MAJOR TRAUMA CLINICAL GUIDELINES

2014 East Midlands Regional Trauma Network
These guidelines were collated in 2010 and are updated here. They have been adopted around the UK by Regional Trauma Services, please use as locally required and it would be appreciated if they are acknowledged appropriately. Responsibility for use outside of the East Midlands Trauma Service must be taken by those implementing the guidelines.
<table>
<thead>
<tr>
<th>INDEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTACT NUMBERS</td>
</tr>
<tr>
<td>TRAUMA TEAM ROLES</td>
</tr>
<tr>
<td>TRAUMA TEAM ACTIVATION – Adult and Paediatric</td>
</tr>
<tr>
<td>TRAUMATIC CARDIAC ARREST / PERIARREST</td>
</tr>
<tr>
<td>TRAUMA CT</td>
</tr>
<tr>
<td>PAEDIATRIC IMAGING IN ABDOMINAL INJURY</td>
</tr>
<tr>
<td>HEAD INJURY ASSESSMENT (ADULT), NICE</td>
</tr>
<tr>
<td>NICE HEAD INJURY INVESTIGATION ADULT</td>
</tr>
<tr>
<td>NICE HEAD INJURY INVESTIGATION &lt;16 YRS</td>
</tr>
<tr>
<td>NICE HEAD REFERRAL AND ADMISSION CRITERIA</td>
</tr>
<tr>
<td>NUH GUIDELINE CLEARING THE CERVICAL SPINE</td>
</tr>
<tr>
<td>NICE - INVESTIGATING THE CERVICAL SPINE</td>
</tr>
<tr>
<td>BOAST 2 - CLEARING THE CERVICAL SPINE</td>
</tr>
<tr>
<td>NUH PELVIC FRACTURE MANAGEMENT</td>
</tr>
<tr>
<td>NUH URETHROGRAM AND CYSTOGRAM</td>
</tr>
<tr>
<td>NUH OPEN FRACTURE MANAGEMENT</td>
</tr>
<tr>
<td>BOAST 4 - OPEN FRACTURE MANAGEMENT</td>
</tr>
<tr>
<td>NUH – PENETRATING CARDIAC INJURY</td>
</tr>
<tr>
<td>NUH – CHEST INJURY PATHWAY</td>
</tr>
<tr>
<td>NUH – MASSIVE TRANSFUSION 1 OF 2</td>
</tr>
<tr>
<td>NUH – WARFARIN 1 OF 2</td>
</tr>
<tr>
<td>NUH – Octaplex 1 of 2</td>
</tr>
<tr>
<td>NUH – rFactor VIIa 1 of 2</td>
</tr>
<tr>
<td>TRANEXAMIC ACID</td>
</tr>
<tr>
<td>TRAUMA IN PREGNANCY, 1 of 2</td>
</tr>
<tr>
<td>TETANUS PREVENTION</td>
</tr>
<tr>
<td>REPORTING KNIFE WOUNDS</td>
</tr>
<tr>
<td>AIRCRAFT EJECTION POLICY NUH 2007</td>
</tr>
<tr>
<td>(NEAR) DROWNING</td>
</tr>
<tr>
<td>BURNS ADULTS AND PAEDIATRIC 1 of 2</td>
</tr>
</tbody>
</table>
KEY CONTACT NUMBERS
TRAUMA CALL 2222

- **Major Trauma Consultant** 784 3420
  07812 268072
- **Major trauma case manager** 70800
- **Anaesthetic Registrar, 3rd on** 784-3051
- **Anaesthetic Registrar, 2nd on** 784-1051
- **Anaesthetic Registrar, 1st on** 784-1050
- **Radiology (MSK)** 784-1311
- **Radiology (Head)** 784-1312
- **Radiology (Body)** 784-1313 *(1313 out of hours)*
- **XRay** 63101
- **CT 3** 66750
- **CT 4** 70446
- **MASSIVE TRANSFUSION** 784-1342
- **Blood Bank** 63660
- **THEATRE COORDINATOR** 64668 or bleep 784 3201
- **Theatre 1 (General Surgery):** 64253
- **Theatre 7 (Trauma):** 64235
- **AICU** 62758 or 62762
- **PICU** 63288
- **CITY SWITCH** 57199 or bleeps on 56155 or 53053
- **QMC SWITCH** 0 or bleep desk 63063
- **NIC Area 1** 70404
- **Obstetric team** 61032  Gynae team 70436 / 63287
- **Organ Donor Coordinator pager** 07659-137821
TRAUMA TEAM

to attend resus ASAP:
TRAUMA TEAM ACTIVATION CRITERIA
NUH GUIDELINE 2013

Trauma Team Activation – 2222

1. Physiological Triggers
   - Airway compromise
   - Clinical evidence of Hypovolaemia
   - GCS<13

   In adults only:
   - SBP <90,
   - RR less than 10 or >29
   - Pregant >20 weeks with torso trauma

2. Anatomical Triggers
   - Penetrating trauma (except a limb)
   - Flail Chest
   - >1 major long bone # (hum/femur/tib)
   - Suspected Pelvic #
   - Spinal cord injury
   - Significant burn or enclosure with fire
   - Amputation proximal to wrist or ankle

3. Pre-Hospital Triggers
   - If information reliable and fulfils above criteria
   - Multiple Trauma Patients

4. Mechanism Triggers
   - Fall >2m(or more than twice the approximate height of the child)
   - Significant intrusion
   - Death or serious injury of another occupant
   - Ejection
   - If in doubt – activate

5. Discretionary
   - If deemed necessary by senior ED doctor or sister.
   - Multiple trauma victims
   - Elderly (>55yrs) or multiple co-morbidities
   - If in doubt – activate

CONSULTANT ATTENDANCE WITHIN 5 MINUTES OF PATIENT ARRIVAL
PAEDIATRIC TRAUMA TEAM ACTIVATION
NUH GUIDELINE 2012

A: Airway injury or compromise

B: Respiratory distress or failure
   Flail chest

C: Clinical evidence of hypovolaemia
   Significant haemorrhage

D: GCS ≤13

E: Penetrating trauma (except a limb)
   Spinal cord injury
   Amputation proximal to wrist or ankle
   >1 major long bone fracture
   Suspected abdominal or pelvic injury
   Depressed or open skull fracture, CSF leak
   Significant burn or smoke inhalation

Mechanism:
   Death of another occupant
   Fall >3 metres or more than twice patient’s height
   Ejection from vehicle, trapped under vehicle or
   prolonged extrication (>30mins)
   Multiple children in same incident

Physiological triggers:

<table>
<thead>
<tr>
<th></th>
<th>Infant &lt; 1 year</th>
<th>Small Child 1-8 years</th>
<th>Large Child 9-15 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resp rate</td>
<td>&lt;20 or &gt;50</td>
<td>&lt;20 or &gt;35</td>
<td>&lt;15 or &gt;25</td>
</tr>
<tr>
<td>Systolic BP</td>
<td>&lt;70 mmHg</td>
<td>&lt;70mm Hg</td>
<td>&lt;80mm Hg</td>
</tr>
<tr>
<td>Pulse</td>
<td>&lt;90 or &gt;170</td>
<td>&lt;75 or &gt;130</td>
<td>&lt;80 or &gt;120</td>
</tr>
<tr>
<td>GCS</td>
<td>≤13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sats</td>
<td></td>
<td>≤90%</td>
<td></td>
</tr>
<tr>
<td>Skin</td>
<td>Cool, pale, clammy</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Ensure CODE RED trauma call sent to involve Consultant Surgeon in team

TRAUMATIC CARDIAC ARREST

CARDIAC ARREST DUE TO TRAUMA?

NO → ALS Protocol

YES → SIGNS OF LIFE?

On Arrival or Pre Hospital

NO → Resuscitation Futile

YES → ADDRESS TREATABLE CAUSES SIMULTANEOUSLY

CPR ongoing throughout, unless interferes with intervention

A

Definitive airway early

B

Bilateral Thoracostomies (5th IC space)

Ventilating

C

Replace Volume – Fluid or Blood

Consider MTP

eFAST – ?cardiac movement

?pericardial effusion

Splint pelvis

 PENETRATING THORACIC TRAUMA?

- Consider Immediate Emergency Thoracotomy

- Call theatre coordinator (bleep 784 3344) ask for scrub nurse and thoracotomy tray

- If evidence of pericardial tamponade or strong suspicion cardiac injury, call Cardiac Surgery consultant on call

 BLUNT THORACIC TRAUMA?

- If eFAST shows pericardial effusion or clinical evidence large haemothorax- consider thoracotomy (after discussion with Trauma Consultant)

 PREGNANT TRAUMA PATIENT

Resuscitate in left lateral position

Deliver foetus within 5min cardiac arrest - call Obstetric and Neonatal crash teams via switch

 SIGNS OF LIFE

These are defined as pupil reactivity, electrical activity on monitor, cardiac movement on eFAST or brainstem reflexes. Different from loss of cardiac output
CT is the gold standard for the secondary survey of the head, neck and trunk – notis ordercode CTTRAUMA. (EDTRAUMA for nurse ordering). CT should be an early priority and planned for within 10 minutes of patient arrival whenever possible.

1. The radiologist will attend the trauma call and this can be discussed early to allow the scanner to be held available.
2. The trauma team should accompany the patient but only 3 members of the team should wait inside the CT reporting area due to limited space.
3. If a patient with **SBP<90 mmHg** is to go to CT, this must be agreed between the anaesthetist and trauma team leader. The surgical consultant should be aware of the patient.
4. Patients with **SBP 70-90 mmHg** may benefit from the diagnostic accuracy of a scan but the decision is difficult:
   1. If high volumes of fluid are needed to maintain this BP a CT may not be safe.
   2. Consultant anaesthetist must be aware
   3. If intra-abdominal bleeding suspected, Consultant General Surgeon must be aware.
   4. Trauma team should accompany patient to CT
5. Patients with **SBP<70 mmHg** should probably go to theatre, not CT.
6. IV contrast to be used unless contraindication.
7. Oral contrast has no role in trauma CT, d/w radiology
8. Peripheral injuries eg plateau fractures / face may be scanned at the same time if the patient is fit enough.
9. Resuscitation continues during CT, take blood products to CT if relevant and continue to monitor and warm the patient throughout.
10. Transfer using scoop stretcher at all times.
11. Consider other imaging for children under 12 years / puberty – see paediatric imaging guideline.
Paediatric imaging of blunt abdominal injury
NUH Guideline Oct 2011

BLUNT ABDOMINAL INJURY

UNSTABLE

RESUSCITATE 10 ml/kg N Saline, REPEATED +/- blood

RADIOLOGIST PERFORMED FORMAL ULTRASOUND IN RESUS (ie NOT A SIMPLE FAST SCAN)

IMMEDIATE LAPAROTOMY
(omit US if it causes significant delay)

STABLE

Remains unstable

Free fluid detected or clinical concern eg handlebar injury or lapbelt

Solid organ injury

Consider CT

Hollow organ injury

Consider admit for repeated observation

CT

Normal scan

Deteriorates clinically, reassess
Assessment in emergency department

Stabilise airway, breathing and circulation (ABC) before attending to other injuries.

- **GCS ≤ 8**
  - Involve anaesthetist or critical care physician early to provide appropriate airway management and assist with resuscitation
  - Exclude significant brain injury before ascribing depressed conscious level to intoxication

- **GCS 9–14**
  - Immediately
  - Assess risk of clinically important brain injury/cervical spine injury (see pages 8–11)
  - High risk
    - Extend assessment to full clinical examination to establish need for imaging of head and/or cervical spine (see pages 8–11)

- **GCS 15**
  - Within 15 minutes of arrival
  - Low risk
    - Emergency department clinician should re-examine within a further hour – part of assessment should establish need for CT imaging of head and/or cervical spine (see pages 8–11)

**Pain management**
- Manage pain effectively and reassure patients.
- Treat significant pain with low dose of intravenous opioids titrated against clinical response and baseline cardiorespiratory measurements.

**Training**
- All emergency department clinicians involved in assessing patients with head injuries should be able to assess the presence and absence of the risk factors listed on pages 8–11 on selection and urgency for imaging – training should be available as required to ensure this.
- Emergency department (and all in-hospital) observations of patients with head injuries should only be carried out by professionals competent in the assessment of head injury.
- All those involved in the assessment of infants and children with head injury should be trained to detect non-accidental injury.

**If patient returns to emergency department within 48 hours** of discharge with persistent complaint relating to initial head injury, involve a senior clinician with experience in head injuries and consider CT scan.
Investigation for clinically important brain injury

CT imaging of the head is the primary investigation of choice.

Selection of adults for CT scanning of head

Are any of the following present?

- GCS < 13 when first assessed in emergency department
- GCS < 15 when assessed in emergency department 2 hours after the injury
- Suspected open or depressed skull fracture
- Sign of fracture at skull base (haemotympanum, ‘panda’ eyes, cerebrospinal fluid leakage from ears or nose, Battle’s sign)
- Post-traumatic seizure
- Focal neurological deficit
- > 1 episode of vomiting
- ▲ Amnesia of events > 30 minutes before impact

No → Any amnesia or loss of consciousness since the injury?

Yes

Are any of the following present?

- ▲ Age ≥ 65 years
- Coagulopathy (history of bleeding, clotting disorder, current treatment with warfarin)
- ▲ Dangerous mechanism of injury
  - pedestrian or cyclist struck by a motor vehicle
  - occupant ejected from a motor vehicle
  - fall from > 1 m or 5 stairs

No

Request CT scan immediately

▲ Imaging should be carried out within 8 hours of injury, or immediately if patient presents 8 hours or more after the injury¹

No imaging required now

¹If patient presents out of hours and is ≥ 65, has amnesia for events more than 30 minutes before impact or there was a dangerous mechanism of injury, it is acceptable to admit for overnight observation, with CT imaging the next morning, unless CT result is required within 1 hour because of the presence of additional clinical findings listed above.
Selection of children (under 16) for CT scanning of head

Are any of the following present?

- Witnessed loss of consciousness lasting > 5 minutes
- Amnesia (antegrade or retrograde) lasting > 5 minutes
- Abnormal drowsiness
- 3 or more discrete episodes of vomiting
- Clinical suspicion of non-accidental injury
- Post-traumatic seizure but no history of epilepsy
- Age > 1 year: GCS < 14 on assessment in the emergency department
- Age < 1 year: GCS (paediatric) < 15 on assessment in the emergency department
- Suspicion of open or depressed skull injury or tense fontanelle
- Any sign of basal skull fracture (haematympanum, ‘panda’ eyes, cerebrospinal fluid leakage from ears or nose, Battle’s sign)
- Focal neurological deficit
- Age < 1 year: presence of bruise, swelling or laceration > 5 cm on the head
- Dangerous mechanism of injury (high-speed road traffic accident either as pedestrian, cyclist or vehicle occupant, fall from > 3 m, high-speed injury from a projectile or an object)

Yes
Request CT scan immediately

No
No imaging required now

Investigation of non-accidental injury in children

A clinician with expertise in non-accidental injuries in children should be involved in any suspected case of non-accidental injury in a child. Consider: skull X-ray as part of a skeletal survey; ophthalmoscopic examination for retinal haemorrhage; examination for pallor, anaemia, tense fontanelle and other suggestive features. Imaging such as CT and magnetic resonance imaging (MRI) may be required to define injuries.

Children under 12 have increased risk from irradiation, so restrict CT imaging of cervical spine to children with indicators of more serious injury, eg:
- severe head injury (GCS ≤8)
- strong suspicion of injury despite normal plain films
- plain films are inadequate.
When to involve the neurosurgeon

- Discuss the care of all patients with new, surgically significant abnormalities on imaging with a neurosurgeon (definition of ‘surgically significant’ to be developed by local neurosurgical unit and agreed with referring hospitals).
- Regardless of imaging, other reasons for discussing a patient’s care plan with a neurosurgeon include:
  - persisting coma (GCS ≤ 8) after initial resuscitation
  - unexplained confusion for more than 4 hours
  - deterioration in GCS after admission (pay greater attention to motor response deterioration)
  - progressive focal neurological signs
  - seizure without full recovery
  - definite or suspected penetrating injury
  - cerebrospinal fluid leak.

Admission

Criteria for admission

- New, clinically significant abnormalities on imaging.
- Not returned to GCS 15 after imaging, regardless of the imaging results.
- Criteria for CT scanning fulfilled, but scan not done within appropriate period, either because CT not available or because patient not sufficiently co-operative to allow scanning.
- Continuing worrying signs (for example, persistent vomiting, severe headaches).
- Other sources of concern (for example, drug or alcohol intoxication, other injuries, shock, suspected non-accidental injury, meningism, cerebrospinal fluid leak).

- **Patient with a head injury**: admit under the care of a team led by a consultant trained in head injury management during higher specialist training (see page 4 for full recommendation).
- **Patient with multiple injuries**: admit under the care of the team trained to deal with most severe and urgent problem.

Making observations

- Perform and record observations on a half-hourly basis until GCS = 15.
- When GCS = 15, minimum frequency of observations is:
  - half-hourly for 2 hours
  - then 1-hourly for 4 hours
  - then 2-hourly thereafter.

Starting after the initial assessment in emergency department.
Unable to clinically clear the spine

Significant ABC problem
- yes: Stabilise
- no
  neurological injury requiring CT head?
  - yes: CT head and neck
  - no
    Indication for CT chest and abdo?
    - yes: CT chest & abdo, pelvis, C, T and L spine
    - no
      Plain Xrays C, T and L spine (CT all if being done for other indication)
      Formal reports NAD
      - yes: clinical evidence of spinal injury
        - yes: Clear
        - no: Seek specialist spinal opinion
      - no: Seek specialist spinal opinion
CERVICAL SPINE
NICE GUIDELINE 56
Investigation in the ED

Selection of adults and children (age 10+) for imaging of the cervical spine

Are any of the following present?

Check both lists

- Patient cannot actively rotate neck to 45 degrees to left and right (if safe to assess the range of movement in the neck)²
- Not safe to assess range of movement in the neck²
- Neck pain or midline tenderness plus:
  - age ≥ 65 years, or
  - dangerous mechanism of injury³
- Definitive diagnosis of cervical spine injury required urgently (for example, prior to surgery)

- GCS < 13 on initial assessment
- Has been intubated
- Plain film series technically inadequate (for example, desired view unavailable), suspicious or definitely abnormal
- Continued clinical suspicion of injury despite normal X-ray
- Patient is being scanned for multi-region trauma

Yes

Request three-view radiographs immediately

No

No imaging required now

Yes

Request CT scan immediately

1. Safe assessment can be carried out if patient: was involved in a simple rear-end motor vehicle collision; is comfortable in a sitting position in the emergency department; has been ambulatory at any time since injury and there is no midline cervical spine tenderness; or if the patient presents with delayed onset of neck pain.

2. Dangerous mechanism of injury: fall from > 1 m or 5 stairs; axial load to head – for example, diving; high-speed motor vehicle collision; rollover motor accident; ejection from a motor vehicle; accident involving motorized recreational vehicles; bicycle collision.

Children under 10 years
- Use anterior/posterior and lateral radiographs without an anterior/posterior peg view.
- Use CT imaging to clarify abnormalities or uncertainties.

Children under 12 have increased risk from irradiation, so restrict CT imaging of cervical spine to children with indicators of more serious injury, eg:
- severe head injury (GCS ≤8)
- strong suspicion of injury despite normal plain films
- plain films are inadequate.
CERVICAL SPINE
CLEARING THE CERVICAL SPINE
BOAST 2 Standards 2008

BRITISH ORTHOPAEDIC ASSOCIATION
STANDARDS for TRAUMA (BOAST)
November 2008

BOAST 2: SPINAL CLEARANCE IN THE TRAUMA PATIENT

Background and Justification:
All patients involved in significant blunt trauma must be assumed to have an unstable injury to their spine; the incidence is approximately 2% and increases up to 34% in the unconscious patient. 50% of spinal injuries occur in the thoracic or lumbar spine; 20% at two levels. Immobilisation with full spinal precautions for prolonged periods creates difficulties in intensive care units. Spinal immobilisation is associated with pressure sores and pulmonary complications and is not recommended for more than 48 hours. Audits in the UK suggest poor implementation of spinal clearance policies. In the neck ligamentous disruption without a major bony injury may lead to instability. Recent comparative evaluations have shown that a modern helical CT scanning with reformatting can demonstrate the subtle abnormalities offering high sensitivity and specificity in detecting unstable injuries of the cervical spine. Plain radiographs are insensitive in the neck and the upper thoracic spine. MRI scanning has high sensitivity but only moderate specificity and is logistically difficult for ICU patients.

Inclusions: All trauma patients who are unconscious, unable to cooperate or who have distracting injuries that exclude reliable clinical assessment.

Exclusions: Children under the age of 16

Standards for Practice Audit:
1. A protocol for protection of the entire spine must be in place in all hospitals managing trauma patients at risk of spinal injury. This protection must be maintained from arrival until appropriate examination or investigations are completed and the spine cleared of injury.
2. Documentation of the neurological status must be made in all at-risk patients; any sign of spinal cord injury mandates urgent scanning.
3. A clinical examination of the whole spine should be documented.
4. If it is anticipated a patient will remain unconscious, unassessable or unreliable for clinical examination for more than 48 hours, radiological spinal clearance imaging should be undertaken.
5. For the cervical spine, the appropriate standard is a thin slice (2-3mm) helical CT scan from the base of the skull to at least T1 with both sagittal and coronal reconstructions; extending that scan to T4/5 overcomes the difficulties of imaging the upper thoracic spine.
6. It is recommended that this cervical spine CT scan be undertaken as a routine with the first CT brain scan in all head-injured patients who have an altered level of consciousness.
7. The remaining thoracic and lumbar spine may be adequately imaged either by AP and lateral plain radiographs or by sagittal and coronal reformatting of helical CT scans of the chest, abdomen and pelvis undertaken as part of a modern CT trauma series (<5mm slices).
8. A senior radiologist must report spinal clearance images prior to withdrawal of spinal protection precautions.
9. If a spinal injury is detected, a neurological assessment must be made, even if incomplete, and repeated regularly prior to urgent transfer to an appropriate spinal injury service.
10. MRI is the urgent investigation of choice for spinal cord injury.

Evidence Base:
Predominantly retrospective case series but with good expert reviews and an evolved multinational professional consensus over 15 years.

Limitations:
There are insufficient series or tested protocols to recommend a policy in children.
The place of MRI as a clearance tool for instability remains uncertain.
There are practical issues with scanning ICU patients and high false positive rates for intervertebral disc and ligament abnormality.
Beware! – They are not always tachycardic at presentation. Apply in children if suspicion of potential injury as in adults.

The initial management aims to:
1. Splint the pelvis to provide tamponade and prevent movement.
2. Detect the presence of a pelvic fracture with an early x-ray / CT.
3. Differentiate between pelvic and intra-abdominal bleeding.

The following is the Standard Operating Procedure:
4. Blunt trauma + sBP < 110 mmHg: Apply pelvic binder.
5. Pelvic binder can be applied even if lateral compression injury is suspected.
6. The Binder should be placed around the trochanters not the iliac crests.
7. If Binder applied pre-hospital leave it, check position and x-ray/CT
8. sBP < 90mmHg: Consider massive transfusion protocol - bleep 784-1342
9. Do NOT examine the pelvis for mechanical stability.
10. Do NOT logroll the patient until the pelvis is cleared.

Obtain an early pelvic x-ray or Trauma CT to clear the pelvis.

If this imaging is normal, the pelvis is cleared: remove binder and then repeat x-ray (an AP compression – open book – injury can be perfectly reduced by the binder so that the plain x-ray and CT scan is normal. A check x-ray after removal of the binder will identify this problem). If there is haemodynamic instability, replace the binder.

If a pelvic fracture is present:
1. You can leave binder in place for up to 24 hours unless patient has severe neurological deficit (e.g. paraplegia).
2. Examine carefully for open wounds, especially in the perineum.
3. If there is an open wound, including vaginal lacerations, antibiotics must be administered. Unless contraindicated, Augmentin, Gentamycin and Metronidazole are recommended.
4. How essential is the logroll?
   a. If unilateral pelvic injury: log-roll to opposite side
   b. If bilateral pelvic injury: avoid log-roll if at all possible, use scoop stretcher.
5. Female patient: catheterise if able. See urethrogram guidance.
6. Male patient: refer to urethrogram g/l.
Investigation in the ED after pelvic fracture

- In the absence of any concerning features, in particular blood at the meatus, or any history of haematuria since accident, a single, gentle attempt at passing a urinary catheter may be undertaken. Sterile technique must be used and the procedure performed by an experienced clinician: this is not the time to teach the technique.

  » i. If clear urine drains then all good
  » ii. If there is any element of blood staining in the fluid draining from the catheter then a contrast study (retrograde cystogram) is mandated – discuss with radiology for optimal method.
  » iii. Retrograde cystogram: inject 100ml diluted (50% saline, 50% contrast) IV contrast medium into the catheter. Clamp catheter and then take AP pelvis x-ray (or CT if the patient is having one).

- If there is any blood at the meatus prior to catheterisation, or any history of haematuria since accident, then a retrograde urethrogram is indicated before attempts at catheterisation – d/w radiology

- Retrograde urethrogram: use 50ml diluted (50% saline, 50% contrast) IV contrast medium in bladder syringe. Insert size 10 Foley catheter so that balloon is just past the meatus then gently inflate balloon with 5ml saline. Hold in place whilst assistant injects contrast into catheter and take AP pelvis x-ray.

- Urethrogram positive: call Consultant Urologist. Decisions now very difficult. If a suprapubic catheter is needed suggest discussion with the pelvic and acetabular surgeons as this will have major implications for any internal fixation.

- Retrograde urethrogram negative: Catheterise. If haematuria perform retrograde cystogram

**Principles apply for children but always consult Consultant Paediatric Surgeon or Urologist prior to any investigation. It is rare this will be done in ED.**
OPEN FRACTURES
NUH Guideline based on BOAST 4, 2009

Wound management
1. Photograph wound
2. Remove gross contamination eg leaves.
3. Do NOT wash out wound at this stage
4. Cover wound with saline soaked gauze
5. Leave wound and dressing undisturbed
6. Check tetanus status
7. Give intravenous antibiotics:
   - Grade I or II: Augmentin
   - Grade III: Augmentin and Gentamicin
   - Farm / Aquatic (eg river) add Metronidazole

Fracture Management
1. Neurovascular exam and documentation
2. Align and splint fracture
3. Repeat neurovascular examination
4. Xray
5. Document all findings

Definitive management
1. Discuss with consultant
2. Timing depends on other injuries and available expertise
3. Debridement, wound closure and definitive fixation should be within 24 hours
4. Severely contaminated injuries, farm and aquatic remain a surgical emergency and must be debrided ASAP
OPEN FRACTURES
BOAST 4 Standards of care

BRITISH ORTHOPAEDIC ASSOCIATION
STANDARDS for TRAUMA (BOAST)
December 2008

BOAST 3: PELVIC and ACETABULAR FRACTURE MANAGEMENT

Background and Justification
Major pelvic and acetabular fractures must be managed with an established trauma system with defined referral pathways. A mismanaged pelvic injury can lead to early death from haemorrhage or major disability while delayed or poor management of an acetabular fracture can lead to accelerated osteoarthritis and avoidable permanent hip dysfunction. 5-10% of pelvic fractures will have a major urological injury. The major fracture incidence has been estimated at 3 displaced acetabular fractures per 100,000 population per year.

Inclusions:
Patients of all ages with displaced fractures of the pelvic ring or acetabular fractures.

Exclusions:
Undisplaced fractures, isolated pubic rami fractures and pathological fractures.

Standards for Practice Audit:

Pelvic Ring Fractures and Dislocations:
1. Major pelvic (and acetabular) fractures and dislocations may be associated with haemorrhage. The early application of a pelvic binder or crossed sheet will aid resuscitation and facilitate laparotomy if required. It may be necessary to replace this with an external fixator if there is an enforced delay in transfer.
2. In the presence of continuing haemorrhage, the urgent treatment must include early fresh frozen plasma, platelets and blood. If there remains ongoing haemodynamic instability, attributable to the pelvic injury, then further treatment options are open pelvic packing and embolisation (where that expertise can be accessed).
3. After haemodynamic stabilisation, early CT scanning should be undertaken to define the pelvic injury. If CT scanning is available in the emergency department it should be carried out at a very early stage as long as it does not interfere with the primary resuscitation and treatment of haemorrhage.
4. A high index of suspicion of genito-urinary damage requires early contrast studies (cystography + CT and urethrography). Intraperitoneal bladder tears, bladder neck involvement or penetrating bone fragments require open bladder repair; extraperitoneal injuries can be managed by urethral drainage. These all demand urgent urological input.
5. Open pelvic fractures, with wounds to the groin, buttock, perineum, vagina or rectum, require urgent bladder drainage by cystostomy tube and bowel diversion with an end-colostomy (with washout). These demand urgent senior general surgical and urological input. Any colostomy should be sited in an upper abdominal quadrant remote from potential definitive pelvic surgical fixation approaches.
6. Posterior urethral injuries identified by urethrography should be managed initially by open or ultrasound-guided suprapubic catheterisation. Subsequently, when necessary, definitive repair by delayed urethroplasty will be part of specialist care.
7. Following haemodynamic and temporary skeletal stabilisation, a definitive plan for pelvic reconstruction needs to be formulated and carried out by a specialist pelvic surgeon as soon as possible and ideally within five days.
8. Image transfer to a hospital specialising in pelvic surgery should occur within 24 hours of presentation for initial treatment advice and to facilitate a coordinated prompt transfer if required. The specialist unit should have all the surgical disciplines to meet the treatment needs of these patients, who often have multi-system injuries.
9. Patient follow-up should occur in the specialist pelvic units to ensure full advice is available for the pain, physical, urological and sexual disabilities which are common outcomes.

Acetabular Fractures:
10. Hip dislocations must be reduced urgently and then an assessment of stability recorded. The neurovascular status before and after reduction must be documented. Skeletal traction should be applied. If the hip remains irreducible or unstable, then urgent advice should be sought from a specialist in acetabular reconstruction. Immediate transfer should be considered.
11. Following reduction of all hip dislocations, a CT scan must be done within 24 hours to exclude bony entrapment and to assess hip congruence and the extent of any fracture. These images should be referred to an expert in acetabular fracture reconstruction promptly to secure an urgent transfer for surgery if required.
12. Displaced fractures requiring reduction and internal fixation should undergo surgery by an acetabular reconstruction expert as early as possible, ideally within five days but no later than 10 days from injury.
13. Chemical thromboprophylaxis should start within 48 hours of injury providing there are no contraindications.

Evidence Base:
Predominantly retrospective case series but also prospective cohort studies. Guidance consistent with the evolved international consensus over 20 years.

Limitations:
The potential of pharmacotherapy (e.g. rFactor VII) in major pelvic haemorrhage is yet to be validated.
If penetrating cardiac injury is suspected, the following actions should be taken:

1. Call Trauma Team

2. Immediately call (pre-alert if possible):
   1. Consultant cardiac surgeon on-call (via City Hospital switchboard 53053). Do not call cardiac surgery SpR.
   2. Emergency Department consultant on-call
   3. Anaesthesia consultant on-call
   4. General surgery consultant on-call
      all via QMC switchboard 63063

3. Emergency thoracotomy in Emergency Department to be performed only if patient in cardiac arrest or extremis. Decision will need to be made by trauma team leader and most senior surgeon present.

4. Transfer patient to main theatre QMC (usually theatre 1 or 2) immediately. Resuscitation should continue there.

5. Unless the patient requires immediate thoracotomy, the patient should not be anaesthetised until the cardiac surgeon arrives.

6. The cardiac surgeon will:
   1. Come directly to QMC to evaluate the patient in theatre.
   2. Alert the cardiothoracic theatre team at NCH
   3. After evaluation, decide if emergency thoracotomy should be performed at QMC or if the patient should be transferred to the cardiac theatre at the City Hospital. This will be in consultation with the anaesthetist and general surgeons but ultimate responsibility for the decision to transfer will be the cardiac surgeon's.
ANALGESIA FOR CHEST INJURIES
NUH Guideline 2013

Analgesia to include paracetamol and NSAID if not contraindicated
+/- 0.3mg/kg oramorph
(20-30mg for typical adult patient, less if elderly or frail)

Severe chest injury
(>2 rib fractures or flail chest or lung injury* or analgesia failure**

* sats <92% (or PaO2 <10kPa) on air

** unable to cough or deep breathe without moderate to severe pain 2 hours after analgesia administration or need for iv opiates

YES

Measure and record spirometry

Admit under Major Trauma
Call 3rd on anaesthetist to consider regional analgesia
Book with theatre coordinator 784-3201 and fast track transfer to theatres
Admit to critical care if requiring FiO2 >0.5

NO

Admit under General Surgery
Prescribe effective analgesia
Monitor EWS
If deteriorates escalate through usual channels involving critical care early

All patients requiring anaesthetic procedures:
Aim to complete within 2 hours of admission,
avoid use of enoxaparin
Keep NBM as sedation may be required

All patients should be referred to CCOT, acute pain team and physiotherapy.
De-escalation from regional analgesia must be coordinated by the Acute Pain Team

Involve thoracic surgeons early for trauma associated with significant blood loss or air leak

All patients with intercostal drain should be considered for neuroaxial analgesia
Massive Transfusion

NUH GUIDELINE 2011

CONSIDER BLOOD FROM FRIDGE if only +/-3 units likely needed. Massive haemorrhage activation is for use when additional blood products are predicted.

ADULT OR CHILD > 50KG AND
SEVERE (or impending) TRAUMATIC HAEMORRHAGIC SHOCK
or SBP<80 ON ARRIVAL OR SBP<90 AFTER FLUID RESUSCITATION
or 25% reduction in expected SBP (paediatric patient) or Blood loss > 150ml/min

ACTIVATION
BLEEP 784-1342

Named Medical coordinator will need to be given to blood bank, may be team leader initially, inform blood bank when hand-over role

“Code 911 - activate massive transfusion protocol”

Provide patient information and a contact telephone number

Pink top bottle to blood bank with form in dedicated orange pod (kept with pelvic binders), or by EDA collecting the trauma pack.

Consider
1. Early pelvic binder
2. Tranexamic acid 1g iv over 10 min (paeds 15mg/kg over 10min iv)
3. Cell salvage
4. Monitor K and Ca on ABG, usually needs Ca after about 8 units PRC
5. Actively prevent hypothermia and be aware of acidosis
6. Consider TEG / ROTEM on ITU or in theatres if patient delayed, can view in ED

*Transfuse only if indicated, start pack 2 if available ASAP with cross-matched blood in place of the o neg in pack 1 and equal ratio PRC:FFP
*Use fluid warmers, document accurately (personnel intensive) and return blood to blood bank before 20 minutes to minimise wastage if not used.
*fbc, fibrinogen and coag between packs. AIM HB >7, Plt>70, Fib>1, PT/APTT normal
*(consider rFVIIa)

Trauma pack 1 available immediately (4 units O Neg)/ 20ml/kg paeds)
Trauma pack 2 after 30 minutes (6RBC, 4FFP, 2 cryo, 1 plts, rFVIIa)
Trauma pack 3 after a further 30 mins (same as pack 2)
Tranexamic Acid available in ED. Factor VIIa on request from BTS
### Massive Transfusion
**NUH GUIDELINE 2012**

#### Adults:
- **Activate Massive Haemorrhage Protocol**
  - QMC Bleep 784 1342
- **Send Samples by Hand**
  - (X Match, Fbc, Coagulation, Fibrinogen)
  - Use ROTEM if available
- **Collect & Transfuse Haemorrhage Pack 1**
  - Instigate resuscitation & haemorrhagic prevention measures
  - Consider Tranexamic Acid 1g over 10 mins
- **Correct Acidosis & Hypothermia**
- **Collect & Transfuse Haemorrhage Pack 2**
  - accordingly
  - Enquire about available blood results but DO NOT WAIT for results before transfusing
  - Use ROTEM results as a guide if available
  - Send repeat samples
  - In addition check ABG, K+, Ca++
  - **Patient Still Bleeding?**
  - Liaise with Consultant Haematologist

#### Paediatric:
- **Activate Massive Haemorrhage Protocol**
  - QMC Bleep 784 1342
- **Send Samples by Hand**
  - (X Match, Fbc, Coagulation, Fibrinogen)
- **Collect & Transfuse Red Cells (20ml/kg)**
  - Instigate resuscitation & haemorrhagic prevention measures
  - Consider Tranexamic Acid (15mg/kg IV over 10 min then 2ml/kg/hr infusion)
  - Correct Acidosis & Hypothermia
- **Collect & Transfuse Haemorrhage Pack 2**
  - accordingly
  - Repeat blood samples ABG, K+, Ca, fib, fbc, coag
  - Liaise with Consultant Haematologist
  - Box 2 - 40 mls/kg red cells
  - 15 mls/kg FFP
  - 15 mls/kg platelets
  - 15mls/kg cryoprecipitate

#### Transfusion Targets
- **Hb 8-10 g/dl**
- **Platelets > 75 x 109/l**
- **PT/PTT < 1.5 x normal**
- **Fibrinogen > 1.5-2.0 g/l**

---

**Transfusion Targets**
- **Hb 8-10 g/dl**
- **platelets > 75 x 109/l**
- **PT/PTT < 1.5 x normal**
- **Fibrinogen > 1.5-2.0 g/l**
Patients on warfarin
NUH guideline for management of excessive anticoagulation in adults, 2008

N.B. ALL mechanical valve patients are excluded from this protocol and should be managed individually by consultation with a haematology registrar or consultant

Call haematologist for advice

Management of excessive oral anticoagulation in adult Non Bleeding patients

- Oral vitamin K has been shown to reduce the INR of patients over anticoagulated by warfarin or other oral anticoagulants.
- Investigate for cause of high INR (e.g. drug interactions, alcohol intake, liver disease, cardiac failure). Further information can be obtained from haematology registrars or consultants and the anticoagulation service

<table>
<thead>
<tr>
<th>INR</th>
<th>Recommended action</th>
</tr>
</thead>
<tbody>
<tr>
<td>INR 3-6 (range 2-3)</td>
<td>Reduce warfarin dose</td>
</tr>
<tr>
<td>INR 4-6 (higher range)</td>
<td>Reduce warfarin dose</td>
</tr>
<tr>
<td>INR 6-8</td>
<td>Stop warfarin for 1-2 days, reduce dose and if possible check INR within 3 days</td>
</tr>
</tbody>
</table>
| INR >8          | Stop warfarin
                Give oral vitamin K 2mg (Konakion MM paediatric 2mg in 0.2ml) diluted in water
                Check INR the following day and re-start warfarin only when INR in therapeutic range |

In major trauma have a low level of suspicion for occult bleeding in the early stages of resuscitation and discuss early with the Haematologist on call – consider 5-10mg Vit K iv and octaplex.
Management of excessive oral anticoagulation in adult Bleeding patients

- Check INR urgently
- Intracerebral or intraspinal haemorrhage is an emergency – discuss with haematology registrar or consultant
- Always investigate for underlying cause of bleeding (e.g. UTI, peptic ulcer, nasal polyp, thrombocytopenia) and cause of high INR (e.g. drugs, cardiac failure, “unwell”, renal failure, liver disease).
- Further action depends on clinical situation and INR.

<table>
<thead>
<tr>
<th>Minor Bleed (e.g. minor trauma, minor nose bleeds etc)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INR</strong></td>
</tr>
<tr>
<td>INR &lt;4</td>
</tr>
<tr>
<td>INR 4-8</td>
</tr>
<tr>
<td>If other risk factors for bleeding (age &gt;70 years, previous history of bleeding, abnormal LFT’s, malignancy, tendency to falls)</td>
</tr>
<tr>
<td>INR &gt;8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Major Bleed</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Admit to hospital irrespective of INR</td>
</tr>
<tr>
<td>- Stop warfarin</td>
</tr>
<tr>
<td>- Discuss with haematology registrar or consultant</td>
</tr>
<tr>
<td>- Give prothrombin complex concentrate (as advised by the haematologists) or fresh frozen plasma 15ml/kg</td>
</tr>
<tr>
<td>- Give IV vitamin K 5mg</td>
</tr>
</tbody>
</table>
Indications for use of Octaplex
Octaplex should be reserved for life threatening situations such as:

- Severe haemorrhage eg gastrointestinal haemorrhage
- Haemorrhage into vital organs eg intracranial haemorrhage
- When urgent surgery is required in a coumarin treated patient.

The decision to reverse anticoagulation must be made only after an assessment of risks.

The administration of PCCs carries a risk of thrombosis in an individual with a prothrombotic state.

In the majority of cases where reversal of coumarin-induced anticoagulation is required, administration of Vitamin K and withholding anticoagulant drugs is sufficient.

The consensus view in Nottingham is:
INR at presentation < 5 – give Octaplex 25iu FIX/kg
INR at presentation > 5.1 – give Octaplex 50iu FIX/kg

Concomitant therapy
Vitamin K should always be administered in situations when Octaplex is required. A dose of 5mg is usually sufficient. The effect of vitamin K should be evident before the effect of Octaplex wears off, so repeat doses of Octaplex should rarely be required. Repeat doses of Vitamin K may however be required to maintain reversal of anticoagulation.

Methods to prevent thrombosis eg antithromboembolism stockings should be adopted in all patients where possible. Subsequent management of bleeding/thrombotic risk, eg use of heparin, should be discussed with a haematologist.
Patient on coumarin with life threatening haemorrhage or requires urgent surgery

↓

Send full coagulation screen to laboratory
Give 5mg Vitamin K by slow iv infusion

↓

Contact Haematologist who will require patient’s approximate weight in kg and INR

↓

Calculate dose with Haematologist:
INR < 5 – give Octaplex 25iu FIX/kg
INR > 5.1 – give Octaplex 50iu FIX/kg

↓

Send request form to Blood Bank
Request form must include patient’s INR, approximate weight, dose agreed and name of authorising haematologist.

↓

Octaplex issued by Blood Bank with protocol
Clinician reconstitutes and administers Octaplex as per protocol.

↓

Check coagulation screen 15 min after completion of infusion.

↓

If insufficient correction of INR more Octaplex may be required, discuss with Haematologist

↓

Check coagulation screen 6 hours after completion of infusion.

↓

Subsequent management of bleeding/thrombotic risk should be discussed with a Haematologist.

Notes:  
1 By convention dose of Octaplex is calculated on the amount of FIX in the product.
2 Blood Bank will not issue doses ≥ 5000 units (10 vials) without querying with a consultant haematologist

For further information on indications for use of Octaplex, notes and references relevant to this protocol, please see the anticoagulation web site on the intranet.

Revised Octaplex protocol (full version) Version 1: May 2006
rFactor VIIa
CONSIDER AS PART OF MASSIVE TRANSFUSION PROTOCOL
NUH GUIDELINE 2011

<table>
<thead>
<tr>
<th>Weight (kg)</th>
<th>rVIIa dose (mg)</th>
<th>Number of vials</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;55</td>
<td>4.8</td>
<td>1 x 4.8mg</td>
</tr>
<tr>
<td>55 - 70</td>
<td>7.2</td>
<td>1 x 4.8mg + 1 x 2.4mg</td>
</tr>
<tr>
<td>70 - 90</td>
<td>9.6</td>
<td>2 x 4.8mg</td>
</tr>
<tr>
<td>90 - 120</td>
<td>10.8</td>
<td>2 x 4.8mg + 1 x 1.2mg</td>
</tr>
<tr>
<td>&gt;120</td>
<td>10.8 (based on lean body mass)</td>
<td>2 x 4.8mg + 1 x 1.2mg</td>
</tr>
</tbody>
</table>

INDICATION

**Life threatening bleed** that has failed to respond to conventional therapy (all surgical measures, tranexamic acid and adequate blood replacement therapy). This is not a first line therapy and must be discussed with an on call haematologist.

The following criteria **MUST** be met for the patient to be given rVIIa:

1. Consider after whole blood transfusion of > 6 units and give after > 8 units
   
   Y   N
2. PT + PTT < 1.5x control
   
   Y   N
3. Fibrinogen > 0.5g/L (ideally > 1g/L)
   
   Y   N
4. Platelets > 50 x 10⁹/L
   
   Y   N
5. pH > 7.2
   
   Y   N

If **YES** to **ALL** questions follow algorithm to prescribe rVIIa
If **NO** to any questions then do **NOT** prescribe rVIIa until corrected

NB LIMITED EVIDENCE OF USEFULNESS IN TRAUMA
Consider after consult with haematologist in patients taking the new oral anticoagulants such as dabigatran. **Off license use**
Instructions for reconstitution and injection of rVIIa
NUH GUIDELINE 2009

1. If time allows, bring powder and water to room temperature (i.e. by holding in hands).
2. Remove plastic stoppers on vials and wipe stoppers with alcohol swab.
3. Open syringe package.
4. Open vial adapter packet and screw on to syringe, taking care not to touch the tip of vial adapter.
5. Pull plunger to draw in a volume of air equal to water in vial.
6. Click the vial adapter on to the water vial.
7. Push the plunger until you feel resistance.
8. Hold syringe with water vial upside down and pull plunger to draw water in the syringe.
9. Remove empty water vial, by tipping syringe with water adapter.
10. Holding the syringe slightly tilted, click vial adapter on to powder vial.
11. Inject the water into the powder vial.
12. Gently swirl the vial until the powder is dissolved. **Do not shake.**
13. Check solution for particulates and discolouration.
14. Turn syringe upside down and pull plunger to draw up NovoSeven.
15. Unscrew vial adapter from the empty vial.
16. Attach to needle and dispose of sharps safely.
17. NovoSeven should be administered intravenously over 2-3 minutes.
18. **Unused vials must be refrigerated and returned to Blood Bank as soon as possible.**
Tranexamic acid
NUH GUIDELINE 2011

Adult dose 1g intravenous over 10 minutes followed by 1g infused over 8hrs

evidence of, or potential for, significant bleeding

SBP < 110 and/or

P > 110

Paediatric dose 15mg/kg over 10 min then 2 mg/kg/hr over 8 hrs
PREGNANCY
check for pregnancy in all women victims of trauma aged 12-65

TRAUMA CALL IN PREGNANT PATIENT

<20 weeks
Fundus below umbilicus

Call Gynae consultant
70436
63287
Switchboard after 5pm
Gynae reg is on site via gynae crash bleep for emergencies

>20 weeks
Fundus above umbilicus

Call labour suite consultant
Senior obstetric reg and reg on labour ward
61032
Switchboard after 5pm
Midwives on 61032
Can do obstetric crash call through switchboard if needed

CRASH CALL 2222 for immediate obstetric team

Maternal hypotension due to shock is a late sign of haemorrhage and is associated with an 80% fetal mortality rate in trauma. Treating the mother will give best outcomes for the child. Anticipate the need for emergency LSCS by activating Obstetric crash team early if patient >20/40.
MAJOR TRAUMA IN PREGNANCY

2222 CODE RED Trauma call and include obstetric crash call if patient known to be >20 weeks gestation and major trauma.

<C>ABC as any trauma patient. RSI may be difficult. Use oxygen, gain iv access x2 and use pelvic binders (can cut to fit) as usual guidelines. Haemorrhage can be masked due to physiology of pregnancy so predict need for fluids / blood early.

Add a Kleihauer test to blood samples (extra fbc bottle to blood bank, plus the G&S bottle)

TXA has little evidence in pregnancy but if strong suspicion of significant haemorrhage it should be prescribed. If immediate LSCS is planned consider if it can be delayed to after delivery of the baby.

Fundus above umbilicus

>20 weeks

Tilt scoop stretcher 30 deg to patients left and / or manually displace uterus to avoid compression IVC

Fundus below umbilicus

<20 weeks

Secondary survey: note uterine contractions, vaginal bleeding which may indicate placental abruption, or amniotic fluid which may indicate ruptured membranes. The vaginal exam would be best performed by a senior member of the obstetric team. Ultrasound or Doppler for fetal monitoring with normal foetal heart rate 110-160 bpm

Xrays and CT should be done if clinically justified by the team leader, whenever possible cover the abdomen with a lead sheet. CTTRAUMA should be considered alongside other options including US and clinical observation. Occult retroperitoneal haemorrhage may occur in pelvic fractures so CT can be of significant benefit.

Maternal bicarb is low in pregnancy

Consumptive coagulopathy can develop rapidly.

Ensure blood bank is aware the patient is pregnant

If mother is Rh D negative consider Rh Immunoglobulin therapy. D/w Haematology for advice. It needs to be given within 72 hrs of the bleed.

Obstetric ward is not appropriate to admit patients for monitoring of head injury or potential serious injury. Patients >20/40 should be discussed with obs for destination from ED
Reporting Knife Wounds

NUH GUIDELINE based on guidance from the General Medical Council and the Department of Health

**Reporting knife wounds** 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 A&E Department 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, that:
- may put you or others at risk of serious harm, or
- would 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.
A TETANUS PRONE WOUND IS:
- Any wound or burn that requires surgical intervention that is delayed for > 6 hours
- Any wound or burn at any interval after injury that shows one or more of the following characteristics:
  - A significant degree of devitalised tissue
  - Puncture-type wound
  - Contact with soil or manure likely to harbour tetanus organisms
- Compound fractures
- Any wound containing foreign bodies
- Wounds or burns in patients who have systemic sepsis.

Intravenous drug abusers are at greater risk of tetanus. Every opportunity should be taken to ensure that they are fully protected against tetanus. Booster doses should be given if there is any doubt about their immunisation status.

Immunosupressed patients may not be adequately protected against tetanus, despite having been fully immunised. They should be managed as if they were incompletely immunised.

TETANUS IMMUNISATION FOLLOWING INJURIES

<table>
<thead>
<tr>
<th>Immunisation status</th>
<th>Clean Wound</th>
<th>Tetanus Prone Wound</th>
<th>Human tetanus immunoglobulin #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fully immunised (see table overleaf)</td>
<td>None required</td>
<td>None required</td>
<td>Only if especially high risk*</td>
</tr>
<tr>
<td>Primary immunisation complete, boosters incomplete but up-to-date</td>
<td>None required (unless next dose due soon and convenient to give now)</td>
<td>None required (unless next dose due soon and convenient to give now)</td>
<td>Only if especially high risk*</td>
</tr>
<tr>
<td>Primary immunisation incomplete or boosters not up-to-date</td>
<td>A reinforcing dose of vaccine and further doses as required to complete the recommended schedule (to ensure future immunity)</td>
<td>A reinforcing dose of vaccine and further doses as required to complete the recommended schedule (to ensure future immunity)</td>
<td>Yes. One dose of human tetanus immunoglobulin in a different site</td>
</tr>
<tr>
<td>Not immunised or immunisation status unknown or uncertain</td>
<td>An immediate dose of vaccine followed, if records confirm this is needed, by completion of a full 5 dose course vaccine to ensure future immunity</td>
<td>An immediate dose of vaccine followed, if records confirm this is needed, by completion of a full 5 dose course vaccine to ensure future immunity</td>
<td>Yes. One dose of human tetanus immunoglobulin in a different site</td>
</tr>
</tbody>
</table>

# For prevention the dose of human tetanus immunoglobulin is:
- For most uses: 250iu by IM injection
- If more than 24 hours have elapsed since injury or there is a risk of heavy contamination or following burns: 500iu by IM injection

* High risk tetanus prone wound:
- Heavy contamination with material likely to contain tetanus spores eg. Stable manure
- Extensive devitalised tissue
QMC is a designated receiving centre for forces aircrew who have ejected from aircraft or have been injured in rotary wing aircraft accidents. These incidents may give rise to considerable and unusual forces, which result in obvious and significant injuries, often involving the spine. Conversely, some aircrew may have sustained important injuries yet have mild or no symptoms.

- Multiply or seriously injured aircrew need to be managed in the normal manner and a separate protocol for this is not required. However, MRI of the whole spine should be performed in these individuals when their condition permits.

- Aircrew who have minor or no apparent injuries require the following assessment:

  1. Full history and physical examination including detailed spinal and neurological assessment.

  2. Whole spine MRI (sagittal T1, T2 STIR, axials as needed)

  3. Other imaging as dictated by clinical needs.

Radiographic skeletal surveys, bone scintigraphy or other imaging investigations are not routinely required and should only be requested with good clinical reason. Spinal radiographs need not be obtained routinely in those without symptoms/signs.

Spinal MRI should be performed as soon as reasonable, preferably within 24 hours. In those without apparent injury, the MR scan does need to be performed outside normal working hours and such cases should not take precedence over those with more clinically urgent conditions. The radiological studies should be reported by Dr Kerslake (ext 62232, bleep 80 6644)

Reviewed RWK 23 August 2007
(Near) Drowning
REFER TO FULL PAEDIATRIC NUH GUIDELINE 1999

Definitions

Drowning is death from suffocation due to immersion in a liquid.
Near drowning implies successful resuscitation from suffocation caused by immersion.
Dry drowning refers to the condition of absence of extraneous fluid in the lungs following drowning.
Secondary drowning refers to fluid accumulation in the lungs following what appears to be successful recovery from a near drowning event.
Hypothermia is defined as a deep body temperature <35°C.

Consider:
Oxygenation and ventilation
Assume c-spine injury
Hypothermia
Development of pulmonary oedema
Risk of aspiration
DIC
Rhabdomyalysis

External re-warming
Remove wet clothes
Empty stomach / NGT
Warming blankets and overhead heater

Internal re-warming
Warmed iv fluids
Warm ventilator gases
Gastric or bladder lavage
Peritoneal lavage

Principles are similar for adult near drowning
Midlands Burn Network Flow Chart for Adult Burns

**Is the Total Body Surface Area (TBSA) Burnt > 10%**
- **YES**: Are any of the following present?
  - Circumferential burns to chest or limbs that require escharotomy
  - Significant burns to face, hands or perineum/genitalia
  - Any airway compromise or inhalation injury
  - Any additional trauma
  - YES: Discuss with and arrange transfer to nearest Midlands’s burn service
    - Nottingham: 0115 969 1169
    - Leicester: 0116 254 1414
    - Birmingham: 0121 627 1627
  - NO: Is the TBSA > 40% TBSA dermal or full thickness burn requiring grafting?
    - **NO**: Are any of the following present?
      - Major head and Neck burns
      - Polytrauma
      - Level of intensive care required that exceeds that available at burn unit
      - Complex reconstructive surgery required
    - **YES**: Discuss with and arrange transfer to the nearest Midlands’s burn centre
      - Birmingham: 0121 627 1627
    - **NO**: Are any of the following present?
      - Associated major trauma
      - Associated co-morbidities
      - Circumferential burns

**Is the TBSA >50%**
- **YES**: Discuss with and arrange transfer to the nearest Midlands burn centre
  - Birmingham: 0121 627 1627
- **NO**: Is there > 40% TBSA deep dermal or full thickness burn requiring grafting?
  - **NO**: Are any of the following present?
    - Associated major trauma
    - Associated co-morbidities
    - Circumferential burns
  - **YES**: Discuss with and arrange transfer to the nearest Midlands’s burn unit or centre
    - Nottingham: 0115 969 1169
    - Birmingham: 0121 627 1627

Adult burns services:
Selly Oak Hospital, City Hospital Nottingham and Leicester Royal Infirmary.

**Please consider referral to Burns services if any of the following:**
- Suspected airway involvement
- Any full thickness burn
- Partial thickness burns greater than 10% adult and 5% in children
- Burns to special areas (hands, face, neck, feet, perineum)
- Electrical burns
- Chemical burns
- Suspected NAI
- Associated major trauma
- Associated co-morbidities
- Circumferential burns

**MOST MINOR BURNS ARE FOLLOWED UP IN ED, DISCUSS WITH SENIOR IF DOUBT**
Acknowledgements:
My thanks to the following who have helped with producing speciality input for these guidelines

Dr Cherry Chang, Haematology
Dr Timothy Taylor, Radiology
Professor C Moran, T&O
Dr A Brooks, General Surgery
Dr E Saunders, Emergency Medicine
Dr J Coleman, Emergency Medicine
Dr P Davies, PICU
Dr J Rutherford, Obs and Gynae
Dr J Somers, Paediatric Radiology