

FExNet 2022 Collated SAQs - Trauma Chest, Abdo, Pelvis

Answers

- | | |
|----------------------|-----------------------------|
| 1. <u>Abdo</u> | 20. <u>Pelvis</u> |
| 2. <u>Car vs Ped</u> | 21. <u>Pelvis</u> |
| 3. <u>Chest</u> | 22. <u>Pelvis</u> |
| 4. <u>Chest</u> | 23. <u>Pelvis</u> |
| 5. <u>Fall</u> | 24. <u>Penetrating Abdo</u> |
| 6. <u>MVA</u> | 25. <u>Polytrauma</u> |
| 7. <u>MVA</u> | 26. <u>Quadbike</u> |
| 8. <u>MVA</u> | 27. <u>Shotgun</u> |
| 9. <u>MVA</u> | 28. <u>Stabbing</u> |
| 10. <u>MVA</u> | 29. <u>Stabbing</u> |
| 11. <u>MVA</u> | 30. <u>Stabbing</u> |
| 12. <u>MVA</u> | 31. <u>Stabbing</u> |
| 13. <u>MVA</u> | 32. <u>Stabbing</u> |
| 14. <u>MVA</u> | 33. <u>Stabbing</u> |
| 15. <u>MVA</u> | 34. <u>Stabbing</u> |
| 16. <u>MVA</u> | 35. <u>Stabbing</u> |
| 17. <u>MVA</u> | 36. <u>Trauma imaging</u> |
| 18. <u>MVA</u> | |
| 19. <u>Pelvis</u> | |

Question 1

A 23 year old male presents to an urban district hospital in a private car after falling from a 1st floor balcony. He was at a party and admits to drinking heavily. He is complaining of isolated abdominal pain and had a positive FAST scan. He has some abdominal wall abrasions and superficial lacerations.

P 130
BP 80/60
Sats 91% on room air
RR 26
Temp 35.1

GCS 15
BSL 5.6

A CT abdomen is obtained and 2 key images are provided. (see Prop Booklet)

- A) List the three (3) **MOST** abnormal findings seen on the CT images (3 marks)

Grade 4 liver laceration - >25% of RIGHT lobe

Active haemorrhage/blush

Haemoperitoneum

- B) The patient has had a Pan Scan and there are no additional injuries detected. There is a 1 hour delay till the patient can receive definitive management of their injury.

Outcome (5 marks)	Management (5 marks)
Adequate Oxygenation	Provision of Oxygen via NP/FM/NRB Head up Analgesia to allow adequate ventilation
Avoidance of Shock/Correction of tachycardia/hypotension	Initial crystalloid only if blood not available Blood products/MTP if not meeting haemodynamic end points (e.g MAP 65, UO 0.5-1ml/hr, normal mentation)
Analgesia/Comfort	Titrated IV opiates e.g. morphine/fentanyl/ketamine PCA
Appropriate haemodynamic monitoring	Insertion of arterial line/CVC/IDC
Correction of hypothermia	Bair hugger, warm blankets Warmed fluids/blood
Avoidance of infection	Cefazolin 1g iv for wound prophylaxis ADT if required Wound cleansing and dressing
Well informed patient and family	Discuss management with patient, and NOK if patient allows Gain valid consent for those procedures performed in ED
Avoidance of coagulopathy	Blood products (FFP/Cryo/Platelets) appropriate for coagulation parameters Correct hypothermia e.g bair hugger TXA 1g over 20mins then 1g over 8hrs
Prevention of vomiting/aspiration	NGT Antiemetics e.g 4mg IV ondansetron

- C) List the three (3) options that can be considered for non-ED definitive management of this type of injury, with a one (1) pro and one (1) con for each option (9 marks)

Definitive Management (3 marks)	Pro (3 marks)	Con (3 marks)
Conservative – close observation on high dependency ward/ICU	No requirement for surgery/instrumentation so less risk of intra/post op complications, anaesthetic complications and infection	Patient has evidence of active bleeding so higher likelihood of failure and need for invasive intervention at later stage
Angiographic Embolisation	Avoids need for laparotomy Less pain Less invasive Less risk of infection/post op complications	Requires specific expertise Risk of pseudoaneurism Doesn't allow inspection of IA contents for other occult injuries Risk of deterioration in angio suite
Laparotomy and packing of liver (damage control surgery) with later	Can delineate the extent of injuries further e.g bile leak – CT findings not always consistent with operative findings CT is a snapshot – can see rapidity of bleeding directly Able to check rest of abdominal contents	Post op complications e.g. wound pain, infection, Anaesthetic complications e.g PONV, aspiration

Question 2**1. Name the significant finding on this CT image and any relevant associated features. (4 marks)**

Displaced Chance type fracture of T12 vertebra

- Ventral displacement of distal vertebral column
- 3 column fracture (ie unstable)
- Likely retropulsion into spinal canal
- S3 fracture

2. List 4 clinical features you would expect to find in neurogenic shock. (4 marks)

Warm peripheries
Hypotensive
Relative bradycardia
Poikilothermia

3. List your management priorities for neurogenic shock (5 marks)

IV fluid resuscitation 20-40 ml/kg of Normal Saline
Early inotropic support with aim of MAP > 85mmHg to ensure adequate organ perfusion Will accept either noradrenaline or adrenaline at 0 – 20 ml/hr
Respiratory support as needed, especially if high C spinal cord injury
Early escalation of surgical decompression of spinal canal within 8 hours of injury (Can also include the definitive surgical management of other traumatic injuries)
Full spinal precautions when managing patient with 30 degrees head up
Other supportive measures 1. Thermal protection 2. Nasogastric tube 3. Urinary catheter 4. Rule out other causes of shock such as hypovolaemia

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Question 3

1. Write three (3) statements that describe the injury in this photo.

Penetrating injury with ?knitting needle to right lower anterior chest (?9th-11th interspace), line of nipple – knitting needle in situ, appears to be at right angle to chest wall, with foreign material at entry point
 Unable to assess depth
 Child appears comfortable, not distressed, co-operative and well perfused
 Chest appears equally expanded right vs left
 (IV access in right cubital fossa)

2. List six (6) possible complications that may be associated with this presentation

Tension pneumothorax
 Simple pneumothorax
 Haemothorax
 Hepatic injury
 Diaphragm injury
 Vascular injury – less likely given location – intercostal
 Intra-abdominal visceral injury – gastric, bowel
 Infection – empyema
 Cardiac injury +/- tamponade - unlikely

The patient's chest pain worsens. Vital signs are:

RR	40	/min
PR	160	/min
BP	60	systolic mmHg
SaO2	98%	on room air

3. Describe you three (3) most important management priorities

Decompress right chest – presumed tension pneumothorax
 Resuscitation – fluid bolus, supplemental oxygen
 Analgesia
 Leave needle in situ
 Urgent surgical review – removal of needle in OT

Candidate number _____

In general:

- Core topic
- Simple presentation
- Question 2 – term ‘complications’ potentially misleading
- Question 3 – vital signs unclear as to whether tension pneumothorax or haemorrhagic shock

Marking

- 1 mark per correct statement (highlighted = essential) + 1 mark for perspective
- Total exam marks available = 15
- Marks given out of 10 (marks/15 x 10)
- Required

Complications candidates listed that were less important/likely/relevant scored ½ a mark each up to a cumulative total of 1 mark.

My list above is more than the requested number of statements for each question.

Highlighted = mandatory

Common problems

- Failure to notice knitting needle
- Failure to consider tension pneumothorax
- Failure for management priorities to address shocked state
- Choice of fluids
 - o Patient is hypotensive – give saline bolus as first line, can follow with blood

Question 4

1.

Mediastinal haematoma – likely great vessel injury

Wide mediastinum

Loss of aortic knob / Loss aorto-pulmonary window

Depressed left main bronchus

Widened right paratracheal stripe

Left apical pleural cap

2.

Neurogenic shock from spine injury

3.

Cardiac contusion / pericardial tamponade

Retroperitoneal haemorrhage

4.

End-points – systolic BP above 100mmHg, cerebral perfusion (care to avoid hypertension in aortic injury)

IV N/S – 500mL-1000mL bolus repeat if necessary up to 2000mL

Metaraminol 0.5mg aliquots, noradrenaline/adrenaline infusion 5-40 mcg/min

Question 5

Q1

Renal parenchymal laceration

Devascularisation parts kidney (hypodense)

Large perinephric haematoma

Q2

IR – blush identified on arterial phase and IR available

Nephrectomy – severe bleeding / shock not amenable to IR

Conservative – no blush on CT, minimal ongoing transfusion requirement

Q3

Haemorrhagic shock / death

Urinoma

Abscess

Hypertension

Urinary fistula

Delayed bleeding

Question 6(17 marks)

A 23 year-old female is brought to your ED following a high speed motor vehicle accident. She has normal vital signs but has tenderness in her right upper abdomen with no peritoneal signs. Secondary survey reveals no other injuries.

- i. Outline the role of the abdominal FAST scan in haemodynamically *stable* blunt trauma patients (3 marks)
 - Clear role for FAST in *unstable* blunt trauma (guides decisions about going to OT...)
 - In stable patients, sensitivity of FAST in detecting significant injury is poor (< 50% - i.e. lots of false negatives – doesn't "rule out" the disease)
 - In particular misses hollow viscus & retroperitoneal injury and doesn't assess solid organ injury (with view to non-operative Mx)
 - There is no evidence base to recommend FAST in this context. Decisions about CT scan/laparotomy/observation need to be based on other patient findings
 - May be useful for clinician practice and possibly a role for serial FAST in a stable patient admitted for observation
- ii. Describe the findings in the right upper quadrant on this FAST scan image (2 marks)

Possible hypoechoic stripe adjacent to kidney – wedge-shaped and bounded by echoic lines – likely represents perinephric fat rather than free fluid. (1 mark for adequate description, 1 mark for correct interpretation)

- iii. What are the pitfalls and limitations of FAST ultrasound scanning in trauma (4 marks)
 - Operator dependent
 - Technical difficulties – obesity, subcutaneous air
 - Requires > 250 mL blood to collect to become positive
 - Doesn't look at retroperitoneal space, hollow viscera or solid organs
 - Role in pelvic trauma unclear
 - Doesn't identify source of bleeding
 - Doesn't distinguish other sources of IP fluid (peritoneal dialysis, ascites, ruptured ovarian cyst etc)
 - False positive → unnecessary further imaging/operation
 - Opportunity cost, in terms of staffing resources and time for other procedures ie. People dicking around with the probe instead of getting on with definitive care
 - Trauma patients non-fasted and limitations with bowel gas
 - Evidence for use in Paediatric population limited and due to primarily conservative approach in kids for blunt trauma - limited utility in decision making.

- iv. Discuss the advantages and disadvantages of whole body CT scanning (“pan scan”) versus selective imaging in trauma (4 marks)

Controversial area. Biggest study is REACT-2 which found

- No mortality benefit in WBCT
- Time to identifying injuries shorter (50 minutes versus 58 min)
- No difference in total radiation dose (both groups ~ 20mSv) – though the range of dose in the selective group 9-22 mSv

- v. Complete the following table relating to ionising radiation arising from CT imaging (4 marks)

	Dose (mSv)	Equivalent number of chest X-rays	Equivalent period of natural background radiation (years)
Head CT	2	100	1
CT abdomen/pelvis	15	700	5

Question 7 (17 marks)

A 27 year old male driver has been involved in a motor vehicle crash at 140kph. He was taken to a rural base hospital and was intubated soon after arrival in ED. Current vital signs are BP 80/40 mmHg, P 140 bpm.

A CHEST XRAY IS SHOWN IN THE PROPS BOOKLET, PAGE 4

- i. List 6 findings on his CXR (6 marks)

- ETT just above the level of his clavicles
- NG tube in situ that migrates below the level of the right hemidiaphragm and curls around to the left above the level of the right hemidiaphragm
- Deviation of the NG tube to the right
- Elevation of the left hemidiaphragm
- Fracture left scapula(subtle)
- Left lung basal collapse/consolidation
- Left apical capping
- Widened mediastinum

- ii. List 5 potential diagnoses in order of severity (5 marks)

- Aortic dissection/transection
- Diaphragm rupture
- Cardiac injury(blunt)
- Lung injury-contusion/laceration
- Spleen injury
- Fractures- scapula, ribs

iii. List the next 3 investigations you would order/perform, in order of priority and provide your reasoning (6 marks)

- EFAST
 - assess for pericardial tamponade, assess for Type A dissection and assess for abdominal FF/PTx/HTx
- Bloods
 - FBC, G+H, coag - suspected haemorrhage and coagulopathy of trauma
- CT pan scan
 - given mechanism to assess for aortic injury, significant solid organ injury/abdominopelvic bleeding
- Blood gas
 - assess for shock - BE, lactate and response to Rx

Question 8

1.

Pathological process	Radiological evidence
Right large haemothorax	Veiled opacification of right hemithorax Substantial rim of blood around outside of lung edge
Left hemi-diaphragm rupture	Stomach clearly evident superiorly displaced in thorax Loss of diaphragmatic outline
Left lung contusion (also accept haemothorax)	Opacification of visible left lung in upper zone

2.

Moderate/large amount of fluid in Morrison's pouch – intraperitoneal blood

3.

- Start with O negative blood
- activate MTP aiming for 1:1:1 packed rbc:FFP:platelets
- target systolic 80mmHg, cerebral perfusion defined by mentation, radial pulse palpable

4.

Right ICC to drain blood

Left ICC to drain blood, decompress left hemithorax

Insertion NGT to decompress stomach

Urgently to OT for control of intra-abdominal bleeding and correction of diaphragm rupture

Question 9 **17/24**

1

Left haemothorax – veiled hemithorax, pleural cap

Mediastinal haematoma – wide mediastinum, rightward displacement NGT, paratracheal stripe, depressed left main bronchus

Right pulmonary contusion – right midzone opacities/consolidation

Right PTX – lucent right hemithorax, subcut emphysema

2

Respiratory acidosis – underventilation, need to increase MV

HAGMA – mainly lactate due to tissue hypoperfusion

Hyperkalaemia – when corrected for acidosis is approx. 3.6

Hypoxia – due to lung pathologies V/Q mismatch – haemothorax, contusions, PTX

3

Improve pO₂ – increase FiO₂, increase PEEP

Increase MV

Give blood – O neg – aim for systolic BP >80mmHg

Insert left ICC large bore

4

Normothermia / warm

Correct respiratory acidosis

(Restore volume is acceptable)

Resuscitate with blood products aiming for 1:1:1 RBC:FFP:platelets

Use ROTEM to target coagulopathy

Normal ionised Ca

Question 10

You are the ED Consultant leading the Trauma team in a Major Trauma Centre.

A 32 year old, previously healthy male has been brought in following a high-speed motor-bike crash which occurred approximately 90 minutes ago. His scene GCS was initially 13, E3 V4 M6, then declined to 7, E1 V2 M4, and he was subsequently intubated. The patient has had bilateral finger thoracostomies and given 2 units of PRBC by the pre-hospital retrieval service.

The initial primary survey in the resus room reveals

A – ETT at 22cm at the teeth.

B – Sats 96% on FiO2 100%, PEEP 5, ETCO2 47, TV 500, Rate 12, PIP 20

C – BP 110 / 60 mmHg, MAP 77, PR 117

D – E1 VT M1, Pupils 4mm, equal and reactive

E – Temp 35.7, right sided scalp and facial lacerations. Bruising to right flank. Pelvic binder in-situ. Patient weight approximately 80kg. Sedated on propofol 1% infusion at 10mls per hour with intermittent fentanyl, last being 40mcg 10 minutes before arrival in resus.

There has been a CXR, PXR, eFAST performed. **(see images in props booklet)**

- a) List three (3) different life-threatening injuries present in this patient and the basis for your diagnoses (6 marks)

Injury	Basis for diagnosis
Intra-abdominal injury with free intraperitoneal fluid	Strongly positive FAST scan demonstrating free fluid in Morrisons pouch
Traumatic brain injury with intra-cranial haemorrhage	Decrease in GCS from 13 to 7
Major pelvic fracture with likely bleeding	Displaced superior pubic ramus/acetabular fracture and inferior pubic ramus fracture (need all for 1 mark)

VBG results are

pH	7.18	
HCO ₃	20	mmol/L
pCO ₂	57	mmHg
pO ₂	83	mmHg
Lactate	3.2	mmol/L (n < 2)
Ion Ca.	0.87	mmol/L (n 1.1 – 1.3)
Na	138	mmol/L (n 135-145)

b) On the basis of his VBG, what medication and dose should you administer immediately? (1 mark)

- Calcium Chloride or Gluconate 10mls, 10%, IV

c) What would be your ventilation strategy and aim? (2 marks)

- Increase ventilation to aim for ETCO₂ low 30's given difference in ETCO₂ and PCO₂ in a patient with suspected traumatic brain injury – 560ml x 16 bpm or similar

d) What blood pressure goals will you have for this patient and state your reasoning? (2 marks)

- Aim - SBP > 100-110 or MAP > 80
- Reasoning – Acknowledgement that hypotension will contribute to secondary brain injury and increase mortality. This takes priority over permissive hypotension

His current observations haven't changed in the first 20 minutes in the resus bay but his right pupil is now 7mm and un-reactive.

e) State one (1) treatment and dose you would give (1 mark)

- NaCl 3% 3mls per kg aim Na <155. Or appropriate dose of 6%, 7.5% NaCl
- Accept mannitol 0.5-1gm / kg 20% solution

Question 11

Answers:

1.

(5 marks) 3/5

PRIORITIES
1. Assemble trauma team, call external members to attend – ie surgeon, radiographer, anaesthetist, orthopaedics
2. Clarify plan and disposition for current patients in resuscitation area
3. Prepare analgesia
4. Prepare equipment for possible interventions – Airway: intubation, Breathing: ICC, Circulation: large bore access, haemorrhage control, FAST scan
5. O Neg blood ready in trauma room, consider TXA

2. (8 marks) 6/8

	CAUSES	INTERVENTION
1	Haemo/pneumothorax	Chest decompression with ICC
2	Intra-abdominal bleeding,	FAST scan If positive – rapid transfer to OT Damage control surgery
3	Pelvic fracture	Pelvic binder +/- CTA Pelvis Interventional radiology
4	External haemorrhage or Long bone fracture	Splinting/traction External compression of bleeding

3. List 3 goals of your fluid resuscitation strategy.

(3 marks) 2

1	Maintain perfusion to vital organs (target SBP 80-100mmHg depending on concern of head injury.)
2	Correct or prevent development of coagulopathy (minimise crystalloid use, targeted blood product use directed by ROTEM or 1:1:1 ratio based approach)
3	Avoid hypothermia (by warming fluids) Avoid acidosis (minimise crystalloid use) (Either is acceptable)

4. Your investigations reveal a pelvic fracture with a disrupted pelvic ring in a vertical shear pattern on pelvic XR . The patient has an unremarkable CXR and a negative FAST scan. The patient remains haemodynamically unstable.

List 1 advantage and 1 disadvantage of operative v angiographic management of the patients pelvic bleeding.
(4 marks) 3/4

	Operative Management	Angiographic Management
ADVANTAGES	Rapid availability Can pack pelvis and apply ex-fix rapidly Can operate on other sites ie compound lower limb injuries can be stabilised. Laparotomy if necessary.	Targeted direct bleeding control with good success rate. Less invasive than operative approach. Fewer infective complications.
DISADVANTAGES	Bleeding control may be unsuccessful. May still need angio. Ex-fix makes mobility and nursing care difficult	Takes time to set up and assemble team. Time consuming particularly if have not identified bleeding vessel on CTA prior to angio. Often Angio suite isolated from other resuscitation areas in the hospital. Does not address other injuries.

Passmark: 14/20 Adjust to ../10 please

Question 12

Questions:

1- In the 10 mins before the patient arrives, please indicate 6 priorities in your preparation for this patient: (6 marks)

Activate trauma team
 Assign roles
 Order PRBC from blood bank (O negative)
 Notify radiology & surgical teams
 Analgesia (Morphine 0.1mg/kg)
 Set up for large bore access

2- On arrival an AP pelvic X-ray is performed as part of the trauma series which is shown below. Please describe the X-ray findings and the implications this will have on the patient's management. (6 marks)

Displaced fracture through pubic symphysis & L SI joint.
 Likely vascular injury causing haemodynamic instability
 Needs stabilization with pelvic binder, CT Angiography if patient is stabilized and definitive Mx in either theatre or interventional radiology.

3- Despite 2 further units of PRBC, the patient remains hypotensive. You repeat the E-FAST in the trauma room, and it remains negative. The trauma surgeon has just arrived and wants an update. Please give a summary of:

a. What is the most likely cause for this patient's hypotension? (1 mark)

Vascular injury from displaced pelvic fracture

b. What are your recommendations for this patient's disposition (2 marks)

Ideally CT for angiography then interventional radiology but at present too unstable for this. Consider theatre for pelvic packing.

c. Complete the following table to outline 5 ongoing resuscitation priorities for this patient and the specific actions you will take to achieve these. (10 marks)

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Resuscitation Priority	Actions Required
Ongoing fluid resuscitation	Secure large bore IV access Activate massive transfusion protocol & continue giving PRBC
Prevent coagulopathy	Avoid use of crystalloids Blood product replacement as guided by MTP or ROTEM
Maintain normothermia	Warm room, cover patient with blankets, warm IV fluids
Assessment for concurrent injuries	CXR, FAST, ideally CT Head/C spine/Chest/Abdo/Pelvis if stabilizes
Spinal immobilisation	C collar, spinal precautions, log rolls

Question 13:

1-What is the name of the sign shown on the above ultrasound?

(1 Mark)

Stratosphere or Barcode sign (Evidence of lack of pleural sliding)

2- What is the diagnosis and what is the likely clinical significance in this patient?

(2 Marks)

R sided Tension pneumothorax leading to obstructive shock

3- Complete the table outlining your immediate management priorities and the actions you will take to manage these? (10 Marks)

Clinical Priorities	Action Required
Relief of obstructive shock	- Needle thoracostomy followed by formal ICC insertion R (N.B Needle Thoracostomy alone is NOT adequate) - Finger thoracostomy - Formal ICC insertion R side
Secure definitive airway	- Rapid sequence induction - Ensuring pneumothorax is decompressed prior to PPV
Maintain adequate end organ perfusion	- Aim for MAP of 65mmHg - Minimal use of crystalloids - Early use of blood products /ROTEM as required
Definitive investigations/ Assessment for other injuries	- CT Head / C-Spine / Thorax / Abdomen / Pelvis - Repeat FAST scan once chest decompressed
Supportive measures	- Adequate analgesia and sedation - Psychosocial support for family / NOK

Question 14

- 1. List 4 major abnormalities shown on his chest X-ray. (4 Marks)**

Widened mediastinum
Opacification both lung fields L > R
L rib #s (2-8)
L subcutaneous emphysema

N.B Intubated is not an acceptable answer as the ETT is adequately positioned.
Consider accepting L ICC malpositioned or kinked as a possible abnormality.

- 2. Whilst in the ED he becomes progressively more difficult to ventilate. List 3 potential causes for this and state the immediate management of each. (6 Marks)**

Cause	Management
ETT blocked	Hand ventilate with BVM, suction ETT, check position of ETT, replace ETT if necessary
Tension Pneumothorax/Haemothorax R ICC- drainage port borderline outside the chest wall (progression of PTx) L ICC- kinked inside pleural cavity (progression of PTx)	Replace R side ICC if no swing noted in canister. Remove and replace ICC on L side.
Pulmonary contusion	Increase PEEP and trial low volume/high rate ventilation
Incorrect position of ETT eg migration into R main bronchus	Check ETT position & pull back to ensure ventilating both lungs
Bronchospasm	Nebulised bronchodilators down ETT

- 3. Outline 6 key steps in performing a large bore intercostal catheter placement on an intubated patient who has been adequately sedated & paralysed. (6 Marks)**

Preparation - Assistant required to hold the arm abducted & correctly position patient. Clean and drape area, Full sterile procedure
Skin Incision - Using scalpel, make an incision (approx. 4-5cm) following rib border then blunt dissection down to pleura and using curved forceps puncture into pleural space
Tube Insertion - Insert 32F tube until distal drainage port is within chest cavity
Connect to Underwater seal drain, ensuring swing in catheter tubing
Suture in position and apply dressing
Confirm position with CXR and ensure patient vitals remain stable/unchanged.

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Question 15 (12 marks)

A 62-year-old man is brought in by ambulance to your tertiary hospital after a low-speed dirt bike accident. He was riding up a hill, hit a mound, and fell backwards onto his left chest and shoulder. He did not lose consciousness and mobilised at the scene.

On assessment, he is alert and talking. His respiratory rate is 20 breaths/minute with shallow respirations, his SaO₂ is 92% on room air; BP is 130/80, his heart rate is 95 bpm, his GCS is 15 and his temperature is 36.2 degrees Celsius. His abdomen is soft and non-tender.

A chest x-ray is performed and is shown in the Props Booklet (Figure 9)

- a. List three positive and two negative findings on this Chest x-ray.(5 marks)

Multiple left-sided rib fractures including displaced fractures of 5 th and 6 th Ribs posterolaterally.
Comminuted # of the mid-third of the left clavicle with 13mm craniocaudal offset
Patchy airspace opacification at the left lower lobe – likely contusion.
No significant haemo- or pneumothorax
No subcutaneous emphysema
Cardiac contour appears normal

- b. List and justify two further investigations you would request for this patient. (4 marks)

Investigation	Justification
CT chest	Further define injuries seen and evaluate for subtle PTx, HTx, mediastinal haematoma, radiological flail.
ECG	Cardiac contusion (dysrhythmia or ST segment changes)
FBE, UEG, LFT, lipase, G&H, coags	Evaluate Hb (and baseline), G&H in case of transfusion
Blood gas	Early signs of hypoventilation secondary to rib # pain (raised pCO ₂).

You decide he needs admission for analgesia and observation, however he refuses to stay.

- c. List the medico-legal requirements necessary for him to be declared competent to make this decision (4 marks)

Cognitive capacity: understand the condition, treatment options, potential outcomes, likelihood
Able to accept/retain/paraphrase info, explain consequences, reasons for their decision
Mental state: not altered by medical conditions+ Not impaired by alcohol/drugs + MMSE>20
Age : adult – given in stem

Ref: Dunn (admin)

Question 16

Most important pathology	Radiographic supporting features
Left tension pneumothorax	Lung edge visible left upper lobe approx. 2cm in from chest wall
	Deep sulcus sign – basal air accumulation
	Mediastinal shift to right

2.

Insertion 32 Fr left ICC

3.

Pathology	Radiographic supporting features
Left pulmonary contusion	Alveolar (fluffy will do) infiltrate left lower zone

4.

- inadequately drained / recurrent tension pneumo
- blocked ETT
- ETT in right main bronchus / malpositioned tube
- pt-ventilator dysynchrony
- bronchospasm (asthma / anaphylaxis / aspiration)
- “over-ventilation” / dynamic hyper-inflation

5.

- large left sided acute subdural haemorrhage (1 mark)
- signs raised ICP (1 mark, plus 1 mark for each of below)
 - midline shift to right
 - loss of sulci left
 - cerebral oedema (loss grey-white differentiation left side)
 - compression left lateral ventricle
 - (accept subfalcine herniation)

6. (1 mark for each)

- **immediate neurosurgical referral for surgery**
- **maintain MAP >75mmHg with IV fluid bolus N/S 1000mL then noradrenaline infusion if needed**
- **maintain O2 sats >90% (increase FiO2)**
- NeurolCU measures
- Raised ICP strategy
- hyperventilate to get PCO2 30-35mmHg until operative management
- bolus osmotherapy (accept 3% saline 5mL/kg or mannitol 1g/kg)
- aim Na approx. 150mmol/L
- normal glucose and temperature

Bold = essential to score > 0; points for strategies and/or details

Question 17**1. List your top 5 management priorities on arrival of this patient.****(5marks)**

Confirm tube placement- ETCO₂, CXR

Improve IV access - 2 large bore IV access

Minimal fluid resuscitation- blood products only. Aim MAP < 60

Neuroprotective measures - Hyperventilate to aim PCO₂ 35mmHg, 3mls/kg

Hypertonic 3% saline or Mannitol 1g/kg IV, Head up 30 degrees

FAST scan for source of haemodynamic instability, OR CT if stabilises with resuscitation measures

Other acceptable options- blood for group X match, control any external haemorrhage, trauma call, neurosurgical call, Ensure C-spine control

You opted to do a FAST scan in the trauma room

2. Give 4 Pros and Cons of a FAST scan in this patient.**(8marks)**

PROS	CONS
Pros- rapid at bedside	Operator dependant
Expediates transfer to theatre	Does not differentiate fluid types
No radiation exposure	Does not look at retroperitoneal space
Non-invasive	Need at least 250mls to be detectable

Other acceptable-

Pros- no contrast, non-invasive, repeatable, highly specific

Cons- false positives, does not look at solid organ injury, unable to grade injuries

During his ongoing resuscitation the massive transfusion protocol has been activated.

3. Give 8 parameters you will aim for in your ongoing haemodynamic resuscitation of this patient.**(8marks)**

VBG- iCa >1.1, Lactate clearance, Ph >7.2

FBC- Hb>80, plts >100

Coags- INR <1.5, FIB >1

Obs-Temp >35mmHg, MAP >60MMhg (preferably higher if closed head injury and no bleeding).

Question 18

You are the retrieval doctor at a pre-hospital scene where there has been a single-occupant rollover MVA. The driver has been trapped for 2 hours by extensive compression of both legs by dashboard and steering column intrusion. He has chest and head injuries (GCS 7)

- i. What are the potential pathophysiological consequences of rapid release of this patient's legs? (2 marks)

-
- Washout of "trash" blood – cold, acidotic, myoglobin-&-potassium-laden
 - Sudden acidosis & K spike – risk malignant dysrhythmias

- ii. What therapies could you use to mitigate these pathophysiological consequences? (3 marks)

-
-
-
- IV access
 - Fluid (saline) pre-load
 - IV bicarbonate
 - Calcium at hand
 - Ideally intubate – with decreased LOC and chest injuries will not be able to mount adequate ventilatory response to sudden acid load

On arrival at the nearby trauma centre, concerns are raised about the possibility of a bilateral lower leg compartment syndrome.

- iii. Outline a technique for measuring compartment pressures (4 marks)

There are a few acceptable answers

- Stryker needle – proprietary device with special needle with side ports – attaches to a pressure measuring component in the Stryker kit
- "Normal" large bore needle or cannula attached to standard IV line and transduced as one would an arterial or CVP line (zero it etc)
- With either device → prep skin, insert needle into muscle body of concern. Use of local anaesthetic is tricky as infiltration of a volume of LA could further increase compartment pressure

Northern Sydney Hospitals Network 2 – SAQ paper 2016.1

- Regardless of finding (in mmHg) a high clinical suspicion should nonetheless prompt urgent consideration of fasciotomy

iv. What pressure threshold would confirm suspicions of compartment syndrome?
(1 mark)

-
- A typical threshold is around > 35 mmHg

v. The patient's creatine kinase is 7000 IU/L. The renal registrar wants you to start a mannitol infusion to reduce renal injury from tubular deposition. List 3 disadvantages or adverse effects of mannitol in this context (3 marks)

-
-
-
- lack of proven efficacy in preventing renal injury or need for dialysis (beyond that provided by aggressive volume → increased UO)
 - causing big fluid shifts and contributing to hypovolaemia/hypotension are potentially bad ideas in a polytrauma patient
 - potential haemoconcentration/increased viscosity
 - effects on ICP (??advantageous in this patient)
 - allergy/anaphylaxis

Question 19

1. Grade 3 **antero-posterior compression** fracture of the pelvis (right side)

Pass 1

2. Pelvic binder, interventional radiology, pelvic packing in OT, ORIF in OT

Pass any 3 out of 4

3. Minimal volume resuscitation

Targets: systolic BP 80mmHg, radial pulse, mentation

Use blood products, minimal crystalloid

Initially O neg then Xmatched

Initiate massive transfusion protocol early

Aim packed cells:FFP:platelets 1:1:1 ratio

(targeted to ROTEM acceptable)

Each point 1 mark but has to show clinical reasoning

Pass 3/5

Total pass 7/11 corrects to **6/10**

Question 20

1.

Pubic diastasis

Widened R Sacro-Iliac Joint

Widened L Sacro-Iliac Joint

2.

Injury classification: APC 3 (Rt) ; technically bilat but Rt-side distracted

3.

Pelvic binder application

End-point – closure of diastasis

4.

Sacral plexus – LL neurology – anything really but motor/reflexes as best sign

Bladder – Haematuria

Bowel – PR bleeding/bony fragment on PR exam

Urethra – perineal haematoma, blood at meatus, inability to pass urine

Major vessels – internal iliacs or other pelvic vessels – haemorrhagic shock

5.

Finding: negative Morrison's/RUQ view

Clinical implications – Laparotomy unlikely to be of any direct benefit – needs management of pelvic bleeding

6.

Platelets >50

Fibrinogen >1.0

Ionised Ca >1.1

INR <1.5

pH <7.2

7.

Coagulopathy

Hypocalcaemia

Volume Overload

Hypothermia

Metabolic alkalosis

Hyperkalaemia

TRALI

Question 21

1. AP Compression fracture (Open-Book) with:

Diastasis of symphysis

Opening of Rt Sacroiliac joints

Binder too high

Large amount soft tissue swelling right side

2.

APCIII

3.

Massive pelvic haemorrhage

Free fluid on CT +/- FAST; Blush on CT

Management: Interventional Rad +/- OT

Bladder injury

Contrast extravasation/ Indistinct Bladder dome on RUG

Management: IDC to decompress, OT for repair

Urethral Injury

Blood at meatus/ boggy swelling in perineum

Inability to pass IDC

Contrast extravasation on RUG

Management: Surgical Repair

Bowel Injury

PR Bleeding

Management: Surgical Repair in OT

Sacral Plexus injury

Foot drop/ Incontinence

Management: Reduce Fracture +/- Nerve repair

Other answers acceptable

Question 22

1-Classify the radiological abnormality & state the findings that support this.
(3 Marks) - 3/3

Vertical shear injury of pelvis (Malgaigne Fracture) consisting of:
Superior and inferior pubic rami fractures
Fracture of L iliac wing

2-List 5 possible complications of this injury in this patient. State how you would assess for these in the ED. Complete the table below. (10 marks) 8/10

Complication	Assessment
Arterial injury	Haemodynamic instability, blush on CTA
Injury to genitalia	PV bleeding, perineal haematoma, vaginal tears on PV exam
Urethral injury	Bloods at urethral meatus, inability to insert IDC without resistance
Bladder injury	Retrograde CT urethrogram with contrast extravasation
Lumbosacral plexus nerve injury	Paraesthesias, weakness of lower limb
Rectal injury – compound fracture	PR bleeding, bony fragments of PR exam

3- List 2 alternate options for further management for this patient's pelvic injury.
(2 Marks) 2/2

Interventional Radiology – for embolization of potential arterial injury
Operating theatre for surgical management/pelvic packing/external fixation

4- List 5 factors which may affect your choice in the above management options.
(5 Marks) 3/5

Availability of interventional radiology resources & staff vs theatre resources & staff

(- eg time of day, location, hospital resources)

Haemodynamic stability of patient – better to go to OT if ongoing instability

Associated injuries of patient – better to go to OT if associated **chest or abdo injuries**

Results of FAST scan – positive FAST for intraabdominal bleeding should go to OT

Presence of blush on CTA of pelvis – may benefit from interventional radiology & embolization

Passmark = 16/20 (adjust /10) (8/10)

Question 23

Monash Practice Fellowship Exam, Dec 2014

Feedback to candidates from Dr. Michaela Mee (Emergency Physician, Monash Medical Centre, VIC)

Pass rate: 63% (37/59)

Pass grade: 14/24

Highest mark: 21.75/24

To pass SAQ7 needed to pass 2/3 parts minimum

All parts required a certain element to pass that part (eg recognizing pelvic fracture in part one), and if this was not there, the points achieved for that part were capped (see below)

This SAQ had questions open to interpretation, however the best answers were those that showed perspective, organized thoughts, and a set of headings/fields that lend themselves to a more comprehensive answer.

My recommendation to people is to try to stand back at the start of each question, and think of good subheadings for each element of the answer, allowing further detail under each subheading. This is the best way to show your knowledge and lessen the likelihood of missing important elements. It also means if you are rushed you can get points for general concepts and fill in details later if time.

I also recommend that you think in the examiners shoes to decide what is likely required to pass the question. For example, in part 2 of this question, for a patient with haemorrhagic shock and unstable pelvic fracture, is it enough to mention temporizing measures only such as fluid resus? Would the examiner expect you to mention laparotomy / angiographic embolisation as ways to stop bleeding? Would you be expected to commence RBC/Oneg for fluid resus?

Below I have tried to give examples of a good way to answer each question....

The first part of SAQ7 asks: '**describe the 3 most important positive findings**' after presenting clinical vital signs, a history, and an XR pelvis. While you can still comfortably pass by assuming this wants you to just describe 3 XRAY findings, you will probably get more points if you include findings of the scenario as a whole. An example of good answer is:

1. High risk mechanism, haemodynamic instability: likely haemorrhagic shock
2. Unstable pelvic fracture: R acetabulum, R iliac crest...
3. R Femur fracture: oblique, with likely Donway splint

My approach to marking this question might be controversial to some (see below). Perhaps the question could have been more clearly worded, nevertheless almost all candidates passed this part.

The second question of SAQ 7 asks for your **treatment priorities**. In this case, to pass this part you will probably need to think beyond treatment of the fracture per se. This is the guts of SAQ7. I would consider volume resus with RBC, and laparotomy vs pelvic angio embolisation, as required parts of this answer. This is a treatment question, not a management question. By putting 'urgent IV' or 'ABC' as subanswers, you are just losing potential points. Referrals also have less weight here. It is not enough to call for help from other specialists!.

There are many ways to organize your answer. You will be able to use your system for similar trauma questions so take the time to create an ideal answer. An example of a good answer is as follows:

1. Volume resuscitation: urgent O neg blood, NSaline minimise, massive blood transfusion protocol, permissive hypotension
2. Immobilisation: Pelvic binding, C spine, external fixation
3. Stop bleeding: laparotomy if peritoneal blood on EFAST, pelvic angio embolisation if neg
4. Seek and treat other sources of bleeding/hypotension eg ICC
5. Analgesia: IV fentanyl/ketamine

There are other possible great subheadings that people came up with

The third question of SAQ 7 was commonly misinterpreted as asking what the essential elements of massive transfusion were. Remember to read the question, which clearly asks you to describe elements of a massive transfusion **protocol**. To pass this part you would need to mention blood product ratios in massive transfusion (or show understanding of use of FFP/pl to prevent coagulopathy) somewhere in SAQ7. It is difficult to cover

Candidate number _____

all aspects with 4 points, but if you pick 4 good ones and organize your answer well, you will pass well. An example of a good answer is:

1. Early communication/referral: blood bank, haem team, with clear triggers
2. Blood product ratios: eg RBC:FFP:Pooled platelets 1-2:1:1
3. Monitoring and treatment of complications: eg Coagulopathy, hypocalcaemia, hypothermia, acidosis
4. quality assurance: review of safety of rapid blood product admin, audit

Marking System Used for SAQ7:

ELEMENT	POINTS	max subtot
---------	--------	------------

Part One:

R Acetabulum Fx	1.25	
R Alar/Iliac Crest Fx	1.25	
R superior pub rami fx	1.25	
Extra correct detail of above fx (eg oblique/displ/comm)		0.5 per fx
Possible undispl NOF/sacral fx/Blush sign/SI disrupt or other fx that is reasonable		0.5-1
'Unstable' pelvic fracture/disrupted ring	2	
Likely plausible mechanism		0.5
		4
R Shaft Femur Fx	1.25	
+Donway likely in situ	0.5	
Haemodynamic instability/haemorrhagic shock	2	
Likely HI/C spine injury (ddx GCS 13 due to shock)	2	

Total max possible points for Part 1: _____ / 6

Need 3.5/6 to pass this part. Needs to mention one of pelvic fractures to get >= 3.5/6, otherwise gets 3.25/6

Candidate number _____

Part 2:

IV Volume/fluid Resuscitation (any)	1
Or Vol resus with Oneg blood/RBC/massive tf	3
+/- Permissive hypotension	0.5
C spine immob	1
Pelvic binding	1
Donway	0.5
OT/laparotomy if FAST positive/peritoneal bleed	2
Pelvic angiography/embolisation if FAST neg	1
+/-Damage control surgery	1
Seek and treat other bleeding/EFAST/ICC/survey	2
Analgesia - any	1
Or ketamine/titrated fentanyl/caution with morphine	2
Other:	
Maximise O2 delivery: O2	1
Referrals to trauma/surg/ortho/interventional radiol	1
Tranexamic acid	1
Transfer prep	1

Total possible points for part 2: _____ / 10

NB: Candidate needs to mention use laparotomy / angio embolisation, and fluid/vol resus with RBC, to be able to get $\geq 6/10$ (otherwise max 5.75/10)

Candidate number _____

Part 3

Initiation/Consultation/Communication systems	2
-blood bank, Haem reg	
Indications/Triggers:	2
Haemorrhagic shock actual/impending	
Definition of massive transfusion	
Treatment related:	
-monitoring of complications: hypocalcemia, acidosis, hypothermia, coagulopathy	2
-Ratio RBC:FFP:Platelets : 1-2:1:1	2
institution/evidence based	
-end points	1
-alternative/adjunct medical treatments	1
eg tranexamic acid	
Quality assurance related	
-Safety of blood product administration (labeling, checks)	2
-Audit/monitoring/data collection/review	1
Precautions/limitations (eg is not definitive Mx, eg allergy)	2
Other:	
-other reasonable	1
eg controversies, special considerations	
eg documentation/staffing	

Total possible points for part 3: _____ / 8

Candidate needs to mention use of blood products ffp/pl to get >=4.5/8. Otherwise gets 4.25

TOTAL _____ / 24

PASS MARK for whole question: 14/24

Must pass 2 out of 3 parts to pass whole question. If not, max 13.75/24

Question 24

An 8-year-old girl is brought to the emergency department following a bicycle accident. She was wearing a helmet but no other specific safety gear. The child states she crashed into a fallen tree and was impaled on a stick. She is alert and distressed. When asked how long the stick was she indicates it was the length of her forearm and as thick as her thumb.

Her vital signs are:

Pulse 110 bpm

BP 105/70 mmHg

Cap refill 3 sec

Resp rate 24 breaths/min

SaO₂ 92% on 6L oxygen via non-rebreather mask

Examination reveals a 10cm laceration to the right lateral abdomen at the level of umbilicus (see picture in Props Booklet; Figure 5).

a) List eight potential injuries from the described mechanism.(4 marks)

Thoracic:	Haemothorax
	Pneumothorax
	Pulmonary contusion or laceration
	Diaphragmatic perforation
	Bronchopleural fistula
	Cardiac contusion or laceration (unlikely given clinical state)
Abdominal:	Hollow viscous perforation
	Solid organ penetration (Liver, Kidney, unlikely splenic)
	Vascular injury (IVC, abdominal aorta)
	Ureteric laceration
Pelvic:	Bladder perforation
	Uterine laceration
	Ovarian injury

Marking criteria: Must have at least one injury each from chest, abdomen, pelvis. Any sensible injury acceptable.

b). List four(4) ways in which the paediatric abdomen is different to the adult abdomen. (4 marks)

Small size of patient allows single impact to injure multiple organs.
Abdominal wall is relatively thin
Ribs are more pliable, providing less protection.
Liver and spleen take up a larger proportion of the abdominal cavity.
Diaphragm is more horizontal, pushing liver and spleen further into abdominal cavity.
Bladder is an intra-abdominal organ in small children.

c). State your management of this patient in the ED, including relevant investigations.(6 marks)

Seek and treat immediate life threats: haemo-pneumothorax and hypovolaemia.
Minimal volume resuscitation: End point: Cap refill < 2sec; PRC 10ml/kg aliquots
Analgesia: Parenteral most appropriate in this patient Fentanyl 1mcg/kg q10 min until analgesia Morphine 0.1mg/kg q 15 min until analgesia Ketamine 0.2mg/kg repeat x2 if required
Investigations: Radiological: CXR (portable) +/- CT(chest/abdo/pelvis) if stable to define injury
Investigations: Bloods: VBG – for lactate; Cross match
Urgent notification to General/Trauma Surgeons: High risk penetrating abdominal injury; Requires OT for laparotomy.
IV Ab's: Ampicillin 50mg/kg qid + Gentamicin 5mg/kg od + Metronidazole 12.5mg/kg bd
NBM +/- NGT
Check immunisation for ADT and manage accordingly

Marking criteria: Paediatric Trauma Service Guidelines, LCCH (2016) p26 states: N/Saline as the initial fluid in 10ml/kg aliquots; Blood products (10ml/kg) to be given after saline resuscitation.;I think it reasonable to start with either.

Question 25

You receive a pre-notification that you will be receiving a 23 year old male who has been in a high-speed motor vehicle accident. He has obvious head, torso and limb injuries and is haemodynamically unstable with an unrecordable blood pressure.

On arrival to your emergency department he has lost output and CPR has been commenced 2 minutes prior.

What interventions will you prioritise in this setting? (5 marks)

- Intubation and mechanical ventilation
- Bilateral finger thoracostomies
- Pelvic binder application
- Reduction of long bone fractures
- Blood product administration / massive transfusion protocol

Discuss the role of CPR in this setting (2 marks)

****Controversial area** / no evidence**

If medical cause of arrest – has a role

If important procedures NOT done – likely no role / inhibits

If important procedures done – maybe role

What is the role of ED thoracotomy in blunt traumatic cardiac arrest? (2 marks)

Survival poor <2%

Potential indication:

- Blunt trauma + arrest <10 min WITH pericardial effusion + cardiac activity on PoCUS

Question 26

1.

Hypoxia

Ventilatory failure requiring Positive Pressure Ventilation (either NIV or Intubation)

Need for operative intervention (eg ankle operation)

Progressive pneumothorax or development of haemothorax

2.

Morphine (or other) PCA ie 1mg bolus, 5 min lockout C/I: Severe renal failure, hypercapnoea

NSAIDS; ibuprofen 400mg tds: C/I: Renal Impairment

Paracetamol 1g QID – chronic liver disease

Oxycodone 5mg prn – oversedation from other opiates eg PCA

Question 27

You are the consultant in an urban ED, on a busy shift. You receive ambulance pre-notification about a domestic dispute. They are transporting 2 patients both with shotgun wounds. ETA is 10 minutes.

Patient 1: 46 year old male with wounds to his left chest and abdomen
GCS 12 (E3V4M5)
P 110
BP 80/-

Patient 2: 43 year old female with minor wounds to her left forearm
Vitals are stable

i. Outline 4 key issues involved in this scenario (4 marks)

- Critical injury – adequate personnel/trauma teams to attend
- Notifications – OT, CT, blood bank
- Busy department – ensure ongoing care for rest of department
- GSW – forensic evidence, documentation, police involvement
- Potential safety issue – patients, staff
- Media – likely TV, press etc, media liaison

ii. The male patient is in shock despite 2 litres of normal saline pre-hospital. His GCS has fallen to 8. His chest is hyper-resonant on the right with bilaterally reduced breath sounds. He has an acute abdomen.

List 4 immediate management priorities (4 marks)

- Needs immediate right sided chest decompression + ICC (bilateral)
- Emergent intubation
- Fluid resuscitation, blood, MTP
- Exclude tamponade
- Move to OT as definitive management ASAP

iii. List 5 positive findings on the male patient's CXR (5 marks)

AN XRAY IS SHOWN IN THE PROPS BOOKLET, PAGE 3

- Multiple gun shot pellets over left hemithorax, possible mediastinum
 - ETT, possibly tip in RMB
 - Large right PTX with radiological tension
 - Right ICC crosses midline, requires new ICC or repositioning
- Fractured left sided ribs
- iv. The male has been transferred to theatre. While you are reviewing the female, the police ring to advise you of her husband's possible arrival. He is the suspected perpetrator, and may be armed.
- Outline 4 key issues in your immediate response (4 marks)

- Request immediate police presence and hospital security
- Stakeholder notification – hospital exec, media
- Potential activation hospital code/disaster plan
- Notification of staff, including OT
- Remainder of ED requires ongoing care
- Attempt to secure department for patient/staff/visitor safety

Question 28

You are the overnight registrar in your tertiary hospital ED. You receive an ambulance pre-arrival call at 2am for a 25 year old male, stabbed multiple times in the chest. ETA is 10 min.

Vital signs: HR 150 bpm
 BP 72/41 mmHg
 SaO2 90% on 15L
 RR 30 bpm
 GCS 12

- i. List 6 potential life threatening injuries in this patient (6 marks)

- Cardiac- rupture, tamponade, damage to coronary arteries/ STEMI, contusion
- Lung- haemothorax, pneumothorax, pulm laceration, hilar injury, bronchial/ trachea
- Vessels- aorta, coronary, intercostals, pulmonary artery/ vein etc...
- Abdominal organs/ diaphragm/ oesophagus
- Others- Neck/Head

- ii. Briefly describe how you would prepare to receive this patient (5 marks)

- Team- trauma team- allocate roles, ED reg, juniors, nurses, +/- anaesthetics, surgical reg, radiology- x-ray, brief them with plan, anticipate deterioration, PPE
- Equipment- for intubation, thoracostomies/chest drain, thoracotomy, rapid transfusion, USS
- Packed cells, TXA
- Rest of Department- NUM, make sure other sick patients cared for, clear resus bay,
- Rest of hospital-
 - ED physician on call
 - Cardiothoracics/ surgeons
 - Theatres
 - Anaesthetist
 - ICU
 - Blood bank- MTP
 - Security/ police
 - Social work/ media

iii. What are the indications for ED thoracotomy in trauma (3 marks)

- Widely accepted
 - Penetrating chest injury with cardiac arrest/ peri-arrest non-responsive to resus measures and signs of life within previous 10 (? 15) minutes
- Controversial
 - Penetrating non-thoracic trauma (e.g. abdominal, peripheral) with traumatic arrest and witnessed signs of life/cardiac activity
 - Blunt trauma- with exsanguination from chest drain or pericardial tamponade seen on FAST or who lose signs of life/cardiac activity on arrival

iv. Provide an estimate of survival rates following ED thoracotomy for traumatic arrest (2 marks)

In penetrating chest trauma	15% (some studies as high as twice that)
In blunt trauma	1-2%

Question 29:

26 yo male presents after a domestic dispute with this injury. He is confused and agitated. Vital signs are BP 85/-40, PR 130, sats 94% on RA, GCS 13, RR 28. He looks grey and sweaty.



(i) List 3 possible life threatening injuries: (2 marks – take off one mark for each one missed, no negative marking)

Pericardial tamponade

Tension pneumothorax

Laceration of great vessels including aorta

After the placement of 2 x16G IVC and 500ml of IV crystalloid he becomes progressively more hypotensive and has a PEA arrest.

2. List 2 indications of emergency thoracotomy (1 mark)

a. penetrating chest trauma with witnessed arrest (signs of life prior to arrest) and procedure can be done in 5 minutes

b. In blunt thoracic trauma associated with rapid exsanguination out of ICC (>1500ml) or persistently hypotension (<70mmHg)

3. List 4 contraindications to performing an emergency thoracotomy (4 marks)

Unwitnessed cardiac arrest blunt or traumatic

Severe head injury

Penetrating abdominal injury

Absence of cardiothoracic back up

4. List 3 procedures that can be performed once the chest is opened (3 marks)

Repair of ventricular injury

Open cardiac massage

Cross clamp the aorta

Question 30

1.

Right sided tension **haemothorax (CRITICAL)**

- Veiled opacity to right hemi-thorax
- Significant rim of fluid around lateral lung edge
- Mediastinal shift to left

1 mark for haemothorax, ½ marks for – tension, 3 other bits
pass 2 of 3

2.

Verbal consent / explanation

(sedation optional)

(Gown / gloves / mask / goggles)

Clean chest with anti-septic (appreciate this is a time critical procedure)

Local anaesthesia – lignocaine 1% with adrenaline 20mL

Location - 5th interspace mid-axillary line

Incision with scalpel

Blunt dissection to pleural space / finger sweep

Insertion ICC 28-32 Fr

Connection to underwater seal

Suture and dressing

Pass 7 of 9

Total pass 9/12 corrects to **7.5/10**

Question 31

1.

Pericardial effusion (blood)

[pericardial tamponade is NOT demonstrated per se]

2.

Pt to be intubated

Non-sterile procedure / PPE

Incision – need location and extent

Division of chest wall with appropriate scissors / gigli saw

Rib spreaders

identification of pericardium and phrenic nerve

incision pericardium to release tamponade

repair myocardial laceration if possible

(will accept either clam-shell or left lateral thoracotomy – details will need to match chosen technique)

Question 32

1.

- **Left thoracostomy / ICC insertion** – for clinical or radiological evidence of pneumothorax or haemothorax
- ED thoracotomy – for cardiac arrest if signs of life in last 10 minutes
- Blood administration – if inadequate mentation / radial pulse / systolic below 80mmHg
- Intubation – if agitation impairing management, if hypoxic, if arrest or significantly depressed level consciousness

2.

Left sided pneumothorax (accept tension – rib spaces are widened)

3.

- visible lung edge
- rim of lucency around lung edge
- widened rib spaces on left
- deep sulcus sign

4.

- pericardial tamponade – pericardial fluid on FAST, raised JVP
- intraperitoneal haemorrhage – intra-peritoneal fluid evident on FAST scan, tender abdomen

5.

- extra-thoracic placement – ensure finger has entered thoracic space and guided passage of ICC
- damage to intercostal vessels / nerve – ensure placement above rib not below
- lung laceration – finger sweep on entering thoracic cavity, not use trocar
- heart injury – avoid trocar, gentle insertion of ICC
- diaphragm / abdominal organ injury – ensure placement in triangle of safety, lowest 5th interspace
- infection – full sterile technique

Question 33

1.

Injury: Tension Pneumothorax

Confirmation: CXR/E-FAST/Clinical signs

Management: Decompression with ICC placement

Injury: Massive Haemothorax

Confirmation: CXR

Management: Decompression with ICC, Volume resuscitation

Injury: Cardiac Tamponade

Confirmation: E-FAST, large effusion of pericardial view

Management: Thoracotomy (in ED only if arrests)

Injury: Visceral Laceration – ie liver/spleen/kidney

Confirmation: CT with Active haemorrhage on CT(A) + free fluid

Management: Surgical/Embolisation

Injury: Great Vessel Injury (IVC/Aorta)

Confirmation: CT (Angiography)

Management: surgical

Injury: Cord Injury with neurogenic shock

Confirmation: Neurologic signs and CT Evidence of Spinal Laceration

Management: Manage shock with fluids/noradrenaline, surgical involvement

2.

Blood Only

Matched components 1:1:1 PRBCs:Plts:FFP

Aim for maintenance of cerebral perfusion, SBP approx. 80

Identify and correct Trauma Induced Coagulopathy (ie ROTEM guided fibrinogen replacement)

TXA

Question 34

Answers:

1. Describe 3 important features in this clinical photograph & state the significance.

(3 marks)2/3

- 3 stab wounds to back
- active bleeding
- Proximate to heart – high risk of cardiac injury, likely PTx

2. List 2 ultrasonographic signs that would be consistent with pericardial tamponade?

(2 Marks) 1/2

- Pericardial effusion
- R sided heart collapse during diastole

3. List 2 indications for emergency department thoracotomy for penetrating trauma.

(2 marks)1/2

- Cardiac arrest at any point with initial signs of life in the field
- Systolic blood pressure below 50 mm Hg after fluid resuscitation
- Severe shock with clinical signs of cardiac tamponade

4. List 3 potential complications from resuscitative thoracotomy?

(3 marks)2/3

- a. Coronary artery injury/ligation
- b. Phrenic Nerve laceration
- c. Diaphragmatic injury
- d. Chest wall vascular injury (intercostals, internal mammary)
- e. Infection
- f. Health care worker body fluid exposure

Passmark = 6/10 Adjust to ../10 please

References:

Robert's and Hedges

Rosen's

Question 35

Q1

CXR – lung edge with pneumothorax, mediastinal shift with tension haemo or pneumo, veiling hemithorax with haemothorax

FAST scan – free fluid peritoneum with abdominal visceral injury, pericardial fluid with heart injury/tamponade

Q2

No crystalloid

Blood product use – begin packed cells

Goal – cerebral perfusion/radial pulse / systolic 80mmHg

Blood product ratios 1:1 – 1:2 FFP/platelets:packed cells

Massive transfusion protocol (not an extra mark in addition to ratios and blood product use)

Q3

Pericardial blood / tamponade

Large ongoing air leak

Large ongoing ICC blood losses (some number given will be needed eg >1500ml and 200mL/hr but hard to mark anything as “wrong”)

Q4

Agitation interfering with management / facilitate management

Refractory shock with decreased consciousness

Deteriorating hypoxia

To expedite surgical management also acceptable

Q5

Tension pneumothorax (critical answer)

Tension haemothorax

Blocked ETT – blood/sputum

Misplaced ETT – right main bronchus

Ventilator dys-synchrony (includes not sedated)

Inappropriate ventilator settings eg too large volume

Bronchospasm

Question 36

- i. With regard to blunt abdominal trauma, complete the table with 2 pros and cons of each diagnostic modality (12 marks)

	PROS	CONS
FAST SCAN	• Sensitive and specific for free fluid • Rapid • Repeatable • Portable • Low risk	• Does not identify if FF is blood • Operator-dependant • Does not image retroperitoneum • Difficult if obese / SC air / bowel gas
CT SCAN	• Precise location of lesion(s) • Images retroperitoneum • Not invasive • Can determine if injury suitable for conservative mx	• Expense • Transport out of ED • IV contrast • Radiation
DIAGNOSTIC PERITONEAL LAVAGE	• Very sensitive for intra-abdominal bleeding • Readily available • Low complication rate • Early detection of bowel perforation • No radiation / contrast	• Invasive • Iatrogenic injury • Not specific • Can't tell if injury suitable for non-operative mx • Not often used – deskilled / inexperienced staff

- ii. List two contraindications to performing a FAST exam in trauma. Provide an example for each (4 marks)
- Presence of a more critical problem e.g. airway obstruction
 - A clear indication for emergency laparotomy e.g. penetrating abdo trauma with haemodynamic instability
- iii. Bowel and mesenteric injuries are particularly associated with an abdominal “seatbelt sign”. What CT radiographic findings are classically seen in this injury (3 marks)
- Perforation – with leakage of oral contrast (if used), leakage of bowel contents or presence of free intra-abdominal gas
 - Mural haematoma/mural thickening
 - Abnormal bowel wall enhancement (e.g. from ischaemia)
 - Mesenteric injury with active extravasation of contrast
 - Haziness/fat stranding