The Trauma Call

Introduction to Emergency Medicine 2023

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7:00am

7:45am

8:20am

8:30am

9:00am

9:15am

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9:45am

10:00am

What is trauma?

Minor wounds ——— Complex multi-organ injuries

Major Trauma

- An injury or combination of injuries that are life-threatening
  - Serious injuries or multiple injuries
  - Requiring multidisciplinary evaluation

- Trauma networks → MTCs and TUs

Major Trauma Centres

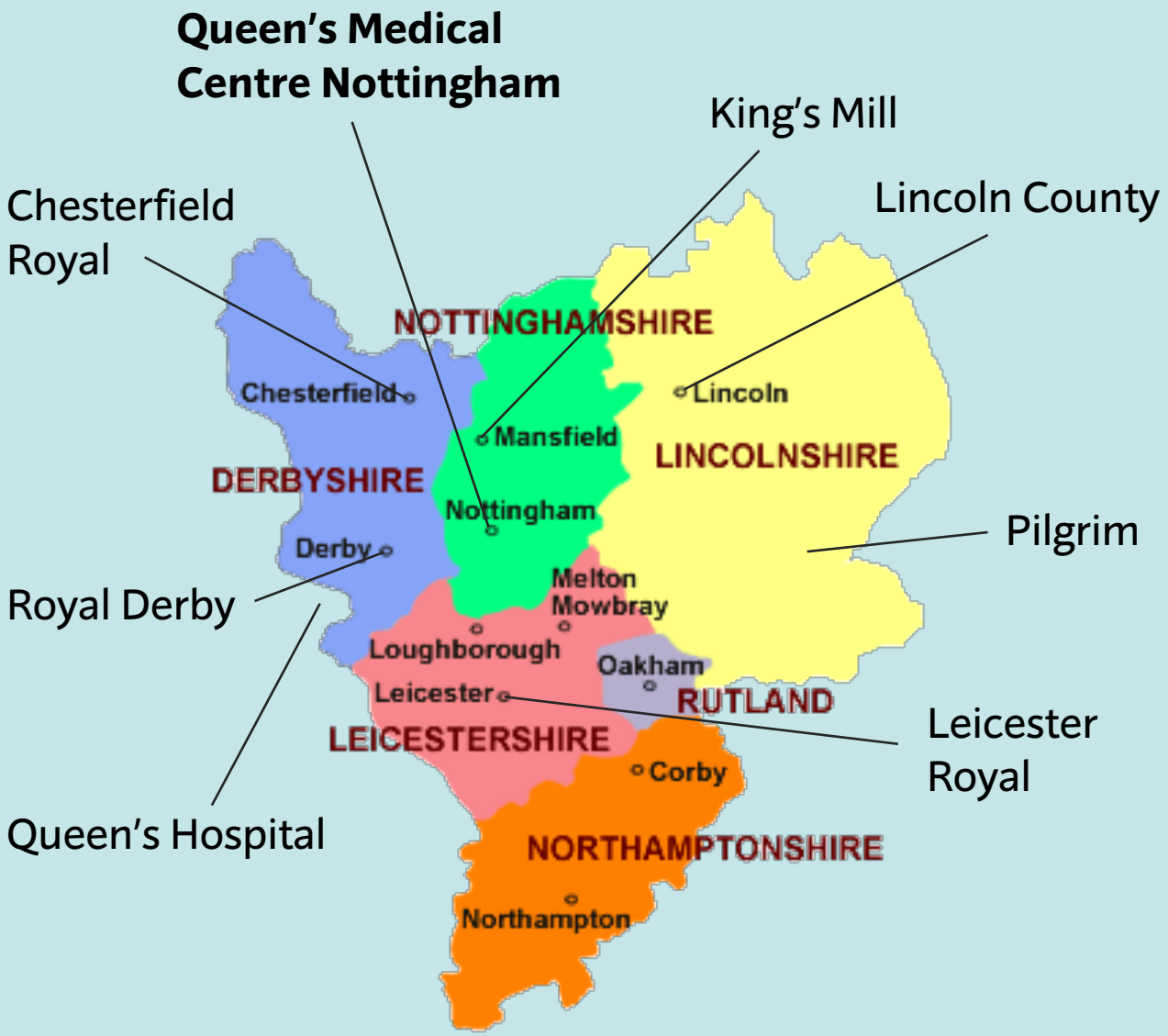
- Facilities/specialties to be able to treat patients with any type of injury, in any combination
  - 24/7 trauma consultant and trauma team
  - Massive haemorrhage protocol in place
  - 24/7 emergency theatres
  - Consultants on site within 30 minutes for: neurosurgery, spinal, vascular, general, T&O, cardiothoracic, plastics, maxfax, ENT, anaesthetics, interventional radiology, intensive care
  - Access to CT scans within 30 minutes (reporting within 1 hour)
  - A defined service for trauma rehabilitation
  - Organ donation service

Trauma Units

- Not a designated MTC within the network, but will take trauma patients when:
  - They don't have injuries requiring MTC care
  - They are so critically injured they would not make it to MTC alive
- TUs must have:
  - A senior doctor trained to be trauma team leader
  - An airway competent doctor
  - A surgeon who can deliver 'damage control' surgery, with 24/7 emergency theatre
  - ED and surgery consultants on call 24/7
  - CT scans available within 60 minutes
  - Transfer protocols in place to send patients to the MTC

East Midlands MTN

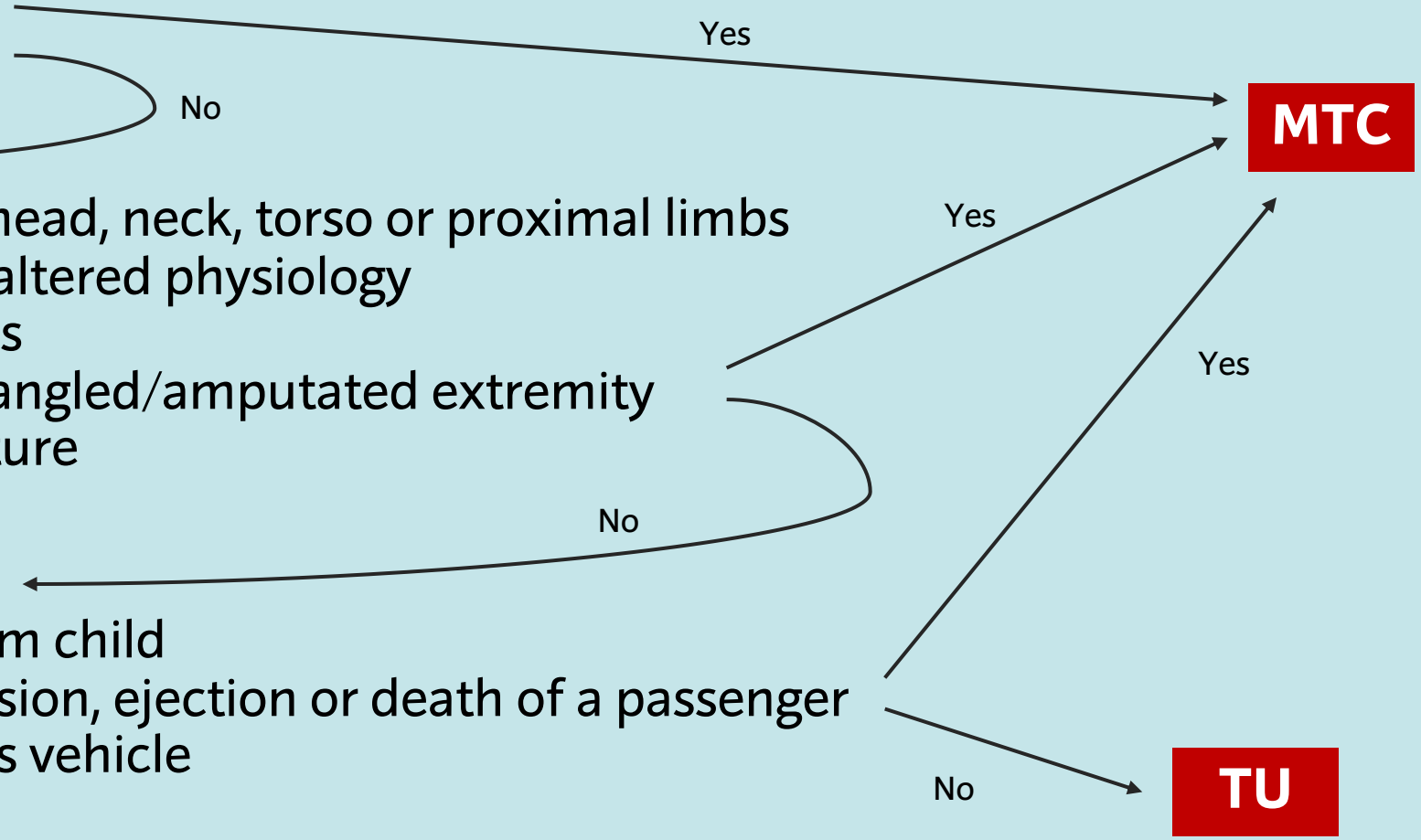
- Our MTC is Queen's Medical Centre in Nottingham
- Leicester Royal Infirmary is a trauma unit
- Hospitals not shown here that have A&E departments are designated 'Local Emergency Hospitals' (LEH)
  - Do not routinely receive trauma, but have processes for transfer to TU/MTC



Trauma Triage

Exceptions
- MTC cannot be reached within 1 hour → TU if closer
- Airway or catastrophic bleeding cannot be controlled → TU if closer
- Cardiac arrest or peri-arrest → TU/LEH if closer

- Physiological
  - GCS < 14
  - Sys BP <90 mmHg
- Anatomical
  - Penetrating injury to head, neck, torso or proximal limbs
  - Any chest injury with altered physiology
  - 1+ long bone fractures
  - Crushed/degloved/mangled/amputated extremity
  - Suspected pelvic fracture
  - Skull fracture
- Mechanism of injury
  - Falls >6m adult or >3m child
  - Motor vehicles – intrusion, ejection or death of a passenger
  - Pedestrian or cyclist vs vehicle
  - Entrapment

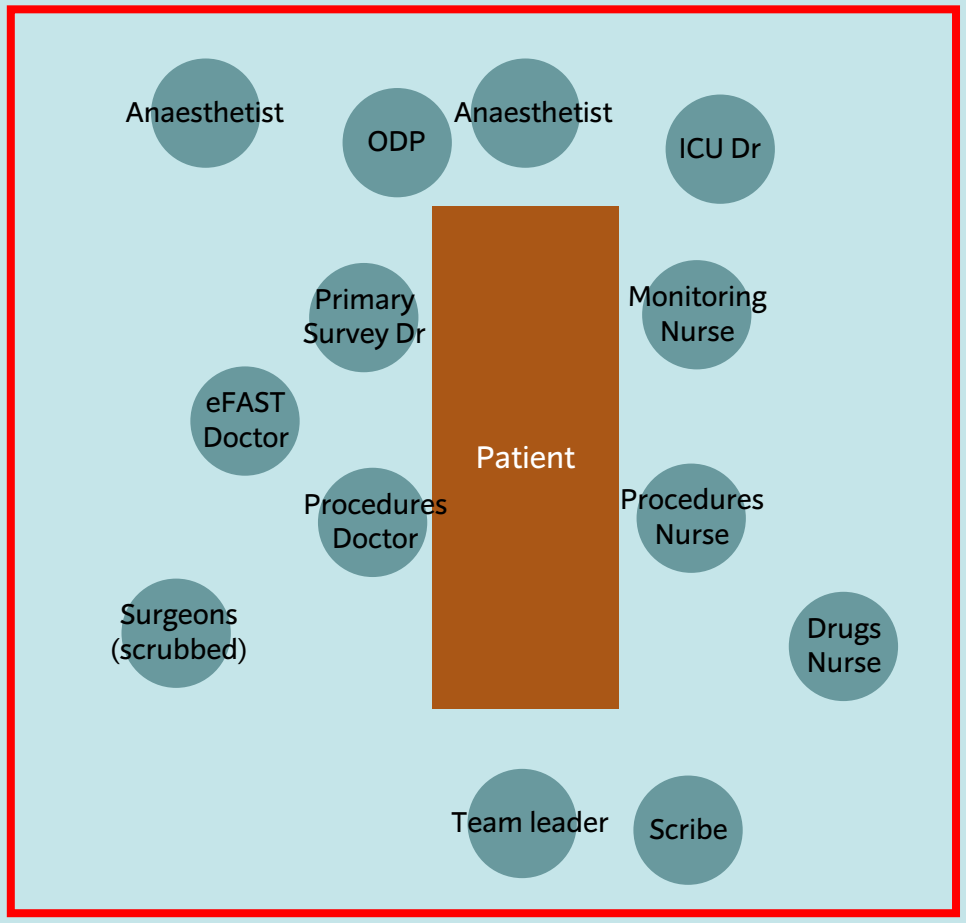


Pre-alert

- Ambulance control to receiving hospital
  - A – Age/sex
  - T – Time of incident
  - M – Mechanism of injury
  - I – Injuries/exam findings
  - S – Signs and symptoms
  - T – Treatment given so far
  - E – ETA and ambulance call sign
  - R – Requirements (e.g. MHP)
- 2222 – adult/paeds trauma team to ED resus / trauma bay

The Trauma Team

- Will gather and have a briefing considering all eventualities, roles assigned, equipment prepared
- MTC
  - ED consultant, T&O consultant, trauma anaesthetist, second anaesthetist, ED SpR, ICU SpR, 2+ ED nurses, trauma ODP, general surgery and T&O SpRs, radiographer, porter/runner
  - Alert CT, theatres and blood bank
- TU
  - ED consultant or SpR, ED doctor/ACP, 2+ ED nurses, porter/runner



Medical students

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A-E in Trauma

	Examine	Investigate	Intervene
A Airway	Are they talking? Do they respond to pain? Is there any: - Stridor/gurgling - Cyanosis - Visible obstruction Look/feel/listen for breathing		Head-tilt chin-lift Jaw thrust Suction/forceps BVM OPA/NPA LMA/I-Gel Endotracheal intubation Surgical airway
B Breathing	Dyspnoea, accessory muscle use, cough, tripod position Tracheal deviation, chest wall abnormalities, chest expansion, percussion, abnormal breath sounds	Oxygen saturation Respiratory rate Peak flow ABG/VBG Chest X-ray	Sit the patient upright Oxygen 15L/min via NRB Consider other treatments for suspected aetiology - e.g. nebulisers such as salbutamol
C Circulation	Pallor, oedema, sweating, blood loss Feel pulse for rate, rhythm and character Assess JVP Listen to heart sounds	HR / BP / CRT Fluid balance Temperature Relevant blood tests 12-lead ECG Bedside echo/POCUS	IV Cannulation! (x2) Fluid resuscitation Blood transfusion Vasopressors/inotropes Anticoagulant reversal
D Disability	AVPU / GCS Pupillary response Toxins and medications Neurological signs (e.g. hemiplegia, seizures, sensory loss, visual loss) Could they be pregnant?	DEFG - Don't Ever Forget Glucose! Urine pregnancy test Review medications - have they had too much/not enough? CT Head criteria?	Can they maintain their airway? Correct glycaemic and electrolyte abnormalities Consider other treatments for suspected aetiology - e.g. benzodiazepines in status epilepticus
E Exposure	Assess head to toe, front to back Preserve body heat Any pain? Skin inspection - wounds, rashes, swelling etc Inspect any indwelling lines (e.g. IVs, catheters)	Any relevant tests for findings, e.g.: - Well's score with D-Dimer/USS for suspected DVT - Swabs/cultures for wounds	Maintain temperature with warm blankets and provide clean/dry clothes Consider other treatments for suspected aetiology - e.g. anticoagulation for DVT, blood products for haemorrhage

<C> ABCDE

Order of priority (what kills first!)

- **Catastrophic haemorrhage**
- Then can do handover
- Airway
- Breathing
- Circulation
- Disability
- Exposure

Catastrophic Haemorrhage

- Comes before anything else!
- Obvious large-volume external bleeding
  - E.g. amputation injury, high volume PR/PV bleeding, penetrating trauma
  - Will look for other haemorrhage (e.g. internal) under circulation
- Apply direct pressure, packing, haemostatic dressings or tourniquets/pelvic binder
- Reverse anticoagulants
- Give antifibrinolytic (e.g. tranexamic acid) early
- Local agents (e.g. adrenaline-soaked gauze)
- Coagulate /ligate small vessels
- Cross-clamp large vessels
- Emergency blood products and Massive Haemorrhage Protocol
  - RED BLOOD CELLS!!!!! (+ the other bits)

ATMIST

- Hands-off handover - If any haemorrhage under control, and not in cardiac arrest
- Same structure as pre-alert:
  - A – Age
  - T – Time of injury
  - M – Mechanism of injury
  - I – Injuries sustained
  - S – Signs and symptoms
  - T – Treatment given so far

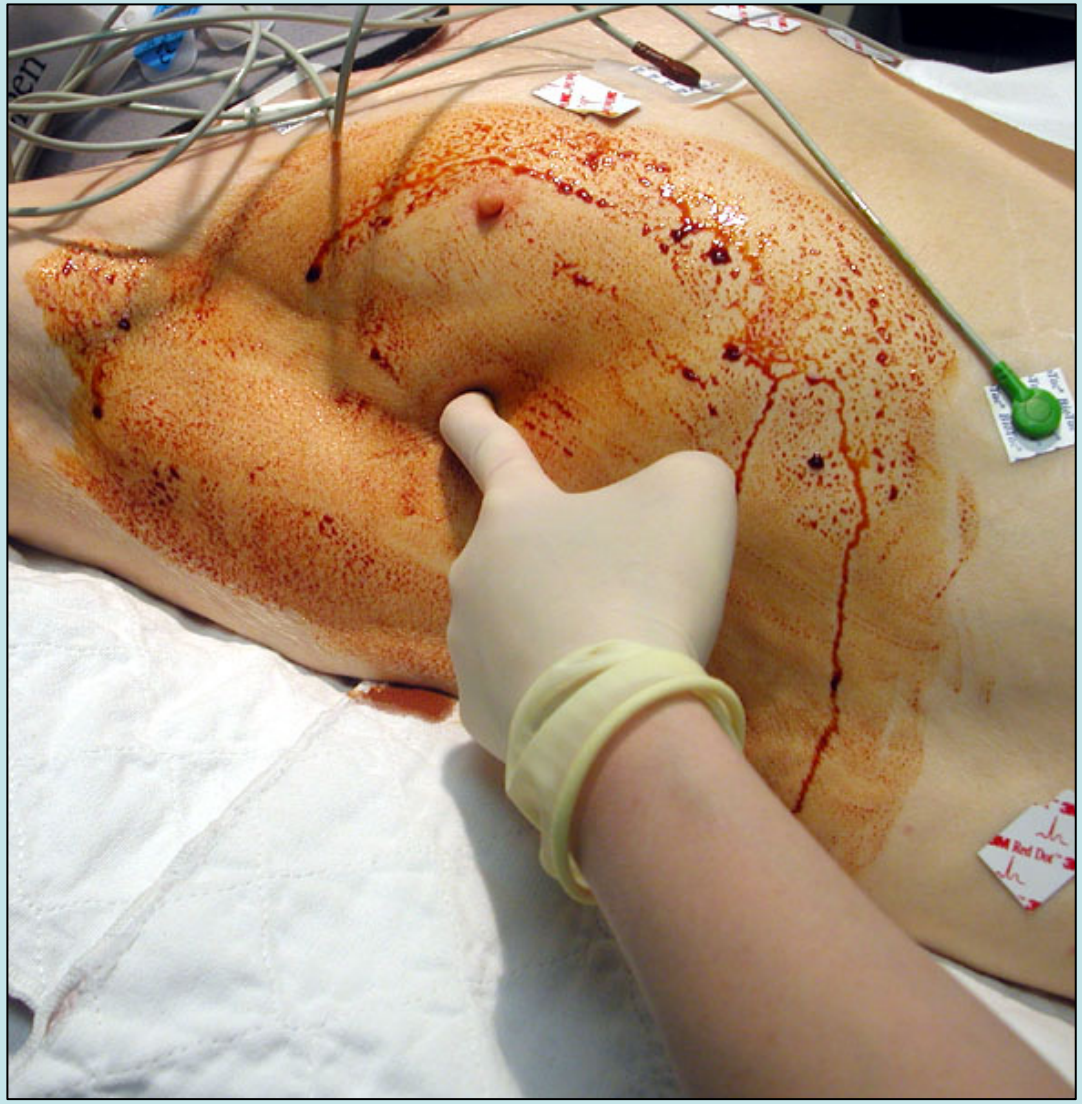
Airway

- Same as before – look, feel, listen, measure…
- Look in the mouth for injuries to the teeth or tongue, blood, vomit, or secretions
- Check the neck for bleeding, crepitus, swelling
  - Also identify landmarks for cricothyroidotomy
- Have a low intubation threshold
  - Unconscious (GCS <8)
  - RSI – rapid sequence induction – ketamine/etomidate + rocuronium/suxamethonium + fentanyl
  - Plan A (RSI + ETT), Plan B (i-Gel + BVM), Plan C (Cricothyroidotomy)

- Airway >> C-spine immobilisation

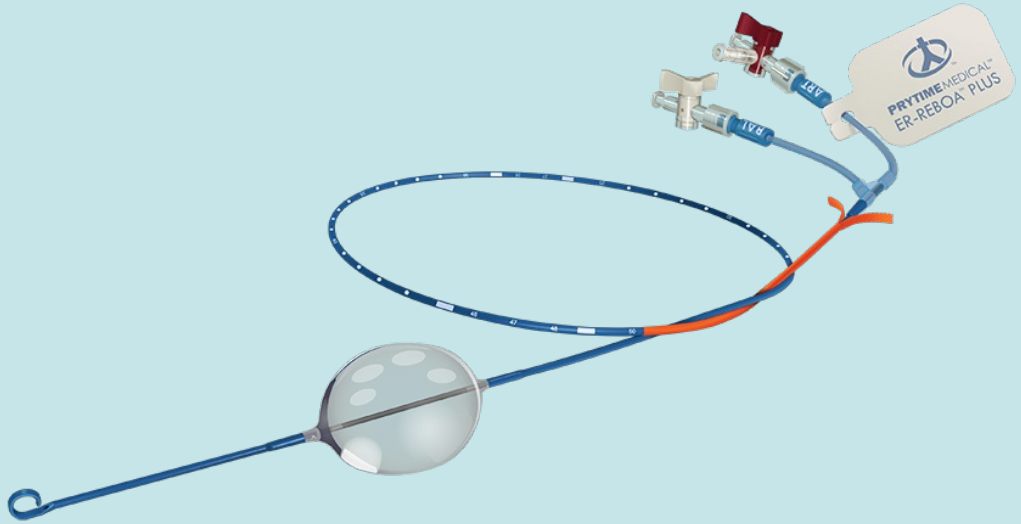
Breathing

- Same assessment as before
- Life-threatening chest injuries:
  - Tension pneumothorax
  - Open pneumothorax
  - Massive haemothorax
  - Cardiac tamponade
  - Airway injury
  - Tracheobronchial injury
- Finger thoracostomies

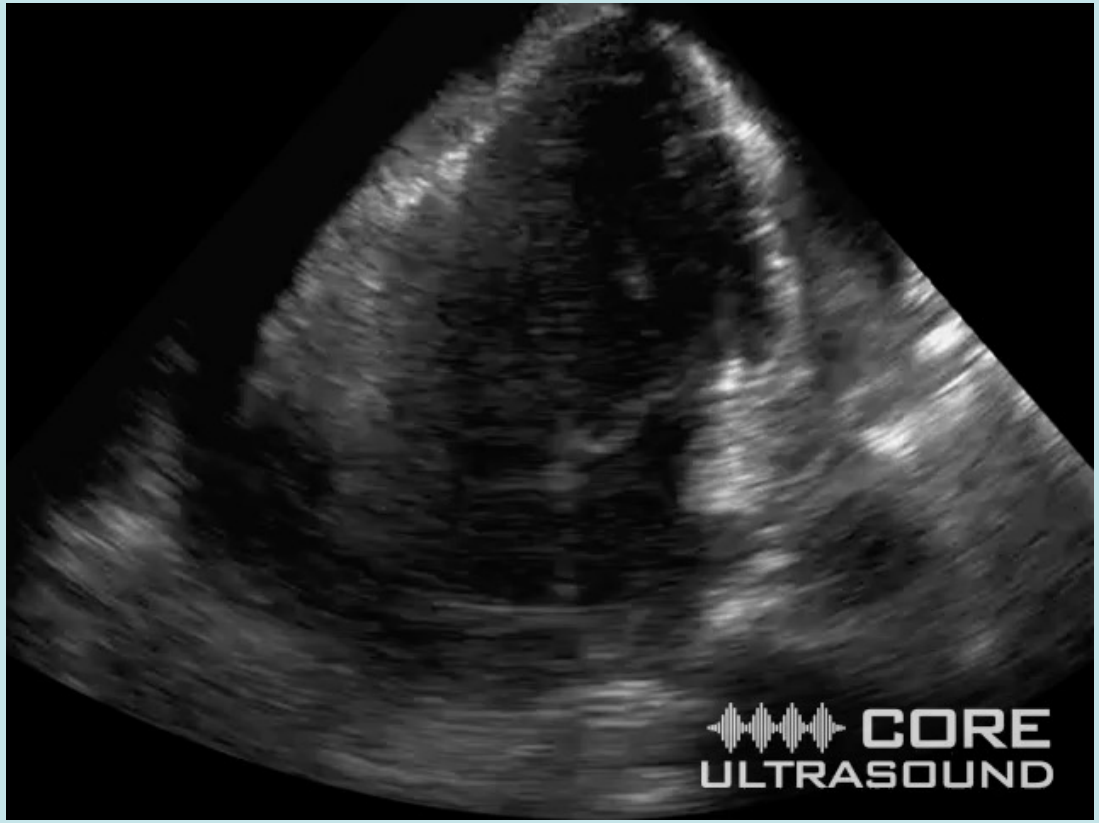


Circulation

- Manual blood pressure
- On the floor, and four more
  - Chest (e.g. haemothorax), abdomen (e.g. splenic rupture), pelvis (e.g. pelvis fracture), long bones (e.g. femoral shaft fracture)
- Stop bleeding
- Replace blood loss – IV/IO access
- The lethal triad
  - Hypothermia – warming measures
  - Acidosis – oxygenate and ventilate
  - Coagulopathy – avoid dilutional coagulopathy
- Physical examination and eFAST



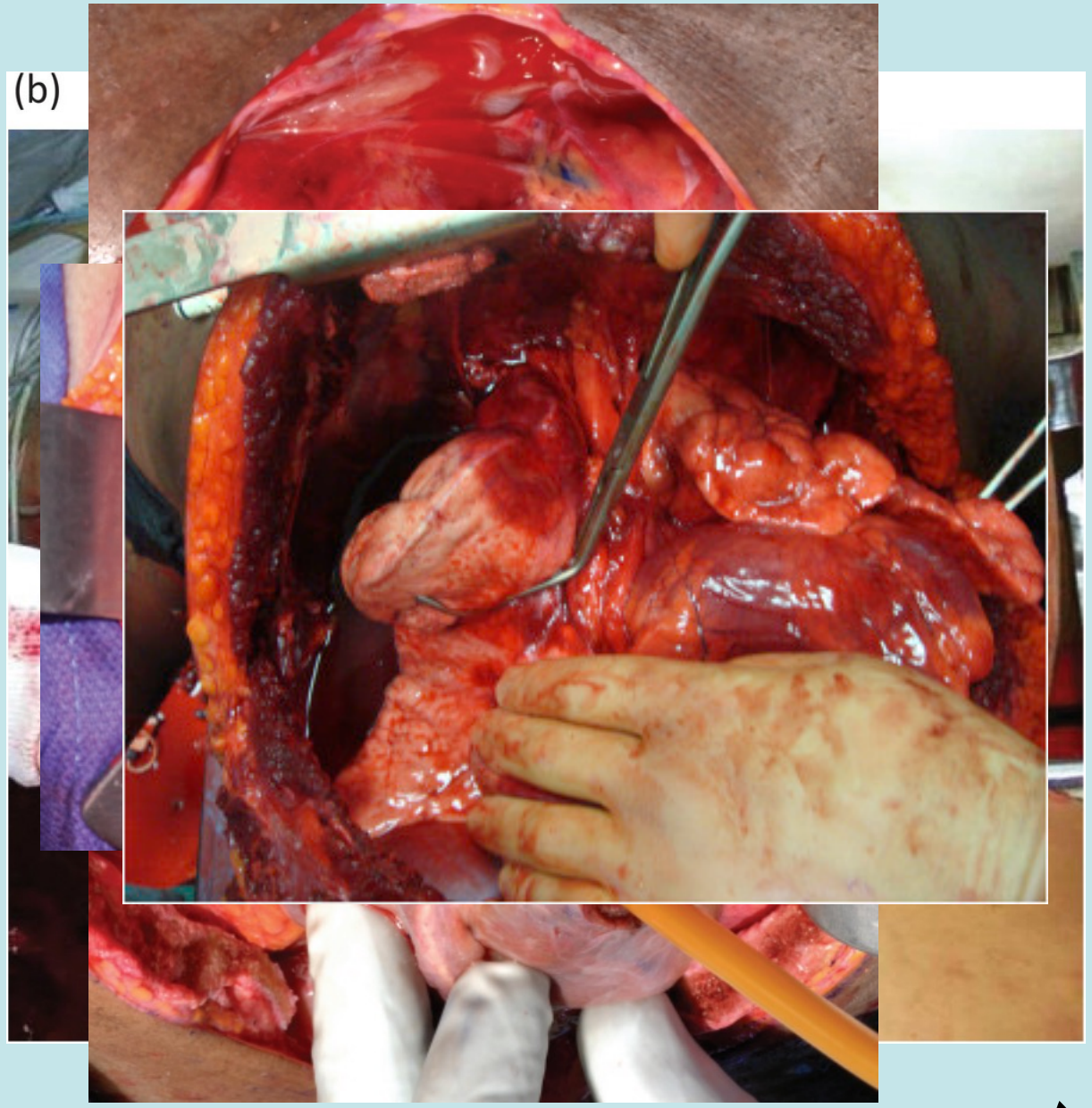
Cardiac eFAST



Cardiac procedures

- Patient in cardiac arrest (or peri-arrest) with penetrating chest trauma
  - Finger thoracostomy
  - Emergency thoracotomy
  - Extend to clamshell thoracotomy

- Open the pericardium
- Repair cardiac injuries
  - Sutures, foley catheter
- Cross-clamp the aorta/VC
- Hilar occlusion/twist
- Cardiac massage
- Internal defibrillation
- Pacing wires
- Intracardiac medications



Disability

- GCS/AVPU
- Pupils
- Look for movement/sensation in all extremities
  - Is there motor deficit or a sensory level? → cord injury

- CT Head?

- Raised ICP management – raise head of bed, hypertonic saline/mannitol, dexamethasone, neurosurgery

Exposure

- Remove all clothing
- Re-cover the patient with warm blankets
- Log roll to assess for injuries in the back
  - Lacerations, abrasions, fractures etc
  - Palpate for vertebral tenderness and PR exam to assess rectal tone and for rectal bleeding
- Continuous temperature monitoring
- Diagnostic peritoneal lavage
- Analgesia!!! – fentanyl/morphine/diamorphine or nerve blocks
- Anxiety - midazolam
- Portable XR, full-body CT

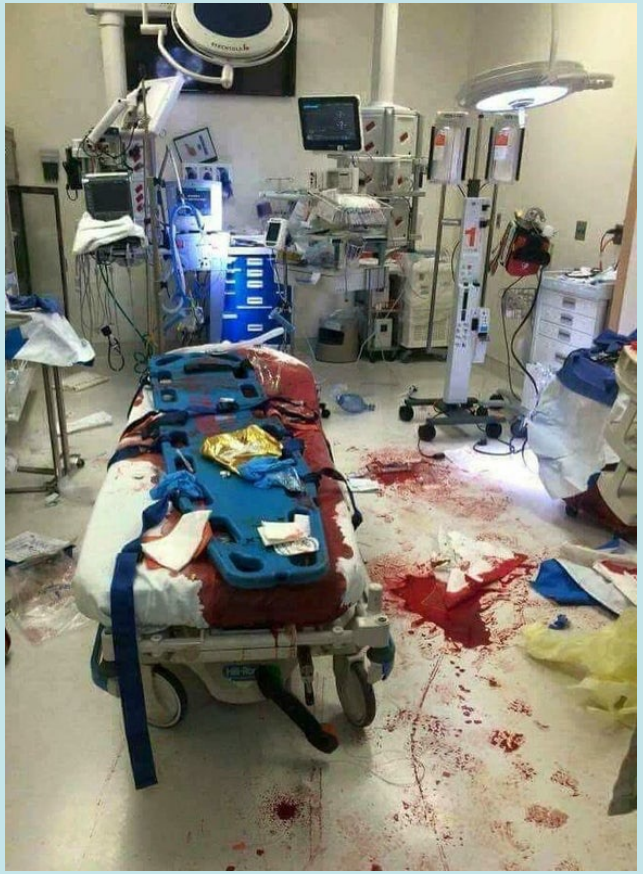
What next?

- Full history
- Head-to-toe examination of all systems
- Continuous monitoring
- Serial neurological examinations

- Then what?
  - Theatres, IR, ICU, trauma ward, mortuary

- Update relatives
- Debrief the trauma team

Cleaning up is fun…



Time for a pizza break

- Then four stations:
  - Log-roll and spinal immobilisation
  - Head CT criteria and interpretation
  - Massive Haemorrhage Protocol
  - eFAST – trauma ultrasound