## 7 Prehospital Care

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## Introduction

Prehospital care of the ballistic casualty should be considered as two intertwined areas:

- 1. Management of the situation.
- 2. Management of the casualty.

Managing the situation involves understanding what is happening at the ballistic incident, who is in charge, the medic's role within this situation, and what medical advice and actions are appropriate.

Managing the injured casualty consists of first aid and advanced care *appropriate to the situation*.

## The Situation: Three Environments of Care

Medics who attend ballistic trauma will find themselves providing care in one of three environments: non-permissive, semipermissive, and permissive. This also has been described as Care Under Fire, Tactical Field Care, and Combat Casualty Evacuation Care.<sup>1,2</sup>

## The Non-Permissive Environment: Care Under Fire

This may occur when a tactically trained medic or medically trained member of an assault team is providing care. A non-permissive environment implies that either the medic or the casualty is under a direct threat. The risks may range from being inside a dangerous structure to being present during a shooting and under fire. It is not a place in which to deliver medical care. The aim is to extract the casualty in any way practicable without the medic becoming a casualty.

#### The Semi-permissive Environment: Tactical Field Care

This environment is not safe, but the direct threat is removed (albeit probably temporarily). Casualty and rescuer might be behind cover, but there is no guarantee the potential assailant or threat will not move and threaten them again.

# *The Permissive Environment: Combat Casualty Evacuation Care*

A permissive environment is a safe environment. In this area the medic should be highly visible and have access to the full range of equipment and resources carried by any prehospital-care practitioner. This does not mean that the medic should delay the casualty's move to hospital.

All three environments will exist around an incident and also can be related to areas of operational control (see Figure 7-1).

Care in these environments is considered later in the chapter.

Unprotected and untrained staff should not enter the inner cordon, which should be controlled by the police or military.

## The Prehospital Environment

#### Preparation

Preparing for the prehospital environment begins long before the call out.

Prehospital medical practitioners require proper training, the correct clothing and equipment, and an understanding of the environment in which they are working.

## Training

The type and level of training required depends on where you are working, for whom you are working, and why you are working there. An individual responding as part of civilian Emergency Medical Service (EMS) has different requirements to the medic working with a military group or police firearms team. A progressive training path is given in Appendix 7-3.

## Clothing

Dress with safety in mind—either to be seen or not to be seen, depending on the setting. Prehospital-care practitioners providing care in a permissive location should wear high-visibility clothing, jackets or tabards, trousers or



FIGURE 7-1. Zones of care. The non-permissive, semi-permissive, and permissive environments respectively translate to the so called Hot, Warm, and Cold zones around an incident. There is an approximate correlation with the command zones described in the Major Incident Medical Management and Support (MIMMS) course and manual (see ref. 3 and Appendix 7.3). Bronze describes tactical command at an incident and silver describes operational command. Gold or strategic command is some way distant to the incident. Bronze of MIMMS equates approximately to the Hot (non permissive) and Warm (semi permissive) zones, the areas inside the inner cordon. Silver of MIMMS equates to the Cold (permissive) zone between the inner and outer cordons. The permissive zone beyond the outer cordon is within the Gold area.

coveralls, and a helmet that is sufficiently robust and meets the safety specification for the job. The clothing also should conform to the dress codes of the organization being represented. Clothing should be marked clearly with the name and position/specialty of the practitioner, and at night, they should have reflectors and a torch, preferably a head torch. Guidance for BASICS (British Association for Immediate Care) Doctors on prehospital clothing can be found on the BASICS website (http://www.basics.org.uk).

Practitioners in the tactical environment should wear the same protective clothing as the tactical team. This should include, as a minimum, ballistic body armor and a ballistic helmet. This equipment is heavy and unwieldy, and practice is required to operate efficiently in it. Ballistic protection is considered in Chapter 4.

## Medical Equipment

This should be adequate for the task, but this needs to be balanced against the necessity to carry it. The practitioner working in a safe area has far more latitude than the practitioner working within a safety cordon. The tactical medic must balance utility with load and should carry as little as possible packed as small as possible. Suggested packing lists can be found in Appendix 7.2.

## The Prehospital Environment

#### Practice

The ballistic incident may range from an accident at a rural shooting ground to a siege and hostage situation. Each situation presents its own problems. What follows is a generic approach that can be adapted to circumstances.

#### Arriving at the Scene

On receipt of a request to attend an incident involving firearms, it is important to consider:

- who has made the request;
- who is in charge of the situation (usually police) If there is no police presence at the scene, it is prudent to confirm they will be attending.
- where you are to report [the incident control point (ICP)];
- the *type* of incident;
- routes in and out;
- the numbers of casualties involved;
- who else is attending.

The acronym METHANE (see Table 7-1) developed and taught by the Advanced Life Support Group (ALSG) in their Major Incident Medical Management and Support course<sup>3</sup> can be adapted to help remember the information that is required and provides a format for sending a situation report or reporting an incident. Major Incident Medical Management and Support is used by the UK military and is also being taught by a number of North Atlantic Treaty Organization (NATO) armies (T.J. Hodgetts, personal communication, November 2003).

#### Table 7-1. METHANE report.

From MIMMS Manual BMJ Books 2002. With permission of BMJ and Prof TJ Hodgetts

M-My name or name of person requesting assistance

E—Exact location of the incident

T-Type of incident

H—Hazards affecting the incident

A-Access routes to the Incident Control Point

N-Numbers of casualties and severity

E-Emergency services involved or required.

For a simple accident, it may just be a case of being taken to the casualty, ensuring scene safety (such as confirming where the weapon involved is), giving appropriate care, and arranging evacuation to hospital.

A more complex situation may require:

- a clear statement of your tasks;
- the commander's concept of how the operation will progress;
- current intelligence and any information on the numbers and locations of the threat;
- numbers of casualties, locations, and routes to and from them;
- other agencies present, such as police, fire, ambulance, and military;
- clothing and equipment required;
- who is escorting you around the incident;
- the location of support services in the event of a long operation (such as catering);
- signal commands being employed.

Finally, watches should be synchronized to the same time as the commanders (see Appendix 7.1).

#### Scene Assessment

The first rule of any prehospital-care incident is safety. This includes safety of the medic, other members of the emergency services, of the public, of the casualty, and of the scene. Every year, prehospital-care providers are injured or killed in both the civilian and military environments because of failing to follow this rule.

Prior to voluntarily entering the scene, the practitioner should understand the level of risk. If a casualty is seen to be lying on the ground, is it safe to approach? If the environment is non-permissive, then a value judgement should be made. The situation will not improve if the rescuer becomes a casualty. A casualty who has suffered a high-velocity head wound is unlikely to survive regardless of the level of care provided, and if the perpetrator were still at large, it would be foolhardy to enter the area. It may be possible to assess the casualty from a safe place, construct a secure approach, and ensure a successful outcome. Do not rush into an incident until after a proper assessment of risk has been made and heed advice from the experts.

## Non-permissive Environment

#### Treatment

This should be rapid and simple:

- A. consider turning the casualty to a recovery position or similar to prevent airway obstruction. Cervical spine (C spine) control is not going to be achieved in these circumstances.
- C. hemorrhage control by direct pressure or tourniquets.

Extract the casualty by whatever means is possible. This may mean physically dragging the casualty to cover.

## ABC or CAB?

ABC is "airway, breathing, and circulation", the accepted Advanced Trauma Life Support/Battlefield Advanced Trauma Life Support (ATLS/BATLS approach to trauma management.<sup>4,5</sup> CAB stands for "Catastrophic hemorrhage, Airway, and Breathing."

Potential survivors are most at risk of bleeding to death. "Catastrophic hemorrhage, Airway, and Breathing" requires one to deal rapidly with catastrophic or massive hemorrhage by applying pressure to the bleeding point (by kneeling on the wound or the application of a tourniquet) and then move onto airway care. A casualty with non-compressible hemorrhage needs surgical intervention and only the management of *life-threatening* airway and breathing problems should delay their transfer to surgery.

## Semi-permissive Environment

#### Treatment

Within tactical medical care, this is likely to be working within the police cordon. If the medic has to go forward into this area, an escort should be provided. The medic should be protected at all times while within the cordon by a suitably trained member of the incident team. This is most likely to be a police officer trained in the use of firearms. The officers' role is not to act as a drip stand or extra pair of hands, but to provide security.

The focus remains on getting the medic and casualty to safety, but if time is available, further care can be carried out:

- A. management of the airway using simple maneuvers and adjuncts such as nasopharyngeal airways. C spine control may be appropriate in a blunt injury, but not in a penetrating injury (see below);
- B. Asherman Chest Seals<sup>™</sup> if access to a sucking chest wound is possible; Possibly needle decompression of a tension pneumothorax (very difficult to assess in this location)
- C. continued hemorrhage control (dressings and tourniquets). Extracting the casualty: depends on potential threat. If the situation is volatile, then rapid extraction is needed.

## Cervical Spine Control?

Cervical spine immobilization is employed in the management of the blunt trauma casualty where clinical signs, symptoms, or the mechanism of injury lead one to suspect biomechanical instability in the cervical spine. The concern is that further movement will cause or aggravate a spinal cord injury.

In penetrating trauma, this approach has been reviewed for a number of reasons:

- Ballistic injury to the cervical spine has a very high fatality rate. Much of this is due to adjacent vascular structures being disrupted. Such wounds may or may not involve the spinal cord.<sup>6</sup>
- In the survivor, these wounds generally are accepted to be stable (see Chapter 16) and moving the casualty is unlikely to cause neurological injury.
- Placing collars and other immobilization devices in a non-permissive environment will have minimal benefit, cause evacuation delays, and the delays may endanger both casualty and rescuer.<sup>5,7</sup>
- A cervical collar may obscure developing life-threatening injuries such as a developing hematoma in the neck that can compromise the airway.<sup>8</sup>

In the military environment, c spine immobilization for penetrating injury to the neck is not advocated.

Where a penetrating injury has occurred along side a blunt injury (e.g., casualty shot in neck and falls off a roof), then immobilization is carried out for the blunt injury unless to do so would endanger both the casualty and the rescuer.

#### Permissive Environment

The practitioner can perform the assessments and treatments *appropriate to the casualty's condition*, as will be discussed below. The aim is not to delay definitive hospital treatment.

The decisions that need to be made are how quickly can the patient be transferred safely and by what means can this be achieved?

- Do nothing at the scene that cannot be carried out safely in transit, and
- do nothing in transit that would not be better carried out in a hospital.

Ballistic trauma is still relatively uncommon in most parts of the UK so it is important to guard against becoming overawed by the injury or the situation.

#### Do Not Forget the ABCs

#### ASSESS

A. Is the airway clear? If not, what must be done to secure it? Will a simple adjunct be sufficient, or must the patient have a definitive airway (surgical or endotracheal) to allow transfer?

B. What is required to improve respiration? Can any defect be closed with an Asherman Chest Seal<sup>TM</sup>? Does the patient now need chest drainage, or will a needle thoracostomy do? How much oxygen is available? Is evacuation by helicopter or other aircraft? Does this influence my decision on chest drainage?

C. Has all compressible hemorrhage been secured? Is there uncompressible hemorrhage that needs the attention of a surgeon? Does the patient now need intravenous (IV) access, or can it be secured in transit? Does the patient need fluids, and if so, is hypovolemic or normotensive resuscitation appropriate? (Fluid resuscitation is considered further in Chapter 8)

D. What neurological assessment of the patient is required? Does the patient need a Glasgow Coma Score (GCS) or is an AVPU Score sufficient? AVPU means "is the casualty Alert or responding to Voice or only responding **P**ain or Unresponsive? Is the patient's airway at risk because of neurological trauma and a decreased consciousness level?

E. Does the patient have any extremity trauma? Does the casualty need limb splintage or pelvic compression straps to improve survival? Can the patient be stabilized on the stretcher and evacuated, or is a traction splint needed first?

A secondary survey rarely is required in prehospital care unless time and location dictate it and it usually is achieved better in hospital.

#### Multiple Casualties

Triage of multiple casualties is considered in Chapter 26.

#### Evacuation and The Chain of Care

The prehospital practitioner should not see him or herself as acting in isolation, but as part of a team whose aim is to return the casualty to health. The aim is to do what is appropriate at each level to ensure safe movement onto the next, but not to perform procedures that are better done further down the chain of care.

Within the UK military environment this is described as "roles." Role 1 is care under the direction of a doctor (such as a Regimental Aid Post), Role 3 provides hospital-level care, and Role 4 is definitive care, usually provided away from the conflict, (e.g., the NHS and associated military facilities). Role 2 provides the link between Roles 1 and 3. A Role 2 facility with surgical teams attached is described as "Role 2+".<sup>9</sup>

Monitoring should be employed prior to or during evacuation. The minimal level of monitoring is a fully trained medic looking after the patient and who is capable of dealing with any unexpected emergencies that may occur.

The use of electronic monitors for pulse oximetry, electrocardiogram (ECG), and blood pressure will be dictated by availability and the situation. Prehospital monitoring used by London Helicopter Emergency Medical Service (HEMS) has been described by Morley.<sup>10</sup>

#### Packaging and Transfer

The default transport is a properly equipped and crewed emergency ambulance providing a rapid move to a suitable hospital.

At shooting incidents, military, police, and medical helicopters may be in attendance. When used correctly, helicopters can provide a rapid move to hospital, but a number of factors need to be considered.

An Emergency Air Ambulance or a police helicopter with dual police and ambulance tasking should be suitably crewed and equipped to care for and transport casualties. A police helicopter operating only in the police role or military helicopter not configured for casevac are unlikely to have the appropriate crew and equipment. That is not to say they cannot be used effectively if crew and equipment can be carried by them.

Not all hospitals have a helicopter landing site (HLS). Of those that do, few are suitable for night operations in the UK. A significant number are some distance away from the emergency department, and an additional ambulance journey may be required from the HLS to the hospital.

#### The Crime Scene

It is nearly always inevitable that, unless at war, a ballistic incident will be a crime scene. This will often apply in peace support and "post conflict" military operations. This has implications for the medic.

If the incident is to be investigated, it is incumbent on all involved to contaminate the scene as little as possible. The practitioner should not interfere with the scene unless it is an unavoidable part of the treatment of a casualty. The dead should not be moved unless it is to gain access to the living. If they are moved, this must be recorded. Artifacts, weapons, and shell casings should not be moved. The death should be confirmed by a doctor in the presence of a police officer. The medical practitioner's movements and role within the incident need to be documented. At the end of the incident, nobody should leave the scene without the permission of the incident commander. Forensics is considered further in Chapter 5.

## Summary

Ballistic trauma produces many problems for the prehospital practitioner. These are not just related to the injuries, but also to the hazards of the situation. Proper training, equipment, and clothing, coupled with an awareness of the dangers encountered and knowledge of how to act and react to the particular circumstances, should lead to the best possible outcome for the casualty and team. Understand the command structure of the incident, the roles and responsibilities of all involved, and the need of the police to investigate the scene. It is not a situation for the amateur, but for a committed and experienced individual who is properly trained. If such an incident is encountered unexpectedly then remember safety, situational awareness and risk assessment. Clinically do simple procedures well followed by timely transfer of the casualty to an appropriate hospital. Above all else remember individual safety.

#### Aide Memoire

Be prepared. Be familiar with equipment. Keep equipment up to date. Train regularly with supported service. Receive METHANE report. Arrive Safely. Receive orders. Non-permissive care: Clear airway. Control Hemorrhage. CAB. Semi-permissive care: Minimal care consistent with safety. Transfer as soon as possible. Permissive care: All you need to, nothing you do not. Rapid package and transfer by the most appropriate means.

## References

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- 9. The Organisation of Medical Support in Army Medical Services Core Doctrine. Principles. 2000, Crown Copyright.
- 10. Morley AP. Prehospital monitoring of trauma patients: Experience of a helicopter emergency medical service. *Br J Anaesthesia*. 1996;76:726–730.

#### *Further Reading*

Prehospital Care

1. Greaves I, Porter K, eds. *Pre-hospital medicine. The principles and practice of immediate care.* London: Arnold; 1999. ISBN 0340676566.

Field and Tactical Medical Care

- 2. McDevitt I. *Tactical Medicine: An Introduction to Law Enforcement Emergency Care*. Boulder, CO: Paladin Press; 2001. ISBN 1 581602553.
- 3. Care in the Field for Victims of Weapons of War. ICRC 2001. Available at: http://www.icrc.org.
- 4. Husum H, Gilbert M, Wisborg T. Save Lives, Save Limbs. Life Support for Victims of Mines, Wars and Accidents. Penang: Third World Network: 2000. ISBN 983 9747428.

## Appendix 7.1. Orders Process

The orders process: Information required by you or those working for you.

Ground Brief—a short description of the ground/terrain/environment in which you will be working.

Situation Report—Up-to-date information on what is happening, including the threat, casualties, and supporting assets.

Task—Your task specifically.

Execution of the Task—The commanders' concept of the operation, his intentions and plan, and your role within it. In addition, details of all the tasks delegated to individuals in the team and their place in the overall

plan. Finally, coordinating instructions, including timings, movement, and routes to be used.

- Support Information—Dress and equipment. The location and arrangements of facilities available for feeding, washing, sleeping, and personal hygiene during the task.
- Signals and Commands—Pre-arranged signals, their meanings, and the command structure.

The Time—Synchronize your watch with the commanders.

<b>Tactical Care Provider</b> : All you need and nothing you don't	<b>Pre-hospital Care Provider</b> : All you need (if you can carry and work with it).
Rucksack (small) Tactical Medical Vest (a waistcoat with multiple equipment pouches)	Rucksack (large)
Airway	Airway (with C spine control if needed
1. Oro/naso-pharyngeal airway	1. Oro/naso-pharyngeal airways
2. Surgical airway kit	<ol> <li>Surgical airway kit</li> <li>Self Inflating Bag-Valve-Mask set</li> <li>Advanced airway equipment eg: Laryngeal Mask, Laryngoscope, Endo-Tracheal Tubes, End-tidal CO2 detector.</li> <li>Cervical Collars</li> </ol>
Breathing:	Breathing:
1. Asherman Chest Seals <sup>™</sup>	1. Asherman Chest Seals <sup>TM</sup> ,
2. Large bore cannulae	2. Large bore cannulae
	3. Field Chest Drainage sets.
Circulation:	Circulation:
1. Tourniquets	1. Tourniquets
2. Dressings-Roller bandages,	2. Dressings: Roller bandages, Field
Field Dressings	Dressings
	3. Triangular bandages
	4. lape
	5. Intravenous cannulae

#### Appendix 7.2. Suggested Packing Lists

	<ul><li>6. Intravenous fluids and giving sets</li><li>7. pressure infuser</li><li>8. Interosseus access and infusion kits</li></ul>
<b>Drugs</b> 1. Opiate analgesic 2. Antiemetic	<ul> <li>Drugs <ol> <li>Opiate analgesic</li> <li>Antiemetic</li> <li>Benzodiazepine</li> <li>Primary care medications</li> </ol> </li> <li>Diagnostic: <ol> <li>Stethoscope,</li> <li>sphygmomanometer,</li> <li>Torch,</li> <li>Blood sugar testing set,</li> <li>Ophthalmoscope,</li> <li>Auroscope.</li> </ol> </li> </ul>
Dress: tactical: as per group being supported Torch if tactically appropriate	<b>Dress</b> : Helmet, High Visibility Jacket, over trousers, Safety Boots, Torch
	<b>Paed Kit:</b> Paediatric aidememoires, triage tapes and trauma kit
Packaging: straps, splints and stretchers to assist drag and rapid removal of casualty	Packaging (depending on nature of injury-blunt or penetrating) Spinal boards Head blocks Splints Extrication kit
Administration: Triage Cards Chem. lights (Multiple colours)	Administration: Triage cards, paperwork, reference manuals

## Appendix 7.3. Training

a. *Basic first aid*. Basic first aid as taught by British Red Cross, St. John Ambulance, and the Military gives the tools for initial casualty care with minimal resources. Basic first-aid courses can be accessed from local Red Cross and St. John training organizations.

b. *Specific prehospital training*. Progressive training and qualification in prehospital care is offered and overseen in the UK by the Faculty of Prehospital Care at the Royal College of Surgeons (RCS) of Edinburgh.

Training is delivered by organizations such as BASICS Education Ltd. An initial qualification is the RCS's Pre-Hospital Emergency Care Certificate. After this comes the Diploma in Immediate Medical Care (Dip IMC) and the Fellowship in Immediate Medical Care (FIMC). *Contact:* Faculty of Pre-Hospital Care, The Royal College of Surgeons of Edinburgh, Nicolson Street, Edinburgh EH8 9DW; e-mail: prehosp@rcsed.ac.uk; BASICS Education Ltd., Turret House, Turret Lane, Ipswich IP4 1DL; e-mail: educ@basics.org.uk.

c. For Major Incident Management Training: Major Incident Medical Management and Support Course (MIMMS). *Details from:* Advanced Life Support Group, http://www.alsg.org.

d. For working within the military environment, clinical courses such as Battlefield Advanced Trauma Life Support (BATLS) and Battlefield Advanced Resuscitation Training (BARTS) have been developed. These usually are offered only to the military, but the training manual *Battlefield Advanced Trauma Life Support* (2<sup>nd</sup> Edn 2000), D/AMD/113/23. AC No 63726 can be obtained from: Defense Storage and Distribution Center, Mwrwg Road, Llangennech, Llanelli, Carmathenshire SA14 8YP.

e. *Additional Training*. Additional tactical and field training is needed for individuals providing close medical support to police and military organizations. This needs to be geared around the likely operating environments of these organizations.