

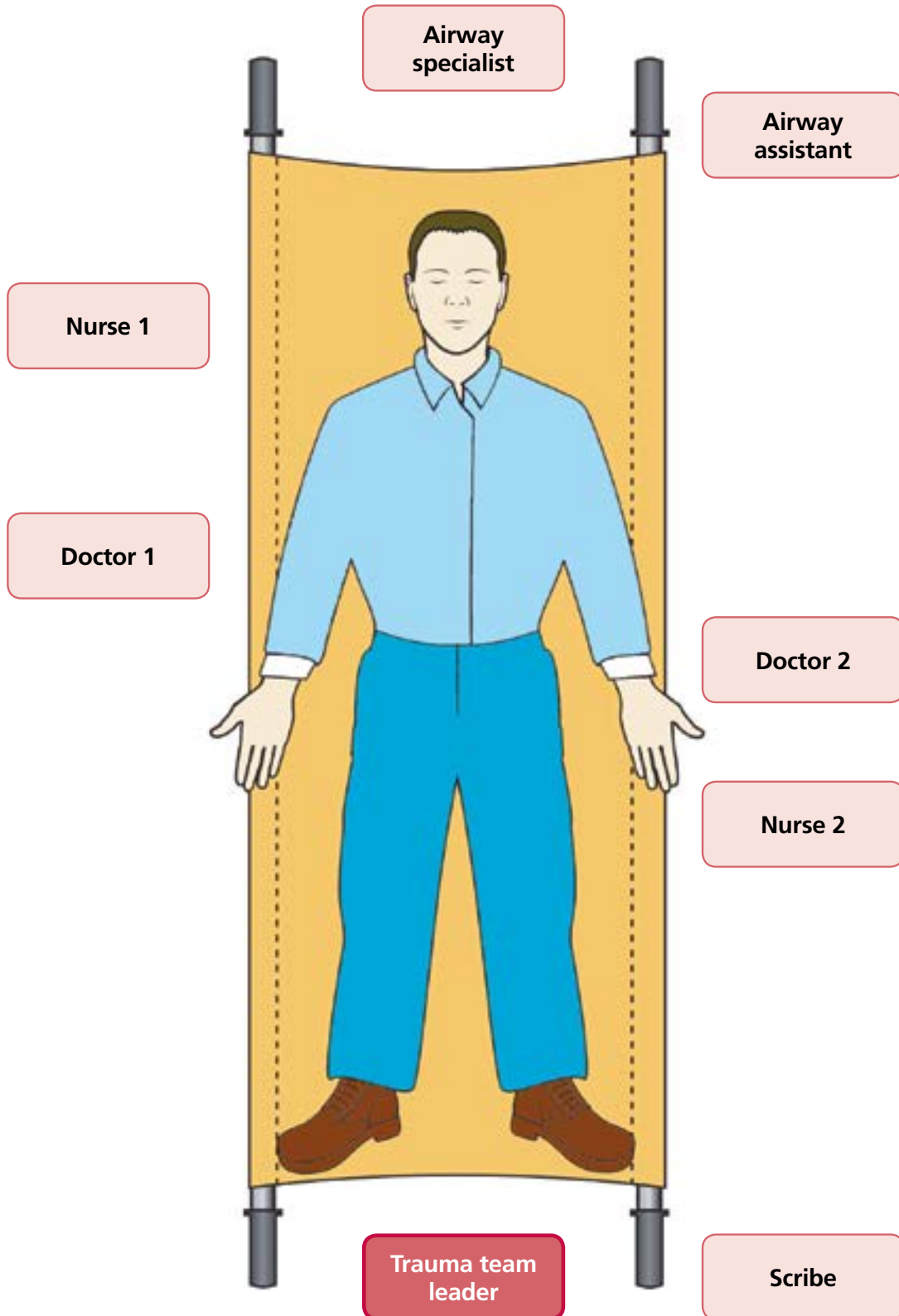
05

Acute care

05

05 • Acute care

05.a • Trauma team roles



05.a

05.a • Trauma team roles



Trauma team leader

- consultant in MTC
- ST5 or above in TU
- has East of England trauma team leader training certificate
- controls and manages the trauma team resuscitation
- makes decisions in conjunction with specialists
- prioritises investigations and treatments
- is responsible for all handovers and transfers
- follows checklist

Before patient arrival

- ensures trauma team activated
- appoints scribe (preferably additional team member)
- ensures correct PPE and identification worn
- ensures CT notified
- ensures team members 'book in' on ED documentation
- introductions and roles assigned
- ensures tranexamic acid ready (if needed)
- ensures blood products ready (if activated)
- ensures theatre ready (if right turn resus)
- briefs team
- starts the clock when the patient arrives in bay



Airway specialist

- communicates airway patency and issues to **team leader / scribe**
- ensures patient oxygenated and ventilated with no airway obstruction. Intubate when appropriate only in discussion with the **team leader**
- ensures cervical spine immobilisation
- it is usually appropriate for the airway specialist to talk to the patient and provide ongoing assessment of GCS. Reassures patient on arrival, sets the scene of what is happening and takes AMPLE history:
 - A** allergies
 - M** medications
 - P** past medical history
 - L** last meal
 - E** everything else relevant
- this role may be shared with **doctor 1**. Inform outcome to **team leader / scribe**
- considers need for endogastric tube
- arterial lines may be indicated. To avoid delay to CT this can usually be done after CT or in the operating theatre. It should not delay either
- communication with theatres role is shared with **surgeon**

05.a • Trauma team roles

Airway assistant

- may assist with removing patient clothes, have scissors to hand
- assists **airway specialist** in all airway interventions
- takes emergency airway equipment / drugs on any transfers (CT, theatre, ITU)



Doctor 1

- undertakes primary survey <C>ABC. Clearly states findings to **team leader** and **scribe**
- takes AMPLE history if anaesthetist busy, reassures patient on arrival, sets the scene of what is happening
 - A** allergies
 - M** medications
 - P** past medical history
 - L** last meal
 - E** everything else relevant
- performs procedures depending on skill level and training. Confirms skill levels with **team leader** prior to patient arriving
- neurology exam needed before paralysing anaesthetic agents used
- ensures patient kept warm



Nurse 1

- prepares for trauma call with warming devices, tranexamic acid (if needed)
- prepares for the trauma call with level one run through when indicated, warmed IV fluids run through, chest drain sets out if suggested
- ensures full monitoring is applied quickly and observations fed back to the **team leader**
- has scissors ready – removes all clothing including underwear and store securely
- covers with Bair Hugger / blankets – check temperature
- prepares for transfer to CT ASAP (possibly within 10–20 minutes) and/or theatre
- helps with procedures as identified, eg. catheter, chest drain, arterial line



Doctor 2

- two peripheral lines taking 20mls of blood at same time
- bloods needed will usually include:
 - FBC
 - U&E
 - LFT
 - pregnancy test
 - XM 6 units (or G&S occasionally)
 - glucose
 - coag screen
 - venous gas (will include glucose and lactate)
- orders radiology and bloods in discussion with **team leader**
- performs procedures depending on skill level and training and as guided by **team leader**. Confirms skill levels with **team leader** prior to patient arriving
- FAST scan if accredited and not delay CT
- administers drugs, eg. analgesia, antibiotics. Keeps patient warm
- undertakes secondary survey including tympanic membranes

05.a • Trauma team roles



Nurse 2

- has scissors ready – removes all clothing with **nurse 1**
- helps with getting IV access and sending bloods off if required, sets up intraosseus kit (ezi-IO) if no / difficult IV access
- draws up drugs / administers as prescribed
- helps with procedures as identified for **nurse 2** or **doctor 2**
- prepares for transfer to CT as soon as possible and/or theatre

Scribe

- use *ED trauma documentation*
- records names, grades and specialties of all clinical staff attending, plus time of arrival
- ensures clock is started when patient arrives and is recorded in *ED trauma documentation*
- records all observations
- records all findings and interventions
- ensures patient wrist labels are applied (including allergy)

05 • Acute care

05.b • Trauma team activation

On receiving a pre-alert message from a pre-hospital provider, a trauma team should be activated if any of the following criteria are met:

<input type="checkbox"/> Trauma triage tool 'positive'	
<input type="checkbox"/> Traumatic cardiac arrest	
A	<input type="checkbox"/> airway obstruction / concern
B	<input type="checkbox"/> RR <10 or >29
	<input type="checkbox"/> open pneumothorax
	<input type="checkbox"/> flail chest
C	<input type="checkbox"/> massive / catastrophic haemorrhage
	<input type="checkbox"/> SBP <90mmHg (sustained)
	<input type="checkbox"/> suspected major pelvic #
	<input type="checkbox"/> penetrating injury to neck / chest
D	<input type="checkbox"/> GCS motor <4
	<input type="checkbox"/> evidence of spinal cord injury
	<input type="checkbox"/> suspected open / depressed skull #
E	<input type="checkbox"/> more than 1 proximal long bone #
	<input type="checkbox"/> crushed, degloved, mangled or amputated limb

Trauma team activation

Tel:

When activating the trauma team, it should be clear whether it is

ADULT

PAEDIATRIC




OBSTETRIC

05 • Acute care

05.d • First hour of care in the emergency department

The TEMPO guidance aims to build upon the teaching and practice of ATLS (8th edition) which all those involved in acute trauma care should be familiar with and is regarded as the basic standard of care for major trauma patients.

All emergency departments in the Network are expected to follow the same emergency management of the major trauma patient based upon these guidelines.

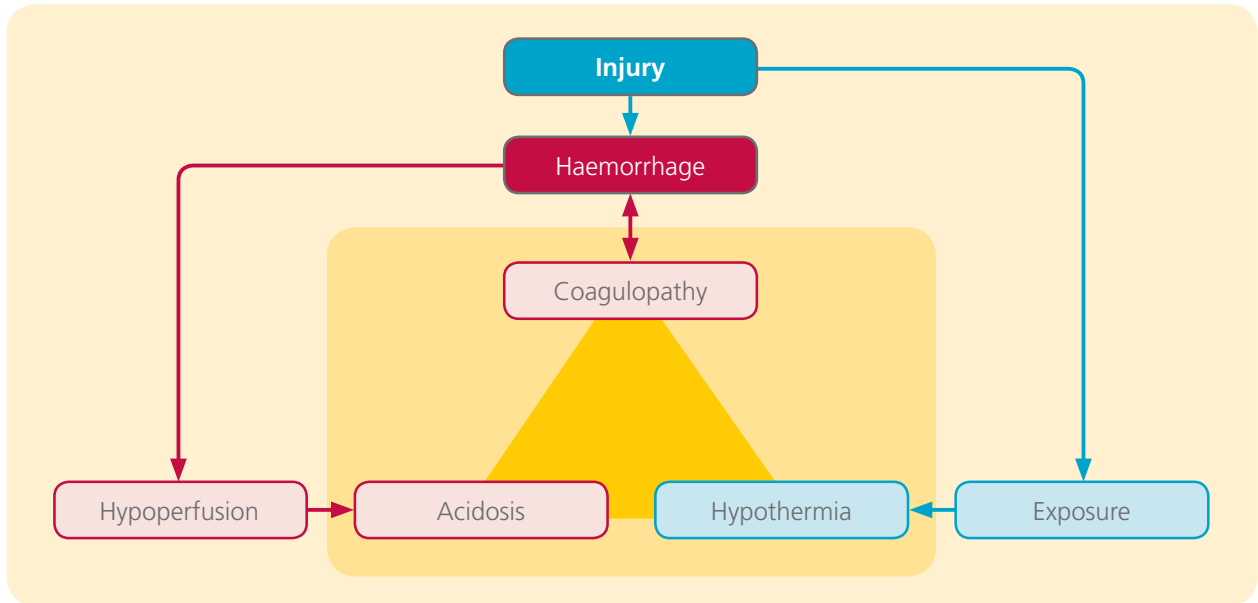
Elapsed time	Processes undertaken
Time 0	Patient on ED trolley
Within 10 minutes 	Reception/handover Primary survey and immediate interventions Establish ED monitoring Establish anaesthesia and ventilation (if required) Establish appropriate IV access, undertake venous blood gas, give analgesia +/- fluids Request immediate imaging: CT in stable patients, FAST and PXR in unstable patients Identify and transfer to trauma theatre if patient necessitates immediate damage control surgery
Within 30 minutes 	Gain cardiovascular control Administer tranexamic acid: First bolus (if not already given) and start second infusion Any immediate radiological studies undertaken in resus complete and available for viewing Antibiotics / tetanus given Transfer to CT and start scanning
Within 60 minutes 	Formal CT report available <i>Images transferred to MTC and Network Co-ordination Service contacted</i> Complete secondary survey and further treatments Further imaging undertaken, eg. limbs Tertiary specialist involvement, eg. ENT, maxfax Disposition / transition plan made
Within 90 minutes	Transition to final destination



05.d • First hour of care in the emergency department

Targets for damage control resuscitation

The injured patient can quickly become hypothermic, acidotic and coagulopathic in response to the injury. Damage control resuscitation aims to prevent further damage by targeting these problems.



Hypothermia

- limit patient exposure where possible
- use a forced air warming product (eg. Bair Hugger) to maintain a normal body temperature
- blood products and IV fluids should be warmed for giving

Acidosis / coagulopathy

Acidosis usually reflects hypoperfusion secondary to haemorrhagic shock. This hypoperfusion is also thought to be one of the initiators of the early coagulopathy seen in trauma patients that cannot be measured using the PT and APTT.

- control major external haemorrhage
 - direct pressure
 - tourniquets
 - haemostatic agent (eg. Celox™)
- control internal haemorrhage
 - splinting fractures (femur and pelvic)
- maintenance of perfusion pressure
 - aiming for systolic BP of 90mmHg in those *without* a head injury
 - aiming for a MAP >80mmHg in those *with* a head injury
- early use of blood products
- ensure tranexamic acid has been given (both doses)
- damage control surgery, if needed



05 • Acute care

05.e.i • Emergency radiology

All imaging should be requested following discussion with the team leader and radiologist. Good communication between the trauma team and the radiology department is essential and will facilitate the service provided and enable more accurate reporting.

CT

The imaging modality of choice in acute severe trauma is CT. Definition of severe trauma is ISS >15. However, in the acute setting trauma CT may be deployed in patients with ISS of 8–15. A list of suggested indications for whole body trauma CT protocol is included below. In minor / moderate trauma or where one body part is injured, the CT protocol may be tailored appropriately. Caution should be applied regarding distracting injuries.

Acquisition of trauma CT images should be protocol driven. This enables the imaging process to be streamlined and provide uniformity across the region. Definitive imaging should not be delayed by other less accurate investigations¹. FAST imaging and plain film imaging may be indicated in certain scenarios, this is detailed in the document '*Standards of practice and guidance for trauma radiology in severely injured patients*' published by the Royal College of Radiology¹.

In pregnant patients modification of the pathway should be discussed between the trauma team leader and radiologist. Depending upon the mechanism and severity of injury, CT may still be the imaging modality of choice.

Transfer to CT should be rapid with minimal delay. Radiology must indicate when the scanner is available and therefore when the patient can be moved.

The CT trauma protocols utilised in the major trauma centre are provided for both adult (appendix 1 and 3) and paediatric polytrauma (appendix 2). Further guidance on the use of alternative protocols is available in the Royal College of Radiology document¹.

The general principles for polytrauma imaging include:

- time is of the essence
- adequate imaging coverage
- avoid a 'piecemeal' approach and repeated visits to the CT department
- optimise images obtained. For example, in pelvic fractures, arterial phase imaging is crucial for assessment of arterial versus venous bleeding
- aim to keep radiation exposure as low as reasonably possible
- trauma team leader to discuss CT request with radiologist. Clinical presentation should guide most appropriate imaging

Suggested indications for CT imaging from vertex to symphysis in polytrauma² are:

1. Clinical

- all adequately resuscitated major trauma patients
- all ventilated trauma patients
- spinal injury with neurological compromise
- reduced GCS (excluding isolated head injury)



05.e.i • Emergency radiology

2. Mechanism

Mechanism may not be a reliable guide to injury. The list below should act as a guide in conjunction with clinical signs.

Blunt trauma:

- ejection from vehicle / thrown from motorbike
- motor vehicle fatality in the same passenger compartment
- motorbike / bicycle / pedestrian hit by car at ≥ 20 mph
- prolonged extrication time (> 20 mins)
- crush injury to thorax / abdomen
- fall > 3 m (10ft)

Penetrating trauma:

- blast injury (explosion / bomb)
- gunshot wound

Reporting:

All trauma CTs should be reviewed whilst the patient is on the table, particularly for foci of active bleeding. Notify the relevant clinicians promptly.

The *Emergency department trauma documentation* (page 9) provides a means of reliably communicating immediately life-threatening injuries to the trauma team and should be completed by the radiologist at the time of the scan. The primary CT survey / provisional report is not to be used to exclude any injuries.

A formal report should be made available as soon as possible, within an hour of the end of the trauma CT.

US:

FAST scan should not delay definitive imaging and should only be performed by an accredited practitioner.

References

¹Standards of practice and guidance for trauma radiology in severely injured patients, (The Royal College of Radiologists, 2011)

²Smith CM, Woolrich-Burt L, Wellings R, Costa ML, 'Major trauma CT scanning: the experience of a regional trauma centre in the UK', *Emerg Med J* (2011); 28: 378–382

For staff use only:
 Hospital number:
 Surname:
 First names:
 Date of birth:
 NHS no: _ _ _ / _ _ _ / _ _ _ _
 Use hospital identification label

Radiology

Scans

Plain films <small>(please circle)</small>	Time: H H : M M	CXR / PXR / C-spine
CT scan <small>(please circle)</small>	Time: H H : M M	Head / Neck / Chest / Abdo / Pelvis / Legs / Other
Transfer of images to MTC	Yes / No	Time: H H : M M
First FAST	Time: H H : M M	MRI scan Time: H H : M M

Initial reports

To guide initial management only. Formal detailed report will follow on PACS.

Airway

ET placement <small>(please circle)</small>	Satisfactory / Unsatisfactory
Airway obstruction	Yes / No

Breathing

Pneumothorax	Right / Left / No
Contusion/laceration	Yes / No

Circulation (bleeding)

Thoracic	Right / Left / No	Pelvic	Yes / No
Abdominal	Yes / No	Soft tissue	Yes / No

If yes, please comment briefly:

Disability

Intracranial bleed	Small / Moderate / Large / No
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Other major injuries noted (please comment):

Reporting Radiologist (print name):	Date: D D / M M / Y Y
Signed:	Time: H H : M M

05.e.i • Emergency radiology – Appendix 1

Major Trauma Centre guidelines for CT imaging in adult blunt polytrauma

Patients should attend the department on a trauma board with adequate IV access. Remove unnecessary metal objects from the imaging field.

1. Standard head CT

Unenhanced axial head CT – either angled to orbitomeatal line or if suspected facial injury, spiral acquisition through brain and facial bones.

Bone reconstructions on thinnest possible with edge enhancement.

2. Cervical spine CT

Image from foramen magnum to T3–4. Sagittal 2mm and coronal 2mm reconstructions either on the scanner or using PACS workstation.

Following head and neck imaging, if possible the patient's arms should be placed above their head, crossed over the lower abdomen or placed on a pillow over abdomen.

3. Arterial phase – chest and abdomen

Image from C6 to aortic bifurcation post IV contrast medium; trigger over ascending aorta, 100mls at 4mls/sec. Acquire thin section axial images on a soft tissue reconstruction.

(If there is known or suspected pelvic injury, continue through the pelvis to below the pubic symphysis. If imaging chest to pelvis in arterial phase, consider using 150ml IV contrast medium followed by 50ml normal saline.)

4. Portal venous phase – abdomen and pelvis

Image from domes of diaphragm to below symphysis pubis at 70 secs from the start of the contrast medium injection. Acquire thin section axial images on a soft tissue reconstruction algorithm.

5. Delayed phase

The initial images should be reviewed whilst patient on the CT table and delayed imaging performed through all areas suspicious for active bleeding or where solid organ injury detected (particularly renal injury).

Image at approximately 5 mins post IV injection, if clinically appropriate.

Reformat – thoracic and lumbar spine in sagittal and coronal planes, 2mm reconstructions on CT scanner or PACS workstation.

Caveats:

1. Known or suspected pelvic trauma: arterial phase should extend to the pubic symphysis.
2. If bladder rupture is suspected, CT cystogram should be performed if there is a catheter in situ (50mls of contrast in 450mls of normal saline – bladder filled under gravity – approximately 250–400mls).
3. Consider leg run-off in lower limb trauma with clinically suspected vascular compromise (if imaging the lower leg, may need to consider increasing IV contrast medium to 200mls and 100mls normal saline to improve bolus quality).

05.e.i • Emergency radiology – Appendix 2

Major Trauma Centre guidelines for CT imaging in paediatric blunt polytrauma

CT is the imaging modality of choice

No pre-contrast imaging of the chest or abdomen

Protocol:

Head / C-spine – if indicated pre IV contrast medium

Chest – single arterial post IV contrast medium, in inspiration if possible

Abdomen/Pelvis – single portal venous phase only

Consider delayed topogram / CT at 10 minutes if urinary tract injury

If bladder injury or pelvic fracture, consider formal cystogram

Oral contrast medium:

A single dose of dilute gastrograffin 10–15 minutes before the examination can be considered if the patient is clinically able to tolerate this. If the patient is intubated, this can be given via NG tube following discussion with the anaesthetist.

Scan delay times will vary according to local protocols.

Intravenous contrast medium:

Local protocols must be followed

Within Cambridge University Hospitals Major Trauma Centre:

2mg/kg of warmed Iomeron 300 used, to a maximum of 100ml. Minimum of 10ml overall volume. If less than 10ml, a saline bolus can be given to make up to 10ml.

The delay from time of injection to imaging will differ between different scanners.

Prescription for oral Gastrograffin in paediatric trauma

Age	dose and dilution
0–1 years	1ml Gastrograffin / 60mls water
2–5 years	2mls Gastrograffin / 125mls water
6–12 years	3mls Gastrograffin / 175mls water
13+ years	4mls Gastrograffin / 250mls water

05.e.i • Emergency radiology – Appendix 3

Penetrating trauma CT protocol

1. Standard head CT – if involved

Unenhanced axial head CT – either angled to orbitomeatal line or if suspected facial injury, spiral acquisition through brain and facial bones.

Bone reconstructions on thinnest possible with edge enhancement.

2. Cervical spine CT

Image from foramen magnum to T3–4. Sagittal 2mm and coronal 2mm reconstructions either on the scanner or using PACS workstation.

Following head and neck imaging, if possible the patient's arms should be placed above their head, crossed over the lower abdomen or placed on a pillow over the abdomen.

3. Arterial phase – chest and abdomen

Image from C6 to aortic bifurcation post IV contrast medium; trigger over ascending aorta, 100mls @ 4mls/sec. Acquire thin section axial images on a soft tissue reconstruction.

Consider also imaging the neck in the arterial phase, following IV contrast medium, to assess vascular injury secondary to penetrating injury.

4. Portal venous phase – abdomen and pelvis

Image from domes of diaphragm to below symphysis pubis at 70 secs from the start of the contrast medium injection. Acquire thin section axial images on a soft tissue reconstruction algorithm.

5. Delayed phase

The initial images should be reviewed whilst patient is on the CT table and delayed imaging performed through all areas suspicious for active bleeding or where solid organ injury is detected or suspected (particularly renal injury).

Image at approximately 5 mins post iv injection, if clinically appropriate.

Oral / rectal contrast medium:

In suspected penetrating trauma to the abdominal or pelvic cavity, rectal and oral contrast medium can be helpful in the detection of bowel injury.

Oral contrast medium – dilute oral contrast medium can be administered orally or via NG tube.

Rectal contrast medium – give 1000ml of diluted iodinated contrast medium delivered via a drip system with a ballooned Foley catheter inserted within the rectum.

If bladder injury is suspected, CT cystogram or formal cystogram can be undertaken. If there is a bladder catheter in situ – fill bladder under gravity with 50mls of contrast medium in 450mls of normal saline.

05.e.iv • Interventional radiology (IR)

The role of IR in major trauma is to stop haemorrhage as quickly as possible with minimal interference as part of damage control resuscitation. Information supplied by the head to pelvis CT scan is key to informing the decision-making process.

- Trauma team leaders should be aware of possible indications for IR in trauma as detailed in the table below.
- Decisions on the use of IR should be made in conjunction with a senior clinician from the appropriate specialty.
- Once requested and the patient is on site, IR should be available within 30 minutes of referral.

Site	Non-operative management	Interventional radiology	Damage control surgery
Thoracic aorta	No role except in small partial thickness tears	Stent graft for suitable lesions	Ascending aortic injury or arch injury involving great vessels
Abdominal aorta	No role	Occlusion balloon, stent graft for suitable lesions	Injury requiring visceral revascularisation or untreatable by EVAR
Peripheral / branch artery	No role	Occlusion balloon, stent graft for suitable lesions	Any lesion which cannot rapidly be controlled or which will require other revascularisation
Kidney	Subcapsular or retroperitoneal haematoma without active arterial bleeding	Active arterial bleeding, embolisation or stent graft	Renal injury in association with multiple other bleeding sites or other injuries requiring urgent surgery
Spleen	Lacerations, haematoma without active bleeding or evidence of false aneurysm	Active arterial bleeding or false aneurysm Focal embolisation for focal lesion Proximal embolisation for diffuse injury	Packing or splenectomy for active bleeding in association with multiple other bleeding sites
Liver	Subcapsular or intraperitoneal haematoma or lacerations without active arterial bleeding	Active arterial bleeding Focal embolisation if possible Non-selective embolisation if multiple bleeding sites as long as portal vein is patent	Packing if emergency laparotomy needed with subsequent repeat CT and embolisation if required
Pelvis	Minor injury with no active bleeding	Focal embolisation for arterial injury (bleeding, false aneurysm or cut-off)	External compression and subsequent fixation if bleeding from veins or bones
Intestine	Focal contusion with no evidence of ischaemia, perforation or haemorrhage	Focal bleeding with no evidence of ischaemia or perforation. Or, to stabilise patient, allow interval laparotomy pending treatment of other injuries	Ischaemia or perforation requiring laparotomy +/- bowel resection

IR facilities are available at the MTC 24/7, with availability also in some TUs.

05 • Acute care



05.f • Emergency transfer

Network Coordination Service: 0300 330 3999, option 3.

As soon as a trauma patient arrives in a Trauma Unit (TU), consideration should be made to whether they may require transfer to the MTC or other specialist facility.

The Network Coordination Service (NCS) should be contacted as soon as transfer is considered. This may be PRIOR to stabilisation and imaging to enable early support of transfer. It is vital that the patient is transferred as soon as is safely possible and delays are not incurred. The TU has a number of options available to them to support patient transfer and the NCS consultant will assist with clinical and logistical planning.

The options are usually:

- Use of Major Trauma Outreach Service (MTOS) *arranged through NCS. This will be mobilised on request when available.*
- Use of TU medical/nursing staff and East of England Ambulance Trust (EEAST) vehicle *arranged internally by the TU and through ambulance control after discussion with NCS.*
- Use of enhanced care teams with or without EEAST vehicle *arranged through NCS.*

Regardless of which option is utilised, all personnel undertaking transfers should be current with appropriate transfer training and all patients with critical care needs should have a transfer compliant with AAGBI and Intensive Care Society guidelines. This includes guidelines for monitoring, oxygen, equipment, drugs, fluids including blood products and appropriate transfer vehicle.

Major Trauma Outreach Service (MTOS)

In order to support the wider functions of the Trauma Network, an outreach and retrieval service is being piloted which has the following key functions:

- Emergency secondary transfer of adult and paediatric trauma patients from regional TUs to the Major Trauma Centre (MTC) or other specialist centre (burns, cardiothoracic).
- Training and education.

The emergency transfer service is a dedicated and specifically trained team comprising:

- **physician** – senior trainee or consultant in emergency medicine or anaesthesia with specific training in pre-hospital emergency medicine (PHEM)
- **paramedic** – with extensive experience of pre-hospital care and specific training in PHEM
- **transfer driver** – specifically trained in emergency driving.

The team operate a dedicated transfer ambulance. Transfers by air may be considered where appropriate.



05.f • Emergency transfer

Which patients are suitable?

MTOS may be deployed by NCS to TUs to transfer trauma patients of any age. This doesn't seek to replace any other specialist retrieval services, but may provide an appropriate and timely response.

The following patients may not be suitable:

- **non-trauma critical care patients** – for these patients secondary transfer should follow existing procedures relating to the transfer of critical care patients.
- **those with complex needs (eg. those with intra-aortic balloon pumps, those receiving extracorporeal membrane oxygenation (ECMO), or the very young)** – these patients may have needs that require additional support from the TU to the emergency transfer service.

If in any doubt, discuss the possibility for the use of MTOS with the NCS consultant.

How is MTOS mobilised?

MTOS is deployed via the NCS on the authority of the duty network consultant.

When available, the emergency transfer service will be offered to referring TUs in order to support a timely and safe transfer of the patient to the MTC.

Early notification to NCS will assist in the timely deployment of MTOS. There may be occasions where MTOS is deployed to a TU prior to the patient's arrival in response to the triage notification or pre-alert information from pre-hospital providers. On their arrival, they may be used to assist in the ongoing care of the patient while the transfer is arranged.

What to do to prepare for the arrival of the MTOS transfer team

When MTOS has been deployed to a referring TU, there are a number of key steps that can be undertaken to prepare the patient for handover before the arrival of the team. A checklist is available to help with this.

In all patients:

- manage in accordance with TEMPO standards using the CACBCDE approach
- ensure that oxygenation requirements are fully addressed. Assess the need for intubation and ventilation
- consider the potential need for haemorrhage control and blood transfusion in transfer. Cross-match where appropriate
- ensure that the patient's analgesia needs are addressed
- consider an anti-emetic as prophylaxis against motion sickness.

In ventilated patients:

- Maintain on standard transfer service infusions for sedation, analgesia and paralysis. (see 11.d). These should be started by the TU trauma team.
- Only if time allows, establish invasive blood pressure monitoring.

Standard packaging / preparation (all patients):

- Unless the c-spine can be definitively cleared, maintain full spinal immobilisation.
- On arrival of the transfer team, all immobilised patients will be packaged on an orthopaedic 'scoop' stretcher. There is no requirement to place patients onto a vacuum mattress or similar device.
- Normothermia should be targeted.



05.f • Emergency transfer

Administrative:

- ED trauma notes and all relevant documentation to be transferred with the patient.
- Liaise with radiology and confirm that all images including reconstructions have been transferred electronically prior to transfer.
- Ensure the radiologist's CT report is printed and both sent with the patient *and* faxed to the MTC: secure MTC (ED) fax number: 01223 217057.
- Inform the patient and next of kin.

Handover of care

On arrival of the MTOS team, a handover of the patient should be undertaken between the team and the Trauma Team Leader.

Both the MTOS team and existing trauma team should work in partnership to ensure that the patients' needs continue to be met and vigilance is paid to monitoring, whilst the patient is transferred onto the MTOS team's equipment and packaged ready for transfer.

The Trauma Team Leader remains responsible for the patient until such time as the patient the MTOS team are ready to take over that responsibility and a handover has been completed from the Trauma Team Leader to the MTOS team. The aim is to leave the ED with the patient within **20 mins** of arrival of the transfer service.

In-transit care

Regardless of transferring personnel, the standard of clinical care provided in the TU should be maintained during transfer. This may require utilisation of senior transferring staff for those patients with more complex needs.

Catastrophic haemorrhage:

- Ensure all wounds are dressed and active haemorrhage arrested.
- Splint fractured limbs, stabilise pelvic fractures.
- Ensure TXA, blood and blood products are available and given as required.
- Check blood and blood products to enable rapid transfusion on route.

Airway with cervical spine control:

- Intubated patients should be transferred by a medical team trained in anaesthesia and critical care (all MTOS teams will be).
- Any patient with the potential to deteriorate necessitating intubation should have this done prior to transfer, or transferred by personnel trained in providing emergency anaesthesia in the pre-hospital / ambulance environment.
- Full spinal precautions should be maintained with three point inline immobilisation unless the patient can be assessed clinically in combination with normal spinal imaging.

Standard packaging / preparation (all patients):

- Unless the c-spine can be definitively cleared, maintain full spinal immobilisation.
- On arrival of the transfer team, all immobilised patients will be packaged on an orthopaedic 'scoop' stretcher. There is no requirement to place patients onto a vacuum mattress or similar device.
- Normothermia should be targeted.



05.f • Emergency transfer

Breathing:

- Normal oxygen saturations should be maintained.
- In head injuries oxygen saturations should be >95% and normocarbia should be targeted.
- Check ABGs in all patients with chest injury prior to transfer.

Intercostal drains:

- Should be considered in patients with pneumothorax (even if small) prior to transfer.
- Ensure drains are adequately secured.

Circulation:

- Adequate vascular access is essential.
- Reconsider the need for damage-control surgical interventions in the TU.
- Liaise if necessary with TU general, vascular and orthopaedic teams.
- Commence TXA infusion in appropriate patients and continue during transfer.
- Consider the requirement for inotropic or vasopressor support on route. Do not use inotropic or vasopressor agents in place of blood or fluid resuscitation but do maintain cerebral perfusion pressure particularly in head injured patients.

Disability:

- Neuroprotective strategies to prevent secondary brain injury are essential and frequently overlooked. These apply to both spontaneously ventilated and mechanically ventilated.
- Maintain normoxia, normocarbia and an adequate MAP.
- Ensure adequate sedation and muscle relaxation in ventilated patients.
- Address analgesic requirements. Commence opiate infusion in ventilated patients.
- Maintain a head-up position. This can be achieved by packaging the patient on a scoop stretcher with cervical spine immobilisation and then lifting the ambulance / transfer trolley hydraulic back rest.
- Loosen cervical spine collars without losing in-line immobilisation.
- Ensure tube ties are not impairing venous drainage.
- Consider spinal shock as a cause of hypotension, especially in patients without evidence of external or internal haemorrhage and manage with appropriate vasopressors.
- Check and address hypo- and hyperglycaemia.

Exposure and packaging:

- Target normothermia.
- Package the patient as described above.
- Ensure all packaging, lines and monitoring is secured.
- Be aware of risk to pressure areas, eyes, peripheral nerves and vessels.

05.f • Emergency transfer

Key contacts

Network Coordination Service
0300 3303999



Developing the future

Trauma outreach and retrieval services are in their infancy and the existing emergency transfer service is in its pilot stages, your feedback is essential in order to shape the future of these services and to ensure that they meet the needs of the Trauma Network, regional Trauma Units and Major Trauma Centre.

Please direct all feedback, suggestions or questions to:
outreach@eoetraumanetwork.nhs.uk



05.g • Trauma team debrief

It is important to take a few minutes to debrief after each trauma call. This tool is a suggested format for these debriefs and follows the after action review (AAR) method.

Trauma call:	Date	DD / MM / YYYY	Time	HH : MM
Debrief:	Date	DD / MM / YYYY	Time	HH : MM
Debrief lead:			Trauma team leader?	Yes / No
Attending				
What was expected to happen?				
What actually happened?				
Why was there a difference?				
What can we learn for the future?				
Any other comments/issues				

Please share these with your Trauma Committee.
Please consider sharing with the Trauma Network if you feel it would be helpful.

