

FEx Net 2022 collated SAQs:

Trauma in Special Circumstances - Answers

1. Burns
2. Burns
3. Burns
4. Burns
5. Burns
6. Burns
7. Burns
8. Electrical Trauma
9. Electrical Trauma
10. Eye Trauma
11. Eye Trauma
12. Eye Trauma
13. Eye Trauma
14. Eye Trauma
15. Eye Trauma
16. Eye Trauma
17. Injured Infant
18. Lightning Strike
19. Obese Trauma
20. Pregnancy Trauma
21. Pregnancy Trauma
22. Pregnancy Trauma
23. Retrieval

Question 1 (12 marks)

A 53 year old female had a syncopal episode and collapsed onto an electric heater. She sustained a facial burn. She is now haemodynamically stable and GCS 15.

You are in a rural ED.

A CLINICAL IMAGE IS SHOWN IN THE PROPS BOOKLET, PAGE 13

- i. List 4 issues to consider in your assessment of this patient (4 marks)

- Cardiac monitoring/ECG/other investigations for **cause of syncope**
- Assess for **airway involvement**
- Assess for signs of head/neck/ other injury – e.g. fluctuant/altered GCS, lacerations, haematoma, haemotympanum
- Tetanus status?
- Other

- ii. How would you describe this burn to the burns registrar on call at the tertiary hospital (2 marks)

- Burn involves approx. 2% TBSA
- Central area of full thickness burn (approx. 1% TBSA) with white/leathery appearance of skin and no capillary refill
- Surrounded by partial thickness burn with evidence of deroofed blisters
- Area extends from the patients left ear (involving the inferior 2 thirds of their helix, antihelix and the tragus), the majority of the patients left maxillary, mandibular and zygomatic areas, to the patient's chin.
- Left eye, lips and airway appear to be spared

iii. Outline 4 issues in the management of this burn (4 marks)

- Administer first aid if not already received – cool running water for 20mins
- Tetanus booster
- Appropriate analgesia
- Apply appropriate dressing (ie Silver-based eg acticoat) or bactigras
- Refer to a burns centre as this is a full thickness facial burn that will require a skin graft – needs tertiary management

iv. List 2 possible adverse sequelae from this burn (2 marks)

- Infection (left ear particularly at risk given it is a cartilaginous structure)
- Involvement of facial nerve, resulting in facial droop on the left side
- Permanent scarring
- Others

Question 2

You are the duty consultant in charge of an urban ED. A 55 year old gentleman is brought to your resuscitation bay after being rescued after the gas from a barbeque exploded in his face. His estimated weight is 80 kg.



1) What clinical signs and symptoms would you actively look for in this patient? (2.5 marks)

- **Facial or oral burns**
- Singed nasal hairs
- Swollen lips
- Singed eyebrows/eyelashes
- Signs of other trauma
- Oedema (laryngeal, facial etc.)
- Tachypnoea
- Wheeze
- Stridor

2) List 5 investigations you would perform in this patient (2.5 marks)

- **Carboxyhaemoglobin level**
- UEC
- Glucose
- ABG
- Creatinine Kinase
- CXR
- ECG

3) On exposure of the patient you estimate he has sustained **10%** deep dermal burns.

Calculate this patient's fluid requirements in the first 8 hours (1 marks)

Total fluid based on Parkland formula (Hartmann's solution) = $4\text{ml} \times 80\text{kg} \times 10\% = 3.2\text{ L fluid}$.

Therefore, give 1.6 L over first 8 hours.

4) List 8 criteria requiring transfer to a specialised burns unit (4 marks)

- Mid to deep dermal burns in adults >10% TBSA (total body surface area)
- Full thickness burns in adults >5% TBSA
- Mid-dermal, deep dermal or full thickness burns in children >5% TBSA
- Burns to the face, hands, feet, genitalia, perineum and major joints
- Chemical burns
- Electrical burns including lightning injuries
- Burns with concomitant trauma
- Burns with associated inhalation injury
- Circumferential burns of the limbs or chest
- Burns in patients with pre-existing medical conditions that could adversely affect patient care and outcome
- Suspected non-accidental injury including children, assault or self-inflicted
- Pregnancy with cutaneous burns
- Burns at the extremes of age – infants and frail elderly

Question 3

1.

Stridor

Loss of voice/Hoarse voice/Odynophagia

Marked Lip swelling

Obvious oral cavity/oropharyngeal swelling

Burnt nasal hair

2.

Hypoxia from burns

Toxic from combustion – CO or cyanide

Trauma from associated injury

Heat Stroke

3.

36%

4.

Parkland formula – $4\text{ml/kg} * \%BSA$

$4 * 36 * 100 = 14400\text{ mL}$

Half over first 8hrs, half over next 16hrs

Question 4

(30 marks)

You are working in the retrieval service when you receive a call for advice from a junior medical officer who is working in a small rural hospital 300km from the tertiary centre. They have a 34 year old male patient who has sustained burns to their chest and arms whilst lighting a fire on their farm.

- 1. List 2 different methods that could be used to estimate the TBSA% of this patient's burns. (2 Marks)**

- Lund and Browder chart
- Rule of nines
- Palmar surface

- 2. What key features of this patient's assessment would make you concerned for the presence of airway burns. (5 Marks)**

- Stridor
- Hoarse voice
- Carbonaceous sputum
- Singed facial hair
- Nasal/oral burns
- History of fire in a confined space

- 3. List your advice to the junior doctor about whether IV fluids would be indicated for this patient? (3 Marks)**

- If >15-20% TBSA for adult patient
- If coexistent traumatic injuries
- If delayed presentation
- If inhalation injury

- 4. If fluids are required, outline your advice about how to calculate the initial fluid requirements for this patient. (4 Marks)**

- Modified Parkland Formula
- $3-4\text{mLs} \times \text{TBSA\% Burn} \times \text{Weight (kg)}$
- 1/2 Total Fluid Volume to be given in first 8 hours post burn
- 1/2 Total Fluid Volume to be given over next 16 hours

- 5. List 6 criteria that would indicate that this patient requires referral to a burns centre for ongoing management. (6 Marks)**

- Burns > 10 % TBSA in an Adult (partial and full thickness)
- Full thickness burns > 5% TBSA

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Emergency

- Burns to special areas (eg face, hands, feet, perineum, genitalia, and major joints)
- Circumferential burns
- Burns in the presence of major trauma or significant co-morbidity
- Unable to managed in the current level of hospital

6. Complete the table by listing 5 immediate and 5 long term complications that may occur from this patient's burns. (10 marks)

Immediate

Infection/Sepsis

Fluid loss

Hypothermia

Rhabdomyolysis

Acute renal failure

Compartment syndrome

Chest rigidity & hypoventilation from eschar

Long term

Cosmetic/Scarring

Loss of function

Loss of income/employment

Contractures

Psychological

Restrictive chest wall/lung disease

Pass mark: 18/30

Question 5

Pass Mark: 8

Regarding Burn
injuries:

1. List 2 different methods for estimating burns TBSA% (1 Marks)

- Lund and Browder chart
- Rule of nines
- Palmar surface

2. What are the 4 different burns depths? (2 Marks)

- Epidermal
- Superficial dermal
- Mid dermal
- Deep dermal
- Full thickness

3. List 3 scenarios when a patient with burns requires IV fluids? (3 Marks)

- Adult >15-20% TBSA
- Children >10% TBSA
- electrical burns
- coexistent traumatic injuries
- delayed presentation
- inhalation injury

4. How are initial fluid requirements calculated in burns, describe the details? (1 Marks)

- Modified Parkland Formula
- $3-4\text{mLs} \times \text{TBSA\%} \times \text{Weight (kg)}$
- 1/2 Total Fluid Volume to be given in first 8 hours post burn
- 1/2 Total Fluid Volume to be given over next 16 hours

5. List 5 patient scenarios that would require referral to a burns centre: (5 Marks)

- Burns > 10 % TBSA in an Adult
- Burns > 5 % TBSA in a Child
- Full thickness burns > 5% TBSA
- Burns of face, hands, feet, perineum, genitalia, and major joints
- Circumferential burns

- Chemical or electrical burns
- Burns in the presence of major trauma or significant co-morbidity
- Burns in the very young patient, or the elderly patient
- Burns in a pregnant patient
- Suspicion of Non-Accidental Injury

Question 6

Pass mark: 12/18

You are working in the retrieval service when you receive a call for advice from a junior medical officer who is working in a small rural hospital 300km from the tertiary centre.

They have a 34 year old male patient who has sustained burns to their chest and arms whilst lighting a fire on their farm.

1. **List 2 different methods that could be used to estimate the TBSA% of this patient's burns.** **(2 Marks)**
 - Lund and Browder chart
 - Rule of nines
 - Palmar surface

2. **What key features of this patient's assessment would suggest the presence of airway burns.** **(4 Marks)**
 - Stridor
 - Hoarse voice
 - Carbonaceous sputum
 - Singed facial hair
 - Nasal/oral burns
 - History of fire in a confined space

3. **What features in patient presentation and assessment would indicate IV Fluids should be given?** **(3 Marks)**
 - If >15-20% TBSA for adult patient
 - If coexistent traumatic injuries
 - If delayed presentation
 - If inhalation injury/airway burns

4. **If fluids are required, outline your advice about how to calculate the initial fluid requirements for this patient.** **(2 Marks)**
 - Modified Parkland Formula
 - $3-4\text{mLs} \times \text{TBSA\%} \times \text{Weight (kg)} = \text{total in first 24hrs}$
 - **1/2 Total Fluid Volume to be given in first 8 hours post burn**
 - **1/2 Total Fluid Volume to be given over next 16 hours**

5. **List 6 criteria that would indicate that this patient requires referral to a burns centre for ongoing management.** **(3 Marks)**

- Burns > 10 % TBSA in an Adult (partial and full thickness)
- Full thickness burns > 5% TBSA
- Burns to special areas (eg face, hands, feet, perineum, genitalia, and major joints)
- Circumferential burns
- Burns in the presence of major trauma
- Burns with significant co-morbidity (Type 1 Diabetes, CCF)
- Unable to managed in the current level of hospital
- Burns with inhalation injury

6. Complete the table by listing 4 early (<72hrs) and 4 long term (>72hrs) complications that may occur from this patient's burns.

(4 marks)

Immediate

Infection/Sepsis

Hypovolaemia from fluid loss

Electrolyte disturbances – Hypokalaemia, Hyperkalaemia

Acute Respiratory Distress Syndrome

Acute Kidney Injury

Carbon Monoxide Poisoning

Hypothermia

Rhabdomyolysis

Chest rigidity & hypoventilation from eschar

Long term

GI Ulcer

Disfigurement -Cosmetic/Scarring

Loss of function

Loss of income/employment

Contractures

Psychological

Restrictive chest wall/lung disease

Pass mark: 12/18

Question 7

Questions:

1. List 7 potential complications of this burn and describe the key management option for each. (14 marks) - 10/14

Answer :

Airway burns with stridor – early intubation

Breathing – ventilation issues with restriction of chest wall movement–
escharotomy

Inhalational burns – oxygen and ventilatory support for ARDS – NIV with PEEP

Hypovolaemia – third spacing – rehydration using Parkland's formula $4\text{ml} \times \text{kg} \times \% \text{ burn}$

Circumferential limb burns/Compartment syndrome – escharotomy

Rhabdo and ARF – 20ml/kg N saline to treat shock and then calculate burn surface area and replace fluids over 48hrs. Maintain UO.

Infection – cover burns and silver impregnated dressings for prevention of infection

2. You are preparing to do an escharotomy of the torso when your resident asks whether the patient needs to consent to the procedure.

List the principles of consent that apply in this situation. (3 marks) - 2/3

Answer 2

Patient is critically unwell and will be **unable to provide consent for this life-saving procedure**. He is unlikely to have capacity to consent given he is intoxicated, hypoxic and shocked and there is suspicion of self-harm.

We will treat this patient's life-threatening injuries under the principle of **Duty of Care** (Guardianship Act) and proceed with treatment whilst attempting to notify next of kin or the Adult Guardian to inform them of the events.

Documentation all discussions and decisions carefully in the medical record.

Passmark = 12/17 (adjust to /10) (7/10)

Question 8 (15 marks)

A 27 year old man climbed over an electricity sub-station fence and sustained an electrical injury while grabbing a metal pole with his right hand. He arrives 30 minutes later complaining of tingling in his right arm and a numb left foot.

A CLINICAL PHOTOGRAPH IS SHOWN IN THE PROPS BOOKLET, PAGE 8

- i. Describe the wound seen on the foot (1 mark)

- Deep, full thickness burn to plantar aspect forefoot
- Depressed central area with surrounding eschar
- Sensible answer

- ii. Complete the table outlining factors that determine the severity of an electrical injury (8 marks)

Category	Explanation
Voltage	High voltage defined as > 1000V (some say 600V)
Current	0.5-2mAmp –tingling 1-4mAmp – pain threshold 6-22mAmp – tetanic contraction, unable to let go 18-30mAmp – respiratory arrest > 70mAmp – VF > 2000mAmp – asystole
Resistance	Wet skin much better conductor than dry → increase likelihood of injury resistance increases – nerves/vessels -> muscles -> bone

Type of current	Low voltage AC more likely to → VF High voltage AC, and DC -more likely to cause muscle contractions that throw person away from source -more likely to cause asystole

- iii. For each of the three categories below, what specific injuries or problems may occur in the patient described in the stem? For each, describe the pathophysiological process (6 marks)

	Injury	Pathophysiology
Cardiac	Variety of dysrhythmias	High voltage injury likely (substation) Evidence of trans thoracic current
Nervous system	Peripheral nerve injury/parasthesia/paralysis	Current down arm and leg
Limb soft tissue	Cutaneous burns Vascular injury	Current from hand-foot Vasospasm/thrombosis/ischaemia Heating of tissue

Question 9

Pass mark :9/12

A 36-year-old male electrician is brought into your ED post electrocution from exposure to a 11000-volt power line. He was thrown against a metal panel 8 meters away and noted to have no signs of life on scene.

Bystander CPR and ambulance resuscitation managed to gain ROSC after a down time of approximately 20 minutes.

His initial cardiac rhythm on scene was ventricular fibrillation.

On arrival to your ED this patient is intubated and ventilated with the following vital signs:

Heart rate	84bpm
Blood Pressure	145/90
Resp Rate	15 breath per min, hand ventilated
O2 Sats	98% on 15L via BVM

Questions:

- 1. Name four factors related to the nature of electrical exposure that can influence the severity of an electrical injury.**

(4 Marks)

Voltage level:	High voltage > 1000 Volts are high risk injuries
Current level :	>2 amps causes burns and > 10 amps causes asystole
Current type:	AC more likely to precipitate VF compared with DC AC is considered 3x more dangerous than DC due to its ability to cause tetanic muscle contractions that prolongs contact of victim with the source.
Pathway of current:	Pathway determines type and severity of injury Vertical pathway most dangerous as all organs are in the line of injury Horizontal pathways usually spares brain but can still be fatal due to heart, respiratory muscle and spinal cord involvement
Duration of current:	Longer the duration likely the more severe the injury

- 2. List four types of injuries that can be sustained in this patient and provide an example of each type.**

(4 Marks)

(This is an easy question, so both type *and* example are needed to gain a mark)

Thermal Burns

Burns to skin: varying thickness

Burns to eyes

Compartment syndrome

Blast Trauma

Blunt trauma to head / spinal / chest / abdomen from the blast

Head Trauma

Spinal Trauma

Chest Trauma: Haemothorax, Pneumothorax, Rib Fractures, Lung Contusions, Cardiac Contusions
 Abdominal / Pelvic Trauma: Any type of visceral injuries
 Bony Injury: Any type of significant bony injury from the impact of the blast and being thrown.
 Tympanic Membrane rupture

Cardiovascular Injury
 Cardiac dysrhythmias: Malignant (VF, Systole) to other conduction disorders
 Direct myocardial necrosis in high voltage or alternate currents.

Neurological Injury
 Hypoxic brain from cardiac arrest
 Continuous tetanic contractions
 Seizures
 Spinal cord injuries

Crush Injury / Acute renal failure / Rhabdomyolysis from ischaemia

3. List 4 indications for the use of telemetry in the Emergency Department for a patient with a suspected electrical injury, without cardiac arrest.

(4 Marks)

High voltage injury (>1000 volts)
 Loss of consciousness
 Seizures
 ECG changes or documented arrhythmias
 Previous cardiac disease (especially cardiac arrhythmias)
 Burns

Pass Mark is 9/12

Question 10 (16 marks)

A 68 year old male sustains blunt trauma to his right eye from a golf ball.

- i. Describe three abnormalities in the image (3 marks)

A CLINICAL IMAGE IS SHOWN IN THE PROPS BOOKLET, PAGE 14

- Extensive subconjunctival haemorrhage
- Extensive chemosis
- Dilated pupil
- Proptosis
- Periorbital bruising

- ii. List 5 features on assessment that would suggest orbital compartment syndrome (5 marks)

- Proptosis
- Rock hard eyeball palpated with eyelid closed
- Visual acuity. Significantly decrease, rapidly dropping to light perception only
- Inability to open eye
- Severe eye pain
- Limited eye movements
- Raised IOP >40 mm Hg. Rock hard eye ball to palpation compared to the other side
- RAPD

iii. Describe the steps involved in a lateral canthotomy/cantholysis (8 marks)

- Need to have adequate LA and/or sedation. Inject 1-2 mL local anaesthetic into lateral canthus
- Perform the canthotomy - insert needle holder from lateral canthus towards bony orbit and compress this area to devascularise it.
- Remove needle holder and using scissors cut along the lateral canthus 1-2 cm to the bony orbit.
- Perform cantholysis: Grasp the lateral lower eyelid with toothed forceps. Pull the lower eyelid down to visualise the inferior canthal tendon and cut through this with scissors. If not visualised the tendon can be identified as a rigid band, like a guitar string, "strummed" by the forceps to help locate it.
- If IOP still high after this cut the superior canthal tendon too by lifting the upper eyelid and locating the tendon. Use scissors to cut.

Question 11:

45 yo male is hit in the eye with a tennis ball while having a friendly match with his neighbour.

1. Describe the abnormalities in the photo (1 mark)

Irregular pupil, hyphaema, conjunctival injection and oedema, bruise to the inner upper eyelid, presence of fluorescein

2. List 3 things that should be examined or assessed: (3 marks)

Visual acuity, light reflex / RAPD

Globe pressure , slit lamp examination of anterior chamber and pupil

3. What grade is this hyphema? (1 mark)

Grade 2

4. List 4 complications that may occur? (4 marks)

Rebleed, traumatic iritis, glaucoma, corneal staining

Three days after being discharged home with outpatient ophthalmology review, he represents with throbbing eye pain, tearing and photophobia.

5. What is the most likely diagnosis? (1 mark)

Traumatic iritis

Question 12 **7/10**

1

Extruded iris / aqueous humour

Irregular pupil

Cloudy cornea

Scleral injection

2

Penetrating eye injury

3

Analgesia – eg IV morphine 2.5mg aliquots

Anti-emetic IV ondansetron 8mg

Urgent review Ophthalmology

IV Antibiotics – drugs not required for this one

Eye shield

Question 13

12 Marks

A 60yr old man presents to your non-tertiary emergency department stating he 'walked into something' 30 minutes ago sustaining a left eye injury. He refuses to answer further questions as to the exact mechanism. He undergoes an urgent CT scan of his head and face.

His CT is found in the Props Booklet

1. List THREE abnormalities on his CT scan (3 marks)

Must have first two to get any marks

- Globe rupture
 - Orbital blowout fracture or fracture of orbital floor with depression
 - Displacement of inferior rectus
 - Haemorrhage/Air in maxillary sinus
2. List FOUR examination findings you would look for on your assessment (4 marks)

Must have VA to get any marks

- Visual acuity
- Extra ocular movement
- Sensation over inferior orbital nerve
- Assessment of pupils shape
- Pupillary reflexes
- Inspect for hyphaema
- GCS or other neurological assessment for intracranial injury
- Cervical spine midline tenderness
- Septal haematoma/other facial injury

*testing IOP not recommended as to avoid pressure on the eye, avoid flouroscein

3. State your ongoing management for this man (5 marks)

- Urgent referral to Ophthalmology
- Lie patient flat
- Avoid external pressure on the eye
- Tetanus update
- IV antibiotics (cephazolin 2gm IV +/- gentamicin)
- Eye shield - not pad
- Analgesia - appropriate opiate-based analgesia
- IV anti-emetic
- Sinus precautions

*topical antibiotics not indicated

Question 14

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Answers:

1.

(Marks 3) 2/3

Hemorrhage in the anterior chamber inferiorly
Iridodialysis (iris separation from ciliary body) inferiorly
Pupillary distortion – damage to sphincter ?traumatic mydriasis

2.

(marks 12) 8/12

- **Vitreous haemorrhage**

floaters and cobwebbing (minor haemorrhage)
visual haze or visual loss in more extensive haemorrhages
red reflex absent
Weiss ring on fundoscopy /retina obscured

- **Retinal detachment**

VA markedly decreased
Absent red reflex
Visual field loss
Fundoscopy indeterminate / elevated retina

- **Ocular globe rupture**

Vitreous humor leak
dark uveal tissue exposed at limbus
distorted pupil
decreased visual acuity
subconjunctival haemorrhage with swelling or chemosis
decreased intraocular pressure

- **Lens subluxation and dislocation**

blurred vision
quivering of the iris when the patient moves their eye

- **Retrobulbar haematoma**

proptosis
ischaemia of the optic nerve - fixed and dilated pupil
nerve palsy / muscle entrapment – ophthalmoplegia

- **Acute Glaucoma**

severe unilateral pain / nausea and vomiting
visual loss / halo
semi dilated non reactive pupil
corneal haze
markedly increased intraocular pressure (> 30 mmHg)

3-

(Marks 5) 3/5

Bedrest at 30 Degrees
Analgesia – avoid NSAID's – opioids if needed
Eye shield
Cycloplegics

Discuss with ophthalmology – features suggest an additional injury – needs urgent review

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Consider USS to exclude retinal detachment / globe rupture

Passmarks 13/20 Adjust to ../10 please

Question 15:

Questions:

1- List three (3) abnormalities in the given photograph: (3 marks)

Marked conjunctival injection

Hyphaema

Traumatic mydriasis

2- List three (3) possible associated injuries (3 marks)

Lens dislocation

Globe rupture

Orbital wall fracture

Retinal detachment

3- Please list two (2) early and two (2) late complications of the above condition. (4 marks)

Early Complications	Late Complications
Rebleeding	Corneal blood staining
Raised IOP Traumatic iridocyclitis	Posterior/peripheral anterior synechiae Optic atrophy

4- List five (5) management steps for this patient. (5 marks)

- Analgesia (avoid NSAIDs, aspirin)
- Patch eye
- Bed rest and head elevated 30 degrees to aid settling of hyphaema
- Topical cycloplegics – homatropine/tropicamide
- Treat associated complications – Raised IOP with acetazolamide/topical timolol. Traumatic iridocyclitis – steroids/cycloplegics
- Treat associated injuries listed above

Question 16

Passmark: 8/12

A 21-year-old male presents to a tertiary Emergency Department after suffering an injury to his right eye at work while hammering metal.

His eye photo is included in the props booklet:

Questions:

1. List 3 abnormalities on the image (3 marks)

- . Lacerated sclera
- **Uveal prolapse**
- **Misshapen pupil**

2. List 2 relevant negative findings (2 mark)

- No hyphema
- No signs of extraocular trauma

3. State what further investigation you would perform and justify your choice. (2 marks)

- Safe modality (CT/USS) to locate FB.
- MRI incorrect and contraindicated.
- Plain film not appropriate as investigation in a tertiary ED.

4. State 5 immediate management steps. (5 marks)

- Immediate ophthalmological referral
- Elevate head of the bed
- Eye shield
- ADT
- IV antibiotics. (broad spectrum IV Pip taz or similar broad spectrum cover with appropriate dose)
- Analgesia (IV with appropriate dose opiate)
- Antiemetics (IV appropriate dose)

Pass mark: 8/12

Question 17 (14 marks)

Whilst you are at triage, a 3 month infant is brought to ED by his father. His father states that the infant has been sleepy all day and is not interested in feeds. He also reports the baby has also had a recent cough and a fever.

The following observations are recorded

RR 14 (poor respiratory effort)

Oxygen saturation 84% in air

HR 50

BP 95/50

Temp 34.8

The infant appears pale, quiet, and is unresponsive responsive. Faint bruising is noted on the cheeks.

a) Explain your immediate management of this infant. (6 marks)

Move to appropriate resuscitation area.

Assist ventilation with bag and mask to RR of 30/min. or 15:2 ratio

Supplemental O₂ to achieve SpO₂ > 90-92%

Obtain vascular access or intraosseous within 2 minutes

Urgent Glucose

Intubation with rapid sequence approach unless becomes responsive with O₂ or correction of hypoglycaemia

Atropine if remains bradycardic or as intubation adjunct

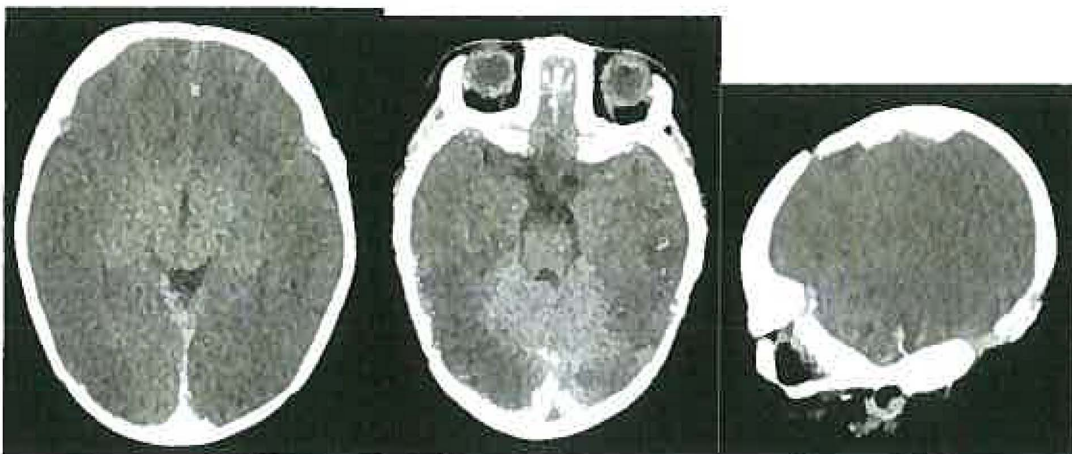
IV fluid bolus 10 or 20ml/kg

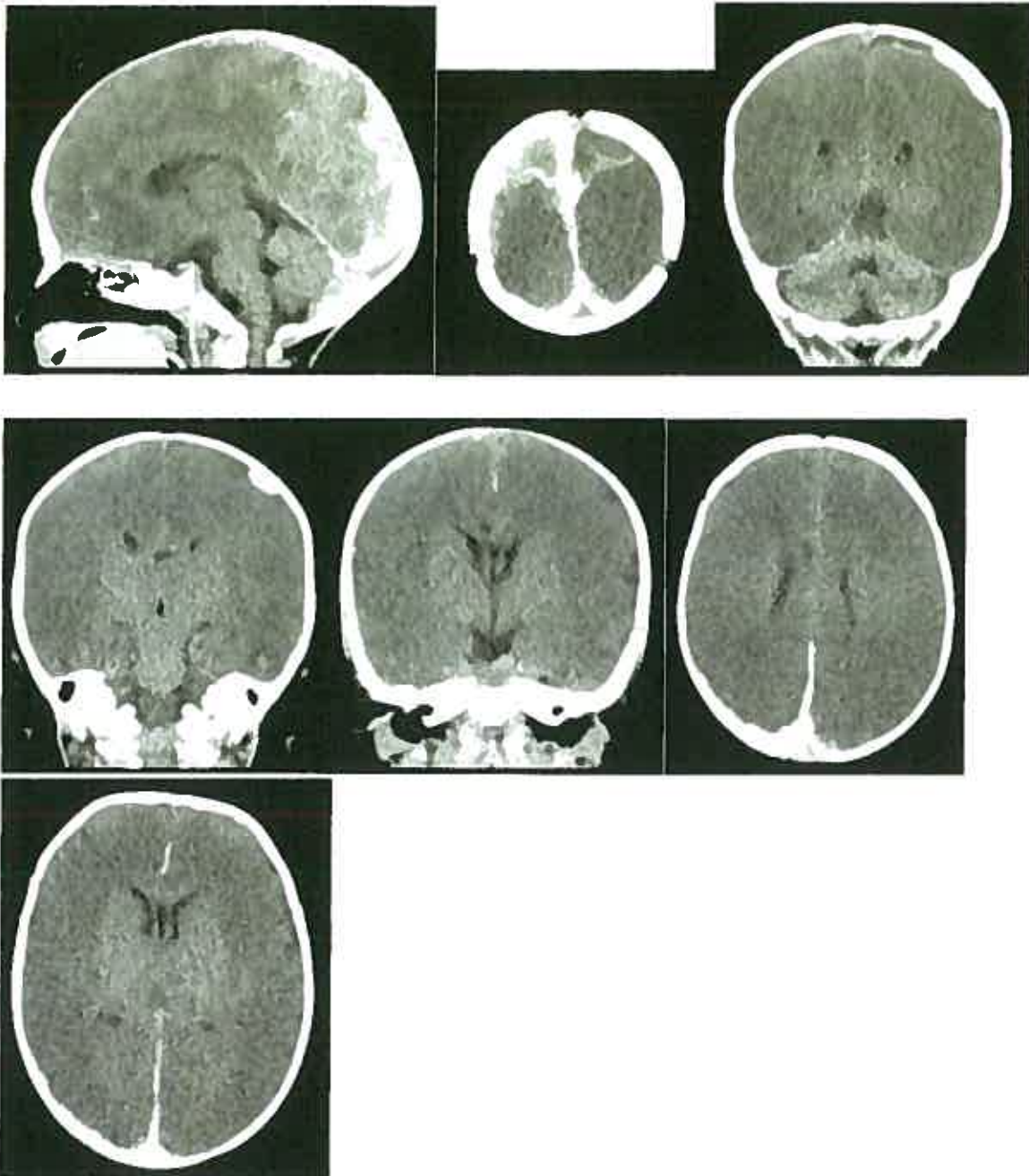
Broad spectrum IV antibiotics Cefotaxime

Obtain more detailed history

b) An urgent CT of his Brain is performed

Describe the relevant findings on the selected images provided (4 marks)





Subdural haemorrhage – left parietal, 2-3mm thick – location and size required for 2 marks

Subarachnoid haemorrhage – frontal /occipital – location required for 2 marks

Diffuse ventricular compression / Cerebral oedema – 1 mark only

c) List 2 other services that need to be informed because of these findings (2 marks)

Urgent neurosurgery consultation

Child protection unit

Intensive care unit

d) The patient's mother arrives in the department, visibly distraught. Outline your approach to explaining your findings to her. (2 marks)

Ensure another person is present with you - Chaperone/Social Worker present

Consider need for security presence

Openly disclose suspicion of NAI

Inform of legal requirement to inform DCP and Child protection

Additional notes re floppy baby case

Initial impression is that of an infant who may have a respiratory complaint, but with no features of increased respiratory effort. However, the infant is floppy and unresponsive (U on AVPU scale), so immediate attention needs to be to secure an airway (esp. with history of vomiting as well) and assisted ventilation. Moving the infant to an appropriate resuscitation area (resuscitaire would significantly aid response to treatment (e.g. Management in acute area/on large bed only exacerbates hypothermia leading to refractory arrhythmias).

Specific care needs to be taken during intubation attempts (either soon after suctioning or during placement of ETT), not to cause undue vagal stimulation which may result in reflex bradycardia as this may falsely be interpreted as signs of raised ICP. Correct treatment therefore would be to commence ECM and give atropine IV/IO depending on access obtained. Adequate muscle relaxant and sedation (morph/midaz/fentanyl) should be given prior to intubation.

The candidate should realise that the history above does not adequately explain the life-threatening condition of this young infant with altered LOC. Sepsis should also be considered. ED Consultant assistance or code #33 called early. PICU/ Radiology warned. Neurosurgical Team specifically contacted. Social worker attendance requested if available.

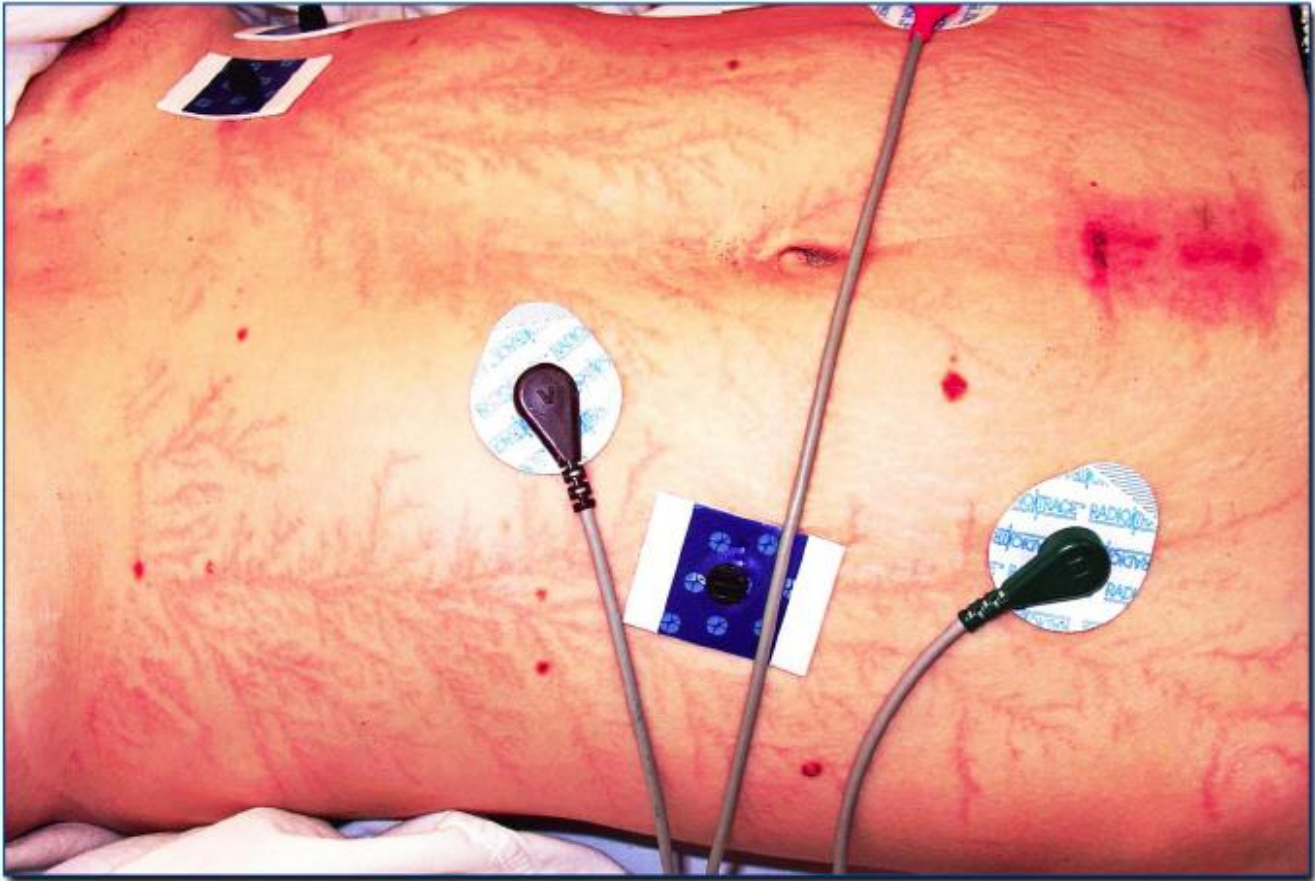
Question 18

Image reproduced from Dunn's Emergency Medicine Manual, 6th edition

i. What is the most likely diagnosis? List two (2) features from the photograph that support this diagnosis (2 marks)

Diagnosis

- Lightning strike

Clinical features

- Lichtenberg figures (ferning / feathering)
- Burns from belt buckle

ii. List four (4) immediate complications that you would assess for (4 marks)

- Keraunoparalysis – transient limb paralysis or sensory changes with vascular spasm (reversible distal limb ischaemia).
- Muscle injury - compartment syndrome, rhabdomyolysis.
- Neurological injury – seizures, LOC, hemiplegia, peripheral nerve injury.
- Eye injury – e.g. corneal burns, retinal detachment, optic nerve injury, delayed cataracts.
- Ears – ruptured tympanic membranes (in 50%), sensorineural deafness.
- Burns
- Blast injury, secondary trauma
- Hypoxic brain injury post CPR

iii. List one (1) important delayed complication requiring specialty follow-up (1 mark)

- Eye complications – particularly cataracts.
- Burns
- Neurological syndromes – e.g. paralysis, neuropathies.

iv. List and justify three (3) investigations for this patient. (3 marks)

- CT brain - ? CNS injury
- ECG - ? arrhythmia
- CK - ? rhabdomyolysis
- UEC - ? potassium
- Urine dip - ? myoglobinuria
- Others – troponin (?AMI), nerve conduction studies, audiometry

Question 19 (15 marks)

An obese man is brought to your ED following a rollover MVA. His estimated weight is 210kg. He has head and chest injuries.

i. List four ways in which obesity affects assessment and/or management of the airway and breathing during the primary survey (4 marks)

- ↑upper airway soft tissues: difficult intubation and airway maintenance
- ↑Pulmonary artery occlusion pressure: increased by high intra-abdominal and pleural pressures
- ↑Pulmonary artery pressure: mild to moderate elevations may result from OSA alone
- ↓Total lung capacity
- ↓Vital capacity
- ↓Functional residual capacity: atelectasis and reduced oxygen stores increase propensity for desaturation
- ↑Pleural pressure: reflects chest wall compression
- ↓Respiratory system compliance: stiffer respiratory system likely from lung and chest wall contribution
- ↑Airway resistance: risk of asthma and airway closure
- ↓Hypercapnic ventilatory response: contributes to obesity hypoventilation syndrome
- ↑Upper airway resistance: contributes to difficult airway and sleep apnoea

ii. Complete the table identifying two effects of obesity on each component of pharmacokinetics (8 marks)

Component	Effects of obesity
Absorption	
Distribution	

Metabolism	
Elimination	

ABSORPTION

- increased absorption of oral medications (increased gastric emptying)
- difficult IV access in the obese
- decreased SC absorption due to poor subcutaneous blood supply
- IM administration may fail if needles are too short

DISTRIBUTION

- markedly affected by ratio of adipose tissue to lean body mass if lipid soluble
- increased Vd of lipid soluble drugs
-> dose lipid soluble drugs on actual body weight
(remifentanyl is an exception, although lipophilic Vd does not change – use IBW or LBW)
- no change in Vd of H₂O soluble drugs (but blood, ECF, body organ and connective tissue volume are also increased)
-> dose on ideal or lean body weight
- accumulation of lipophilic drugs in fat stores
- may increase dose required to gain effect
- total body water may be increased by resuscitation volume
- C_{max} reduced
- altered protein binding

METABOLISM

- variable effects
- increases in cytochrome P450 2E1 activity and phase II conjugation activity
- more likely to be affected by critical illness with drug interactions
- reduced hepatic blood flow

ELIMINATION

- T_{1/2} increased of lipid soluble drugs due to accumulation
- obese patients with normal renal function have increased GFRs
-> increased clearance of drugs excreted by the kidneys
- co-existing disease will effect this (e.g. nephropathy associated with diabetes and hypertension)
- calculated and measured creatinine clearance correlate poorly in obesity and in critical illness

- iii. Non-invasive BP measurement is difficult in the obese. Provide a detailed description of the recommended BP cuff bladder width, length and position (3 marks)

The most common error in blood pressure measurement is use of inappropriate cuff size. Considerable overestimation can occur if the cuff is too small. The bladder length recommended by the AHA is 80 percent of the patient's arm circumference, and the ideal width is at least 40 percent. Error is minimized when the cuff width is 46 percent of the arm circumference, although for large adult and thigh cuffs this is not practical. In obese patients, longer, wider cuffs are needed to compress the brachial artery adequately. In children, cuff bladder width should be at least 40 percent of the arm circumference halfway between the olecranon and acromion; the cuff should then cover 80 percent or more of the arm circumference.

For correct cuff placement, the midline of the cuff bladder should be positioned over the arterial pulsation in the patient's upper arm following palpation of the brachial artery in the antecubital fossa. There should be a 2– to 3–cm space for the stethoscope between the lower end of the cuff and the antecubital fossa, unless this would require an undersized cuff. In patients with an arm circumference greater than 50 cm, the cuff should be wrapped around the forearm, supported at heart level, and the radial pulse felt at the wrist

Question 20

Long question 18 Marks

You are in charge at the emergency department of a tertiary centre when the ambulance service notifies you of the imminent arrival of a 28yr old female who is 30 weeks pregnant who has been involved in a motor vehicle collision.

You are informed that her vital signs are:

GCS 15 (E4,V5,M6)

HR 120

BP 100/80

O2 sats 95% RA

RR 24

Temp 37.

BSL 5.6.

You prepare for her arrival with your trauma team.

1. Complete the table, listing 3 changes to her cardiovascular and 3 changes to her respiratory system in pregnancy and their implication that make interpretation of her vital signs or management challenging (6 marks)

Cardiovascular	Change in pregnancy	Implication
Plasma volume	Increased by 50%	Dilutional anaemia, reduced O2 carrying capacity, signs of shock appear late
Heart rate	Inc 15-20bpm	Inc CPR demands
Uterine blood flow	10% CO	Potential for massive haemorrhage
Respiratory	Change in pregnancy	Implication
RR	Inc	Dec buffering capacity, acidosis more likely
Laryngeal oedema	Inc	Difficult intubation
Upper airway blood supply	Inc	Friable mucosa- inc bleeding and difficult airway visualisation

2. List the relevant specific maternal obstetric history to obtain: (4 marks)

Confirm gestation in weeks and current pregnancy complications
Fetal lie/ placental location
Blood type/Rh status
Previous pregnancy/birth complications

On your primary survey you confirm her vital signs are

HR 120
 BP 100/80
 RR 24
 O2 sats 95%
 Afebrile
 GCS 15.

She has equal breath sounds, no evidence of a chest injury and her airway is patent with no cervical tenderness. She is warm and well perfused with dual heart sounds. She has a seatbelt mark across her abdomen with tenderness in the left upper quadrant.

3. List 3 diagnostic imaging options of her abdomen and their justification for use: (3 marks)

Imaging modality	Justification
FAST scan	Similar sensitivity in non-pregnant patient, will identify free fluid in the abdomen
Formal USS	Confirm gestational age, solid organ injury, FHR, fetal activity/presentation, placental locations, amniotic fluid volume
CT abdo	Risk of radiation is small compared to delayed diagnosis of trauma, fetal vulnerability most <15 weeks gestation, will define injury and grading

4. She is known to be Rh negative. What is the role for a Kleihauer test? (1 mark)

To confirm the dose of Anti-D required post sensitising event. i.e if she needs more than 625IU (if kleihauer >6ml will need inc dose anti-D)

5. List 4 clinical examination findings you expect if placental abruption occurs: (4 marks)

Abdominal tenderness

Vaginal bleeding

Uterine tenderness/woody feel

Uterine contractions

Also: fetal compromise and maternal haemodynamic instability

Question 21 (12 marks)

A woman in late pregnancy is brought to you following a high speed MVA.

- i. List three changes in respiratory physiology that occur with pregnancy [3 marks]

- Tidal volume increases (30-40%)
- Total lung capacity decreases (5% due to diaphragm elevation)
- Respiratory rate and minute volume increases (30-40%)
- pCO₂ decreases giving respiratory alkalosis
- Expiratory reserve volume decreases

- ii. Complete the table regarding cardiotocographic (CTG) monitoring in trauma (4 marks)

Purpose of CTG monitoring	
Gestation (weeks) from which CTG monitoring is useful	
Recommended duration of CTG monitoring in trauma	
Three CTG findings suggesting foetal distress	

- Purpose – detect uterine contractions which might suggest abruption/uterine irritability, assess for foetal distress/hypoxia
- Gestation – greater than 22-24 weeks – no role prior to that
- Duration – 4-6 hours in minor trauma – 24 hours in severe trauma or if any abnormalities in first 4-6 hours
- 3 abnormalities – premature contractions, foetal tachycardia, foetal bradycardia, loss of beat-to-beat variability, late deceleration after contractions

Candidate number _____

iii. Describe the process of peri-mortem caesarean section [5 marks]

- Make a midline vertical incision from the xyphoid to the symphysis pubis
- Bluntly separate the rectus muscles down the midline with a finger
- Open the peritoneum – either bluntly by pulling with your hands or with scissors
- Make a small incision at the lower end of the uterus, above the reflection of the bladder
- Insert two fingers, and lift the wall of the uterus away from the foetus. Using scissors, cut the uterus to the fundus
- Remove the infant, clamp and cut the cord, proceed to neonatal resuscitation
- Remove the placenta manually

Question 22:

Candidate Name:

Passmark 8/12

A 32 year old female self presents to your emergency department following a fall down 6 stairs at work.

She is 28/40 G1P0.

She has no complaints of pain but wants to be 'checked out'.

- I. What are four of the major cardiovascular physiological changes in pregnancy that may impact on the clinical assessment of this patient? (4 Marks)**

Plasma volume increased by 50%
Heart rate increased by 15-20bpm
Cardiac output increased by 40%, gravid uterus pressure on IVC significant
Uterine blood flow 10% cardiac output

Also: SVR decreased, arterial BP decreased by 15mmHg, decreased venous return by gravid uterus on IVC, increased concentrations of most clotting factors

- II. On assessment, her primary and secondary survey is normal. List one (1) specific examination and three (3) investigations related to the pregnancy that need to be performed for this patient? (4 Marks)**

(4 Marks)

Uterine examination- fundal height, tenderness, contractions
CTG- role debatable between 24-28/40 but early sensitivity for abnormal fetal HR
Ultrasound- useful as FAST, examination of solid organ injury, confirm fetal presentation and gestation, placental location and amniotic fluid volume. Not a good predictor of placental injury.
Blood test- Kleihauer, to determine amount of Anti-D required for fetomaternal haemorrhage

- III. What four criteria need to be met for safe discharge of this patient? (4 Marks)**

(4 Marks)

Normal examination with no abdominal tenderness, bruising or contractions
No PV loss or discharge
Normal fetal movements
Safe discharge environment- s/work, explored DV, increased antenatal surveillance

Question 23**Answers**

1. Based on the above information, which patient would you request be extricated first and why?

(3 marks) 2/3

Patient 1

- Haemodynamically compromised and most likely to be time critical.
- Needs immediately airway Mx due to cyanosis.

2. Based on the above information, list 4 injuries that you are concerned that Patient 2 may have sustained, stating the reason for your concern.

(4 marks) 3/4

Lower limb fractures, possibly compound – as trapped by legs
 Head injury – GCS 14 & agitated
 Chest injuries/PTx/Haemothorax/Flail chest – elevated RR, significant mechanism
 Intra-abdominal injuries – significant mechanism, seatbelt injuries
 Pelvic injuries – significant mechanism, trapped by legs
 Spinal injuries – significant mechanism

3. Based on the above information, list 6 potential injuries that Patient 1 may have sustained. For each, state how the injury would need to be specifically addressed before helicopter transportation to the trauma centre.

(12 marks) 9/12

Potential Injuries	Management of Injury prior to transport
Head Injury with altered LOC	Intubation with C spine protection Neuroprotective measures to prevent secondary injury
Haemo/Pneumothorax/Tension PTX	Mini-thoracostomy or chest drain (Needs to be definitive prior to loading NOT a cannula in IC space)
Flail chest with respiratory compromise/Lung contusions	Intubation, ensure adequate oxygenation with FiO2 to maintain O2 sats >94%
Intra-abdominal organ injury	Secure large bore IV access, IV fluid boluses to endpoints of SBP >100 in setting of head injury. Blood if available

	pre-hospital, tranexamic acid
Pelvic fracture +/- associated vascular injury	Secure large bore IV access, Pelvic binder, tranexamic acid, IV fluids to endpoints of SBP > 100 in setting of head injury
Long bone fractures, possibly compound	Splinting in anatomical position, Secure large bore IV access, IV fluids to endpoints of SBP > 100 in setting of head injury, tranexamic acid
Spinal fractures	Spinal immobilisation with C spine collar and spinal board for transfers

Passmark: 14/19 Adjust to ../10 please