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KEY CONTACT NUMBERS

TRAUMA CALL 2222

ANAESTHETIC REG, 3RD ON 784-3051
ANAESTHETIC REG, 2ND ON 784-1051
ANAESTHETIC REG 1ST ON 784-1050

RADIOLOGY HEAD 784-7975
RADIOLOGY BODY 784-7974

XRAY 63101
CT 3 66750
CT 4 70446

MASSIVE TRANSFUSION 784-1342
(remember to stand down after event)
BLOOD BANK 63660

THEATRE COORDINATOR 64668 or bleep 784 3201
Theatre 1: 64253 Theatre 7: 64235

AICU 62758
PICU 63288

CITY SWITCH 57199 or bleeps on 56155 or 53053
QMC SWITCH 0 or bleep desk 63063

NIC Area 1 70404
Trauma Team Activation – 2222

<table>
<thead>
<tr>
<th>1. Physiological Triggers</th>
<th>2. Anatomical Triggers</th>
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<tbody>
<tr>
<td>Airway compromise</td>
<td>Penetrating trauma (except a limb)</td>
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<td>Clinical evidence of Hypovolaemia</td>
<td>Flail Chest</td>
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<tr>
<td>GCS&lt;13</td>
<td>&gt;1 major long bone # (hum/femur/tib)</td>
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<td></td>
<td>Suspected Pelvic #</td>
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<tr>
<td>In adults only:</td>
<td>Spinal cord injury</td>
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<td>SBP &lt;90,</td>
<td>Significant burn or enclosure</td>
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<td>RR less than 10 or &gt;29</td>
<td>Amputation proximal to wrist or ankle</td>
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<tr>
<td>Pregant .20 weeks and torso trauma</td>
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</table>

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

4. Mechanism Triggers
   Fall >10 feet (or more than twice the approximate height of the child)
   Significant intrusion
   Death of another occupant
   Ejection
   If in doubt – activate

5. Discretionary
   If deemed necessary by senior ED doctor or sister.
   Multiple trauma victims
   Elderly or multiple co-morbidities
   If in doubt – activate
TRAUMA TEAM

to attend resus ASAP:

- ODP
- ANAESTHETIST
- DOCTOR 1
- DOCTOR 2
- NURSE 1
- NURSE 2
- TEAM LEADER
- Scribe
- LEAD NURSE
- SPECIALISTS
- RADIOGRAPHER
- EDA
GUIDANCE ON CT
NUH GUIDELINE 2009

CT has become the gold standard for the secondary survey of the head, neck and trunk.

1. CT should be obtained as soon as possible, ideally with the provisional report by 30 minutes after arrival in ED.
2. Notify CT radiographer ASAP to enable scanner to be emptied for immediate use.
3. If a patient with SBP<90 mmHg is to go to CT, this must be agreed between the anaesthetist and trauma team leader.
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. Trauma CT should be vertex to symphysis pubis.
7. IV contrast to be used unless contraindication.
8. Oral contrast delays immediate scans so has limited role in emergency trauma CT, see overleaf.
9. Peripheral injuries eg plateau fractures may be scanned at the same time if the patient is fit enough.
10. Resuscitation continues during CT, take blood products to CT if relevant and continue to monitor and warm the patient throughout.
11. Transfer using scoop stretcher if any chance of pelvic fractures.
Whenever time allows for oral contrast to optimise images consider as below. Contraindications to NGT include, 1) basal skull fracture with NGT and 2) bleeding from nose.

Do **not** attempt to give oral contrast without NG/OGT to supine trauma patient. This may indicate intubation to protect the airway.

**Decision for Abdominal CT after trauma**

- **Intubated and ventilated, airway secure**
  - NG/OG tube
  - Oral contrast gastrografin 3%:
    - 12 mls in 400mls water for abdo CT
    - 21mls in 700mls water for Abdo and pelvis
  - Protocol held in resus CD cabinet

- **Conscious, c-spine immobilised**
  - Attempt NGT if no contraindication
  - Unable to pass or contraindicated, no oral contrast
Paediatric imaging of blunt abdominal injury
NUH Guideline Oct 2011

Blunt abdominal trauma

Unstable

Resuscitation 10 ml/kg N.Saline or blood (repeat)

Stable

USS in Resus

Yes

Free fluid only or clinical concern e.g. lap belt or handlebar injury

CT

Solid organ injury

Consider CT

Hollow organ injury

Immediate laparotomy

Solid organ injury

Clinical deterioration

Admit, observation

Normal: Consider admission & observation

Stable?

NO

USS ultrasound
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.
HEAD INJURY
NICE GUIDELINE 56
Investigation in the ED (Adult)

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

Yes

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

Image should be carried out and results analysed within 1 hour of request being received by radiology department

No imaging required now

Yes

Image should be carried out within 3 hours of injury, or immediately if patient presents 8 hours or more after the injury

1 If 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 (ante- 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 10 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.

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: \(^5\)
  - half-hourly for 2 hours
  - then 1-hourly for 4 hours
  - then 2-hourly thereafter.

\(^5\) Starting after the initial assessment in emergency department.
Unable to clinically clear the spine

- Significant ABC problem
  - no
  - neurological injury requiring CT head?
    - yes
      - CT head and neck
    - no
      - Indication for CT chest and abdo?
        - yes
          - CT chest & abdo, 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
Children under 10 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.

Children under 10 years
- Use anterior/posterior and lateral radiographs without an anterior/posterior peg view.
- Use CT imaging to clarify abnormalities or uncertainties.
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.
PELVIC FRACTURE
NUH GUIDELINE 2009
Investigation in the ED

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.
8. sBP < 90mmHg: Activate 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 immediate CT) to clear the pelvis.

If this x-ray 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.
PELVIC FRACTURE
NUH GUIDELINE 2009
Investigation in the ED

Guidelines
1. Call trauma team
2. Follow ATLS protocol - ABC’s first
3. Protect the spine and pelvis at all times
4. If pelvic fracture suspected - splint pelvis with sheet or binder
5. Early pelvic x-ray is essential
6. Do not test pelvis for mechanical stability
7. Do not log-roll patient until pelvis cleared
8. Do not pass urinary catheter until pelvis cleared
9. Decision making is difficult
   - call senior general and orthopaedic surgeons early

Associated Injuries
○ 90% multiple injuries
○ 60% hypovolaemic shock
○ 8x risk aortic transection

Haemorrhagic shock + Unstable pelvic fracture
Immediate Pelvic Splint + FAST / USS / DPL or laparotomy

Recognise Injury Patterns

Key Principles
ABC’s first
“the first clot is the best clot”
Reduce bleeding by:
○ careful patient handling
○ immobilising the pelvis
○ early blood transfusion
○ early clotting screen
○ early FFP / platelets
○ consider factor VIIa

Associated Injuries

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<th>Injury</th>
<th>70%</th>
<th>60%</th>
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Christopher Hoare, University Hospital, Nottingham
CONTRAST URETHROGRAM / CYSTOGRAM
NUH GUIDELINE 2009
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 surgeon: 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.
  » 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.

- 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 5mls 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

Background and Justification:
The British Orthopaedic Association and the British Association of Plastic, Reconstructive and Aesthetic Surgeons have reviewed their 1997 guidance and now publish a review of all aspects of the acute management of these injuries using an evidence-based approach, leading to the "Standards for the Management of Open Lower Limb Fractures," which are free to download from www.boa.ac.uk and www.bapras.org.uk. This BOAST is derived from these standards. Contrary to traditional teaching, best outcomes are achieved by timely, specialist surgery rather than emergency surgery by less experienced teams.

Included Patients:
All patients with high energy open fractures as manifest by the following injury patterns:

Fracture Pattern: - Multifragmentary (comminuted) tibial fracture with fibular fracture at same level
- Segmental fractures
- Fractures with bone loss, either from extrusion or after debridement

Soft tissue injury: - Swelling or skin loss, such that direct, tension-free wound closure is not possible
- Degloving
- Muscle injury that requires excision of devitalised muscle via wound extensions
- Injury to one or more major arteries of the leg
- Wound contamination with marine, agricultural or sewage material

Standards for Practice Audit:
1. Intravenous antibiotics are administered as soon as possible, ideally within 3 hours of injury. Co-amoxiclav (1.2g) or Cefuroxime (1.5g) 8 hourly and are continued until wound debridement. Clindamycin 600mg, 6 hourly if penicillin allergy
2. The vascular and neurological status of the limb is assessed systematically and repeated at intervals, particularly after reduction of fractures or the application of splints
3. Vascular impairment requires immediate surgery and restoration of the circulation using shunts, ideally within 3-4 hours, with a maximum acceptable delay of 6 hours of warm ischaemia
4. Compartment syndrome also requires immediate surgery, with 4 compartment decompression via 2 incisions (see overleaf)
5. Urgent surgery is also needed in some multiply injured patients with open fractures or if the wound is heavily contaminated by marine, agricultural or sewage matter.
6. A combined plan for the management of both the soft tissues and bone is formulated by the plastic and orthopaedic surgical teams and clearly documented
7. The wound is handled only to remove gross contamination and to allow photography, then covered in saline-soaked gauze and an impermeable film to prevent desiccation
8. The limb, including the knee and ankle, is splinted
9. Centres that cannot provide combined plastic and orthopaedic surgical care for severe open tibial fractures have protocols in place for the early transfer of the patient to an appropriate specialist centre
10. The primary surgical treatment (wound excision and fracture stabilisation) of severe open tibial fractures only takes place in a non-specialist centre if the patient cannot be transferred safely
11. The wound, soft tissue and bone excision (debridement) is performed by senior plastic and orthopaedic surgeons working together on scheduled trauma operating lists within normal working hours and within 24 hours of the injury unless there is marine, agricultural or sewage contamination. The 6 hour rule does not apply for solitary open fractures. Co-amoxiclav (1.2g) and Gentamicin (1.5mg/kg) are administered at wound excision and continued for 72 hours or definitive wound closure, which ever is sooner
12. If definitive skeletal and soft tissue reconstruction is not to be undertaken in a single stage, then vacuum foam dressing or an antibiotic bead pouch is applied until definitive surgery
13. Definitive skeletal stabilisation and wound cover are achieved within 72 hours and should not exceed 7 days.
14. Vacuum foam dressings are not used for definitive wound management in open fractures.
15. The wound in open tibial fractures in children is treated in the same way as adults
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 2010

Background
Good analgesia is required to allow patients to deep breathe and cough effectively, reducing the risk of chest infections. The type of analgesia will generally depend on the seriousness of the injury, but all patients should receive regular analgesia.

For patients that are being discharged from the Emergency Department:
These patients will be those who are clinically stable with mild to moderate pain.
- Paracetamol 1g QDS
- Diclofenac 50mg TDS
- Dihydrocodeine 30-60mg QDS PRN

For patients admitted to C25 for pain relief:
- Paracetamol 1g QDS
- Diclofenac 50mg TDS
- Serecal (morphine tablets) 10mg QDS and 10mg 2 hourly PRN for breakthrough pain
- Senna 20mg

The consultant on the morning ward round should review the pain relief. Some patients will require higher doses of morphine. In addition a TENS machine should be fitted, unless there are any contraindications.

Other contributing factors should be assessed:
If excess alcohol is involved refer to the "QMC alcohol withdrawal policy".
If drug abuse is involved refer to the "QMC and CHN guide to the treatment of drug misusers"

NSAIDS

<table>
<thead>
<tr>
<th>Contraindications</th>
<th>Cautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allergy to non steroidal anti-inflammatory drugs or aspirin</td>
<td>Cardiac impairment – can precipitate cardiac failure by causing fluid retention</td>
</tr>
<tr>
<td>Pregnant</td>
<td>Blood dyscrasias</td>
</tr>
<tr>
<td>Taking anticoagulant medications</td>
<td>Renal impairment</td>
</tr>
<tr>
<td>Previous or active peptic ulceration</td>
<td>Liver impairment. Avoid in severe impairment</td>
</tr>
<tr>
<td>Drug interactions – see following page</td>
<td>Elderly – check renal and cardiac function, ensure PPI prescribed</td>
</tr>
</tbody>
</table>

There is currently no indication for using selective inhibitors of cyclo-oxygenase 2 (COX-2).

Indications for prescribing a Proton pump inhibitor (PPI) whilst patient receives a NSAID.
- Over 65
- Low dose aspirin,
- Concomitant steroid therapy

MORPHINE

<table>
<thead>
<tr>
<th>Contraindications</th>
<th>Cautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allergy to opioids</td>
<td>Raised ICP/head injury</td>
</tr>
<tr>
<td>Acute respiratory depression</td>
<td>Renal impairment</td>
</tr>
<tr>
<td>Risk of paralytic ileus</td>
<td></td>
</tr>
<tr>
<td>Liver disease – avoid or reduce dose</td>
<td></td>
</tr>
</tbody>
</table>

IMPORTANT INTERACTIONS WITH MORPHINE

MAOIs (Monoamine oxidase inhibitors)
Avoid combination use and for 2 weeks after stopping MAOIs. Possible CNS excitation or depression

MOCLOBEMIDE
Possible CNS excitation or depression

Admit under ED to C25 or Surgeons/ critical care for surgical HDU if severe, elderly or co-morbidities
Massive Transfusion
NUH GUIDELINE 2011

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 20mg/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)
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
Massive Transfusion
NUH GUIDELINE 2011

**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
  - Correct Acidosis & Hypothermia

- **Collect & Transfuse Haemorrhage Pack 2** according to

  **Patient Still Bleeding?**
  - Liaise with Consultant Haematologist

- **Collect Haemorrhage Pack 3 & Transfuse**
  - Check available blood results
  - Send repeat samples
  - Use ROTEM as a guide if available

  **Patient Still Bleeding?**
  - Discuss with Consultant Haematologist
  - Further components require authorisation form Consultant Haematologist

**Transfusion Targets**

- Hb 8-10 g/dl
- Platelets > 75 x 10^9/l
- PT/PTT < 1.5 x normal
- Fibrinogen > 1.5-2.0 g/l

**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
    - (20mg/kg IV bolus then 10ml/kg/hr infusion)
  - Correct Acidosis & Hypothermia

- **Collect & Transfuse Haemorrhage Pack 2** accordingly

  **Patient Still Bleeding?**
  - Liaise with Consultant Haematologist

- **Collect Haemorrhage Pack 3 & Transfuse**
  - Check available blood results
  - Send repeat samples
  - Use ROTEM as a guide if available

  **Patient Still Bleeding?**
  - Discuss with Consultant Haematologist
  - Further components require authorisation form Consultant Haematologist

**Transfusion Targets**

- Hb 8-10 g/dl
- Platelets > 75 x 10^9/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>
<tr>
<td>INR &gt;8</td>
<td>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</td>
</tr>
</tbody>
</table>

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.
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.

### Minor Bleed (e.g. minor trauma, minor nose bleed etc)

<table>
<thead>
<tr>
<th>INR</th>
<th>Recommended action</th>
</tr>
</thead>
<tbody>
<tr>
<td>INR &lt;4</td>
<td>Reduce warfarin dose. If INR from remote dosing scheme advise patient to see GP.</td>
</tr>
<tr>
<td>INR 4-8</td>
<td>Stop warfarin for 2 days. Restart at appropriate dose when INR in therapeutic range</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>
<td>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</td>
</tr>
<tr>
<td>INR &gt;8</td>
<td>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</td>
</tr>
</tbody>
</table>

### Major Bleed

- Admit to hospital irrespective of INR
- Stop warfarin
- Discuss with haematology registrar or consultant
- Give prothrombin complex concentrate (as advised by the haematologists) or fresh frozen plasma 15ml/kg
- Give IV vitamin K 5mg
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 coumarininduced 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.

Further detail on the intranet or from Haematology on call
Octaplex
NUH guideline for reversal of warfarin in life threatening situations, 2006

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\(^1\) 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.\(^2\)
↓
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
GIVE 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)

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
rFactor VIIa
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 bleeding
SBP < 110 and/or
P > 110

Paediatric dose
20mg/kg over 10 min then 10 mg/kg/hr over 8 hrs
**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:
  o A significant degree of devitalised tissue
  o Puncture-type wound
  o 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.

Immunosuppressed 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
Severely bleeding wound identified

Direct pressure and elevate when appropriate

Indirect pressure when appropriate

Apply tourniquet if limb wound still bleeding

Ensure senior ED staff are aware and surgeons alerted to arrange definitive management of haemorrhage

Catastrophic haemorrhage and direct surgical intervention to stop the bleeding available immediately

Delay to surgical intervention for haemorrhage control or no surgical intervention appropriate

QUIKCLOT - two person technique

Formal wound assessment and surgical control of haemorrhage

* Excludes intra-thoracic and intra-abdominal use as product not licensed for internal use.
Please complete for each patient and file in the box provided or return to Dr Jo Ollerton, Consultant Emergency Department.
Shaded area compulsory for immediate completion, other sections appreciated.

<table>
<thead>
<tr>
<th>Name, DOB and K number</th>
<th>Date Time</th>
<th>Location: ED Theatre Other ..........</th>
</tr>
</thead>
</table>

**Site used (circle):**
- head
- chest
- lower limb
- Abdomen
- axilla
- neck
- Upper limb
- buttocks
- groin
- Face

**Other:**

**Observations:**
- P
- BP
- RR
- GCS

**Aetiology of injury:**

**Successful use of Quikclot®** yes / no

**Transferred from ED to:**
- Theatre
- Angiography
- ITU / HDU
- Ward

**Surgical procedure:**
- In Resus
- Theatre
- Other ...........

**Comments**
**Midlands Burn Network Flow Chart for Adult Burns**

- **Is the Total Body Surface Area (TBSA) Burnt > 10%**
  - NO
  - YES

- **Is the TBSA >50%**
  - NO
  - YES

- **Is there > 40% TBSA deep dermal or full thickness burn requiring grafting?**
  - NO
  - 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
  - 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
  - NO

- **Discuss with and arrange transfer to the nearest Midland’s burn centre**
  - Birmingham
    - 0121 6271627

- **Discuss with and arrange transfer to nearest Midlands’s burn service**
  - Nottingham
    - 0115 969 1169
  - Leicester
    - 0116 254 1414
  - Birmingham
    - 0121 6271727

---

**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**
BURNS
MIDLANDS BURN SERVICE NETWORK FLOWCHART, 2009

Midlands Burn Network Flow Chart for Paediatric Burns

Is the Total Body Surface Area (TBSA) Burnt > 5%

- NO
  - Is the TBSA burnt >10%
    - NO
      - Is the child under 12 months?
        - YES
          - Discuss with and arrange transfer to the nearest Midland’s burn centre
            - Birmingham 0121 333 9999
        - NO
          - Is the TBSA burnt >30%
            - NO
              - Are any of the following present?
                - Full thickness area of >1% TBSA
                - Circumferential burns to chest or limbs that may require escharotomy
                - Significant burns to face, hands or perineum/genitals
                - Any airway compromise or inhalation injury
                - Any additional trauma
            - YES
              - Discuss with and arrange transfer to nearest Midland’s burn service
                - Nottingham 0115 969 1169
                - Leicester 0116 254 1414
                - Birmingham 0121 333 9999

- YES
  - Are any of the following present?
    - Full thickness area of >1% TBSA
    - Circumferential burns to chest or limbs that may require escharotomy
    - Significant burns to face, hands or perineum/genitals
    - Any airway compromise or inhalation injury
    - Any additional trauma
  - NOT

- Is the TBSA burnt >10%

- Is the child under 12 months?

- YES

- NO
  - Is the TBSA burnt >30%

- NO
  - Are any of the following present?
    - Full thickness area of >1% TBSA
    - Circumferential burns to chest or limbs that may require escharotomy
    - Significant burns to face, hands or perineum/genitals
    - Any airway compromise or inhalation injury
    - Any additional trauma

- YES

- NO
  - Are any of the following present?
    - Child has significant smoke inhalation and/or will need respiratory support for their burn injury?
    - Major trauma
    - A need for renal support

- YES

- NO
  - Discuss with and arrange transfer to the nearest Midland’s burn unit or centre
    - Nottingham 0115 969 1169
    - Birmingham 0121 333 9999

- NON

- NO

- YES
  - Discuss with and arrange transfer to the nearest Midland’s burn centre
    - Birmingham 0121 333 9999

Burn Facility  BF
UHL (Leicester Royal Infirmary), NUH (City Hospital), and BCH (Birmingham Children’s Hospital)
  - No admission under 12 months
  - Over 12 months < 1% TBSA Full thickness
  - Over 12 months < 5% TBSA

Burn Unit  BU
NUH (City Hospital), and BCH (Birmingham Children’s Hospital)
  - Under 12 months < 10% TBSA
  - Over 12 months:
    - < 30% TBSA
    - < 20% TBSA (Deep dermal/FT)
      - No admission for children requiring ventilator support.
      - No admission for children with multiple injuries
  (Children with TBSA between 20-30% to be discussed with BC)

Burn Centre  BC
BCH (Birmingham Children’s Hospital)
  - Under 12 months > 10% TBSA
  - Over 12 months:
    - > 30% TBSA
    - > 20% TBSA (Deep dermal/FT)
    - Children requiring ventilator support
    - Children with Poly-trauma.

MOST MINOR BURNS ARE FOLLOWED UP IN ED, DISCUSS WITH SENIOR IF DOUBT