

Clinical Practice Guideline 10:

Exposure

Version	1.0	
Date	January 2021	
Author	Rob Barclay	Emergency Medicine Consultant SEHSCT / NIHEMS
Reviewer	Gareth Hampton	Clinical Director Emergency Medicine, SHSCT
Approved by	NIMTN Clinical Advisory Group	
Review date	Month 2024	

KEY MESSAGES

- Adequate exposure is essential for complete patient assessment and management in trauma.
- Exposure and packaging should be sequenced to reduce unnecessary movement where possible.
- Hypothermia should be considered in trauma patients and steps taken to maintain temperature or warm the patient.
- Minimise handling in severely hypothermic patients.
- Cardiac arrest in hypothermia requires modifications to standard resuscitation protocols.

NIMTN Clinical Practice Guidelines are intended to inform standardised, best-practice care for injured patients across Northern Ireland. Although they are based on up to date evidence at the time of writing, readers should note that it remains the responsibility of individual clinicians to make final decisions regarding the most appropriate treatment for specific patients in their care.

Prehospital practitioners employed by Northern Ireland Ambulance Service (including those involved in specialist teams such as HEMS and HART) may find these guidelines informative but should continue to follow guidance contained within JRCALC, NIAS and HEMS guidelines and SOPs.

Related Guidelines

[CPG 4: The Primary Survey](#)

[CPG 17: The Secondary Survey](#)

Importance of appropriate clothing removal

Full head to toe exposure is essential for complete patient assessment and management in trauma. It allows more accurate identification of injury pattern, better access to the patient to instigate interventions, reduces artefact in imaging and can be vital to reduce iatrogenic complications like pressure sores. Exposure should ideally take place at the time of packaging in the prehospital environment. There will be times where this is not possible due to the time critical nature of injuries already identified, perceived risks of further injury to the patient or staff, or concerns about environmental factors like hypothermia. If clothing removal has not occurred by the time of arrival to the Emergency Department it should be timed to coincide with other factors in the assessment in such a way that movement of the patient is minimised e.g. at the time of scooping from a vacuum mattress.

Top to Toe examination

A systematic search must be made to identify, triage and treat all injuries, as those missed can have long term implications for the patient. Time critical injuries should be identified and managed in the primary survey. Following this, a secondary survey should also be performed and relevant investigations ordered where required. If this is not carried out due to time critical treatment requirements, this must be noted and handed over to the inpatient team. Most missed injuries are the result of unperformed or incomplete surveys. In order to avoid this phenomenon, a survey checklist and standardised documentation is recommended. See also [CPG 17: The Secondary Survey](#).

Log roll

Patients with suspected spinal injury should have their body position maintained in a neutral posture. Movements to assess the patient's back, remove clothing and place splints are likely to require a log roll to limit unwanted spinal movement. The log roll should be carried out in a coordinated fashion under the control and direction of the person controlling the patient's head. In order to minimise disruption of clot in haemodynamically unstable patients the manoeuvre should be carried out sparingly. All required examinations and interventions should be coordinated to remove the need for further log rolls. The findings of the exam on log roll should be documented carefully and handed over accordingly. If a log roll is not carried out this must also be documented and handed over.

Splintage and packaging

The correct placement of splints is important for both pain control and to reduce ongoing haemorrhage. This should generally be carried out after adequate removal of clothing to prevent failure of splinting or complications such as pressure sores. Neurovascular status should be monitored and recorded after splinting. Patients with suspected spinal injury should be transported in a vacuum mattress with appropriate cervical spine immobilisation. A scoop stretcher may be used for very short transfers where time does not allow for vacuum mattress usage.

Importance of temperature control

Hypothermia should be avoided. A drop in core body temperature can occur for a variety of reasons. In the trauma patient it may be as a direct consequence of injury and haemorrhage, as a result of prolonged exposure to a cold environment, or as a result of medical therapy like transfusion of blood products or cold crystalloid fluids.

Hypothermia contributes to trauma induced coagulopathy, and worsens outcome for trauma patients. It also contributes to discomfort, pain and anxiety felt by the patient.

In order to limit hypothermia it may be reasonable to delay full exposure of the patient until the environment is suitable. Once a patient has been exposed and assessment completed, measures should be taken to limit the development of hypothermia. This may be achieved by active or passive methods.

Particular care should be taken with anaesthetised patients who will be more prone to hypothermia, having been deprived of many of their natural compensatory mechanisms.

Management of hypothermia

Patients may also develop hypothermia as a primary concern. Hypothermia is defined as a core body temperature below 35°C and can be classified and characterised as follows;

- Mild: 32-35°C. Patient is alert. Shivering. Looks and feels cold. Tachycardia
- Moderate: 28-32°C. May become drowsy or confused, withdrawn. Movements uncoordinated. Shivering stops. Bradycardia, hypotension and atrial fibrillation are common.
- Severe: < 28°C. Unresponsive, fixed dilated pupils, areflexia, profound bradycardia and hypotension. Signs of life may be very difficult to detect.

Swiss staging system:

- I – clearly conscious and shivering
- II – impaired consciousness without shivering
- III – unconscious
- IV – not breathing
- V – death due to irreversible hypothermia

Careful handling is important in severe hypothermia where movement may precipitate arrhythmia or cardiac arrest. Where possible consider placing defibrillator pads before moving. Maintain horizontal positioning and minimise movements.

Packaging is an important factor in preventing hypothermia in pre hospital care. Removal of wet clothing, use of blankets, foil, and heating pads may all prevent worsening hypothermia. If wet clothes cannot be easily removed a vapour barrier using blankets and foil should be used.

Ensure blood glucose levels are checked early and throughout transfer.

On admission, the patient's temperature should be noted and measures instituted to warm the patient if the body temperature is low. Continuous temperature monitoring is essential to ensure that mild hypothermia does not worsen. Specific measures to prevent and correct mild hypothermia include controlling physical exposure, administration of warmed fluids, and passive rewarming with blankets and forced-air devices. In the case of moderate or severe hypothermia and coagulopathy, central rewarming may be needed.

Hypothermic cardiac arrest

Cardiac arrest in the setting of hypothermia requires modification of the standard cardiac arrest algorithm. These modifications are summarised below.

- Assess core temperature with a low reading thermometer; tympanic in spontaneously breathing, oesophageal (distal) in patients with a tracheal tube or a supraglottic device with an oesophageal channel in place.
- Check for the presence of vital signs for up to one minute.
- Hypothermic patients with risk factors for imminent cardiac arrest (i.e. core temperature < 28°C, ventricular arrhythmia, systolic blood pressure < 90 mmHg) and those in cardiac arrest should ideally be directly transferred to an extracorporeal life support (ECLS) centre for rewarming. At time of writing, this service is not routinely available in Northern Ireland.
- Hypothermic cardiac arrest patients should receive continuous CPR during transfer.
- Chest compression and ventilation rate should not differ to CPR in normothermic patients.
- Consider the use of a mechanical chest compression device if prolonged CPR is needed.
- If ventricular fibrillation (VF) persists after three shocks, delay further attempts until the core temperature is > 30°C.
- Withhold adrenaline and amiodarone if the core temperature is < 30°C.
- Increase administration intervals for adrenaline to 6-10 minutes (i.e. after every FOUR 2-minute CPR cycles) while the core temperature is 30-34°C.
- Senior Emergency Department or Intensive Care clinicians may consider discussion with quaternary referral services capable of ECLS in suitable patients.
- Non-ECLS rewarming should be initiated if an ECLS centre cannot be reached within hours (e.g. 6 hours). In Northern Ireland, initiation of non-ECLS rewarming strategies will almost always be indicated.

Summary

In summary, adequate exposure is essential to best identify and manage traumatic injury. Carefully sequencing this with consideration to the patient and their environment along with appropriate packaging should ensure the patient is transferred to hospital in the best possible condition. Standardised systematic examination and documentation help to limit missed injuries which may have long term impacts on a patient.

Healthcare workers should be mindful of hypothermia in trauma patients, either as a primary aetiology, as a product of trauma physiology, or as a consequence of treatment. This should be identified by regular monitoring of temperature and corrected wherever possible.

References

- S Stawacki, D Lindsay. Missed Traumatic injuries: A synopsis. International Journal of academic medicine. 2017;3;s15-23
- Forrest M, Lax P. Advanced Trauma and Critical Care Manual. 2014; 36-38
- Nice Guideline. Major Trauma: assessment and initial management. 2016;23-24
- Nice Guideline. Spinal injury: assessment and initial management. 2016
- Kornblith L, Moore H et al. Trauma-Induced coagulopathy: The past, present and future. Journal of Thrombosis and Haemostasis. 2019;17:852-862
- Moffatt, S. Hypothermia in trauma. Emergency Medical Journal. 2013;30:989-996
- Wray J, Bridwell R et al. The diamond of death: Hypocalcaemia in trauma and resuscitation. American Journal of Emergency Medicine. 2021;41:104-109
- Brown D, Brugger H et al. Accidental Hypothermia. New England Journal of Emergency Medicine. 2012;267:1930-1938
- Dow J, Giesbrecht G et al. Wilderness Medical Society Clinical Practice Guidelines for the Out-of-Hospital Evaluation and Treatment of Accidental Hypothermia. Wilderness and Environmental Medicine. 2019;30:S47-S69
- Truhlar A, Deakin C et al. European Resuscitation Council Guidelines for resuscitation 2015 Section 4. Cardiac arrest in special circumstances. Resuscitation. 2015; 95; 148-201
- Deakin C, Soar J et al. Special circumstances Guidelines. Resuscitation Council UK. 2021