

## Paediatric Major Trauma (Adapted from Network) Guideline - Derby only - Full Clinical Guideline

Reference no.: CH CLINC C53 CED

### Introduction

Derby is a Trauma Unit rather than a Major Trauma Centre and children fulfilling criteria for major trauma should be diverted pre-hospital to the local MTC (usually QMC). However some patients fitting criteria may still arrive in Derby; those with life-threatening injuries requiring stabilisation before transfer, children fulfilling major trauma criteria that hasn't been recognised, children may deteriorate or injuries become apparent on arrival or may self-present and found on triage to meet MTC criteria (upto 50%).

Using a structured approach to trauma has been demonstrated to reduce early and delayed deaths from trauma in adult and paediatric populations.

### Aim and Purpose

This guideline is based upon the East Midlands Major Trauma Centre Guideline (2022) which is a network guideline intended to be used within the wider trauma network. The Guideline has been adapted for use within University Hospital Derby & Burton where the Royal Derby Hospital is a designated trauma unit. There are separate guidelines referring to specific injuries which are referenced within this document.

These guidelines were originally collated in 2010, were significantly updated in 2020 and have been further revised in 2022. They are for use within Nottingham University Hospitals NHS Trust and the wider East Midlands Major Trauma Network. Responsibility for use outside the network must be taken by those implementing the guidelines.

Regarding the MTC guidance contact: [David.Smith@nuh.nhs.uk](mailto:David.Smith@nuh.nhs.uk)

### Keywords

Major trauma, MTC, Major Haemorrhage, primary survey, secondary survey, paediatric transfer, knife wounds, tetanus, abdominal trauma, head trauma, spinal trauma, pelvic trauma, drowning, thoracotomy

### Network Major Trauma Guideline

## Contents

Introduction.....	1
Aim and Purpose.....	1
Definitions, Keywords.....	1
Network Major Trauma Guideline.....	1
Key Contacts.....	3
Paediatric Trauma Call Triage Criteria.....	4
The Paediatric Trauma Team.....	7
The Pre-Alert.....	7
Paediatric Major Trauma Checklist.....	9
Pre Arrival.....	10
On Arrival Handover.....	11
The Primary Survey.....	12
The Secondary Survey.....	14
The Tertiary Survey.....	<b>Error! Bookmark not defined.</b>
Imaging – <i>Key messages</i> .....	15
General rules.....	15
Site Specific Rules.....	16
Paediatric Major Trauma Imaging Decision Tool.....	<b>Error! Bookmark not defined.</b>
Paediatric Trauma Transfers.....	19
Transfer Flowchart for Trauma Units.....	20
Children and Young Person’s Safeguarding.....	21
Reporting Knife Wounds/Police Attendance.....	22
References.....	24
Documentation Controls.....	25
Appendices.....	26
Normal observation values.....	26
Injury Severity Score.....	26
Glasgow Coma Scale.....	27
Paediatric Major Trauma – Checklist.....	29

## Key Contacts (Derby)

### Adult Emergency Department Derby

- Resus: 87691
- Nursing/Doctors Station: 86808/87694

### Radiology

- Emergency Xray: 83223
- On Call SPR: Via Switch

### Anaesthetics

- 3<sup>rd</sup> on (Senior SpR): mobile number on whiteboard in resus

### Blood Transfusion

- Major Haemorrhage Protocol: 2222
- Blood bank: 88532
- Haematology SpR/Consultant on call: via Switchboard

Theatre Coordinator: 07500 976508

Children's Hospital Bleep Holder: 6516 (bleep)

ENT: 3200 (SHO) (bleep)

### Major Trauma (QMC)

- QMC Switchboard: 0115 9691122
- Consultant: via Switchboard
- Fellow: 07812277336
- Case Managers (0800-2000): 07595284854
- QMC Switchboard 0115 9691122
- Cardiothoracics: QMC via Switchboard
- Neurosurgery; QMC via Switchboard
- Burns and Plastic: QMC Via Switchboard

### Paediatric Surgery (QMC)

- Consultant: via Switchboard
- Nottingham Paediatric Surgery SpR: 07812268916
- Surgical SPR Derby:
  - 08:00 to 20:00: 07887451533
  - 20:00 to 08:00 07385343651

## Derby Trauma Guidelines

Derby Trauma Guidelines can be viewed on Koha. The following guidance may also be helpful

1. Major Trauma Quick Guide
2. Major Haemorrhage
3. Major Injuries Guideline
4. Skeletal Trauma
5. C-Spine Injuries (adults and children)
6. Head Injuries
7. Time Critical Transfers
8. Burns and Scalds
9. Tetanus (adults and children)

## Paediatric Trauma Call Triage Criteria

A trauma call should be put out when it is identified that a child who is due to arrive or has arrived in the department may be suffering significant injuries as a result of trauma. Major trauma that is identified at scene should be diverted pre hospital to the nearest MTC (usually QMC). However we know from TARN data that over 50% of paediatric trauma is brought in by parents and thus the trauma team may need to be activated post arrival and transfer arranged as required.

Follow the guidelines for activation of trauma calls and **never worry** about calling a trauma call when the child later is found to have no major injury; the team can be stood down quickly once the patient has been assessed. Trauma patients are complex and by definition will involve multidisciplinary teams. Emergency trauma management will follow well defined principles and will not be confined to any one specialty. The factors most commonly causing clinical problems are late decision making and lack of effective communication within and between teams.

Particular attention needs to be paid to full documentation of decisions, interventions and times. The role of the scribe is pivotal to good documentation. Ensure you feedback any significant issues to the Trauma Team Leader to enable assessments, and changes to practice, to be made.

Within the local MTC a tiered trauma response has been introduced – however due to the relative rarity of paediatric trauma within University Hospitals Derby and Burton, a single level trauma call is made. **In the case of traumatic cardiac arrest both a trauma call and paediatric emergency call should be put out via 2222.**

**Trauma team activation is via 2222** (Paediatric Trauma Call) and may be initiated:

- Pre-alert trauma call via EMAS
- Pre-alert by ED/CED based on pre-alert information
- No pre-alert – on arrival
- No Pre-alert – during assessment

**Triggers – in a child presenting with injury and the following**

<b>Physiological</b>	<b>Anatomical</b>	<b>Mechanism</b>	<b>Discretionary</b>
<ul style="list-style-type: none"> <li>• Airway Compromise</li> <li>• Hypovolaemia</li> <li>• GCS &lt; 13</li> <li>• Traumatic cardiac arrest</li> <li>• Hypotension</li> </ul>	<ul style="list-style-type: none"> <li>• Penetrating torso, neck or groin trauma</li> <li>• Flail chest</li> <li>• 2 or more long bone fractures</li> <li>• Suspected Pelvic Fracture</li> <li>• Significant abdominal injury (bruising or penetration)</li> <li>• Spinal Cord Injury</li> <li>• Significant Burns (&gt;10% BSA, facial or</li> </ul>	<ul style="list-style-type: none"> <li>• Fall &gt; 2 x height or &gt; 2m</li> <li>• Death of other occupant in RTC</li> <li>• Vehicle intrusion</li> <li>• Ejection from vehicle</li> </ul>	<ul style="list-style-type: none"> <li>• Senior clinical opinion</li> <li>• Multiple trauma victims</li> <li>• If in doubt</li> </ul>

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## The Paediatric Trauma Team

The trauma team is comprised of the:

- Trauma Team Leader – CED Consultant or Senior Decision Maker
- CED/ED/Paediatrics Doctors x 2
- CED Nurse x 2
- Anaesthetist & ODP
- Scribe
- Orthopaedic Doctor
- Trauma Case Manager

Often a senior clinician (registrar or consultant) from A&E can also attend to support. There is always a senior clinician in the Adult Resus who can be accessed for immediate support if required.

Further specific expertise can be sort via switchboard e.g ENT, Maxillofacial surgeons General Surgeon.

Cardiothoracic, neurosurgical and Burns/Plastics support is from regional centre (Nottingham)

## The Pre-Alert

Injured children who are brought in by ambulance may have a pre-alert call made by the prehospital team. These calls come to Resus and a pre-alert form is brought to CED. The receiving clinician should record as much information as possible, including anticipated time of arrival. The ATMIST mnemonic (Below) should be used.

In some cases the condition of the patient changes after the pre-alert but prior to arrival. Prehospital teams may call back to update with the latest information.

For cases where the transfer time is expected to be long (eg >20 minutes), it is helpful to put out the trauma call as a “standby” call with the anticipated time to arrival declared when calling Switchboard on 2222. **The full trauma call should then be put out at least 5 minutes prior to expected arrival of the patient.**

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A: Age

T: Time of incident

M: Mechanism

I: Injuries suspected

S: Signs

T: Treatment given

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## Paediatric Major Trauma Checklist

<b>P</b>	<b>Prepare</b>	<ul style="list-style-type: none"> <li>• Call Trauma team / Major Haemorrhage Protocol (MHP)</li> <li>• Bair hugger / Warmer / Rapid infuser</li> <li>• Clingfilm for burns</li> <li>• Splints, pelvic binder, tourniquet</li> <li>• Headbox for RSI, difficult airway trolley</li> </ul>
<b>T</b>	<b>Tranexamic Acid</b>	<ul style="list-style-type: none"> <li>• If not administered already</li> <li>• 30mg/kg bolus (max 2g)</li> </ul> (To be given within the first 3 hours following injury)
<b>R</b>	<b>Resuscitation</b>	<ul style="list-style-type: none"> <li>• Consider the activation of MHP</li> <li>• Fluid warmer (if older, consider rapid infuser)</li> <li>• Cell salvage</li> <li>• No hypotensive resuscitation (unless post pubertal)</li> <li>• Pelvic binder/splint fractures/tourniquet</li> <li>• Limit crystalloid and colloid use</li> </ul>
<b>A</b>	<b>Avoid Hypothermia</b>	<ul style="list-style-type: none"> <li>• Target temperature &gt;36 degrees Celsius</li> <li>• Remove wet clothing and sheets</li> <li>• Warm fluids</li> <li>• Warming blanket/mattress/Bair hugger</li> </ul>
<b>U</b>	<b>Unstable? Damage control surgery</b>	<ul style="list-style-type: none"> <li>• If unstable, coagulopathic, hypothermic or acidotic, consider damage control surgery</li> <li>• Aim surgery time &lt;90 minutes</li> <li>• Haemorrhage control, decompression, decontamination and splintage</li> </ul>
<b>M</b>	<b>Metabolic</b>	<ul style="list-style-type: none"> <li>• Avoid acidosis</li> <li>• Base excess guides resuscitation</li> <li>• If lactate &lt;5mmol/litre or rising, consider stopping surgery, splint and transfer to PICU</li> <li>• Monitor blood glucose</li> </ul>
<b>A</b>	<b>Avoid Vasoconstrictors</b>	<ul style="list-style-type: none"> <li>• Inappropriate use of vasoconstrictors doubles mortality</li> <li>• However, use may be required in cases of spinal cord or traumatic brain injury</li> </ul>
<b>T</b>	<b>Test Clotting</b>	<ul style="list-style-type: none"> <li>• Check clotting every 15ml PRBC/kg Body weight</li> <li>• Aim platelets &gt;75 x 10/litre</li> <li>• Aim INR &amp; APTTr ≤ 1.5</li> <li>• Aim fibrinogen &gt; 1.5g/litre</li> </ul>
<b>I</b>	<b>Imaging</b>	<ul style="list-style-type: none"> <li>• Consider:</li> <li>• Local guidelines for paediatric trauma</li> <li>• Does this child need imaging at all?</li> <li>• If imaging is required which anatomical area(s) need to be covered?</li> </ul>

<b>C</b>	<b>Calcium</b>	<ul style="list-style-type: none"> <li>• Maintain ionised Calcium &gt; 1.0 mmol/litre</li> <li>• Administer 0.2ml/kg 10% Calcium Gluconate over 10 minutes as required (Maximum 2g/20ml)</li> <li>• 0.11 mmol/kg is equivalent to 0.5 mL/kg of calcium gluconate 10%</li> <li>• Give Calcium routinely with massive transfusion.</li> </ul>
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Adapted from: ETC Manual, Figure 11.2: Massive Haemorrhage protocol for children (Copyright ©: L May, A Kelly, M Wyse, K Thies, T Newton)

## Pre Arrival

All team members should sign in on arrival and introduce themselves to the team leader. It is helpful to use the labels provided to identify roles, names can be added to these.

A team member should complete the pre-alert board and the age/weight based trauma drug/fluid/device calculations as per the checklist.

The team leader briefs the team on:

- Mechanism of injury
- Injuries anticipated
- Possible need for interventions/intubation based on prehospital information
- Likely destination

Roles are then assigned to team members by the team leader:

- Airway assessment and management – typically Anaesthetist and ODP
- Primary survey clinician
- IV access and blood taking
- Medications and fluids
- Monitoring and observations
- Interventional procedures (eg who will insert a chest drain if needed)
- Secondary survey
- Scribe/Timer
- Parent support

The team leader should also ensure that

- Any specialty or senior support anticipated to be required have been contacted
- Equipment is available eg blocks, tape, pelvic binder, blankets, Bair-hugger, transfer monitor, Belmont rapid infuser (if indicated)
- Patient is pre-booked in and major haemorrhage protocol is activated in advance of arrival if massive blood loss is suspected
- CT radiographer and radiologist are alerted for children suspected to have major injury requiring rapid scan (eg major traumatic brain injury), so that the scanner can be kept clear
- The PTRAUMATIC checklist (above) is considered

## On Arrival Handover

The patient is brought in to the bay by the prehospital team. The team leader and prehospital team should decide whether the child should remain on the ambulance trolley for a critical intervention before transfer to MTC or transferred to CED trolley immediately. If the patient is stable enough, it is ideal to hold a “hands off” handover. This allows all team members to stop and listen to the handover information. If there is immediately necessary treatment (eg ongoing CPR), then the team should immediately provide care and perform a primary survey whilst the handover takes place. The decision between a “hands on” or “hands off” handover should be made by the team leader in conjunction with the lead prehospital clinician.

The handover should be brief and follow the ATMIST guide above. The AMPLE mnemonic (below) provides a useful secondary history and should be included when possible. All team members are given the opportunity to ask any further questions of the prehospital team, though these should be brief and focussed. The scribe will often need to speak to the handing over clinician in more detail afterwards to ensure all essential information is clearly documented.

Family members may have arrived with the patient. If possible, it should be facilitated for at least one relative to stay with the patient, they will need continuous support from a staff member.

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A: Allergies

M: Medications

P: Past Medical History

L: Last Meal

E: Events leading to incident, including  
any safeguarding concerns

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## The Primary Survey

This should commence immediately after the prehospital handover (or earlier if the team leader has directed a “hands on” handover). Findings should be relayed clearly and loudly to the team leader and so that the whole team can hear. If the patient is awake, speak to them, tell them what you are doing and provide reassurance as much as possible.

This assessment aims to identify immediately life threatening injuries and to help in the decisions regarding whether or not, and what, imaging might be necessary. It should take no more than 2 minutes.

### C Catastrophic haemorrhage

Look for catastrophic external haemorrhage – apply pressure +/- haemostatic dressing +/- tourniquet

### A Airway with C-spine protection

Assess the airway for signs of obstruction

Consider the need for airway interventions

Give high flow oxygen

Try to remove any collars and maintain cervical spine protection with blocks and tape only. If the child will not tolerate this, consider manual in line stabilisation. If this is also not tolerated, it is safer to allow the child to move than to try to force spinal immobilisation.

For some mechanisms of injury, cervical spine protection may not be required at all (eg stabbing with no history or evidence of other assault/fall etc). Consider the context and appropriateness of all interventions.

### B Breathing

Examine the chest for signs of bruising, abrasions or abnormal chest wall movement

Palpate for chest expansion, tenderness and subcutaneous emphysema

Auscultate all zones of the chest anteriorly and laterally, and listen to the percussion note

Monitor oxygen saturations and respiratory rate

Immediate intervention should be considered depending on the findings

- Early airway support may be required
- Open pneumothorax – apply occlusive dressing secured on three sides and prepare to insert chest drain
- Tension pneumothorax – decompress chest by needle or thoracostomy and prepare to insert chest drain
- Massive haemothorax – support circulation and prepare to insert chest drain
- Flail chest – requires good, early analgesia

## C Circulation with haemorrhage control

Activate major haemorrhage protocol if child is haemodynamically unstable (see MHP guideline)

Assess pulse for rate and quality

Monitor heart rate and blood pressure ([see appendix for normal values](#))

Check skin colour and capillary refill time

Check for signs of occult blood loss in chest, abdomen, pelvis or long bones

Apply pelvic binder if any signs to suggest pelvic injury or if child is unstable

Remember that scalp wounds can bleed significantly and may not be immediately obvious

Obtain IV access – if child is unstable, insert two large bore cannulae

IO access may be needed if unable to obtain rapid access

Take blood for FBC, U&E, LFT, Amylase, Clotting, G&S or crossmatch and venous gas

Give tranexamic acid if concerns regarding active bleeding, injury was within 3 hours, and child has not already received TXA pre-hospital (see major haemorrhage guideline)

## D Disability

Assess conscious level using modified [GCS](#)

Check pupil size and reaction to light

Observe for lateralising signs or possible spinal cord injury

## E Exposure

Check temperature

Provide warming blankets and/or bair hugger warming as appropriate

Rapid surface examination for obvious injuries then replace blankets

**It may be appropriate at this stage if the child is trauma centre triage positive with obvious injuries requiring treatment at a MTC to perform life-saving interventions and then redirect via a 999 EMAS ambulance to QMC. This does not need to wait for imaging and does not require permission from MTC. (Although they do require informing. Please see time critical transfer guideline for more details)**

## The Secondary Survey

This should be performed once the primary survey has concluded and all interventions needed to secure airway, ventilator and circulatory stability have been completed. This may be before or after any necessary CT imaging, depending on the situation and at the discretion of the team leader. If the patient is being transferred this should not be delayed for a secondary survey. This will be performed at MTC.

The secondary survey should usually be performed by the Orthopaedic surgeon if present.

Occasionally, for children deemed unlikely to have significant injuries following their primary survey, but who are too distressed or uncooperative to perform a valuable secondary survey while still in resus, it may be more appropriate to step them down and allow a period of observation and time to calm after the stress of a trauma call before a secondary survey is attempted. It should however, be completed before the patient leaves the department.

**In CYP requiring immediate transfer to MTC or theatre following primary survey and stabilisation the secondary survey may not have been completed prior to transfer.** In these cases, there should be a clear documentation and handover that the child will need a secondary survey post op or on arrival to MTC.

The secondary survey is a thorough head to toe examination to identify injuries not already found during the primary survey. This assessment guides the need for further investigation (eg limb xrays), need for further specialist input, and treatment.

Areas to be assessed include:

- Head, scalp
- Face including eyes, ears, nose, mouth
- Neck
- Chest
- Abdomen
- Pelvis and perineum
- Back and spine (may require log roll if spinal precautions are necessary)
- Full extent of all limbs
- Neurological examination including cranial and peripheral nerve function

## Imaging – Key messages

**Does this child need imaging at all?**

**If imaging is required, which anatomical area(s) need to be covered?(see following table)**

**Unlike in adult trauma there is a very high threshold for a ‘PAN-CT’ – specific injuries should be assessed for in primary survey and specific body parts imaged as per clinical findings**

### General rules

Exposure to ionising radiation should be minimised and the “as low as reasonably achievable” (ALARA) principles adhered to. The routine use of adult trauma protocols is inappropriate in most children, who typically sustain different patterns of injury and have a far greater lifetime risk of radiation associated morbidity than adults.

Injury patterns in children are more commonly isolated to a body region rather than multiple sites. Appropriate clinical examination should be undertaken before any imaging is requested.

The value of a normal x-ray must not be underestimated. Discuss with a senior radiologist if any doubt about x-ray findings.

There is no role for ultrasound outside of assisting in interventional procedures. FAST scan **should not be performed** and especially should not delay transfer to CT, if imaging is indicated.

Transfer to the CT scanner should be facilitated rapidly once the decision to scan has been made. Children should be transferred using the adult trauma mattress if >40kg, particularly if there are concerns about pelvic or spinal injuries. For smaller children employ pragmatism to ensure minimal movement of the spine as possible. This will probably involve transferring on the scoop. The trauma team should accompany the patient to the scanner, continue trauma resuscitation as required, and await a hot report by the on call radiology registrar to identify any immediately life threatening injuries. The provisional reports should then be available within the next 30 minutes. Formal reports by the Consultant radiologist should always be checked, these are often rapidly available, but occasionally may need to be checked the next day.

Local guidance is distilled from the comprehensive Royal College of Radiologists guideline, available at: <https://www.rcr.ac.uk/publication/paediatric-trauma-protocols> and NICE guidelines, available at: <https://www.nice.org.uk/guidance/cg176>

## Site Specific Rules

<b>Head</b>	<p>Isolated head injuries are common in children A child who requires a CT head does not necessarily need imaging of C-spine or any other body part</p> <p>Indications for CT Head within 1 hour (under 16 )are as per NICE Guidelines (2023):</p> <ul style="list-style-type: none"> <li>• Suspicion of NAI.</li> <li>• Post-traumatic seizure - no history of epilepsy.</li> <li>• GCS &lt; 14, (&lt; 1 yr GCS &lt;15) in the ED</li> <li>• GCS &lt;15 2 hours after the injury</li> <li>• Suspected open/ depressed skull injury/basal skull injury/ tense fontanelle</li> <li>• Focal neurological deficit</li> <li>• &lt;1 year, head bruise, swelling or lacerations of &gt; 5 cm</li> <li>• TWO OR MORE of:             <ul style="list-style-type: none"> <li>○ Witnessed loss of consciousness &gt; 5min</li> <li>○ Abnormal drowsiness,</li> <li>○ Three or more discrete episodes of vomiting</li> <li>○ Amnesia (antegrade or retrograde) &gt; 5 min</li> <li>○ Dangerous mechanism of injury</li> <li>○ Bleeding or clotting disorder</li> </ul> </li> </ul> <p>If over 16:</p> <ul style="list-style-type: none"> <li>• a GCS score of 12 or less on initial assessment in the emergency department</li> <li>• a GCS score of less than 15 at 2 hours after the injury on assessment in the emergency department</li> <li>• suspected open or depressed skull fracture</li> <li>• any sign of basal skull fracture (haemotympanum, 'panda' eyes, cerebrospinal fluid leakage from the ear or nose, Battle's sign)</li> <li>• post-traumatic seizure</li> <li>• focal neurological deficit</li> <li>• more than 1 episode of vomiting.</li> </ul>
<b>Cervical spine</b>	<p>Cervical spine injury is rare</p> <p>If there is a <b>clinical suspicion of neck injury</b> CT should be performed if:</p> <ul style="list-style-type: none"> <li>• You are also performing a CT Head</li> <li>• GCS &lt; 13/Intubated</li> <li>• Focal Peripheral Neurology</li> <li>• Paraesthesia</li> <li>• Need for urgent definitive diagnosis</li> <li>• Abnormal x-ray or strong clinical suspicion DESPITE normal x-ray</li> </ul> <p>Plain Radiographs should be performed if:</p> <ul style="list-style-type: none"> <li>• None of above</li> <li>• Neck pain + any of             <ul style="list-style-type: none"> <li>○ Dangerous mechanism (&gt; 1 m)</li> <li>○ Axial load</li> <li>○ High speed RTA/ejection/ bicycle collision</li> </ul> </li> </ul>



	<ul style="list-style-type: none"> <li>○ High risk patient factors (e.g osteogenesis imperfecta)</li> </ul> <p>Plain radiographs should ideally include lateral, AP and peg views, though peg views can be difficult to obtain and of suboptimal quality in young children</p> <p>Assess isolated neck injury using Canadian c-spine rules (see c-spine injury guideline)</p>
<b>Thoracolumbar spine</b>	<p>Plain radiographs should be the primary investigation in the majority of cases where isolated injury is suspected.</p> <p>If neurological signs are present, MR should be the imaging of choice, otherwise localised CT.</p> <p>If completing a Chest/Abdomen CT – Spine should be included in this.</p>
<b>Chest</b>	<p>Primary imaging of blunt chest trauma (if indicated) is CXR</p> <p>CT with contrast should be performed if:</p> <ul style="list-style-type: none"> <li>• Penetrating trauma</li> <li>• Flail chest</li> <li>• Pericardial tamponade</li> <li>• Any injury shown below (in x-ray)</li> </ul> <p>If CXR shows significant injury CT Thorax should be performed</p> <p>e.g</p> <ul style="list-style-type: none"> <li>• Rib fractures</li> <li>• Fracture of 1st 3 ribs or sternoclavicular fracture-dislocation</li> <li>• Fracture of lower ribs (abdo CT)</li> <li>• Scapular fracture</li> <li>• Persistent large pneumothorax or air leak after chest drain insertion</li> <li>• Mediastinal air</li> <li>• Bowel loops in chest</li> <li>• Air fluid level in chest</li> </ul>
<b>Abdomen</b>	<p>Primary imaging when indicated is CT with contrast</p> <p>CT of the abdomen and pelvis is only indicated in severe multi system trauma or clinical concern based on Mechanism of injury and clinical examination and should be made by a senior clinician.</p> <p>Inclusion criteria for Abdo CT:</p> <ul style="list-style-type: none"> <li>• Lap belt or handlebar injury</li> <li>• Abdominal wall ecchymoses</li> <li>• Abdominal Tenderness in a conscious patient</li> <li>• Abdominal distension</li> <li>• Clinical evidence of persistent hypovolaemia</li> <li>• Blood from the rectum or NG tube</li> <li>• Penetrating abdominal trauma</li> <li>• Frank Haematuria</li> <li>• Suspected pelvic injury</li> </ul> <p>This request should only be made after appropriate clinical assessment and discussion with the oncall radiologist.</p>
<b>Pelvis</b>	<p>“Screening” pelvic xrays are not indicated</p> <p>Presence of a pelvic binder is not an indication for imaging without clinical assessment</p> <p>Pelvis CT if required, should be done in conjunction with abdominal CT due to likely association of injuries</p> <p><b>Post-removal of pelvic binder xrays are not indicated in children</b></p>

<b>Limbs</b>	Plain xrays of specific sites should be primary investigation Complex limb injuries may be imaged with CT if indicated, if the patient is stable
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## Paediatric Trauma Transfers



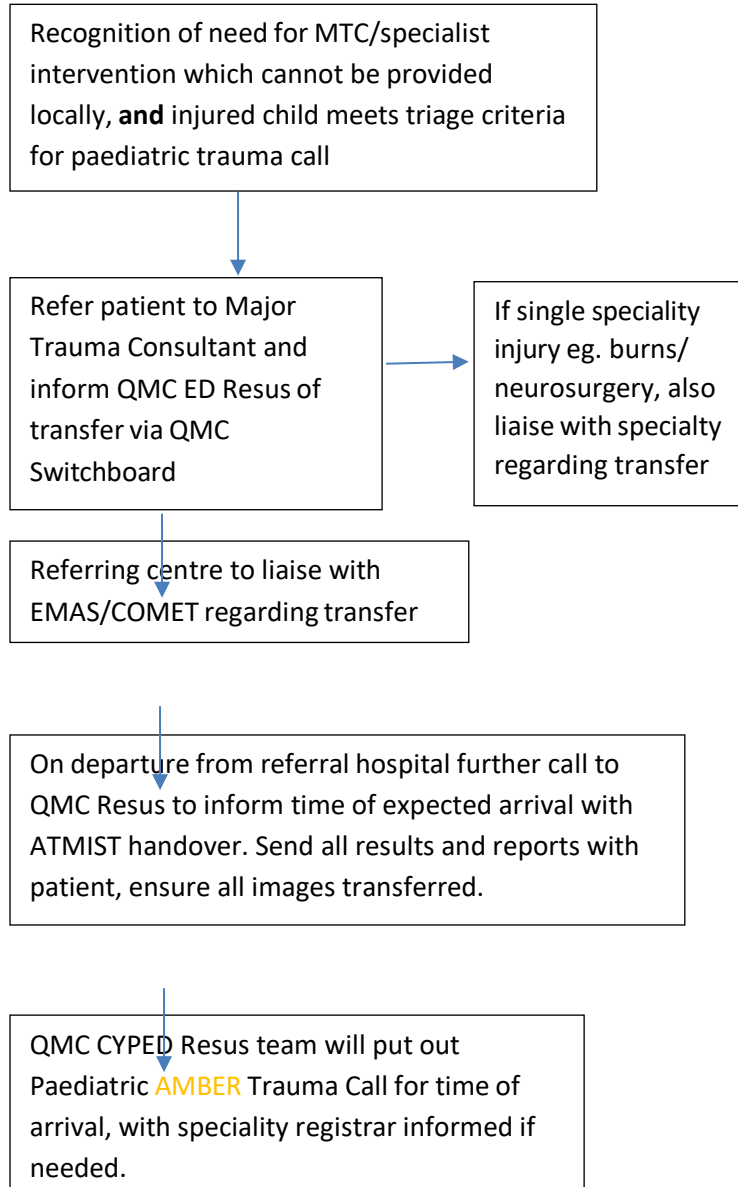
As the Major Trauma Centre for the East Midlands, Queen's Medical Centre in Nottingham will receive injured patients from across the region. Many are brought directly to QMC by the prehospital services, but some initially present to Trauma Units in Chesterfield, Derby, Burton, Mansfield, Lincoln, Grantham, Boston or Leicester and a proportion of these with multiple or complex injuries needing specialist trauma care will require transfer in to the Major Trauma Centre.

All trauma transfers should be referred via the Major Trauma Consultant and ED Resus at QMC also informed. If the patient has a single specialty problem (eg neurosurgery or burns) they should also be discussed with the specialty team directly.

Transfer of injured children may be arranged through EMAS or through COMET, but transfer should not be delayed to wait for specialist paediatric transport teams. Early transfer is needed to minimise time to definitive care. This may need to be facilitated by referring hospital staff travelling with the patient. EMAS may also be able to deploy critical care prehospital teams in some cases if necessary. On departure from referring hospital, a call should be made to QMC ED Resus to inform of expected time of arrival with ATMIST handover.

[Derby Time Critical Transfer Guideline \(C60\)](#)

### Transfer Flowchart for Trauma Units



#### Trauma Call Criteria

##### Mechanism of injury:

- Fall >Twice the Height of the child
- Bullseye/significant Damage to the vehicle
- Death or Serious injury of another Occupant/Multiple Trauma
- Ejection from or trapped under vehicle
- Stabbing

##### Injuries Suspected:

- Chest injury with abnormal physiology
- Open fracture, Pelvic fracture or >1 major long bone fracture
- Suspected abdominal injury
- Suspected spinal cord injury
- Amputation proximal to wrist/ankle
- Significant burn (>10%) or smoke inhalation
- Depressed/open skull fracture/Traumatic Brain Injury
- Penetrating trauma

#### ATMIST HANDOVER

- A - Age
- T – Time of Incident
- M – Mechanism
- I – Injuries Suspected
- S – Signs
- T – Treatment given

QMC Switchboard: 01159249924

QMC CYPED Resus: 86466

QMC Adult Resus: 86664

QMC CYPED: 81149/81148

## Children and Young Person's Safeguarding

It is the responsibility of all staff to prioritise the safety of the children under our care, both in hospital and when they are discharged.

For all injured children and young people, ask the following questions:

- Does the story of the mechanism fit with the injury pattern seen?
- Do the injuries fit with what is reasonable for the child's development age (eg is the child mobile)?
- Has the history remained consistent or has the account changed during attendance?
- Could the parents or carer have done anything in advance to prevent the accident happening (eg scalds in toddlers)?
- Could the parents or carers have done anything after the accident to improve medical care (eg was there an unjustifiable delay in attendance)?
- Always consider the safety of any siblings or other children in contact with the family.

If there are any concerns, further action must be taken.

Clear, contemporaneous documentation remains vital, and verbatim history taking is extremely important.

### Specific safeguarding tools & procedures

Safeguarding Alert	Available on Lorenzo with further information on CPIS Not always accurate so ask the parents as well.
Health Visitor Liaison/ School Nurse Liaison	Supports families in providing a safe supported environment. Shares information with the O-19 service to highlight support needed after significant injury. All injuries under 1, all burns under 5 and all significant traumas should have one completed
SCIMT Check	Identifies if the family has had previous social care involvement. Does not replace a social care referral. Should only be used if no concerns about neglect/ deliberate harm.
Social Care referral	To be done in all cases where there are concerns about possible deliberate harm or neglect.

Contact details & more information available at: [Safeguarding Children | z UHDB Intranet](#)

## Reporting Knife Wounds/Police Attendance

The police are responsible for assessing the risk posed by members of the public who are armed with knives. They need to consider:

- the risk of a further attack on the patient
- risks to staff, patients and visitors in the ED or hospital
- the risk of a further incident near to, or at, the site of the original incident.

For this reason, the police should be told whenever a person arrives at hospital with a wound inflicted in a violent attack with a knife, blade or other sharp instrument. Police should not be informed where the injury to the patient is accidental, or a result of self-harm. If you have responsibility for the patient, you should ensure that the police are contacted, but you may delegate this task to any member of staff. Identifying details, such as the patient's name and address, should not usually be disclosed at the stage of initial contact with the police.

### **Make the care of your patient your first concern**

When the police arrive, you should not allow them access to the patient if this will delay or hamper treatment or compromise the patient's recovery. If the patient's treatment and condition allow them to speak to the police, you or another member of the health care team should ask the patient whether they are willing to do so. You, the rest of the health care team and the police must abide by the patient's decision.

### **Disclosing personal information without consent**

Where it is probable that a crime has been committed, the police will seek further information. If the patient cannot give consent (because they are unconscious, for example), or refuses to disclose information or to allow health professionals to do so, information can still be disclosed if there are grounds for believing that this is justified in the public interest or disclosure is required by law.

Disclosures in the public interest are justified where:

- failure to disclose information may put the patient, or someone else, at risk of death or serious harm.
- disclosure would be likely to assist in the prevention, detection or prosecution of a serious crime and
- failure to disclose would be prejudicial to those purposes.

If there is any doubt about whether disclosure is justified, the decision to disclose information without consent should be made by, or with the agreement of, the consultant in charge, or the Trust's Caldicott Guardian. Wherever practicable, you should seek the patient's consent to the disclosure or tell them that a disclosure has been made unless for example it may put you or others at risk of serious harm, or may be likely to undermine the purpose of the disclosure, by prejudicing the prevention, detection or prosecution of crime. The reasons for disclosure should be recorded in the patient's notes.

## Dog Bites

When children are bitten or injured by dogs and present to CED social care and police (via 111) should always be informed with appropriate documentation within the medical notes.

Children's Social Care referral required for

- A child under 5 years of age is injured by dog bite
- The child/young person is under 18 years of age and sustains injuries which require medical treatment and initial information suggests the dog responsible could be prohibited and/or dangerous or the parents have acted irresponsibly

In CED this means all dog bites need to be referred as CED staff would not always have context around the type of dog or wider contextual safeguarding concerns

The Police should be contacted on 101 if:

- At any point a dog bites a child under 18 years old. Some referrals might be logged 'for information' only by the agencies, including Social Care, if it is clearly established that no significant or continued risk is likely to the child, or other children (for example, if the dog has already been 'put down' or removed)

In CED this means all dog bites need to be referred as CED staff would not always have context around the type of dog or wider contextual safeguarding concerns

## References

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5. Advanced Paediatric Life Support Manual – 6th Edition
6. European Trauma Course Manual – 2nd Edition
7. East Midlands Paediatric Major Trauma Guidelines, Available NUH Website – Accessed July 2023
8. West Midlands Paediatric Major trauma guidelines
9. Safeguarding Children from Dangerous Dogs Guidance, Derbyshire Safeguarding Childrens Board, accessed November 2023  
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## Documentation Controls

<b>Reference Number</b> CH CLINC C53 CED 2	<b>Version</b> V001		<b>Status</b> Final	
Version / Amendment History	Version	Date	Author	Reason
	V001	Dec 2023	Dr Jon Riley	Split from Major Haemorrhage as standalone guideline
<b>Intended Recipients:</b> All Paediatric Medical Staff All Paediatric Nursing Staff Emergency Department Staff				
<b>Training and Dissemination:</b> Cascade the information via BU newsletter and address training				
<b>Development of Guideline:</b> Dr Jon Riley <b>Job Title:</b> ST7 Paediatric Emergency Medicine				
<b>In Consultation with:</b> Emergency Medicine Consultants responsible for trauma (Dr Ewan Baron, Dr Graham Johnson)				
<b>Linked Documents:</b> (Nice guidance/Current national guidelines)				
<b>Keywords:</b> (Search term for KOHA) Haemorrhage, Transfusion, Major Haemorrhage, Major Trauma				
<b>Business Unit Sign Off</b>			<b>Group:</b> Paediatric Guidelines Group <b>Date:</b> 22 <sup>nd</sup> December 2023	
<b>Divisional Sign Off</b>			<b>Group:</b> Women's and Children's Clinical Governance Group <b>Date:</b> 22 <sup>nd</sup> December 2023	
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<b>Review Date</b>			November 2026	
<b>Contact for Review</b>			Dr Ian Lewins	

## Appendices

### Normal observation values

Age	Respiratory rate	Heart rate	Systolic BP
Term baby	40-60	90-180	60-90
1 month	30-50	110-180	70-104
3 months	30-45	110-180	70-104
6 months	25-35	110-180	72-110
1 year	20-30	80-160	72-110
2 years	20-28	80-140	74-110
4 years	20-26	80-120	78-112
6 years	18-24	75-115	82-115
8 years	18-22	70-110	86-118
10 years	16-20	70-110	90-121
12 years	16-20	60-110	90-126
14 years	16-20	60-100	92-130

### Injury Severity Score

Major Trauma is defined as injuries producing an Injury Severity Score (ISS)  $\geq 16$   
The ISS is based on the Abbreviated Injury Scale (AIS).

#### Abbreviated Injury Scale (AIS)

The AIS is taken from a catalogue listing types of injury and describes the severity of injury to one defined body region:

1. Minor
2. Moderate
3. Serious
4. Severe
5. Critical
6. Maximal (lethal injury)

#### Injury Severity Score (ISS)

To calculate an ISS for an injured person, the body is divided into six regions.

These body regions are:

1. Head and neck including cervical spine
2. Face, including facial skeleton
3. Thorax, thoracic spine and diaphragm
4. Abdomen, viscera and lumbar spine
5. Extremities including pelvic skeleton
6. External soft tissue

An ISS is then calculated according to  $ISS = A^2 + B^2 + C^2$  where A, B, C are the AIS scores of the three most injured body regions.

Score	Infant <1 yr	Child 1-4 yrs	4 yrs -Adult
	<b>Motor Response</b>		
6	Spontaneous		Obeys commands
5	Withdraws to Touch	Localises Pain	
4	Withdraws to Pain		
3	Abnormal Flexion to Pain (Decorticate)		
2	Abnormal Extension to Pain (Decerebrate)		
1	No Response		
	<b>Eye Opening</b>		
4	Open		
3	To Voice		
2	To Pain		
1	No Response		
	<b>Verbal Response</b>		
5	Coos, Babbles	Normal Interaction	Alert and Orientated
4	Irritable Cry, Consolable	Confused Speech, Consolable	Disorientated
3	Persistent Crying	Inconsolable	Inappropriate Words
2	Moans to Pain	Incomprehensible Sounds	
1	No Response		

The ISS takes scores from 0 to 75 (i.e. AIS scores of 5 for each category). If any of the three scores is a 6, the score is automatically set at 75. Since a score of 6 ("unsurvivable") indicates the futility of further medical care in preserving life.

### Glasgow Coma Scale

Adapted from Advanced Life Support Group (2011). Advanced Paediatric Life Support. (5e)  
London:BMJ Publishing Group

## Paediatric Major Trauma – Checklist

<b>Age:</b>		<b>Sex:</b>	
<b>W</b>	<b>Weight</b>	1-12 months (0.5 x age in months) + 4 1-5 years (2 x age in years) + 8 6-12 years: (3x age in years) + 7 Adult >50kg. Adapt on arrival if needed.	
<b>E</b>	<b>Energy</b>	4 Joules/kg >50kg 150Joules	
<b>T</b>	<b>Tube</b>	age /4 +4 >50kg size 7	
<b>F</b>	<b>Fluids Consider MHP</b>	10ml/kg bolus (5ml/kg blood) >50kg 500ml bolus Consider MHP/rapid infuser/splinting	
<b>L</b>	<b>Lorazepam</b>	0.1mg/kg (Max 4mg)	
<b>A</b>	<b>Adrenaline</b>	0.1ml/kg 1:10,000 >50kg 10ml 1:10,000	
<b>G</b>	<b>Glucose</b>	2ml/kg Glucose 10% >50kg 100ml	
<b>TXA Tranexamic Acid</b>		30mg/kg bolus under 12 years (max 2g)	
<b>Saline 2.7/3% Hypertonic Saline</b>		3-5ml/kg over 10-20 mins >50kg 250ml bolus	
<b>Calcium Gluconate</b>		0.2ml/kg 10% over 10 minutes >50kg 10ml 10% over 10 minutes (2 g /20ml maximum)	0.11 mmol/kg is equivalent to 0.5 mL/kg of calcium gluconate 10%
Consider analgesia			
<b>Morphine</b>		50-100mcg/kg IV Oramorph 0.2-0.3mg/kg >50kg (2-10mg)	
<b>Fentanyl</b>		0.5-1microgram/kg IV 1.5mcg/kg intranasal >50kg 50-100mcg	
<b>Ketamine</b>		0.3 mg/kg IV adult: 20-30mg	See Sedation for Paediatric Procedures guideline for sedation doses
<b>Paracetamol</b>		15mg/kg IV infusion >50kg 1g	