broken pipes);
 - Electricity;
 - Noxious gases;
 - Deceased Bodies;
- Consider the environmental impacts (e.g., extreme hot or cold climates) and the effects this may have on patient management;



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- Consider cultural considerations regarding patient exposure.

7. Patient Personal Protective Equipment

- When possible make use of Personal Protective Equipment (PPE) for the patient in an effort to reduce their exposure to environmental hazards during extrication;
- Patient PPE should be applied at the earliest opportunity during the rescue operation;
- PPE considerations include the following:
 - Eye protection;
 - Hearing protection;
 - Respiratory protection from:
 - Dust;
 - Noxious gases;
- Protect patient from falling debris as circumstance allow.

8. Removal of Compressive Force

- It is imperative that the rescue team understand the importance of treating the patient prior to release of the compressive force;
- The timing of the removal of the compressive force should be closely coordinated between the rescue technicians and the USAR medic;
- Ensure, as far as possible, an unobstructed egress route prior to the removal of the compressive force;
- Patients may appear stable as long as the compressive force is in place;
- Anticipate and try and prevent (pre-release fluid bolus) sudden patient deterioration following removal of the compressive force (e.g., third spacing; acute hyperkalaemia; metabolic acidosis);
- Attempt to place two large bore intravenous lines, or closest practical alternative, prior to removal of the compressive force;
- Ensure adequate supply of additional intravenous fluids is immediately available if required;
- Ensure immediate availability of resuscitation medications if and when needed prior to removal of compression;
- Consider the following release options in order of most to least desirable:
 - Controlled release of compressive load:
 - Commence administration of fluid bolus prior to removal of the compressive load;
 - Consider medication administration (e.g., sodium bicarbonate) prior to removal of the compressive load;
 - Incremental release of the load with ongoing patient evaluation and monitoring during and between lifts;
 - If patient shows sign of deterioration during the release, halt the release and manage patient as required (e.g., fluid bolus);

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- If possible, wait for patient to stabilise prior to recommencing the release of the compressive load;
- Non-incremental release of the compressive load due to technique being used (e.g., a crane lifting a load):
 - Commence administration of fluid bolus prior to removal of the compressive load;
 - Consider medication administration (e.g., sodium bicarbonate) prior to removal of the compressive load;
 - As far as possible evaluate and monitor the patient;
- Rapid release of the compressive load:
 - Rapid deterioration in patients clinical status;
 - Life over limb;
 - Imminent safety threat to rescuers and or casualty
 - If circumstance allow, consider applying a tourniquet prior to the rapid removal of the compressive load;
- If there is an acute deterioration that does not respond to medical treatment during a controlled release of the compressive load, consider a rapid extrication.

9. Patient Immobilisation and Packaging

- In consultation with the rescue technicians, consider the egress route as this will influence immobilisation and packaging methods;
- Repackage the patient as required during the extrication process (e.g., taking patient through a 90 degree bend; vertical lifting);
- Consider time implications of packaging with regard to rescuer safety and the patients clinical status;
- Maintain the security of airway devices during extrication;
- Maintain the security of intravenous access lines during extrication;
- Provide immobilisation as required by the patients clinical condition and as determined by the environmental constraints;
- Maintain spinal immobilisation as required, whenever possible, throughout the extrication process;
- Remove non-essential equipment prior to packaging and extrication;
- Ensure all members of the team involved with the extrication are monitoring the patient.