04
Pre-hospital

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04.a • Care on scene

Ambulance Service staff should apply JRCALC guidelines to major trauma patients.

Medical and enhanced care teams (ECT) should be guided by ATLS principles.

- All pre-hospital personnel must apply current best-evidence based care, which may at times supersede AACE (JRCALC) or ATLS guidance.
- Assessment and resuscitation may need to be performed concurrently.

Minimum monitoring standards

Every major trauma patient must have multimodality monitoring applied.

Continuously (recorded every 5 minutes)

- clinical assessment
- pulse oximetry (SpO_2)
- heart rate (ECG)
- respiratory rate
- end-tidal capnography (all patients with endotracheal tubes or supraglottic airway devices, whether breathing spontaneously or ventilated)

Every 5 minutes

- non-invasive blood pressure (NIBP)

Every 15 minutes

- pain score
- pupil size and reactivity

Catastrophic haemorrhage

- Significant bleeding should be controlled as soon as it is identified, even before management of the airway.

Airway and breathing support

- Apply pulse oximetry as soon as patient contact is made and continuously throughout the pre-hospital phase.
- Provide oxygen to all major trauma patients.
- Manage hypoxia assertively.

Airway support should be applied in a stepwise manner until an open airway is achieved.

- Airway manoeuvres should be used and adjuncts inserted if required.
- Endotracheal intubation without drugs should only be attempted if there is impending or actual cardiorespiratory arrest.

Enhanced care teams should consider the need for securing a definite airway in patients with an inability to protect or maintain an airway or who have a failure to oxygenate or ventilate.

Breathing assessment needs to be systematic and thorough looking for evidence of common traumatic injuries (front and back as needed).

Circulatory support

Adequate organ perfusion must be maintained in major trauma patients. However, the need to maintain organ perfusion must be balanced with the risk of exacerbation of bleeding and coagulopathy that may accompany normo- or hypertension. In the first instance intravenous fluids should be used to restore an adequate circulating volume. Boluses of 250mls (for adults) of crystalloid solution should be titrated to effect.

The following targets should be used for guidance (adults):

- traumatic brain injury – *systolic blood pressure >120mmHg*
- blunt traumatic injuries – *systolic blood pressure >80mmHg*
- penetrating traumatic injuries – *systolic blood pressure >60mmHg*

In the absence of a brain injury, hypotension should be tolerated if it is associated with a clear sensorium (alert and orientated). The presence of a brain injury requires a balance between maintaining cerebral perfusion pressure and not worsening bleeding. Boluses of fluid should be cautiously titrated to maintain adequate organ perfusion.

The use of inotropes and vasopressors may improve blood pressure but are associated with worsening outcomes. They should be used with great caution in patients who are no longer fluid responsive.

Haemorrhage control

- bleeding must be controlled assertively
  1. Direct pressure should be applied to open bleeding wounds.
  2. For bleeding limbs, consideration should be given to the use of tourniquets, to be applied just above the wound.
  3. Where direct pressure / tourniquets alone are unable to stop external bleeding haemostatic agents (eg. Celox™) should be applied.
  4. Limb fractures should be splinted (and tractioned, if appropriate) to limit the extent of concealed bleeding.

Tranexamic acid should be considered for all adult major trauma patients with proven or likely significant haemorrhage.

Where a patient is exsanguinating a request for immediate blood availability must be made at the time of the ATMISTER hospital pre-alert. Ask for '**massive blood loss**' activation.

Neurological assessment and support

- Vertebral column protection should be applied to all major trauma patients not meeting critera for clearance.

Initially this should be by manual in-line stabilisation of the complete (cervical, thoracic and lumber) spine. A cervical collar should be applied but should be loose fitting to minimise rises in intracranial pressure and further injury.

Assess neurological function:

- Glasgow Coma Score
- pupil size and reactivity
- limb power
- limb sensations (and highest normal dermatome if sensory level present).

04.a • Care on scene

A Glasgow Coma Score should be calculated, the motor component of which will be required for application of the trauma triage tool – a low motor score (4 or less) identifying likely major trauma.

Patients with brain injuries and altered levels of consciousness should have neuroprotective strategies commenced. Consideration should be given to the use of:

- anaesthesia (sedation and analgesia)
- mechanical ventilation (control of oxygenation and carbon dioxide)
- maintenance of adequate cerebral perfusion pressures (MAP > 90mmHg)
- optimise cerebral venous drainage (loose collars / ties, head up)
- hypertonic solutions

Burns

Patients with burns should be conveyed to the nearest emergency department (ED). Airway, breathing and circulatory support with analgesia should be provided en-route as necessary.

Pain

All major trauma patients should be provided with analgesia.

- Consider intravenous opioid analgesia for all patients.
- Splint fractured limbs.
- Entonox should be avoided in patients with chest injuries.
- Procedural sedation should be provided prior to performing painful procedures or manoeuvres (eg. limb splinting/extrication).
- Regional analgesia using nerve blocks may be useful, particularly for lower limb injuries.
- Consider pre-hospital anaesthesia for patients in severe pain for which systemic analgesia is unlikely to be adequate due to extent of injuries.

Enhanced care teams (ECT)

Enhanced care teams (ECT), consisting of a senior pre-hospital emergency medicine doctor and a critical care paramedic, are active within the region to provide advanced critical care interventions and clinical support.

- If a patient has sustained major trauma they should be conveyed according to the Trauma Triage Tool as rapidly as possible.
- ECTs can be requested by the attending crew via the Critical Care Desk in Ambulance Control on channel 202.
- Delays at scene whilst awaiting an ECT should be avoided.
- If necessary the attending crew should make progress towards the Trauma Unit (TU) / Major Trauma Centre (MTC), informing and updating the Critical Care Desk.

04.a • Care on scene

Patient packaging

Packaging should be seen as an integral part of patient management. Done correctly, appropriate packaging minimises spinal movement, splints fractures, provides pain relief, minimises clot disturbance and blood loss, and helps to prevent hypothermia. Its important that this is practised and performed so that delays are minimised on-scene.

Spinal Immobilisation

Patients should be assessed for an indication to immobilise the spine. The approved methods include:

- JRCALC 'Immobilise' algorithm

Where an indication exists the patient should be immobilised fully. The patient should have an appropriately sized cervical collar applied and be immobilised on an orthopaedic (scoop) stretcher. All multiply injured patients will have had clothing removed in order to facilitate a proper examination. This 'skin to scoop' approach is preferred for severely injured and unconscious patients. Patients should be secured to the scoop using at least three belt straps. Torso straps should be sufficiently loose to not impair ventilation.

Three-point immobilisation of the neck should be used – collar, blocks and head straps should be used to reduce neck movements.

The long (back) board should be used as an extrication device and only in exceptional circumstances used for immobilisation.

Access

Ensure good access to the following:

- Intravenous / intraosseus access sites
- Ventilator hosing and attachments
- Thoracostomy sites

Ensure monitoring cables are secure within the package to prevent snaring during transfer.

Splinting

Suspected fractures of limbs should be splinted as part of the packaging process. When a pelvic injury is suspected, a pelvic splint should be applied at the time of packaging to reduce the number of movements required. The aim is to reduce pain and blood loss in patients.

Preventing heat loss

Patients require adequate exposure to assess for and manage injuries. It is however essential that measures are taken to prevent heat loss in the pre-hospital environment. In the context of trauma, normal body temperature is aimed for (35.5 – 36.5°C)

The equipment available will vary though general principles and methods apply:

- Protect patient from the environment
- Expose the patient for the minimum time required to assess and instigate treatment then package to prevent heat loss as soon as is practicable.
- Ensure appropriate blanketing
- Record the patient's temperature
- If available use insulating blankets such as Blizzard Blanket
- In hypothermic patients use warming blankets (heat blanket) where available *avoiding direct contact with the patient's skin*

04.b • Trauma triage tool

Suspected major trauma?

Does injured patient meet **any** of the criteria below?

Physiology

Sustained respiratory rate below 10 or above 29?
(use JRCALC abnormal paediatric values for children)
Sustained systolic BP below 90 mmHg or absent radial pulses?
GCS motor score of 4 or less (withdrawal to pain or less)?

Anatomy

Open pneumothorax or flail chest?
Suspected major pelvic fracture?
More than one fractured proximal long bone?
Crushed, degloved, mangled or amputated limb?
Suspected open or depressed skull fracture?

YES

Inform **CCD *now*** **Channel 202** using **'Priority RTS'**

Can **Major Trauma Centre** be reached within 45 minutes?

NO

Consider requesting pre-hospital medical team

YES

Can airway, breathing and bleeding be controlled?

NO

YES

Go directly to nearest Major Trauma Centre

NO

Inform **CCD *now*** **Channel 202** using **'Priority RTS'** and proceed to nearest emergency department

Pre-alert MTC / ED
Call 0300 330 3999
Select Option 1
NCS will put you through to the unit

Go to nearest Trauma Unit

04.b • Trauma triage tool

Enhanced care teams (ECT)

The trauma triage tool will be followed by all enhanced care teams. Where a helicopter is used for patient transport, the 45 minutes applies to the total journey time from scene to the MTC emergency department. This includes all associated land ambulance transfers at either end.

If the enhanced care team feel there are good clinical grounds for taking the patient to the MTC but they are either not triggering the tool (anatomy or physiology) or are over 45 minutes journey time, they (or their consultant) should discuss decision-making early with the duty consultant at Network Co-ordination Service.

04.c • Pre-alerting the hospital

A	Age and sex
T	Time of incident
M	Mechanism
I	Injuries suspected
S	Signs (observations)
T	Treatment given
E	ETA
R	Requests – obstetric / cardiothoracic – massive blood loss – right turn resuscitation

The pre-alert should be given by calling Trauma Network Co-ordination Service and using the ATMISTER mnemonic.

It should take only 30 seconds to give an ATMISTER.

It should be also used at handover to the trauma team in the ED unless:

- CPR is in progress
- immediate airway problem
- catastrophic haemorrhage

in which case clinical care must proceed immediately to address the problem.

References

Trauma: Who Cares? (NCEPOD, 2007)

Regional Networks for Major Trauma (NHS Clinical Advisory Groups Report, 2010)

UK Ambulance Service Clinical Practice Guidelines, (Joint Royal College Ambulance Liaison Committee, 2006)

Advanced Trauma Life Support (American College of Surgeons)