Cheshire and Merseyside Major Trauma Centre Collaborative

MAJOR TRAUMA

STANDARD OPERATING PROCEDURE AND CLINICAL GUIDELINES

V 1.0

October 2015

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Changes	Lee Winterbottom
Review date	2016
Owner	Cheshire and Mersey Major Trauma Operational Delivery Network

The CM MTCC comprises the following organisations:
Aintree University Hospitals NHS Foundation Trust, Royal Liverpool and Broadgreen Hospitals NHS Trust, Walton Centre NHS Foundation Trust.

CONTENTS

SECTION 1: CONTACTS

- **PENETRATING CARDIO:**
  Contact Consultant cardiothoracic surgeon via LHCH switchboard on **0151 600 1616**

- **BURNS:**
  Contact burns unit at Whiston hospital via switchboard on **0151 426 1600**

- **VASCULAR:**

Point of contact: Both the vascular registrar and consultant on call are available through RLUH switchboard; **0151 706 2000, or directly via the Aintree switchboard for Aintree based referrals.**

If a vascular opinion is required in the SMART centre area (Chester, Wirral, Warrington) there is a vascular surgeon based in the Countess of Chester Hospital contactable via switchboard (COCH) on **01244 365000**. Leighton patients should be referred to the Royal Stoke University Hospital MTC.

(If there is any uncertainty about the transfer or management of a patient with a suspected vascular injury we would encourage early discussion with the appropriate vascular team on call)

- **ORAL AND MAX FAX:**
  Contact AUTH via switchboard on **0151 525 5980**

- **PELVIC:**
  Contact ALUH via switchboard on **0151 252 5980** or RLUH via switchboard on **0151 706 2000**

- **OPTHALMIC:**
  Contact St Pauls Eye Hospital via RLUH switchboard on **0151 706 2000**

Major Trauma Centre Collaborative
Useful Contacts

Aintree University Hospital

Switchboard: 0151 525 5980
Aintree MTC hotline: 0151 529 2325
Trauma Nurse Co-ordinator: Bleep 5428
Major Trauma Ward: 0151 529 6255
Trauma Therapy Lead: Bleep 2226
Critical Care: 0151 529 2732/2733
Bed Managers: 0151 529 5982 bleep 4635 for surgery & 2180 for medicine
Major Trauma Operational Manager: 0151 529 2870
TARN: 0151 529 3789

The Royal Liverpool and Broadgreen University Hospitals NHS Trust

Switchboard: 0151 706 2000
RLUH MTC Hotline: 0151 706 4444
ED Trauma Nurse: 0151 706 4644
Ortho Trauma Nurse: Bleep 4638
Bed Manager: 0151 706 2314
Duty Manager (out of hours): Bleep 4200
ITU: 0151 706 2400
Trauma Ward 4B: 0151 706 2346
TARN: 0151 706 5776

Alder Hey Children's NHS Foundation Trust

Switchboard— 0151 228 4811
Alder Hey MTC Hotline: 0151 228 1235
Bed Managers: 0151 252 5038
Major Trauma Coordinator: 0151 252 5006 / 07859940690 / Bleep 605
Divisional Manager: 0151 252 5167
TARN: 0151 252 5101

The Walton Centre NHS Foundation Trust
Excellence in Neuroscience

Switchboard: 0151 525 3611
Rapid Access only: bleep 6366/07794242365
Neurosurgical on call: Bleep 5445
Bed Managers: Bleep 2009
Horsley (ITU): 0151 529 5772/5773
Spinal Nurses: 0151 529 ext. 8853/Bleep 5189
Head Trauma Nurse: 0151 529 8279 /Bleep 5524
Trauma Therapy Coor: 0151 529 5452/Bleep 5404
Divisional General Manager: 0151 529 5270
TARN/Service Lead for Trauma: 0151 529 5442

Major Trauma Unit Useful Contacts

Countess of Chester NHS Foundation Trust

1. Switchboard: 01244 365000
   Handover: 01244 363087
2. Bed Management Team: 01244 365900.
   Reverse transfer form Fax no: 01244364496
3. christopher.owen@nhs.net Major Trauma Coordinator
   James.stevens1@nhs.net - Patient Flow Manager
   Karentownsend@nhs.net - Acute Directorate Manager

St Helens and Knowsley Teaching Hospital NHS Trust

1. Switchboard: 0151 426 1600 Handover: 0151 430 1070 (fax)
2. Bed Management Team: 0151 426 1600 bleep 7263.
   Reverse transfer form: by fax to 0151 430 1070
3. Tracey Walker - Interim Operational Lead for Major Trauma 0151 430 1159 or Phil Nee Assistant Director or Operations for Surgery 0151 430 1137

Wirral University Teaching Hospital NHS Foundation Trust

1. Switchboard: 0151 678 5111 Handover: wuthbedmanagement@nhs.net
2. Bed Management Team: Extension 2845
3. Reverse transfer form: wuthbedmanagement@nhs.net

Southport and Ormskirk Hospital NHS Trust

1. Switchboard: 01704 547471 Handover: soh-tr.bed-managers@nhs.net
2. Bed Management Team: 01704 547951 ask for Ascom/Bleep 3800.
3. Reverse transfer form: soh-tr.bed-managers@nhs.net

jenni.riley@nhs.net Major Trauma Coordinator : Bleep via switch ext 3908
mike.aisbitt@nhs.net Trust Trauma Medical Lead
maxine.callaghan@nhs.net AED Matron

Warrington and Halton Hospitals NHS Foundation Trust

1. Switchboard: 01925 635911 Handover: 01925 662789 (fax)
2. Bed Management Team: 01925 635911 Bleep 899.
   Reverse transfer form: by e-mail to WHH_Trauma_Mailbox@whh.nhs.uk
3. Ortho - Matron C Finney ext. 5761 or Bleep 520 Sheila Fields Delaney, Ass Gen Manager Ortho - via switch
4. Surgery - Matron J Burgess ext. 5140 or Bleep 226 Mr.T Liversedge Asst Gen Manager Surgery - via switch
5. Medicine –Matron Ext.5314, Bleep 255 Dawn Forrest , Asst Divisional Director - via switch

*Useful contact – Sue Wilde, Major Trauma Coordinator - susan.wilde@whh.nhs.uk

Nobles Hospital, Isle of Man

Switchboard: 01624 650000 – Working hours (Mon-Fri) ask for Bed Managers
Out of hours (Inc. Bank Holidays and weekends) ask for site manager

SECTION 2: SUGGESTED TRIGGERS FOR MAJOR TRAUMA TEAM ACTIVATION

The designated Trauma Team Leader in the ED may choose to activate the trauma team based upon other parameters or clinical decision making.

Anatomical

- Airway compromise
- Inadequate and unsupportable breathing
- Uncontrolled haemorrhage
- Penetrating trauma to head, torso, back, abdomen or groin
- Signs of significant chest injury – tension, open or large pneumothorax, flail segment, suspected massive haemothorax
- Amputated limb(s)
- >1 long bone fracture
- Suspected significant pelvic fracture

Physiological

- Respiratory rate <9 or >30
- Systolic blood pressure <110 mmHg
- GCS <12

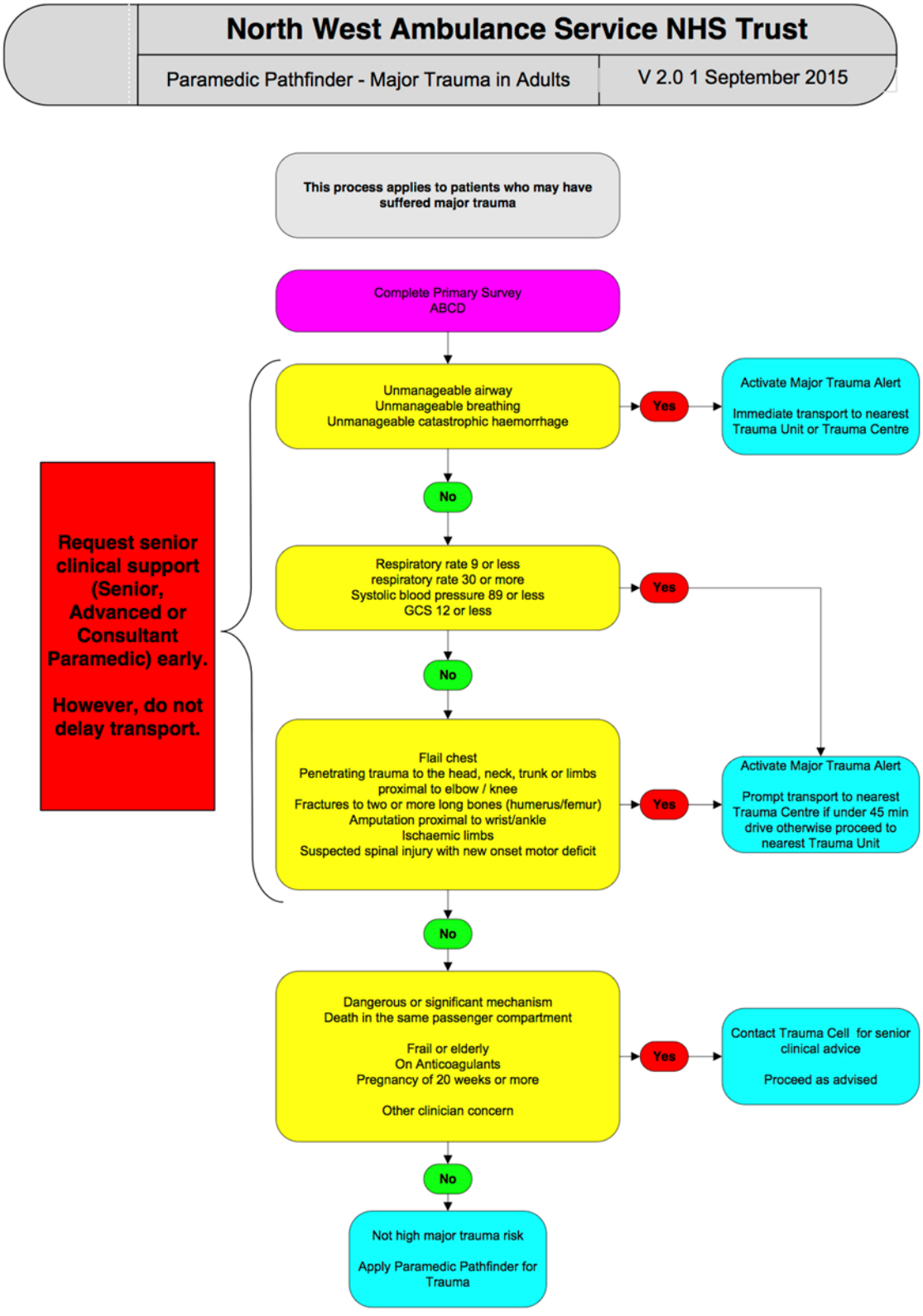
Mechanism

- Falls greater than 3 metres
- Falls down a full flight of stairs
- High impact RTC
- Ejection from motor vehicle
- Death of another person in same passenger compartment
- Pedestrian or cyclist hit by a vehicle
- Significant injuries suggested by mechanism not listed

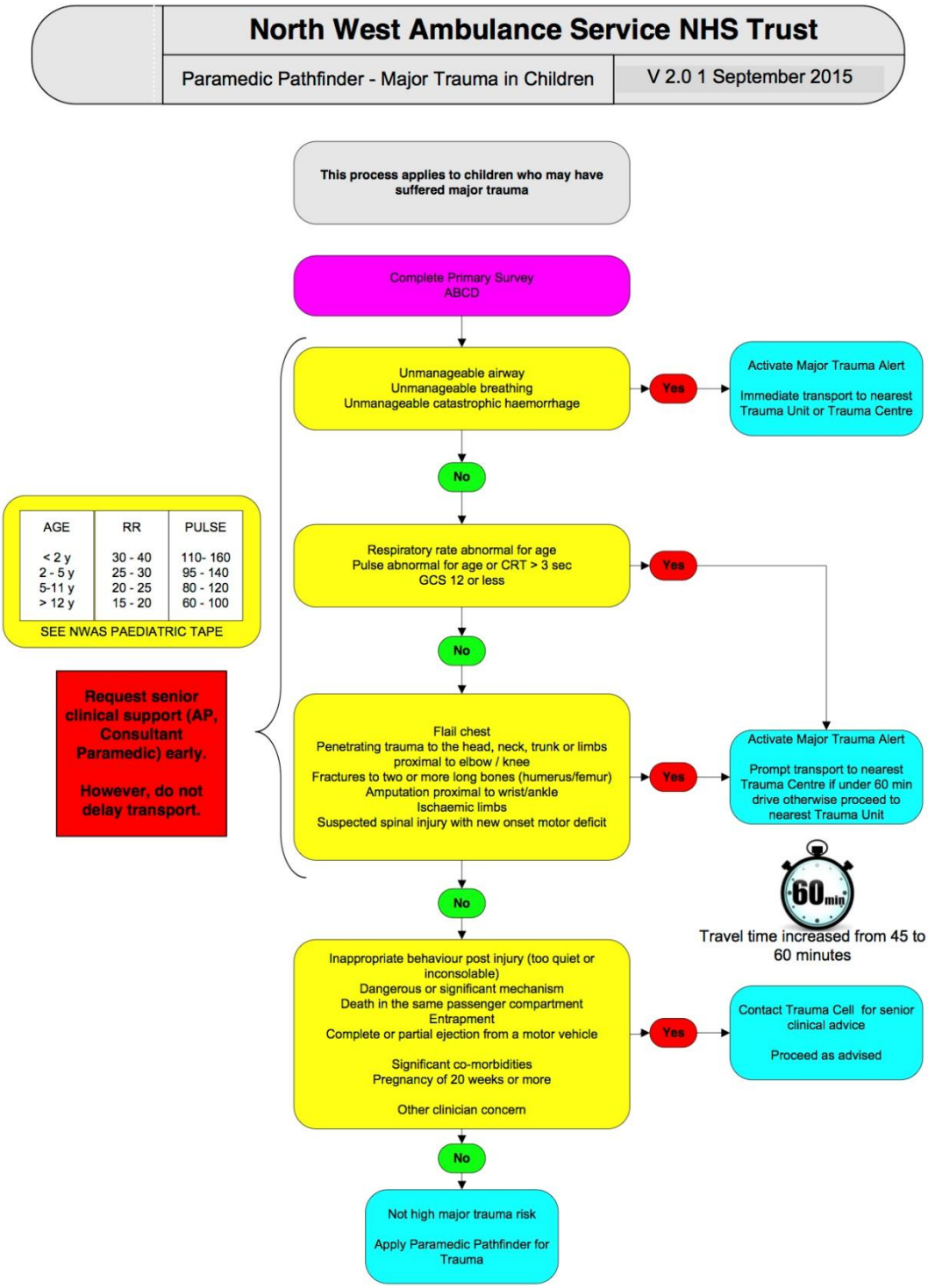
Other Triggers to consider

- Elderly/frail patients
- Significant co morbidities
- Pregnancy
- Paediatrics (Altered GCS, Cap Refil >3seconds,HR >130)
- Other clinician concern

SECTION 3: MAJOR TRAUMA PARAMEDIC PATHFINDER (ADULTS)



SECTION 4: MAJOR TRAUMA PARAMEDIC PATHFINDER (CHILDREN)



SECTION 5: TRAUMA CT

STANDARDS OF PRACTICE AND GUIDANCE FOR TRAUMA CT IMAGING

Content:

1. Introduction:

Cheshire and Mersey Agreed Trauma Protocol

Whole body MDCT is recommended as the investigation of choice by the Royal College of Radiologists (RCR) document, ***"Standards of Practice and Guidance for Trauma Radiology in Severely Injured Patients"*** June 2011.

The purpose of this guidance is to have set standards relating to diagnostic and interventional radiology for use by major trauma centres (MTCs) and trauma units (TUs) relating to:

1. The provision of protocols for imaging and reporting that may be adapted according to local regional service requirements and equipment
2. Diagnostic and interventional radiology appropriate use in management of trauma patients ''

Standard 9 in accordance with RCR guidelines recommends that imaging protocols should be clearly defined and uniform across the regional trauma network.

2. Key Points:

1. Imaging and intervention

There should be consultant input for imaging and intervention in Major Trauma.
A final report should be made available within 1 hour of Multi detector CT imaging (MDCT) acquisition.
All Radiology Trainee reports must be reviewed by a Consultant within 24 hours.
A consultant must be available on-call to provide support and review any images when there is uncertainty about CT findings.

2. Digital radiography (DR) must be available in the emergency room

Focused abdominal sonography in trauma (FAST) does not offer any additional information to that obtained with a CT scan and should not be performed if it would delay transfer to CT.
If patient is haemodynamically unstable to be transferred to CT, FAST can be performed.

3. MRI

MRI is not indicated in the setting of acute trauma care.
In MTC, it should be available 24 hours a day, seven days a week.
In a TU without access to 24-hour MRI, formal written protocols should be in place for the transfer of patients to a facility that has 24-hour MRI.

4. Polytrauma protocol MDCT indications:

Haemodynamic instability
Mechanism/presentation suggests significant injuries that cannot be excluded by clinical examination or plain films
FAST (if used) has demonstrated intra-abdominal fluid
Plain films suggest significant injury, such as pneumothorax, pelvic fractures
Significant injury suspected on clinical assessment

Once the decision is taken to request an emergency MDCT, plain films of the Chest, C-spine or pelvis are usually irrelevant and extremity imaging should be delayed until life- threatening injuries have been diagnosed and treated.

5. Preparation and transfer to MDCT

There should be agreed local protocols with clear attribution of responsibility for every stage.

IV access in the Right antecubital fossa is preferred for contrast administration. Avoid small peripheral lines on hands. Central lines cause unnecessary delay in CT scanning.

Cervical spinal injury precautions and pelvic binders should remain in place until the MDCT has been fully assessed

6. Patient selection

Any patient who triggers the pre-hospital major trauma pathway will also trigger agreed in-hospital trauma team criteria and should have ‘’Whole Body Trauma CT
See below:

Clinical Findings:

Cardiovascular instability
Neck injury, which cannot be clinically assessed
GCS <12
Severe blunt chest or abdominal injury
Fractures of 2 or more proximal long bones
New onset neurological signs
Penetrating injuries – gunshot or blast
Fall >3m
Fall down full flight of stairs
Entrapped patients
Complete or partial ejection, unrestrained passenger
Death in same passenger compartment
Patients with significant co-morbidities, including pregnancy
NICE guidelines where applicable on imaging for relevant injury

Use clinical judgment for patients with:
Crushed, mangled or degloved extremity
Amputation of limb proximal to wrist or ankle
Stab wounds

Decision-making regarding 'stability' for transfer from ED to other clinical areas e.g. CT can be difficult. Consider what is necessary, priorities for transfer and risks versus benefits.

1. Radiographer activates Major Trauma CT protocol

2. If a patient with **SBP<90 mmHg** is to go to CT, this must be agreed between the anaesthetist and trauma team leader.

3. Patients with **SBP 70-90 mmHg** may benefit from the diagnostic accuracy of a scan but the decision is difficult:

    a. If high volumes of fluid are needed to maintain this BP a CT may not be safe.
    b. Consultant anaesthetist must be aware
    c. If intra-abdominal bleeding suspected, Consultant General Surgeon must be aware.
    d. Trauma team should accompany patient to CT

4. Patients with **SBP<70 mmHg** should probably go to theatre, not CT. Haemorrhage control takes priority over imaging.

5. Resuscitation continues during CT, take blood products to CT if relevant and continue to monitor and warm the patient throughout.

6. Transfer using scoop stretcher if pelvic fractures are likely.

7. MDCT Imaging Protocol (See Appendix)

8. Reporting

Initial primary survey review

The aim of this is to give an immediate indication of the major life-threatening injuries while active management continues. The initial images should be reviewed looking for thoracic injuries that might impair breathing, vascular injuries that might cause bleeding and neurological injuries that might cause disability if not treated rapidly. A suggested CT primary survey pro forma is provided (see appendix 2).
Such a form should be filled in at the time, signed and dated.

Secondary/definitive report

Once the primary survey review has been communicated to the trauma team, the scan should be carefully reviewed and the secondary trauma report completed ideally by a Consultant Radiologist (see appendix 3).
Out of hours the Consultant Radiologist should be contacted to review the scan and provide a definitive report within 1 hour if any concern exists.
All trauma scans done out of hours should be reviewed by a Consultant Radiologist within 24 hours.

Addendums to report:
If any addendums on reports with significant extra findings, the results should be conveyed by the reporting Radiologist to the responsible clinician.

Appendix 1: TRAUMA CT PRIMARY SURVEY INITIAL REPORT

NOTE: THIS IS A PRELIMINARY FIRST READ TO IDENTIFY MAJOR LIFE THREATENING INJURIES AND GUIDE INITIAL MANAGEMENT; A FORMAL COMPLETE DETAILED REPORT WILL BE VERIFIED ON THE SYSTEM AS SOON AS POSSIBLE AND WILL REPLACE THIS INITIAL INSTANT SURVEY

PATIENT NAME/ IDENTIFIER		
DATE : / / 201		TIME : :
RADIOLOGIST		

AIRWAY

ENDOTRACHEAL TUBE	N/A	SATISFACTORY	NEEDS REVISION
AIRWAY OBSTRUCTION		YES	NO

BREATHING

PNEUMOTHORAX	RIGHT		LEFT	
CONTUSION	RIGHT		LEFT	
LACERATION	RIGHT		LEFT	
CHEST DRAIN	RIGHT OK	RIGHT REVISE	LEFT OK	LEFT REVISE

CIRCULATION/BLEEDING

THORACIC		
ABDOMINAL		
PELVIC		
OTHER		

MAJOR DISABILITY

INTRACRANIAL INJURY / BLEED		
CERVICAL SPINE		
THORACIC SPINE		
LUMBAR SPINE		
PELVIS		

CLINICAL CONTACT	**NAME**
EMERGENCY DEPARTMENT	
TRAUMA AND ORTHOPAEDICS	
TRAUMA/GENERAL SURGERY	
NEUROSURGERY	
VASCULAR SURGERY	
ANAESTHETICS/ITU	

ADDITIONAL NOTES:

SIGNATURE Please submit this preliminary report to the Trauma Team Leader for inclusion in the patient's trauma document.

Appendix 2: Body CT Trauma Reporting Template:

1. CT HEAD and FACIAL BONES:
2. CT CERVICAL SPINE, including reformats :
3. CHEST :

Lungs:
Trachea Bronchial Tree:
Aorta:
Heart and Mediastinum:
Diaphragm:
Chest Wall, Sternum and Ribs:
Other including foreign bodies, tubes and lines:

4. ABDOMEN and PELVIS :

Peritoneal fluid (Inc. HU)
Peritoneal free air:
Liver:
Rt Kidney and Adrenal:
Lt Kidney and Adrenal:
Pancreas:
Spleen:
Aorta and Retro peritoneum:
Bowel and Mesentery:
Bladder:
Other Pelvic Organs:
Abdominal Wall and Back Musculature:
Other, including foreign bodies, lines etc.:

5. SKELETAL IMAGING :

Thoraco-Lumbar Spine including reformats:
Pelvis:
Other:

OTHER:

CONCLUSION:

COMMUNICATIONS:

SECTION 6: TRAUMA TEAM ROLES

The following roles and responsibilities represent a minimum requirement for the Trauma Team but may require adjustment according to local policies.

Suggested Membership:

- Trauma Team Leader (ED Consultant)
- Anaesthetist (ST3 grade or above)
- ODP
- ED Dr 2
- General surgical doctor
- Orthopaedic doctor
- Lead nurse
- ED Nurse 2
- Scribe
- Runner
- Radiographer

Trauma Team Leader (ED Consultant)

- Activate a 'code red' trauma call based on pre-hospital alert if appropriate
- Designate team roles to trauma team members
- Ensure appropriate PPE worn by team members
- Obtain the handover from the pre-hospital team
- Activate and authorise major haemorrhage protocol if appropriate
- Oversee the initial trauma resuscitation and decide upon treatment priorities as necessary
- Decide upon appropriate investigations and timely interpretation of results
- Decides upon appropriate patient disposition and takes overall responsibility for safe transfer of patient – CT, theatre, Interventional radiology, Critical care, ward or other hospital.
- Liaises directly with other specialities as required
- Talks to relatives
- Ensures patient notes are adequately completed
- Stands down the trauma team in a timely manner

In **exceptional** cases, such as the need to perform a resuscitative thoracotomy it **may** be appropriate for the TTL to delegate this role to another team member. This is a decision for the TTL to make on a case by case basis.

Anaesthetist & ODP (Airway)

- Perform an airway assessment and take responsibility for airway control ensuring adequate simultaneous cervical spine control
- In liaison with the TTL, decide upon the need for and perform intubation

- Ensure optimal ventilation
- Assist with the provision of suitable analgesia or sedation
- Assess pupils
- Co-ordinate the log-roll
- Consider the need for invasive monitoring – any insertion of arterial or central lines must not unnecessarily delay the transfer of a patient to CT or other destination.
- Communicate clearly with the TTL and escalate any change in airway status
- Co-ordinate timely transfer of patient if anaesthetic escort required
- Ensure notes are completed and drugs clearly prescribed.

Doctor 1 (Breathing and Circulation)

- Performs primary survey
- Communicates findings clearly and systematically to the TTL and scribe
- Obtains AMPLE history

A Allergies
M Medications
P Past medical history
L Last meal
E Environment and everything else relevant

- Undertakes procedures deemed necessary by the TTL and dependent on skill level and training – e.g. haemorrhage control, intercostal drain insertion, tourniquet or pelvic binder application
- Perform secondary survey.
- Documents clearly in the notes

Doctor 2

- Obtain IV/IO access –as indicated(draw20mls blood for sampling)
- If unable to obtain IV access or patient in extremis, IO access should be used. The humeral head is the optimal site.
- Order the necessary lab tests and imaging

Orthopaedics

- Complete documentation
- Liaise with senior orthopaedic surgeon
- C Spine immobilisation during RSI
- Arrange splinting/POP application to long bone fractures
- Assist with secondary survey

Surgery

- Complete documentation
- Liaise with senior surgeon

- Assist with external haemorrhage control
- Assess abdomen
- Insert urinary catheter

Lead Nurse

- Ensure nursing roles are delegated to appropriately trained members of staff
- Preparation for and assistance with any interventions deemed necessary by the TTL
- Support the other nursing team members
- Clear and concise communication with the TTL to ensure nursing roles are fulfilled
- Liaise with police, family and other agencies and departments as needed

Scribe

- Documents clearly the members of the trauma team, the time of arrival and ensures they complete the relevant sections of the document
- Writes a clear timeline of the significant events occurring throughout the trauma call
- Communicates clearly and effectively with the TTL
- Ensures relevant data capture for TARN submission

Nurse 2

- Removes patient clothing and apply monitoring equipment
- Double check correct completion of all blood sample requests prior to them being sent to the lab
- Monitor and record fluid balance and note all blood products used in accordance with trust policy
- Prepare and utilise rapid infuser as requested
- Administer Tranexamic acid

Runner

- Ensures transfer equipment (oxygen cylinders, suction, transfer bag, drugs) is immediately available in resus to facilitate transfer
- Liaise with lead nurse
- Collect blood and blood products as requested
- Ensure blood samples are delivered to the lab for immediate processing

ODP

- Support anaesthetist in airway management
- Prepare equipment and drugs for intubation
- Liaise with theatres
- Facilitate patient transfer

SECTION 7: ABDOMINAL TRAUMA

Abdomen

FAST and CT are the main adjuncts for the evaluation of abdominal trauma in adults. Formal ultrasound is usually first line investigation in children – discuss with the surgeon and the trauma team radiologist should be able to facilitate.

1. **Clinical abdominal assessment is difficult. The surgical SpR /consultant should assist in the clinical assessment**

    a. Peritonitis requires a laparotomy.
    b. Equivocal or negative findings with other injuries or confounding factors require further investigations.
    c. Patients with head/chest injuries and lower limb/pelvis injuries require formal **exclusion** of abdominal injury regardless of absent physical signs as the risk of abdominal injury is significant.

2. **FAST**

    a. Focused assessment with sonography for trauma is a **rule in** investigation only and cannot be used to rule out an injury.
    b. A negative FAST means nothing.
    c. FAST only looks for fluid in the perihepatic, perisplenic, pericardiac and pelvic region.
    d. An unstable patient with fluid on FAST should have a laparotomy.
    e. A stable patient with a positive FAST should have a CT to determine the source of bleeding. CT should not be delayed in order to do a FAST scan.
    f. Repeat the FAST as the situation evolves.

3. **CT**

    a. Free fluid (blood) in the abdomen on a trauma CT without solid organ injury requires a laparotomy
    b. Solid organ injury on CT in a stable patient may be managed conservatively in a critical care area with frequent (1-2 hourly) reassessment by the General Surgical Registrar
    c. Development of peritonitis or cardiovascular instability requires a laparotomy
    d. There is a 2-15% incidence of missed hollow viscus injury in patients with solid organ injury – **BEWARE**
    e. The lack of free air on an abdominal CT does NOT rule out hollow viscus injury

The General Surgical Consultant should be present for all trauma laparotomies.

INDICATIONS FOR EMERGENCY LAPAROTOMY (WITH OR WITHOUT CT):

1. Unstable patient with abdominal trauma
2. Clinical peritonitis
3. Unstable patient with positive FAST
4. Unstable patient with free fluid on CT
5. Evidence of hollow viscus injury on imaging
6. Retained weapon

7. Gunshot wound abdomen
8. Evisceration
9. Free fluid (Blood) in the abdomen on a trauma CT without solid organ injury

All unstable patients or patients with peritonitis and evidence of abdominal injury require an immediate laparotomy

Walton Guidelines for Head Injured Patients

Patient in CT scan with history of head trauma for CTB

Acute subdural blood clot > 1.5cm thickness
or
Extradural blood clot >1.5cm thickness

Neuroradiological evidence of TBI e.g. contusions, SAH, acute subdural<1.5, depressed skull fracture **or** no radiological abnormality and GCS <13

Complete full trauma CT while in scanner

GCS < 9

GCS 9-14

*Discuss with neurosurgical registrar on-call via switch 0151 525 3611

ACTIVATE WALTON RAPID ACCESS PROTOCOL

- Call 0151 529 4455 to inform WCFT patient fulfils criteria and is ready for transfer.
- Complete "AT MIST" rapid handover proforma –Fax to WCFT **0151 529 5510** (prior to transfer)

Exclusion criteria

- **Severe co-morbidities e.g.** severe cardiorespiratory disease
- **Severe extracranial injury e.g. life threatening or leading to cardiovascular instability.**
- **Fixed and dilated pupils**
- **Haemodynamic instability**

***Discuss with neurosurgical reg on-call**

Accepted for transfer Walton

Not accepted for transfer

Consider transfer via Aintree ED if no urgent neurosurgical intervention required.
01515292325

Refer Walton Neurotrauma clinic for follow up

SECTION 9: BOAST 2: SPINAL CLEARANCE IN THE TRAUMA PATIENT

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 adnormality.

SECTION 10: MANAGEMENT OF OPEN FRACTURES IN CHESHIRE AND MERSEY

Principles

1. Initial treatment should be given as recommended by BOAST 4.
2. 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
3. Centres that cannot provide combined plastic and orthopaedic surgical care for severe open tibial fractures require protocols for the early transfer of the patient to an appropriate specialist centre
4. Operation should occur on a scheduled trauma list within normal working hours and within 24 hours of the injury, unless there is marine, agricultural or sewage contamination

Assessment

Assessment classification is by Gustillo as per table below:

Gustillo Grade	Definition
I	Open fracture, clean wound <1cm in length
II	Open fracture, wound 1-10cm in length without extensive soft-tissue damage, flaps, avulsions
III	Open fracture with extensive soft-tissue laceration (>10cm), damage, or loss or an open segmental fracture. This type also includes open fractures caused by farm injuries, fractures requiring vascular repair.
IIIA	Type III fracture with adequate periosteal coverage of the bone despite the extensive soft-tissue laceration or damage.
IIIB	Type III fracture with extensive soft-tissue loss and periosteal stripping and bone damage. Usually associated with massive contamination. Will often need further soft-tissue coverage procedure
IIIC	Type III fracture associated with an arterial injury requiring repair, irrespective of soft-tissue injury

Proposed Treatment Pathway

- Initial treatment should be given as recommended by BOAST 4.
- Heavily contaminated wounds require urgent washout in theatre at the admitting hospital unless immediate transfer to another unit is planned and time to theatre will not exceed 6 hours from time of injury
- The majority of type I and II injuries are currently treated in the receiving hospital by the attending orthopaedic team; no change to this process is required
- Type IIIC injuries require vascular surgery input, and therefore if this facility is not available within the admitting hospital, the patient should be sent to an appropriate centre
- Type III B injuries should be managed in a centre with both expert orthopaedic and plastic surgeons in the management of these injuries
- Type IIIA injuries need to be assessed by the admitting Orthopaedic team, and if they do not feel able to offer the expertise required to manage the patients injuries, the patient should be transferred as for a type IIIB

SECTION 11: BOAST 4: MANAGEMENT OF OPEN FRACTURES AND COMPARTMENT SYNDROME

BRITISH ORTHOPAEDIC ASSOCIATION and BRITISH ASSOCIATION OF PLASTIC, RECONSTRUCTIVE AND AESTHETIC SURGEONS STANDARD for TRAUMA – 2009

BAPRAS
British Association of Plastic Reconstructive and Aesthetic Surgeons

BOAST 4: THE MANAGEMENT OF SEVERE OPEN LOWER LIMB FRACTURES

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

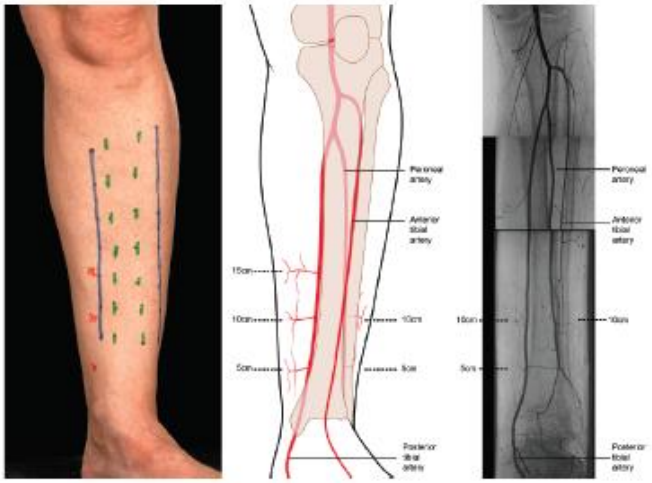
Soft tissue injury:
- Swelling or skin loss, such that direct, tension-free wound closure is not possible
- Degloving
- Muscle injury that requires excision of devitalised muscle via wound extensions
- Injury to one or more major arteries of the leg
- Wound contamination with marine, agricultural or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

Standards for Practice Audit:

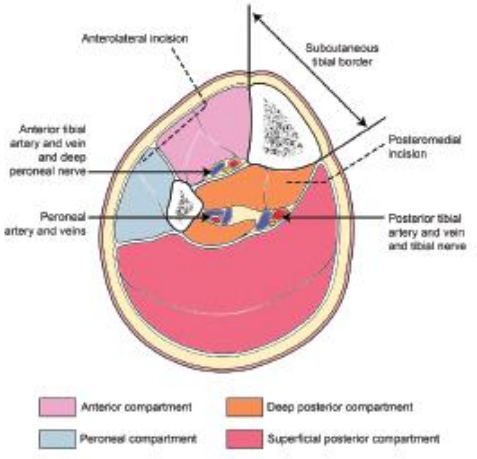
1. Intravenous antibiotics are administered as soon as possible, ideally within 3 hours of injury: Co-amoxiclav (1.2g) or Cefuroxime (1.5g) 8 hourly and are continued until wound debridement. Clindamycin 600mg, 6 hourly if penicillin allergy
2. The vascular and neurological status of the limb is assessed 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 72hours 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

Evidence Base:
Derived from the 2009 BOA/BAPRAS Standards for the Management of Open Lower Limb Fractures. This is based upon case series, case-controlled studies and reviews together with an evolved, multi-national, professional consensus over 15 years.

Limitations:
There is inconclusive evidence to the best method of skeletal stabilisation.

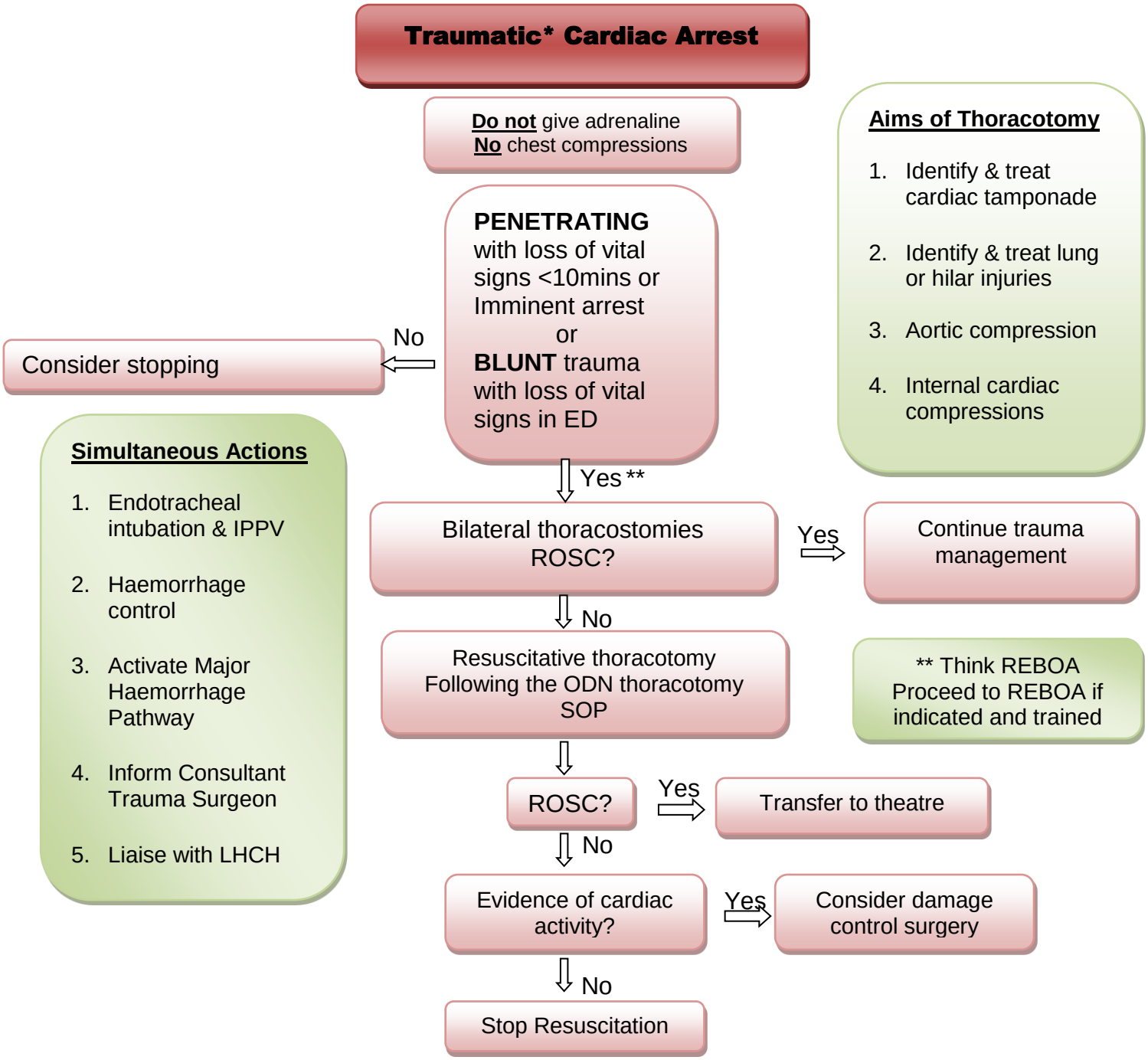


Recommended incisions for fasciotomy and wound extensions. (a) Margins of subcutaneous border of tibia marked in green, fasciotomy incisions in blue and the perforators on the medial side arising from the posterior tibial vessels in red. (b) line drawing depicting the location of the perforators. (c) montage of an arteriogram. The 10cm perforator on the medial side is usually the largest and most reliable for distally-based fasciocutaneous flaps. In this patient, the anterior tibial artery had been disrupted following an open dislocation of the ankle; hence the poor flow evident in this vessel in the distal 1/3 of the leg. The distances of the perforators from the tip of the medial malleolus are approximate and vary between patients. It is essential to preserve the perforators and avoid incisions crossing the line between them.



Cross-section through the leg showing incisions to decompress all four compartments

SECTION 12: TRAUMATIC CARDIAC ARREST GUIDELINE



*Consider non traumatic arrest if a clear medical cause or if evidence of only minor trauma is evident. Continue with ALS guidelines in these cases

SECTION 13: BURNS GUIDELINE

Patients suffering from significant burn injury without airway or circulatory compromise will bypass local hospitals and be taken directly to Whiston hospital if within 45 minutes transfer time.

Burns greater than 15% Total Body Surface Area require intra venous fluid resuscitation. Please refer to **Appendix 3**, National Burn Care Referral Guidance for guidance on the most clinically appropriate level of Specialised Burn Service for treating burn injuries of varying severities.

See **Appendix 4** and **Appendix 5** respectively for National Burns Referral forms for Complex and Non-complex burns.

THE BURN TEAM (SHO AND REGISTRAR) CAN BE CONTACTED FOR ADVICE AND REFERRAL VIA WHISTON SWITCH BOARD ON 0151 426 1600

SECTION 14: VASCULAR TRAUMA

Guidelines on requesting a Vascular Surgery opinion
Major vessel injury requiring repair will usually present with either ischaemia or haemorrhage

KEY POINTS:

Ischaemia

- Hypotension and stress response will shorten tissue tolerance of ischaemia.
- May occur with open or closed injury mechanisms.
- Colour/temp/capillary refill: all reduced in shock, compare sides.
- Absent distal pulses on palpation and asymmetry suggest vascular injury.
- Major vascular injury is less likely with an ABPI measurement of >0.9.
- Identifying a distal Doppler signal does not confirm an adequate circulation.
- Neurological loss: may be ischaemic or associated nerve injury.

Haemorrhage

- May stop temporarily due to arterial spasm, look for associated ischaemia.
- Active extremity bleeding can usually be controlled with correctly placed manual pressure.
- A large, expanding or pulsatile haematoma suggests major bleeding.

Information to have when contacting vascular surgeons

- Mechanism of injury.
- Time since injury and / or tourniquet application.
- Site of injury.
- Haemodynamic status of patient & treatment undertaken.
- Appearance & basic vascular examination findings.

Management

Avoid delay.
Early vascular referral to plan management.
Correctly placed manual pressure to control haemorrhage.
Multi-disciplinary approach to peripheral injuries between Vascular, Plastics, Orthopaedic and Trauma Surgery.
CT Angiogram (especially if doing a CT for other indications).
High index of suspicion for injuries involving joint dislocations and penetrating injury next to major vessel.
Early correction of deformity with reassessment of vascular status.
Consider compartment syndrome particularly with crush injury or complex fractures.

Majority of aortic transections are co-managed with Thoracic Aortic Team at the LHCH. If there is a high index of suspicion of a thoracic aortic injury a CT angiogram should be performed. These injuries are often associated with other major injuries and a thorough assessment is critical. The transaction should not detract from other life threatening injuries, as these should often be addressed first.
Emergencies with a predominantly vascular element should be directed to RLUH where the Liverpool Vascular and Endovascular Service (LiVES) is centred. Patients with complex injuries may not be

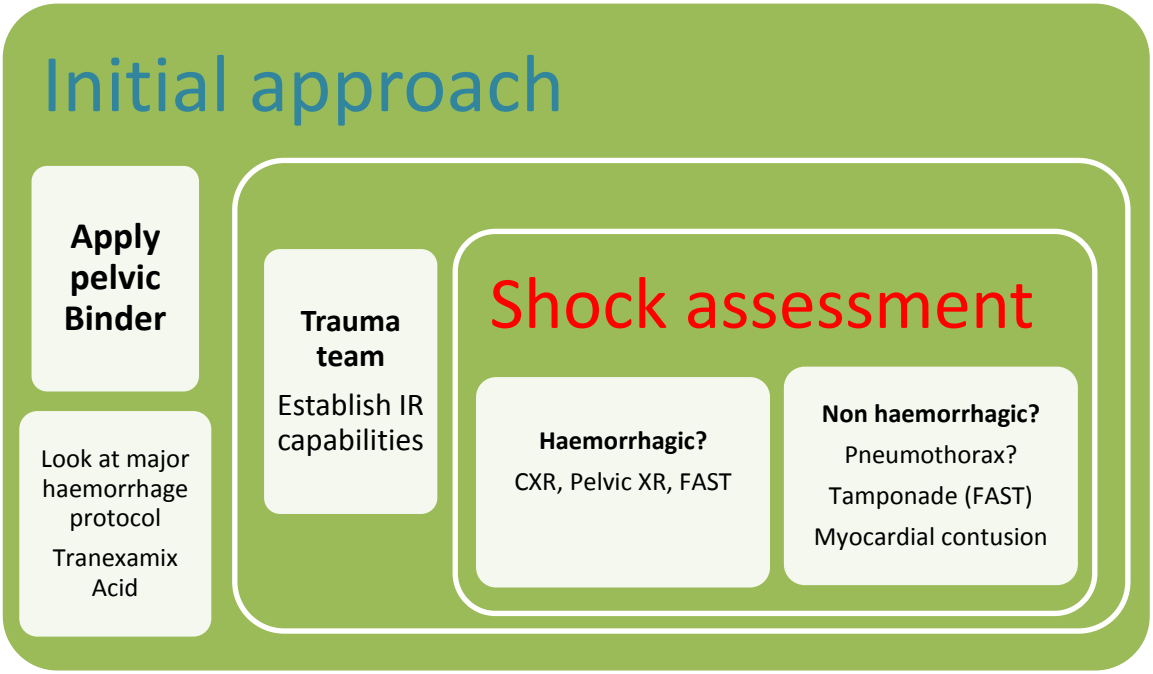
suitable for transfer to the RLUH vascular centre, and the vascular surgeon will travel to the appropriate centre to manage the patient.

Point of contact: Both the vascular registrar and consultant on call are available through RLUH switchboard; **0151 706 2000. Or directly via Aintree switchboard for Aintree based referrals.**

If a vascular opinion is required in the SMART centre area (Chester, Wirral, Warrington) there is a vascular surgeon based in the Countess of Chester Hospital contactable via switchboard (COCH) on **01244 365000**. Leighton patients should be referred to the Royal Stoke University Hospital MTC.

(If there is any uncertainty about the transfer or management of a patient with a suspected vascular injury we would encourage early discussion with the appropriate vascular team on call)

SECTION 15: PELVIC TRAUMA



Imaging

Pelvic xray

Be aware that this may be normal once pelvic binder is placed

CT scan

In patients who are stable enough CT head to pelvis is the trauma GOLD STANDARD

Care to be coordinated by team leader
.

CT may indicate the need for Interventional Radiology input. A pathway is in place to activate this.

FAST

Only to be used by credentialed staff.

Positive in unstable patient = Laparotomy

Negative is NOT RELIABLE

DPA

Diagnostic Peritoneal Aspiration without lavage by a senior surgeon via a supra-umbilical approch is the best test for excluding intraperitoneal haemorhage

Further management options

Consider discussing patient with on call Pelvic Consultant via Aintree Switchboard on

0151-525-5980

Standards for IR

Anaesthetic team will provide patient care in IR suite

Senior (Reg or above) General and Orthopaedic Surgeons to be in IR suite to liaise with interventionist

Theatre

Extraperitoneal pelvic packing (EPP)

Quickest option for major haemorrhage if IR not available

(requires discussion with surgical teams)

Damage control Laparotomy if:

FAST positive

DPA positive

Unstable despite EPP

Interventional Radiology (IR)

Indicated if:

unstable and non pelvic bleeding excluded

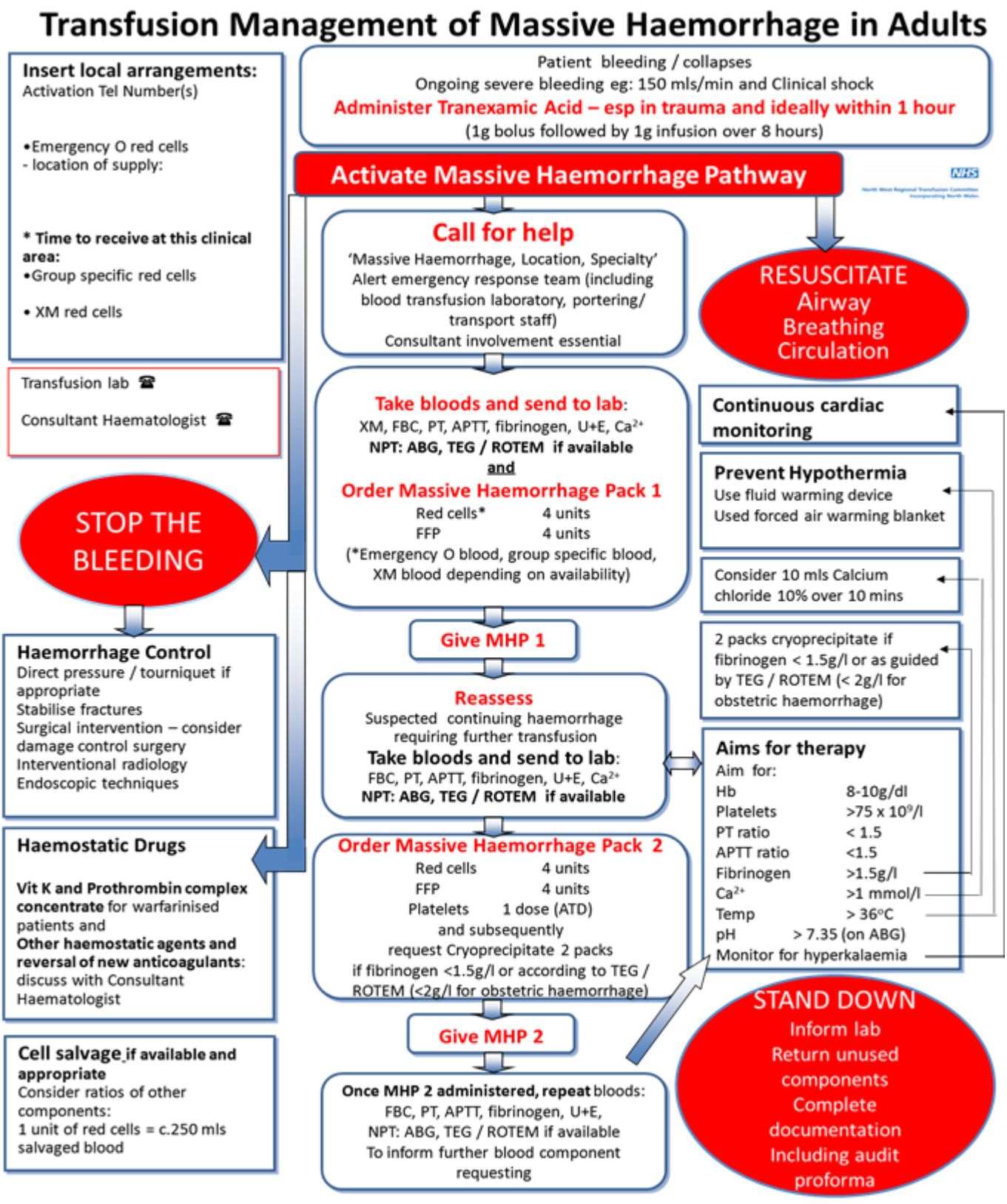
Contrast extravasation on CT

Bleeding after EPP

Bleeding after IR if initially negative

Consider if age >60 and complex fracture, even if stable (odds ratio 15 for intervention)

SECTION 16: MASSIVE HAEMORRHAGE PROTOCOL (ADULTS)



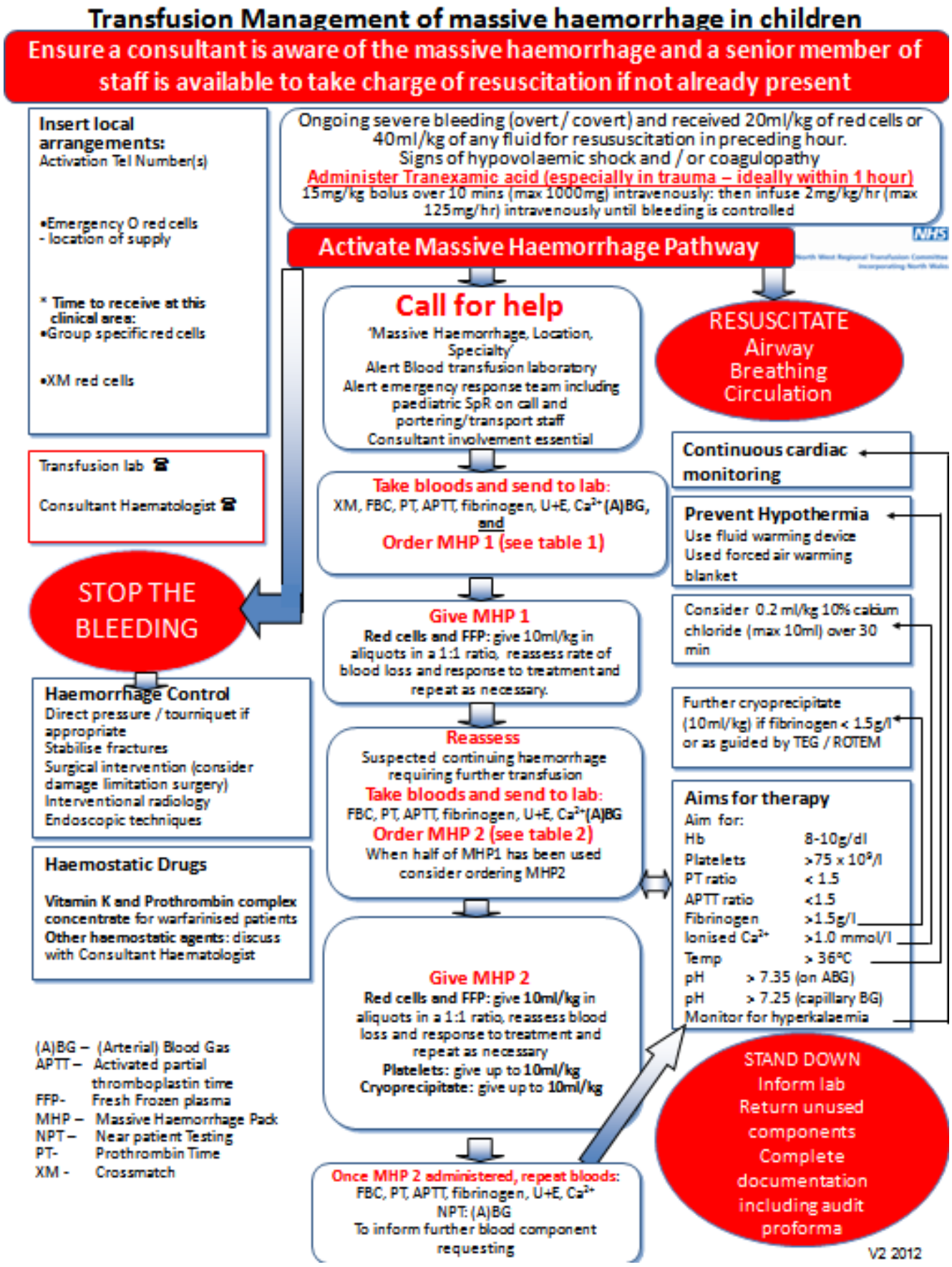
ABG – Arterial Blood Gas
FFP- Fresh Frozen plasma
PT- Prothrombin Time

APTT – Activated partial thromboplastin time
MHP – Massive Haemorrhage Pack
TEG/ROTEM- Thromboelastography

ATD- Adult Therapeutic Dose
NPT – Near Patient Testing
XM - Crossmatch

V2 2012

SECTION 17: MASSIVE HAEMORRHAGE PROTOCOL (CHILDREN)



SECTION 18: REVERSE TRANSFER POLICY

CHESHIRE AND MERSEYIDE MAJOR TRAUMA NETWORK

STANDARD OPERATING PROCEDURE FOR REVERSE TRANSFER

Version 1
July 2014

Cheshire and Mersey Major Trauma Network
Reverse Transfer Pathway
July 2014

Introduction:

Following a suspected major trauma, patients are either taken directly to one of the major trauma centres in the Cheshire & Mersey major trauma centre collaborative (MTCC) or if they are too unstable or under triaged to one of the major trauma units. The patients who arrive at a trauma unit are then assessed, stabilised and if deemed major trauma sent immediately to the MTCC for acute ongoing management. The trauma units access the MTCC via contact with the trauma team leader and this is a call and send service, not a referral request in the same way that the ambulance service uses a paramedic pathfinder tool to determine whether the patient should bypass their local trauma unit and go directly to the MTCC. The MTCC accepts all suspected major trauma patients irrespective of their current bed status. In order for the MTCC to provide this service it is essential that when patients have completed their acute care needs in the MTCC and are fit for an inter-hospital transfer that they are transferred back to their local trust for on-going care in a timely fashion.

Not all patients that arrive at the MTCC with suspected major trauma will require transferring back to their local hospital and there are several pathways which patients can take following assessment by the trauma team leader;

Options are:

- Discharge home, following a period of ward based observation.
- Admit for short or long stay care at the MTCC.
- Transfer to a more appropriate tertiary care facility, e.g. burns or cardiothoracic centre
- Reverse transfer to a designated Trauma Unit for inpatient care.

To facilitate this decision will be made by the MTCC Multidisciplinary team to request reverse transfer of patients back to their local trauma unit once the following points have been achieved.

- Once Immediate acute/ definitive care needs as provided by specialist teams within the MTCC have been completed
- On-going care and intervention can be appropriately and safely provided at on-going unit identified
- Patient is stable enough to undergo inter-hospital transfer.

This decision is the responsibility of the consultant with primary responsibility for the on-going care of the patient.

A reverse transfer may thus be for acute care, or planned care with rehabilitation.

Cheshire and Mersey Major Trauma Reverse Transfer Pathway

1. Following consultant review the patient is deemed suitable and fit for transfer back to their local hospital and on-going clinical needs identified.
2. The MT nurse coordinator contacts the trauma unit switchboard/ bed management team to establish which speciality team and consultant the patient needs to be transferred under.
3. The MTCC consultant contacts the Trauma Unit consultant at the proposed destination organisation to discuss the patient's care needs and handover.
4. The consultant in the Trauma Unit ensures that the wider receiving team are aware of and prepared to receive the patient.
5. Following the consultant to consultant handover the medical referral document is completed and faxed to the receiving speciality team
6. The MTCC will contact the bed management team at the receiving hospital and clearly state that this is a major trauma reverse transfer and the patient has been accepted by consultant "X"
7. The Trauma Unit bed management team will allocate a bed and accept the patient within 48hrs.
8. Following a bed being allocated the MTCC will then contact NWAS to request an appropriate vehicle to transfer the patient.
9. The transfer should take place between 08:00 – 20:00.
10. Prior to transfer the discharging unit/ inpatient team should ensure that the following documentation is ready to accompany the patient.
    - Copy of all medical documentation.
    - Discharge summary including detail of current medication
    - Rehabilitation Prescription/ passport
    - Transfers of imaging will be arranged by Trauma Coordinator if receiving unit does not have access to regional PACS system.
    - The above will be further supported by verbal handover from the nursing and therapy teams.
11. The MTCC has prime responsibility for the provision of a suitably trained and equipped transfer team (adhering to current critical care network standards) to
        - Supervise the care of the patient during transfer,
        - Handover to receiving staff, with a complete patient documentation set, results of investigations,
        - Handover the agreed treatment plan and rehabilitation prescription, including any plans for review at the MTCC.
12. Once the patient has left the care of the MTCC, the MTCC inpatient teams will continue to be available to provide additional information and advice/ instruction regarding the on-going management of the patient if this should be required.

Audit

The MTCC will maintain a database recording the date and time that all reverse transfer requests are registered with the TU bed management team and the date / time the patient leaves the MTCC. Reports from this database will feed in to the ODN and MTCC Boards and the annual re-accreditation process for the TU's.

Cheshire and Mersey Major Trauma Reverse Transfer Pathway

Escalation plan

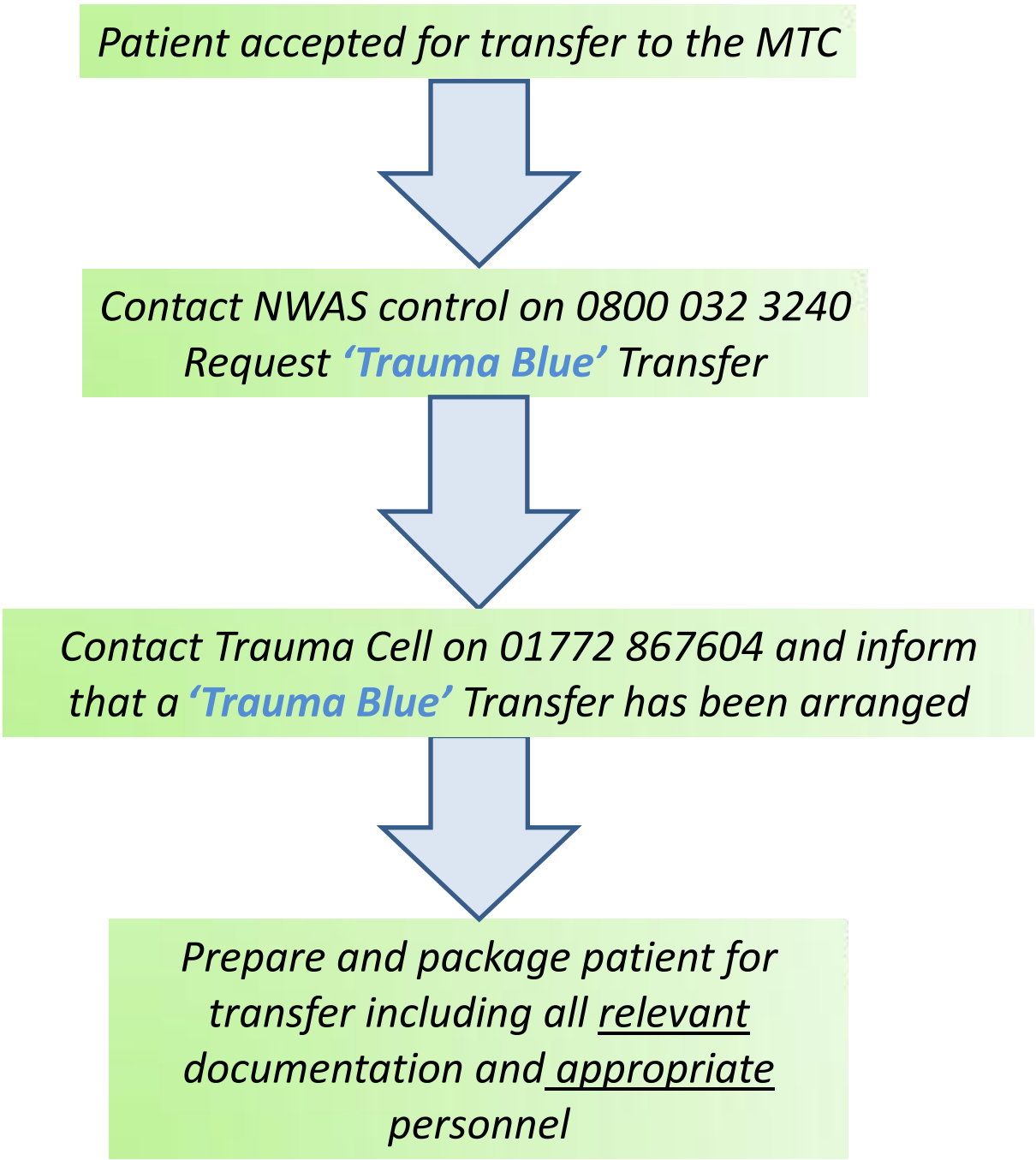
It is well recognised that all trusts in the Cheshire & Mersey major trauma network have constant bed pressures throughout the year and at times accepting patients that are in a bed, in a place of safety back into a trust that is under high pressure with competing priorities can be challenging. It is essential therefore that there is clear guidance for trusts to escalate during periods of high pressure to ensure that major trauma patients are prioritised in order to continue providing major trauma care as a network. All patients once accepted by the "home" consultant should be transferred in less than 48hrs. In instances when this does not occur the following process should be followed.

1. MTCC nurse coordinators to escalate to appropriate operational manager internally that patient is about to breach the 48hr timescale detailing all actions and communication to date
2. MTCC operational manager to contact divisional manager at receiving site
3. If no acceptable outcome then MTCC operational manager to escalate internally to executive team
4. Executive team at MTCC to contact executive team at receiving site
5. MTCC operational manager to inform clinical leads at both site and major trauma network

In order to reduce the number of patients that breach the 48hr timescale it is vital that the MTCC nurse coordinators highlight that this is a major trauma transfer at each point of communication and that the bed management teams at the trauma units are well briefed on the 48hr timescale for major trauma patients.

SECTION 19: TRANSFERRING MAJOR TRAUMA PATIENTS TO THE MTC

Transferring Major Trauma Patients to the MTC



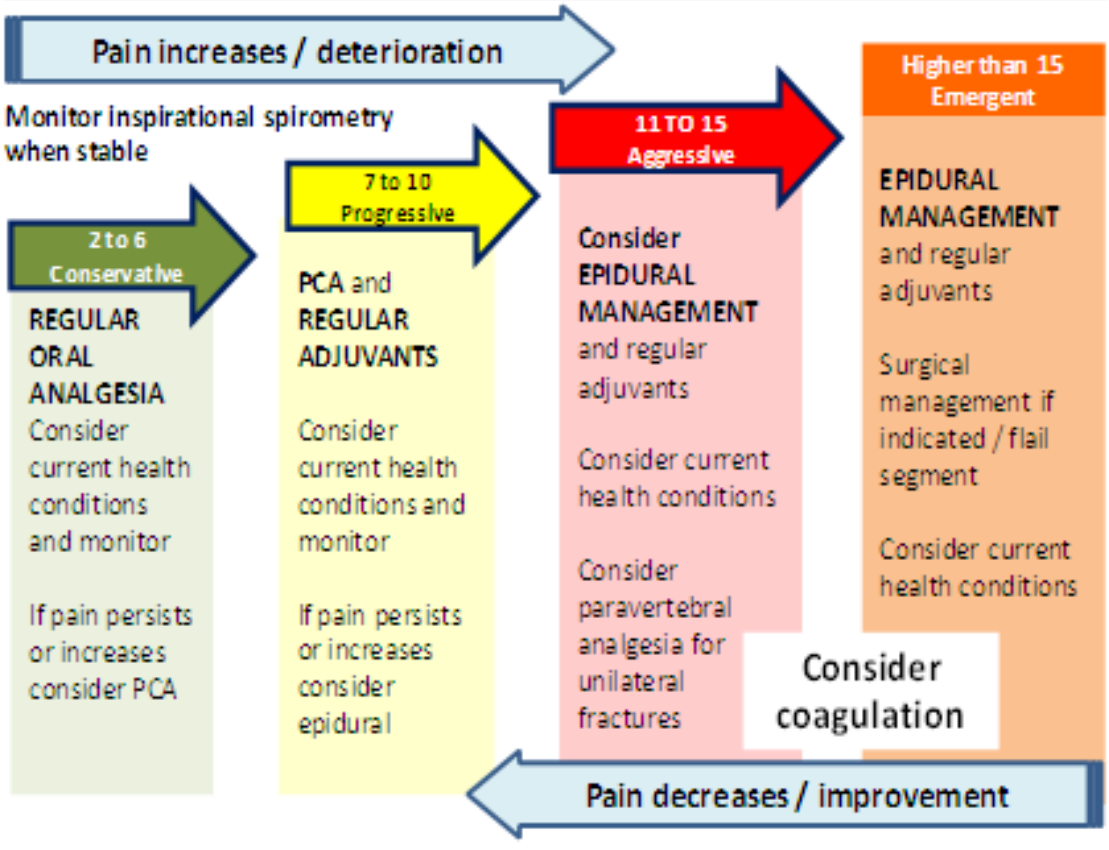
SECTION 20: CHEST INJURIES PAIN MANAGEMENT (RIB FRACTURE SCORING)

Use the Rib Fracture Score to identify appropriate pain management

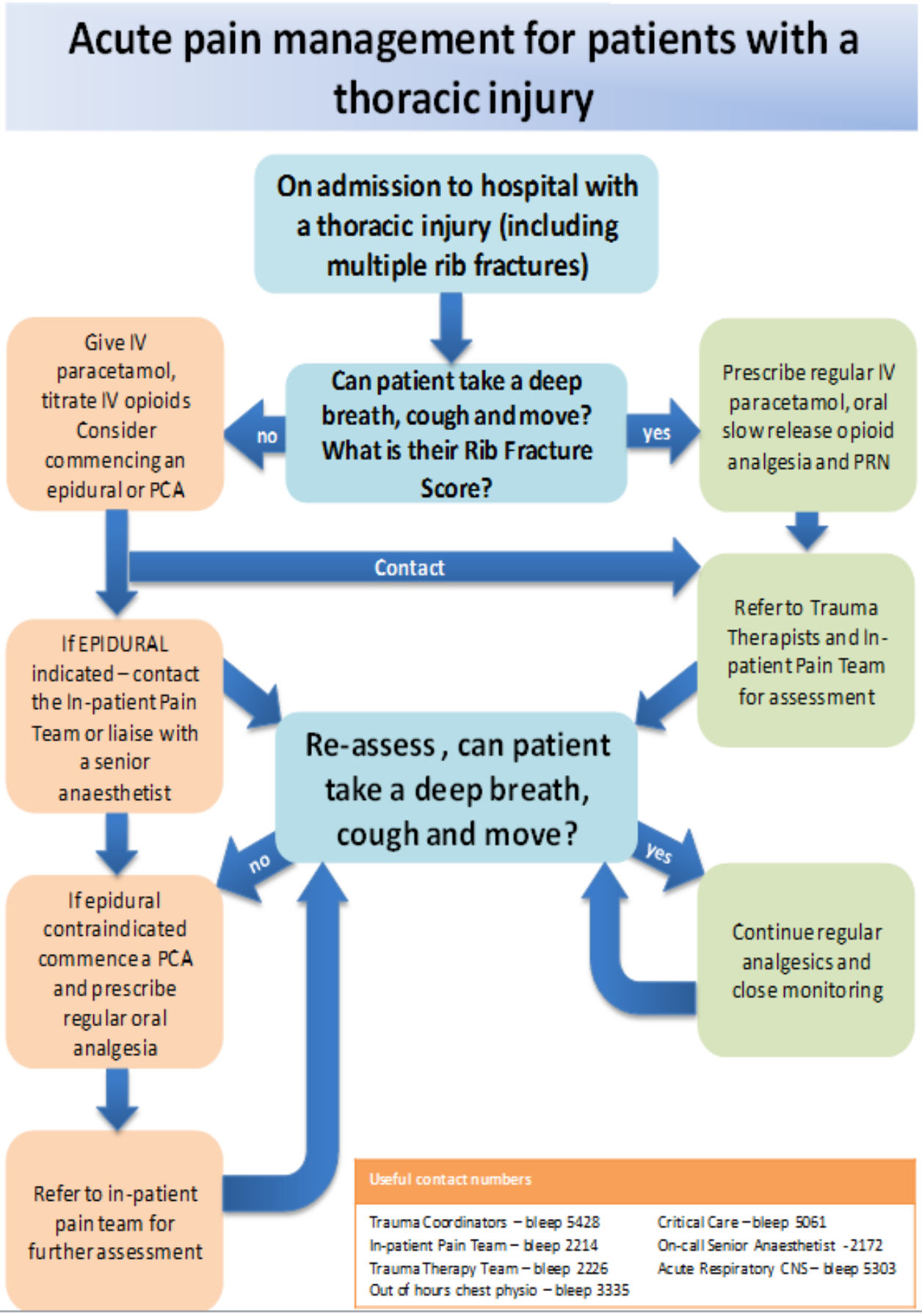
BREAKS	SIDES	AGE FACTOR
Number of fractures	Unilateral = 1 Bilateral = 2	Less than 50 = 1 51 to 60 = 2 61 to 70 = 3 71 to 80 = 4 Over 80 = 5

To calculate
BREAKS X SIDES + AGE = RIB FRACTURE SCORE

Combine the Rib Fracture Score and the pain management ladder idea

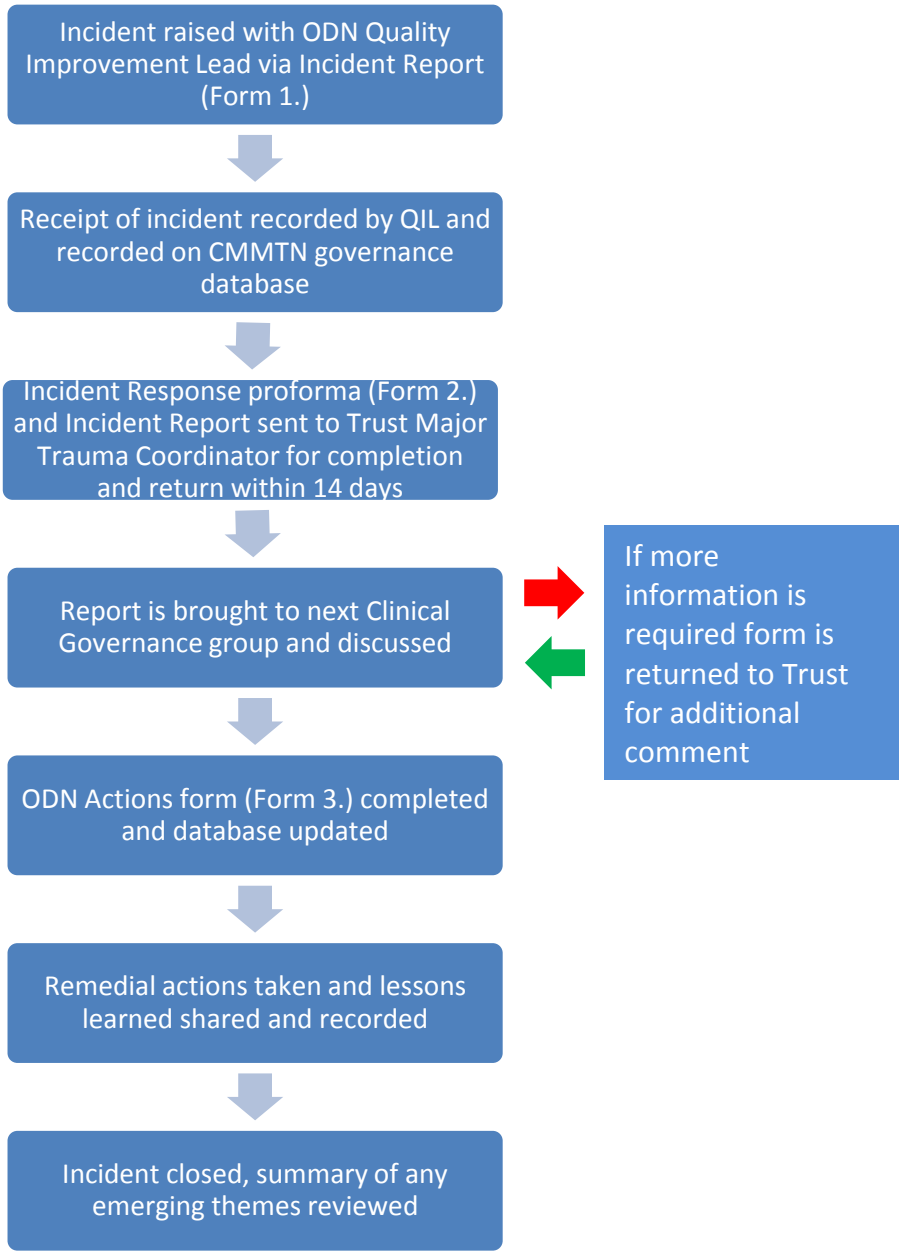


SECTION 21: ACUTE PAIN MANAGEMENT FOR THORACIC INJURIES



SECTION 22: NETWORK INCIDENT GOVERNANCE PROCEDURE

Incident Reporting Procedure and Governance Process Flowchart



SECTION 23: SPINAL CORD INJURY

Guidelines for referral of spinal trauma to the Walton Centre

WCNN will welcome and encourage referral of all patients with spinal fracture, generally will accept all spinal trauma patients with unstable injuries, and all patients with stable injuries with neurologic deficits.

Patients without significant spinal injury ex: patients with chip fracture of vertebral body or spinous process fracture usually will not require transfer to WCNN but can be discussed in the acute phase and reviewed at neurosurgical spinal outpatients.
In cases of Multi-trauma: discuss between units at consultant level to agree a management plan.

Criteria for suspicion of spinal injury

- Patients with altered consciousness suspect spinal injury if: *NICE 2007*
    1- fall > 1 metre or 5 stairs
    2- axial load on head
    3- Rollover motor accident
    4- Ejection from a motor vehicle
    5- Accident involving a motorised recreational vehicle
    6- Bicycle collision
    7- Diving accident
- Spinal pain and tenderness
- Neurologic deficit
- Distracting painful injury
- Suspicion of intoxication

Imaging

* X-rays of suspicious spinal region.
* Thin slice 1.5mm CT scan with sagital and coronal reconstruction indicated when:
  - No adequate visualisation on x-ray.
  - Patients with altered consciousness.
  - A spinal injury is detected on X-ray to evaluate details of injury.

When a cervical spine CT is requested we recommend extending study down to T4 level particularly in unconscious patients.

* Once proven spinal injury on imaging refers for spinal neurosurgical opinion, meanwhile maintain spinal precautions. Discuss need for MRI at time of referral.

* Spinal MRI indicated if
    - CT reveals fracture involving more than 1 column.
    - Significant soft tissue abnormality.
    - High risk for disc, ligament, vascular injury such as dislocation, or fracture through foramen magnum.
    - Any neurologic deficit (root or cord lesion).
    - If MRI indicated then whole spine MRI need to be carried out.

APPENDICES

Cheshire & Mersey Operational Delivery Network
Major Trauma Network

APPENDIX ONE: NETWORK TRAUMA MORTALITY PROFORMA

Mortality Review Proforma

(For Trauma Related deaths)

Review date | Ps

A. First Stage: Categorisation of Death

Patient Name…… Sex M F Hospital CS N°…….. ISS

TARN no……

Fix Addressograph

Date of Birth…… Age……..

Admitting Consultant

Date of Admission | Time of Admission

Bypass | Pre-alert Y / N | Trauma team activated Y / N

APACHE 2 score

Case summary including factors contributing to death

Cause of Death (As on Death certificate)

1a	
1b	
1c	
2	

Post Mortem Findings

Significant Co-Morbidities

1	
2	
3	
4	
5	
6	

Significant Medications

Steroids ☐ Warfarin ☐ Aspirin ☐ Clopidogrel ☐

Immuno-suppressants ☐ Insulin ☐

Organs supported on admission

Advanced RS ☐ Basic RS ☐ Advanced CV ☐ Basic CV ☐

Renal ☐ CNS ☐ GIT ☐ Liver ☐

Surgery

	Date / Time	Procedure / ASA	Surgeon / Grade / Level of Supervision /Degree of Urgency	Anaesthetist / Grade / Level of Supervision
1				
2				
3				
4				
5				

Hospital Acquired Infection

	Organism	Site	Resistance
1			

2			
3			

DNAR Yes ☐ No ☐ Reason ☐ Date ☐

Any Additional Information:

☐

Total Days in Critical Care ☐

Maximum Organ Support Before Death:

Advanced RS ☐ Basic RS ☐ Advanced CV ☐ Basic CV ☐

Renal ☐ CNS ☐ GIT ☐ Liver ☐

Date or Death: ☐ **Time of Death:** ☐

Coroner referral Yes ☐ No ☐

Categorisation of death by Mortality Review Team;

1. Expected death from expected cause ☐
2. Expected death from unexpected cause ☐
3. Unexpected death ☐
4. Unexpected death due to a medical intervention ☐

Is this case a Missed Organ Donor Yes ☐

No ☐

Does this case need a detailed case review Yes ☐

No ☐

Issues for local log

Governance Team Review / Recommendations

Date of presentation at Network CG:

Comments:

B. Second stage: Detailed Case Review & Recommendations

Detailed Review Team: Date of Review

Chairperson:

Name	Designation	Department

Case Review Outcome:

1. Death in-spite of acceptable medical care.
2. Death due to complications in-spite of acceptable medical care.
3. Medical care that may have contributed to death
4. Medical care directly resulting in death

Does this case need Trust Clinical Governance Involvement: Yes ☐

No ☐

Recommendations:

1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

C. Third Stage: Status of Implementation of recommendations:

Advanced Respiratory Support
Indicated by;
• Invasive mechanical ventilatory support (excluding mask / hood continuous positive airway pressure (CPAP) or mask pressure support ventilation (BiPAP) or CPAP applied via a trans-laryngeal tracheal tube).

Extracorporeal respiratory support.

Basic Respiratory Support.
Indicated by one or more of the following:
• More than **50%** oxygen delivered by face mask. *(Note, 50% has been chosen to identify the more seriously ill patients in a hospital and should not be recorded for short term increases in FiO2 such as for transfers or physiotherapy).*
• Close observation due to the potential for acute deterioration to the point of needing advanced respiratory support. *(e.g. severely compromised airway or deteriorating respiratory muscle function).*
• Physiotherapy or suction to clear secretions at least two hourly, whether via tracheostomy, minitracheostomy, or in the absence of an artificial airway.
• Patients extubated for a period ≤24rs after a period of intubation and/or mechanical ventilation via an endotracheal tube for more than 24hrs, • Mask CPAP or non-invasive ventilation.
• Patients who are intubated to protect the airway but needing no ventilatory support and who are otherwise stable.

Advanced Cardiovascular Support:
Indicated by one or more of the following:
• Multiple intravenous vasoactive and/or rhythm controlling drugs when used simultaneously to support or control arterial pressure, cardiac output or organ / tissue perfusion, *(e.g. inotropes, amiodarone, nitrates).*
• Patients resuscitated after cardiac arrest where critical care is considered clinically appropriate.
• Continuous observation of cardiac output and derived indices *(e.g. pulmonary artery catheter, lithium dilution, pulse contour analyses, oesophageal Doppler, impedance and conductance methods).*
• Intra aortic balloon pumping and other assist devices.
▪ Insertion of a temporary cardiac pacemaker (criteria valid for each day of therapeutic connection to a functioning external pacemaker unit).

Basic Cardiovascular Support.
Indicated by one or more of the following:
• Use of a CVP line for monitoring of central venous pressure and /or provision of central venous access to deliver titrated fluids to treat hypovolaemia.
• Use of an arterial line for monitoring the arterial pressure and/or sampling of arterial blood.
• Single intravenous vasoactive drug used to support or control arterial pressure, cardiac output or organ perfusion
• Intravenous drugs to control cardiac arrhythmias

Renal Support.
Indicated by:
Acute renal replacement therapy (e.g.haemodialysis, haemofiltration etc.) or provision of renal replacement therapy to a chronic renal failure patient who is requiring other acute organ support in a critical care bed.

Neurological Support.
Indicated by one or more of the following:
• Central nervous system depression sufficient to prejudice the airway and protective reflexes, excluding that caused by sedation prescribed to facilitate mechanical ventilation or poisoning (e.g. self administered overdose, alcohol, drugs etc.).
• Invasive neurological monitoring or treatment e.g. ICP, jugular bulb sampling, external ventricular drain.
• Continuous intravenous medication to control seizures and / or continuous cerebral monitoring.
-Therapeutic hypothermia using cooling protocols or devices

Dermatological Support.
Indicated by one or more of the following
• Patients with major skin rashes, exfoliation or burns. *(E.g. greater than 30% body surface area affected).*
• Use of complex dressings *(e.g. large skin area greater than 30% of body surface area, open abdomen, vacuum dressings or, large trauma such as multiple limb or limb and head dressings).*

Gastrointestinal Support Indicated by:
Feeding with parenteral or enteral nutrition. (*implies methods of feeding other than normal oral intake*

Liver Support.
Patients should fulfil one of the following categories:
a) Acute on chronic Hepatocellular failure requiring management of coagulopathy and/or portal hypertension (including hepatic purification and detoxification techniques). or
b) Primary Acute Hepatocellular failure patients who are being considered for transplantation and require management of coagulopathy and / or portal hypertension (including hepatic purification and detoxification techniques).

Classification of operation (NCEPOD definitions)
EMERGENCY: Immediate life-saving operation, resuscitation simultaneous with surgical treatment (e.g. trauma, ruptured

APPENDIX TWO: TRAUMA CT IMAGING PROTOCOL

Non-contrast-enhanced MDCT is of no value in trauma imaging.

Protocol:

Clamp urinary catheter before patient leaves emergency department.
Oral contrast: Not required for standard protocol and may mask extravasations.
Rectal contrast: When there is penetrating trauma to the abdominal or pelvic cavity, there is a strong argument for using rectal and oral contrast to help detect bowel injury.
Give 1000 ml 2% iodinated contrast delivered via a drip system and ballooned Foley catheter.
Intravenous contrast: 150 ml @ 3 ml/sec. Venous access whenever possible should be via an antecubital fossa vein. Avoid small peripheral lines on backs of hands, central lines etc.
Commence scanning at 25 seconds.
Scan from C6 to groin: Thorax should be in arterial phase (25 secs), abdominal and pelvic imaging should then follow aiming to commence scanning the liver and spleen at 60 to 65 seconds. If there is concern for arterial bleed then arterial phase abdomen and pelvis followed by portal venous phase abdomen and pelvis.

Modify times for the elderly.

Trauma CT should be vertex of the skull to pubis symphysis in the absence of lower limb injury.

In order
1. Standard head CT (unenhanced)

2. CT facial bones (unenhanced) if required
Reformats: standard sagittal and coronal

3. Cervical spine (unenhanced)

Collimation: 1.25 mm Coverage: C0–bottom of T1
Reformats: standard sagittal and coronal and soft tissue

4. CT neck (arterial phase) if required
Reformats: standard sagittal and coronal and soft tissue

5. Chest, abdomen, pelvis:
Collimation 2.5 mm. In obese patient or if other technical problems, 5 mm may be a compromise option.
Reformats – reconstruct 2.5 mm sagittal and coronal reformats for dorsal spine and lumbar spine

-Delayed phase. Abdomen and pelvis 60 seconds post-commencement portal venous phase if required
-If concerned for bladder injury then CT cystogram can be performed

If suspicious of pelvic trauma, reconstruct pelvic images at 2.5 mm then do coronal reformats.
Coronal soft tissues reformat of chest, abdomen and pelvis often helpful, particularly when discussing findings with clinicians

6. In addition: 3D Reconstructions for rib fixation and complex fractures of a specific body part as required should be carried out

5. Guidance on the indications for interventional radiology (IR) in trauma patients

Decisions regarding IR will be modified according to the facilities and staff available and the patient's stability at presentation

Site	IR
Thoracic aorta	Stent graft for suitable lesions
Abdominal aorta	Occlusion balloon, stent graft for suitable lesions
Peripheral or branch artery	Occlusion balloon, stent graft or embolisation
Kidney	Active arterial bleeding, embolisation or stent graft
Spleen	Active arterial bleeding or false aneurysm Focal embolisation for focal lesion Proximal embolisation for diffuse injury
Liver	Active arterial bleeding Focal embolisation if possible Non-selective embolisation if multiple bleeding sites as long as portal vein is patent
Pelvis	Focal embolisation for arterial injury (bleeding, false aneurysm or cut-off)
Intestine	Focal bleeding with no evidence of ischaemia or perforation. Or, to stabilise patient, allowing interval laparotomy pending treatment of other injuries

Standard 17 RCR: IR trauma teams should be in place within 60 minutes of the patient's admission or 30 minutes of referral.

5. References:

"Standards of Practice and Guidance for Trauma Radiology in Severely Injured Patients" June 2011

APPENDIX THREE: NATIONAL BURN CARE REFERRAL GUIDANCE

NHS

Specialised Services

National Network for Burn Care (NNBC)

National Burn Care Referral Guidance

Version 1, Approved February 2012

1. Introduction

This guidance describes the most clinically appropriate level of Specialised Burn Service for treating burn injuries of varying severities. It answers the question of "What types of burn injuries need referral to which level of Specialised Burn Service."

Following the recommendations of the National Burn Care Review 2001, Specialised Burn Services were stratified into three levels of service:

Burn Centres – This level of in-patient burn care is for the highest level of injury complexity and offers a separately staffed, geographically discrete ward. The service is skilled to the highest level of critical care and has immediate operating theatre access.

Burn Units – This level of in-patient care is for the moderate level of injury complexity and offers a separately staffed, discrete ward.

Burn Facilities – This level of in-patient care equates to a standard plastic surgical ward for the care of non-complex burn injuries

However, these definitions lacked specificity and so this Guidance has been developed through the National Network for Burn Care, an NHS body that includes representation from the 4 regional Burn Care Networks for England and Wales, NHS Specialised Commissioners, Patient Representatives and the British Burn Association. The development of the guidance was informed by an expert multidisciplinary group. The guidance is based on the general principals outlined in the National Burn Care Review (2001) but now replaces the referral guidance contained within it.

This guidance aims to ensure that patients are referred to a burn care service which has the relevant level of expertise and specialised resources to optimise their treatment and recovery

The most up to date version of these guidelines can be found at:
www.specialisedservices.nhs.uk/burncare

2. Using this Guidance

The guidance uses 5 criteria to guide referral decisions:

- TBSA — Total Body Surface Area
- Depth — The depth of burn injury
- Site — Anatomical site of the burn injury
- Mechanism — The etiology of the burn injury
- Other Factors — Parameters that may impact on the severity/complexity of burn injury

Thresholds for the above criteria are listed as either

"Refer:" — It is recommended that the patient be referred to the level of specialised burn service described

Or

"Discuss:" — In such cases a discussion should take place with a Consultant within the appropriate service and consideration given to referring / transferring the patient to the appropriate service level.

- For Thresholds listed as "Refer", it is acceptable (in extenuating circumstances) for patients not to be transferred according to these criteria if discussed with and agreed at Consultant level with the appropriate specialised burn care service (i.e. the next service level up). Such agreement should be recorded in the patient notes and all such cases should be subject to formal audit.
- For the purpose of these guidelines a child is defined as being under 16 years of age.
- For the purpose of these guidelines a neonate is defined as: If born at term (37-42 weeks) then up to 4 weeks after birth. If born pre-term (before 37 weeks) then up to 44 weeks post conception.
- For Adult patients, the implementation of End of Life Care as a result of burn injury should only be made following assessment by at least two Consultants, one of whom should be a Specialised Burn Care Surgeon.

3. Specific Advice to Emergency Departments, General Practitioners and other non-specialised providers:

- The suggested minimum threshold for referral into specialised burn care services can be summarised as:
  - All burns ≥2% TBSA in children or ≥3% in adults
  - All full thickness burns
  - All circumferential burns
  - Any burn not healed in 2 weeks
  - Any burn with suspicion of non-accidental injury should be referred to a Burn Unit/Centre for expert assessment within 24 hours
- In addition, the following factors should prompt a discussion with a Consultant in a specialised burn care service and consideration given to referral:
  - All burns to hands, feet, face, perineum or genitalia
  - Any chemical, electrical or friction burn
  - Any cold injury
  - Any unwell/febrile child with a burn
  - Any concerns regarding burn injuries and co-morbidities that may affect treatment or healing of the burn
- If the above criteria/threshold is not met then continue with local care and dressings as required
- If burn wound changes in appearance / signs of infection or there are concerns regarding healing then discuss with a specialised burn service
- If there is any suspicion of Toxic shock syndrome (TSS) then refer early

If non-specialised practitioners require advice regarding the assessment, care or treatment of any type of burn injury they can contact their nearest specialised burn service at any time.

A list of the specialised burn services in England and Wales is available at:

http://www.specialisedservices.nhs.uk/burncare/key-documents/specialised-burn-care-services-england-wales-1

Thresholds for Referral to Paediatric Burn Services (1)

Criteria		Facility Threshold	Unit Threshhold	Centre Threshold	Note
TBSA	**Refer**	≥2% <5%	≥5% <30% ≥5% <15% if under 1 year old	≥30% ≥15% if under 1 year old	
	Discuss			≥ 20% ≥ 10% if less than 1 Year Old	
Depth	**Refer**	All full thickness burns.	≥2% full thickness if under 10 yrs old ≥1% full thickness if under 6 months old	≥ 20% TBSA if Full Thickness	*All burns that are not blanching should be referred to a specialised burn service*
Site	**Refer**		Any significant burn to special areas (hands, feet, face perineum or genitalia) Any circumferential burn		*"Significant" can mean any injuries where the referrer feels that greater MDT expertise is required*
	Discuss	Any burn to special areas (hands, feet, face, perineum, genitalia)			
Mechanism	**Discuss**	Any chemical, electrical, friction burn. Any cold injury.			
Other Factors	**Refer**	Any burn not healed in 2 weeks.	Any predicted or actual need for HDU / PICU (including those predicted to require support for reasons other than the burn injury – e.g. smoke inhalation)	All those predicted to require assisted ventilation specifically for their burn injury for more than 24 Hours.	*Any child requiring assisted ventilation for >24 Hours must be within a Paediatric Intensive Care Unit.* *It is recommended that all children with smoke inhalation (irrespective of the presence of burn injury) are referred to a PICU with a specialised burn care service on site.*

Thresholds for Referral to Paediatric Burn Services (2)

Criteria		Facility Threshold	Unit Threshhold	Centre Threshold	Note
Other Factors	**Refer**		Any significant deterioration in physiology. Any burn with suspicion of non-accidental injury should be referred to a Burn Unit/Centre for expert assessment within 24 hours	Any child who is physiologically unstable as a result of burn injury	*Suggested parameters for physiologically unstable are:* *Requirement for Inotropic support* *Requirement for renal support or with deteriorating renal function* *A base deficit >5 and deteriorating* *An oxygen requirement >Fi02 of 50% and increasing, especially with abnormal C02 / respiratory rate*
	Discuss	Unwell/febrile child with a burn Any concern regarding burn injury any co-morbidities that may affect treatment or healing of the burn	All children with Major Trauma + Burn Injury (post treatment within Major Trauma Centre) where the burn injury meets unit level thresholds **Any** burn injury in a neonate should be discussed with a Burn Unit or Centre	All children requiring respiratory support All children with Major Trauma + Burn Injury (post treatment within Major Trauma Centres) where the burn injury meets centre level thresholds **Any** burn injury in a neonate should be discussed with a Burn Unit or Centre	*The treatment of children with Major Trauma + Burn Injury should be agreed between the Trauma service and the appropriate specialised burn service* *Neonates should only be admitted to burn services with an onsite NICU*

Thresholds for Referral to Adult Burn Services (1)

Criteria		Facility Threshold	Unit Threshhold	Centre Threshold	Note
TBSA	**Refer**	≥3%<10% (including those with inhalation injury)	≥10%<40% ≥10%<25% with inhalation injury	≥40% ≥25% with inhalation injury	*The minimum indication for Inhalation Injury is defined as – Visual evidence of suspected upper airway smoke inhalation, laryngoscopic and/or bronchscopic evidence of tracheal or more distal contamination/injury or unconscious at scene with suspicion of inhalation or raised COHb.* *If there are any concerns regarding inhalation injury with a patient with any size burn then it should be discussed with a Burn Care Centre*
	Discuss			≥25%	*Special Consideration should be given to referring patients >65 yrs with ≥25% TBSA (especially where there are co-morbidities) to the Burn Care Centre*
Depth	**Refer**	Any full thickness burns	≥5%<40% if non-blanching		*All burns that are not blanching should be referred to a specialised burn service*
Site	**Refer**		Any significant burn to special areas (hands, feet, face, perineum, genitalia) Any non-blanching circumferential burn		*"Significant" can mean any injuries where the referrer feels that greater MDT expertise is required*
	Discuss	Any burn to special areas (hands, feet, face, perineum, genitalia)			
Mechanism	**Discuss**	Any chemical, electrical, friction burn. Any cold injury			
Other Factors	**Refer**	Any burn not healed in 2 weeks.	Any predicted or actual need for HDU or ITU level care Any burn with suspicion of non-accidental injury should be referred to a Burn Unit / Centre for expert assessment within 24 hours		

Thresholds for Referral to Adult Burn Services (2)

Criteria		Facility Threshold	Unit Threshhold	Centre Threshold	Note
Other Factors	**Discuss**	Any concern regarding burn injury and co-morbidities including any co-morbidities that may affect treatment or healing of the burn.	Patients who are pregnant All patients with Major Trauma + Burn Injury (post treatment within Major Trauma Centre) where the burn injury meets unit level thresholds.	All patients with Major Trauma + Burn Injury (post treatment within Major Trauma Centre) where the burn injury meets centre level thresholds. Patients assessed as requiring end of life care should be discussed with a Consultant Burn Specialist at a Burn Centre (to discuss the appropriateness of local palliative care versus transfer to a centre).	*The treatment of patients with Major Trauma + Burn Injury should be agreed between the Trauma service and the appropriate specialised burn service (in accordance with the TBSA, Depth, Site and Mechanism criteria listed above)*

Glossary

TBSA	Total Body Surface Area
Ventilation	Mechanical support for patients who cannot breath by themselves
Circumferential burn	An injury that goes all the way around the surface of a limb or the body
HDU	High Dependency Unit
ICU	Intensive Care Unit
PICU	Paediatric Intensive Care Unit
Inotropic Support	Drugs administered to support the heart or circulation
Renal	Kidneys and their functioning

The most up to date version of these guidelines can be found at:
www.specialisedservices.nhs.uk/burncare


Burn Care Networks – England & Wales
Northern Burn Care Network
Midlands Burn Care Network
South West UK Burn Care Network
London & South East of England Burn Care Network
© National Network for Burn Care (NNBC)

APPENDIX FOUR: NORTHERN BURN CARE NETWORK REFERRAL FORM (COMPLEX BURNS)

Northern Burn Care Network
North of England, North Wales & Isle of Man

NORTHERN BURN CARE NETWORK REFERRAL FORM
ADULT COMPLEX BURNS

Patient Details
NHS Number .....
Name .....
Date of Birth ...../...../..... Gender Male ☐ Female ☐
Address .....
.....
.....
Postcode ..... Telephone number .....
Is an interpreter required? Yes ☐ No ☐
Language .....

Next Of Kin Details
Patient accompanied by .....(relationship)
Name of Next of Kin .....
Contact Details .....
Relationship .....
Family/carer aware of hospital attendance? Yes ☐ No ☐

Airway/Breathing

Patent airway	Yes ☐	No ☐
C. spine injury	Yes ☐	No ☐
Immobilised	Yes ☐	No ☐
Inhalation injury suspected	Yes ☐	No ☐
Soot in nose/throat	Yes ☐	No ☐
Hoarse voice	Yes ☐	No ☐
Stridor/noisy breathing	Yes ☐	No ☐
Anaesthetic assessment	Yes ☐	No ☐
Intubated	Yes ☐	No ☐

Time (if applicable) .....
Please use an UNCUT tube
Laryngoscopy grade I II III IV
Size ETT mm cuffed/uncuffed
Fixed at teeth/nose cm

Referral Information *(Please specify)*
Hospital/ Community/ Other.....
Department – ED / ICU / Ward/ Other .....
Referrer Name .....
Grade .....
Direct Line ..... Fax Number .....

GP Details
GP Name.....
GP Practice/Address .....

PMSH
Smokes /day Alcohol /day
Drug Abuse Yes ☐ No ☐ Specify .....
Allergies Yes ☐ No ☐ Specify.....
Tetanus Status .....
Mobility .....
Learning Disabilities Yes ☐ No ☐
Mental Health Requirements Yes ☐ No ☐
Co-morbidities Yes ☐ No ☐
Specify .....

Safeguarding/Risks
Safeguarding Concerns Yes ☐ No ☐
Risk Concerns Yes ☐ No ☐
Specify .....
Action taken .....

Burn Information
Date of Burn ...../...../..... Time of Burn .....: .....
Cause of Burn.....
First Aid Given/Cooling Yes ☐ No ☐
Was the First Aid Delayed Yes ☐ No ☐
Specify .....
By Whom: Witness/Fire Service/Paramedic/A&E/Other .....

OBS prior to intubation	FIO2 ..... %	SaO2 .....%	RR ..... Min	GCS prior to intubation ...../15

Circulation
HR ..... bpm B/P ..... / .....
Fluid resuscitation commenced? Yes ☐ No ☐
(see overleaf)
Urinary Catheter Yes ☐ No ☐
Balloon inflated..... size.....
CRT ..... sec Peripheral/Core Temp ..... °
Venous Access 1 : central/peripheral size.....site .....
Venous Access 2 : central/peripheral size.....site .....

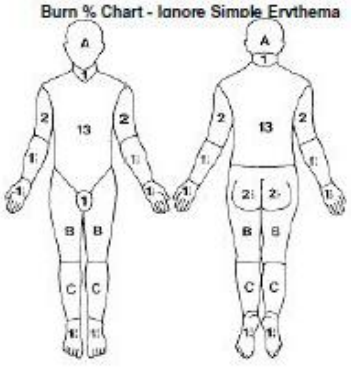
Environment
Patient kept warm prior to and during transfer Yes ☐ No ☐

Wound Management
≥ 15% apply cling film and keep warm
Irrigate chemical (except Phosphorus) burns copiously
Wash small complex burns to facilitate assessment if appropriate

Circumferential Burns: Discuss with burn service prior to transfer
Escharotomies Needed Yes ☐ No ☐
Where .....
Escharotomies carried out prior to transfer Yes ☐ No ☐
Patient Weight .....kg actual/estimated

% TBSA ..... **% TBSA Full Thickness Burns** .....
A :½ of head = 3½% B:½ of one thigh = 4¾% C : ½ of lower leg = 3½%

Burn % Chart - Ignore Simple Erythema



...Please Turn Over

Northern Burn Care Network
North of England, North Wales & Isle of Man

Fluid Resuscitation (This formula is based on the Parkland Formula)

For 1st 8 hours: 0.1875mls x % burn x weight (kg) = mls/hour Hartmann's solution

(please check calculations and discuss 'CATCH UP' fluid with accepting Burn Unit)
We expect the patient to be transferred to the Burn Unit within 8 hours

Fluid Balance Chart – Please complete with ACTUAL volumes given for each hour

Burn Time	Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	Hour 7	Hour 8
Hartmann's (mls)								
Other fluids (mls)								
Oral fluid (mls)								
Urine output (mls) (aim 0.5 – 1ml/kg/hr)								

Results				Medication Given			
Blood		ABG		Time	Drug	Route	Dose
Hb		pH					
WCC		PO2 kPa/mmhg					
Platelets		PCO2 kPa/mmhg					
Sickledex		HCO3					
Na+		BE					
K+		Lactate					
Urea		CoHb %					
Creatinine		Glucose					
Albumin		CK					
ECG		X-Ray (trauma Series)					

Northern Burn Care Network Adult Burn Units Contact Details
–If nearest service is full then contact National Burn Bed Bureau (NBBB) on 01384 215576

Newcastle	Royal Victoria Infirmary	Burn Unit	T: 0191 282 5637 / 0191 282 0271	F: 0191 2820260
South Tees	James Cook University Hospital	Burn Facility	T: 01642 854535	F: 01642 854175
Preston	Royal Preston Hospital	Burn Facility	T: 01772 522 244	F: 01772 523694
Manchester	Wythenshawe Hospital	Burn Unit	T: 0161 291 6314	F: 0161 2916315
Liverpool	Whiston Hospital	Burn Unit	T: 0151 430 1540 / 0151 430 2349	F: 0151 4301508
Wakefield	Pinderfields Hospital	Burn Unit	T: 01924 541700	F: 01924 541911
Sheffield	Northern General Hospital	Burn Unit	T: 0114 27 14129 / 0114 27 14126	F: 0114 2269097

Pre-transfer Checklist	
Airway - safe/secured	
NGT in situ for transit	
Tubes/lines secured	
Poisons centre contacted and details attached	
Analgesia adequate	
Infusions for transit	
Appropriate staff	
Jewellery/watch off	
Notes/X-rays/ Investigations	
Photographs of wounds	
Copy of ED assessment details	
Copy of Ambulance PRF	
Relatives aware of transfer	
Burn Unit contacted with time of departure	

Any Other Relevant Information

Patient refused Yes ☐ No ☐ Reason .....

Transferred to: .....

Form Completed By .....

Signed .....

Designation .....

Contact Details .....

APPENDIX FIVE: NORTHERN BURN CARE NETWORK REFERRAL FORM (NON-COMPLEX BURNS)

Northern Burn Care Network
North of England, North Wales & Isle of Man

NORTHERN BURN CARE NETWORK REFERRAL FORM
ADULT NON-COMPLEX BURNS

Patient Details NHS Number.....
Name.....
Date of Birth ...../..../.....Gender: Male ☐ Female ☐
Address.....
.....
Postcode ..... Tel number.....
Is an interpreter needed? Yes ☐ No ☐ .....
Language .....

Next Of Kin Details
Patient accompanied by .....
Relationship.....
Is the Next of Kin aware? Yes ☐ No ☐ N/A ☐

Burn Information
Date of Burn ...../...../..... Time of Burn .....:.....
Cause of Burn .....
First Aid Given/Cooling Yes ☐ No ☐
If yes, how long for .....
What type .....
Was the first aid delayed? Yes ☐ No ☐
If yes, how long for .....

Wound Assessment
Location.....
Is it over a joint? Yes ☐ No ☐
Size of burn % TBSA / cm
Burn Depth Epidermal
Superficial Dermal
Deep Dermal
Full Thickness

Wound Management: Wash with soap and water and apply cling film (not to faces) for immediate transfer only, otherwise apply appropriate dressing

Circulation Core temperature ..... °
HR ..... bmp B/P ..... / .....

Medication Given

Time	Drug	Route	Dose

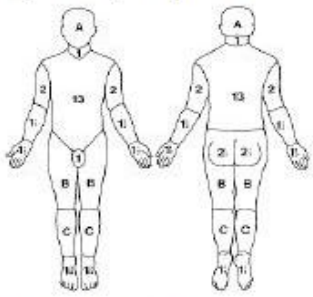
Referral Information (Please specify)
Hospital/Community/Other.....
Department - ED / Ward / Other.....
Referrer Name.....
Grade.....
Direct Line..... Fax Number.....

GP Details
GP Name..... Telephone No .....
GP Practice/Address .....

PMSH
Smokes /day Alcohol units /day
Drug Abuse Yes ☐ No ☐ .....
Allergies Yes ☐ No ☐ .....
Tetanus Status .....
Mobility .....
Learning Disabilities Yes ☐ No ☐
Mental Health Requirements Yes ☐ No ☐
Co-morbidities Yes ☐ No ☐
Specify.....

Safeguarding/Risk
Safeguarding concerns Yes ☐ No ☐
Risks Yes ☐ No ☐
Specify .....
Action taken .....

Burn % Chart – Ignore Simple Erythema



Northern Burn Care Network Adult Burn Units Contact Details

Newcastle	Royal Victoria Infirmary	Burn Unit	T: 0191 282 5637/ 0191 282 0271	F: 0191 2820260
South Tees	James Cook University Hospital	Burn Facility	T: 01642 854535	F: 01642 854175
Preston	Royal Preston Hospital	Burn Facility	T: 01772 522 244	F: 01772 523694
Manchester	Wythenshawe Hospital	Burn Unit	T: 0161 291 6314	F: 0161 2916315
Liverpool	Whiston Hospital	Burn Unit	T: 0151 430 1540 / 0151 430 2349	F: 0151 4301508
Wakefield	Pinderfields Hospital	Burn Unit	T: 01924 541700	F: 01924 541911
Sheffield	Northern General Hospital	Burn Unit	T: 0114 2714129 / 0114 2714126	F: 0114 2269097

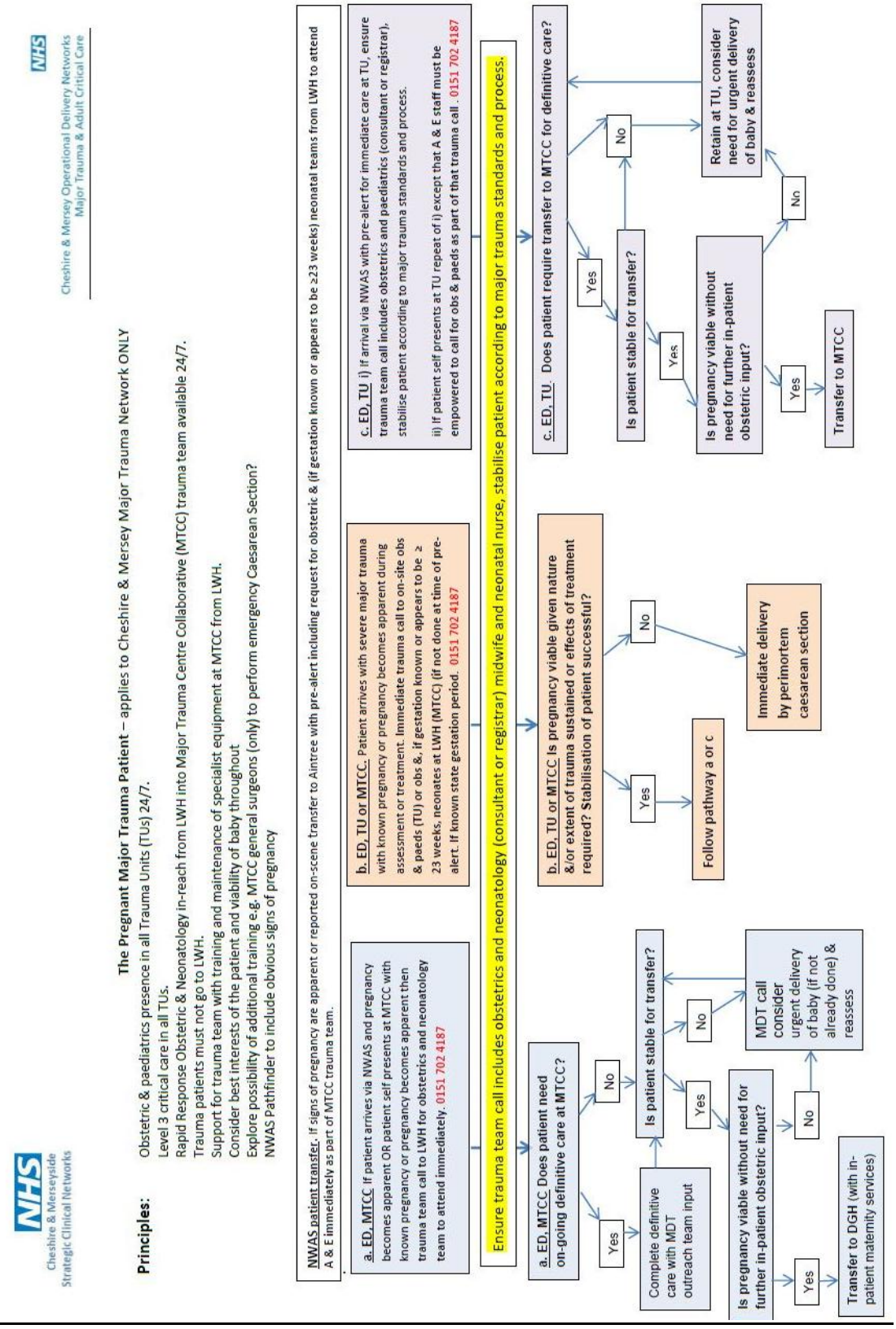
Pre-transfer Checklist	
Poisons centre contacted and details attached	
Analgesia adequate	
Consider cannula	
Jewellery/watch off	
Notes/X-rays/ Investigations	
Copy of ED assessment details	
Copy of Ambulance PRF	

Any Other Relevant Information

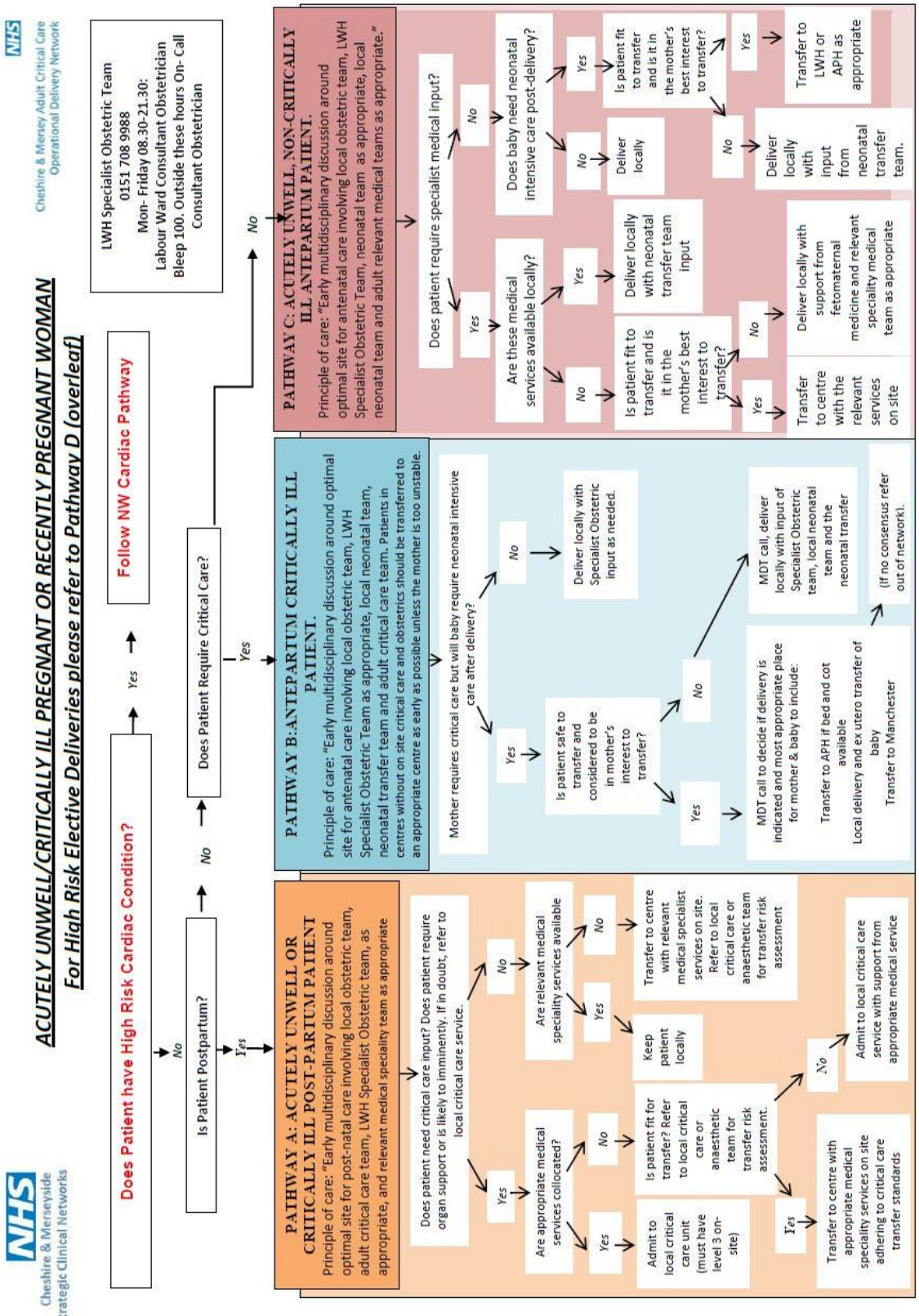
Form Completed By ..... Signed .....
Designation ..... Contact Details .....

NBCN Adult Non-Complex Referral Form v1.0 May 2012

APPENDIX SIX: THE PREGNANT MAJOR TRAUMA PATIENT PATHWAY

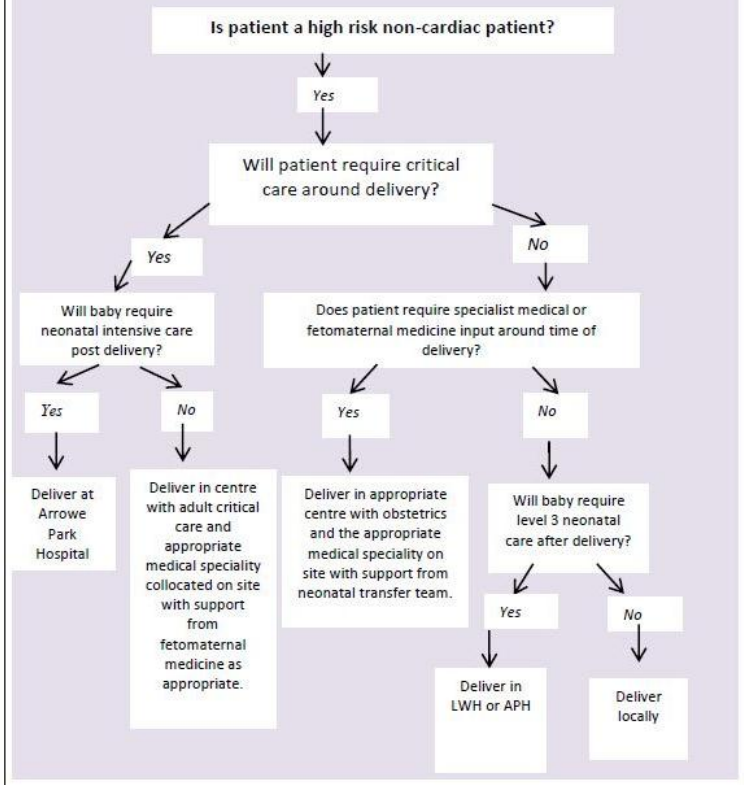


APPENDIX SEVEN: ACUTELY UNWELL/ CRITICALLY ILL PREGNANT OR RECENTLY PREGNANT WOMAN PATHWAY



PATHWAY D: High Risk Elective Deliveries

Principle of care: "Early multidisciplinary discussion around optimal site for delivery involving local obstetric team, LWH fetomaternal medicine team as appropriate, local neonatal team and adult critical care team."



Further Information:

MDT must consist of the following personnel as a minimum:

- Maternal Health Specialist team:
  - Consultant obstetrician LWH
  - Consultant neonatologist LWH
  - Lead Consultant for Neonatal Transport
- Referring site team:
  - Consultant obstetrician
  - Consultant neonatologist/paediatrician in-patient site
  - Consultant intensivist in-patient site
- Receiving site team:
  - Consultant obstetrician
  - Consultant neonatologist/paediatrician in-patient site
  - Consultant intensivist in-patient site

LWH = Liverpool Women's Hospital
APH = Arrowe Park Hospital

Pathway Review date: September 2016

APPENDIX EIGHT: INTER-HOSPITAL TRANSFER FORM

NHS
Cheshire & Mersey Operational Delivery Networks
Major Trauma & Adult Critical Care

NAME:
NUMBER:

Date of Hospital Admission
Date of Transfer

Transfer Details

Transferring unit — Name:
ICU ☐ HDU ☐ ED ☐ Theatre ☐ Ward ☐ Other, please specify:

Receiving unit — Name:
ICU ☐ HDU ☐ ED ☐ Theatre ☐ Ward ☐ Other, please specify:

Reason for transfer — Expert management ☐ No critical care bed ☐ Repatriation ☐ Other, please specify:

Staff Arranging Transfer

At transferring unit	Name / speciality	Consultant in charge
At receiving unit	Name / speciality	Consultant in charge

Escorting Personnel

Doctor	Name / grade / speciality	Transfer trained?	Y / N
Nurse	Name / grade / speciality	Transfer trained?	Y / N
ODP	Name / grade	Transfer trained?	Y / N

Timings (hh:mm) — **Ambulance Details**

Decision to transfer		Agreed category	Time critical (8 mins response) ☐
Ready to leave			Urgent (<1 hour) ☐
Ambulance booked			Reverse transfer (<4 hours) ☐
Ambulance arrived		Incident booking number	
Departed hospital		Has spine been immobilised	Y / N
Arrived destination		Method:	

Diagnosis

Trauma patient? Yes ☐ No ☐
Pre-sedation GCS /15 (E= V= M=)

Vascular Access — **Other Devices**

PVC	Size	Site	Chest drains	☐	Number / site
PVC	Size	Site	Abdominal drains	☐	Number / site
PVC	Size	Site	Catheter	☐	
CVC line	Size	Site	Endotracheal tube	☐	Grade of intubation / Size / Length at lips
Arterial line	Size	Site	Other, please specify:		

Monitoring

SpO_2 ☐ ECG ☐ NIBP ☐ IABP ☐ Temp ☐ $ETCO_2$ ☐ CVP ☐ Other, please specify:

Ventilation During Transfer

Spontaneous ☐ Mechanical ☐ Ventilator type: Mode of ventilation: PEEP:

Has an intervention or adverse / critical incident occurred during the transfer? Please give details

Transfer team comments — **Receiving team comments**

Signature of escorting personnel: Name and signature of receiving staff:

NAME:
NUMBER:

TRANSFER CHART

TIME

GCS: EYES (1-4); VERBAL (1-5); MOTOR (1-6); GCS TOTAL (3-15)

PUPILS: RIGHT — SIZE; REACTION. LEFT — SIZE; REACTION

DRUGS

FLUIDS

VENTILATION PARAMETERS: PEAK AIRWAY PRESSURE; TIDAL VOLUME (ml); SpO_2; FiO_2; $ETCO_2$; RESPIRATORY RATE

BP AND PULSE RATE (1 • ; 2 •; 3 •; 4 •; 5 •; 6 •; 7 •; 8 •) — 190, 180, 170, 160, 150, 140, 130, 120, 110, 100, 90, 80, 70, 60, 50, 40, 30, 20

MONITORING: CENTRAL VENOUS PRESSURE; URINE OUTPUT; CHEST DRAINAGE; TEMPERATURE

The white copy of the form should be filed with the patients notes.
The yellow copy should be sent to: **Operational Delivery Networks Office, The Walton Centre NHS Foundation Trust, Lower Lane, Fazakerley, Liverpool, L9 7LJ.**

APPENDIX NINE: WALTON NEURO RAPID ACCESS FORM

Referring Hospital				
Name and Number of Contact				
Patients Name			Male/Female	
Date of Birth		***Age***	***(>70?)***	
Reason for Rapid Access Transfer	SDH	EDH		
Airway/Breathing				
Intubated	Y/N			
Circulation				
MAP	***(>80mmHg)***			
HR	***(>50<120bpm)***		***ECG/Rhythm***	
Deficit				
GCS prior to Intubation	E=	V=	M=	
Focal Limb Weakness?	RA	LA	RL	LL
Sedation	Y/N	Muscle relaxant	Y/N	
Imaging				
C-Spine	Y/N	CT Head	Y/N	
Have **ALL** the CT Scans been sent to WCFT				
Bloods				
Na++	Hb	***APTT***	pH	
K+	WCC	***INR***	PaO2	
Print & Sign			Date	Time

APPENDIX TEN:BOAST 8: MANAGEMENT OF SPINAL CORD INJURY

BRITISH ORTHOPAEDIC ASSOCIATION
STANDARDS for TRAUMA (BOAST) ©

BOAST 8: THE MANAGEMENT OF TRAUMATIC SPINAL CORD INJURY

Background and Justification:

Spinal cord injury resulting in neurological deficit is a rare but potentially devastating injury. Compromise to the spinal cord may be due to trauma, vascular injury or other disease process and can result in immediate or insidious onset of neurological symptoms including loss or reduction of voluntary motor function, sensory impairment, bowel or bladder dysfunction and loss of autonomic function. The incidence in the United Kingdom is estimated at 12-16 per million population with about 75% of cases due to trauma. Appropriate management from the time of diagnosis of cord injury has been shown to have significant effect on the long-term outcome for patients and reduce short and long-term complications.

Included Patients:

All patients with traumatic spinal cord injury resulting in complete or incomplete para- or tetraplegia. The audit standards apply to those with polytrauma and those with isolated spinal cord injuries but do not apply to patients with spinal column injury without cord involvement. These audit standards apply to adults and children.

Standards for practice audit:

1. All Major Trauma Centres and Trauma Units must have a named, linked Spinal Cord Injury Centre.
2. All hospitals within a major trauma network should have an agreed, common protocol for protecting the neck and spine together with an agreed, common protocol to exclude significant injury (clearance of the neck and spine eg BOAST-2).
3. Centres managing patients with spinal cord injury require 24-hour access to CT and MRI.
4. Clinical evaluation of injured patients must include appropriate and repeated examination of the peripheral nervous system which should be recorded in the medical notes on an ASIA chart in keeping with the International Standards for Neurological Classification in Spinal Cord Injury.
5. Protocols for resuscitation and acute management including skin care, gastric, bowel and bladder care and neuroprotection must be agreed with the linked Spinal Cord Injury Centre and available in all Emergency Departments that may receive patients with spinal cord injury.
6. Centres treating these injuries must have the capability of performing specialist spinal surgery within 4 hours of injury. For those requiring surgery, protocols for anaesthesia and spinal stabilisation must be agreed with the linked Spinal Cord Injury Centre.
7. Protocols for nursing, joint protection and therapy requirements must be agreed with the linked Spinal Cord Injury Centre.
8. Management of the spine must follow written, agreed protocols with the linked Spinal Cord Injury Centre, or alternatively the on call consultant at that centre should be contacted within 4 hours of injury.
9. An early, joint management plan must be formulated and recorded in the medical notes within 12 hours.
10. Once the patient is fit for transfer to a Spinal Cord Injury Centre this should take place within 24 hours, unless it is agreed that it is the patient's best interest to remain in a Major Trauma Centre or Trauma Unit.
11. Spinal Cord Injury Centres should provide an outreach visit within 5 days of referral for patients unfit for transfer, and then follow-up contact (or visit) at least weekly until the patient is transferred.
12. Appropriately trained psychological support must be available for patients, family and carers.
13. All patients with new spinal cord injuries in England must have referral data submitted to the National Spinal Cord Injuries Database. The referral website is found at www.spinalcordinjury.nhs.uk

References:

References are found at www.spinalcordinjury.nhs.uk/docs.aspx
Management of People with Spinal Cord Injury. NHS Clinical Advisory Groups Report (August 2011)
The Initial Management of Adults with Spinal Cord Injuries (May 2012)
ASIA Protocol
Professional consensus