Queensland
Trauma Education

PELVIC TRAUMA

# Haemodynamically unstable pelvic trauma

## Immersive scenario

Facilitator resource kit

CSDS
Clinical Skills Development Service

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## Queensland Trauma Education

The resources developed for Queensland Trauma Education are designed for use in any Queensland Health facility that cares for patients who have been injured as a result of trauma. Each resource can be modified by the facilitator and scaled to the learners needs as well as the environment in which the education is being delivered, from tertiary to rural and remote facilities.

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**Queensland Trauma Education**
**Pelvic trauma – Haemodynamically unstable pelvic trauma: Immersive scenario – Facilitator resource kit**
**Version 1.0**

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# About this training resource kit

This resource kit provides healthcare workers with the knowledge and skills to manage a patient with an open book pelvic injury who is haemodynamically unstable following a traumatic incident.

## National Safety and Quality Health Service (NSQHS) Standards

## Target audience

Emergency medical and nursing clinicians.

## Duration

45-60 minutes.

## Group size

4-6 participants (or team composition applicable to local area).

## Learning objectives

By the end of this session the participant will be able to:

- perform a focussed clinical examination to assess a patient with a major pelvic injury
- identify types of pelvic injury that are associated with vascular injury and bleeding
- perform bedside interventions to aid haemorrhage management
- demonstrate early targeted management (may include retrieval services).

## Facilitation guide

1. Facilitator to provide participant resource kit to the participants.
2. Facilitator to discuss the pre-simulation briefing and deliver the immersive simulation on haemodynamically unstable pelvic trauma.
3. Utilise the supporting documents to maximise learning throughout the immersive scenario.
4. Utilise the debrief guide to evaluate and support participant performance and provide feedback.

## Supporting resources

- Structured assessment in trauma.
- Specific management.

# Overview of pelvic trauma

The care of patients with major pelvic trauma is focussed on the identification of both mechanical and physiological instability and directing management towards the stabilisation of both. Different classification systems exist for pelvic injury, some on anatomical patterns and others based on mechanism of injury and need for operative management.

Pelvic injury occurs in 3% of skeletal injury, with the patients often being young with significant multisystem injury.

Overall, the clinical care is targeted towards the haemodynamic status, the anatomical impairment of pelvic ring function and the associated injuries. This often requires a multidisciplinary approach to manage the resuscitation, control the bleeding and stabilise the bony injury.

## Further reading

| **WSES classification and guidelines** | |
|---|---|
| Publication | World Journal of Emergency Surgery |
| Link | https://doi.org/10.1186/s13017-017-0117-6 |

| **Current management of hemorrhage from severe pelvic fractures: Results of an American Association for the Surgery of Trauma multi-institutional trial** | |
|---|---|
| Publication | The Journal of Trauma and Acute Care Surgery |
| Link | https://doi.org/10.1097/TA.0000000000001034 |

| **Pelvic ring injuries: Emergency assessment and management** | |
|---|---|
| Publication | Journal of Clinical Orthopaedics and Trauma |
| Link | https://doi.org/10.1016/j.jcot.2015.08.002 |

| **Effect of Early Pelvic Binder Use in the Emergency Management of Suspected Pelvic Trauma: A Retrospective Cohort Study** | |
|---|---|
| Publication | International Journal of Environmental Research and Public Health |
| Link | https://doi.org/10.3390/ijerph14101217 |

| **Primary Clinical Care Manual 10th edition, Fractured Pelvis, p. 190** | |
|---|---|
| Organisation | Queensland Health |
| Link | https://qheps.health.qld.gov.au/__data/assets/pdf_file/0027/2354850/PCCM-10th-Edition.pdf |

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## PRIMARY SURVEY

# Structured assessment in trauma

## C — Catastrophic haemorrhage

Rapidly assess, control haemorrhage

**Immediate management:** Application of direct pressure, consider tourniquet application, do not remove penetrating foreign objects, initiate large bore IV access and rapid fluid resuscitation.

**Life threats:** Exsanguinating external haemorrhage, blunt/penetrating thoracic and/or abdominal injury.

## A — Airway/C-spine

Rapidly assess, maintain or secure airway and C-spine

**Life threats:** Airway obstruction, blunt/penetrating neck injury.

## B — Breathing/ventilation

Rapidly assess, support ventilation/oxygenation

**Life threats:** Tension pneumothorax, massive haemothorax, open pneumothorax, flail chest, ruptured diaphragm.

## C — Circulation with haemorrhage control

Rapidly control, assess and support haemodynamics

**Life threats:** Exsanguinating external haemorrhage, cardiac tamponade, penetrating cardiac injury.

## D — Disability

Rapidly assess and protect neurological status

**Life threats:** Catastrophic cerebral haemorrhage.

## E — Exposure

Expose patient, assess for further injuries, maintain normothermia

## Specific management

- Recognition of open book pelvic injury.
- Application of pelvic binder.
- Haemostatic resuscitation.
- Identification of potential arterial bleeding and management options.

# Simulation event

## This section contains the following:

1. Pre-simulation briefing poster
2. Immersive scenario
3. Resource requirements
4. Handover card
5. Scenario progression
    a. State 1: Initial assessment
    b. State 2: Ongoing management / secondary assessment
    c. State 3: Management
6. Supporting documents
7. Debriefing guide

# Pre-simulation briefing

## Establishing a safe container for learning in simulation

### 1 Clarify objectives, roles and expectations

- Introductions
- Learning objectives
- Assessment (formative vs summative)
- Facilitators and learners' roles
- Active participants vs observers

### 2 Maintain confidentiality and respect

- Transparency on who will observe
- Individual performances
- Maintain curiosity

### 3 Establish a fiction contract

Seek a voluntary commitment between the learner and facilitator:

- Ask for buy-in
- Acknowledge limitations

### 4 Conduct a familiarisation

- Manikin/simulated patient
- Simulated environment
- Calling for help

Note: Adjust the pre-simulation briefing to match the demands of the simulation event, contexts or the changing of participant composition.

### 5 Address simulation safety

Identify risks:

- Medications and equipment
- Electrical or physical hazards
- Simulated and real patients

V2 Effective: 1/7/2021. Adapted from Rudolph, J., Raemer, D. and Simon, R. (2014). Establishing a Safe Container for Learning in Simulation. Simulation in Healthcare: Journal of the Society for Simulation in Healthcare, 9(6), pp.339-349.

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## Immersive scenario

| | |
|---|---|
| **Type** | Immersive scenario |
| **Target audience** | Emergency department medical and nursing clinicians |
| **Overview** | A 30-year-old male patient is transported to the ED following an MBC 50 minutes ago. He is haemodynamically unstable, confused and pale. He is complaining of pain over R lower quadrant of his abdomen and hip.<br><br>Participants are required to demonstrate the rapid recognition of haemodynamic instability and perform assessment focused on identification of source of bleeding and prioritise management. |
| **Learning objectives** | By the end of this session the participant will be able to:<br>• perform the assessment of a haemodynamically unstable trauma patient to identify a major pelvic injury<br>• apply external pelvic compressive device to aid haemorrhage management<br>• implement haemostatic resuscitation strategy<br>• demonstrate early targeted management. |
| **Duration** | 45-60 minutes, including debrief. |

## Resource requirements

### Physical resources

| | |
|---|---|
| **Room setup** | Resus bay in emergency |
| **Simulator/s** | 1 manikin - SimMan 3G or ALS simulator |
| **Simulator set up** | • Street clothes, lying supine<br>• Cervical collar in situ<br>• No pelvic binder<br>• Moulage: anterior bruising across lower abdomen/pelvis |
| **Clinical equipment** | • Standard precautions PPE.<br>• Standard resus bay equipment: monitors, resus trolley, infusion pumps, blood warmers.<br>• Fluids/blood products: N/saline, Hartmann's, packed red blood cells/blood components<br>• Medications: IV analgesia<br>• Pelvic binder (available for application if requested by participants) |
| **Access** | 2 x IVC setups. 18g cannula R) ACF with empty N/S 0.9% 250ml bag, No IV sticker attached to L) arm |
| **Other** | ED chart and relevant paperwork |

### Human resources

| | |
|---|---|
| **Faculty** | 2 facilitators (doctor/nurse with debriefing experience) to take on roles of scenario commander and primary debriefer |
| **Simulation coordinators** | 1 for manikin set up and control |
| **Confederates** | 1 confederate in room, optional 1 confederate to provide QAS handover / radiographer / other team member |
| **Other** | Trauma team composition - 2 nurses and 3 doctors in room (or team composition applicable to local area) |

## Handover card

Handover from ambulance officer

This is Sam Johnson. He is an otherwise healthy 30-year-old male with no known allergies. He was witnessed to be the rider of a motorbike vs truck approximately 50 minutes ago. He was thrown over the bike, impacting with the road about 5 meters away.

He was assisted by bystanders on scene until the first crew arrived but was reportedly never knocked out, was wearing a helmet and remains GCS 14 throughout care, being confused to place and time. He has no other focal neurological deficits, pupils 3mm and reactive bilaterally.

His other vital signs are: HR 120, BP 90/60mmHg, saturations 97% 6L HM and respiratory rate 28. He is complaining of pain in his R lower quadrant of his abdomen and R hip.

He has an 18g cannula in his R) ACF and we have given him 10mg IV morphine and 8mg IV ondansetron with minimal effect. He has also had 750mls NSaline IV and a cervical collar applied.

Many thanks for your ongoing care of Sam.

## Scenario progression

<table>
<tr><th colspan="4">STATE 1: INITIAL ASSESSMENT</th></tr>
<tr><th colspan="2">Vital signs</th><th>Script</th><th>Details</th><th>Expected actions</th></tr>
<tr><td>ECG</td><td>ST</td><td rowspan="9">Sam<br>Moaning loudly,<br>“I am in so much pain. Please help me.”</td><td rowspan="9">Primary survey results<br>A: Cx collar, airway patent, nil anterior neck injury<br>B: nil chest wall tenderness, nil crepitus, nil subcutaneous emphysema, equal breath sounds bilaterally<br>C: nil external bleeding, poor perfusion peripherally, pelvis and lower abdo tenderness, bruising across lower abdomen/pelvis, scrotal/penile bruising<br>D: GCS 14 (confused), nil neurological deficits<br>E: temp 35.6</td><td rowspan="9">Commence primary survey<br>❑ Assess airway/breathing<br>○ optimise oxygenation and ventilation.<br>❑ Assess circulation<br>○ recognise abnormality in circulation<br>○ gain further IV access.<br>❑ Assess disability and expose patient.<br>❑ Action call for help early. Identify resources available to local area.</td></tr>
<tr><td>HR</td><td>120</td></tr>
<tr><td>$SpO_2$</td><td>97% 6L HM</td></tr>
<tr><td>BP/ART</td><td>90/60mmHg</td></tr>
<tr><td>RR</td><td>28</td></tr>
<tr><td>Temp</td><td>35.6</td></tr>
<tr><td>BGL</td><td>7</td></tr>
<tr><td>GCS</td><td>14 E4V4M6</td></tr>
<tr><td></td><td></td></tr>
</table>

| STATE 2: ONGOING MANAGEMENT / SECONDARY ASSESSMENT | | | | |
|---|---|---|---|---|
| **Vital signs** | | **Script** | **Details** | **Expected actions** |
| **ECG** | ST | **Sam**<br>Moaning, "Ahhhhh, my hip! What's happening?" | **Secondary survey results**<br>If not examined above:<br>Abdomen/pelvis: pelvis and lower abdo tenderness, bruising across lower abdomen/pelvis, scrotal/penile bruising<br>No wounds to suggest compound injury<br>Long bones: NAD<br>Log roll: nil midline bony tenderness/bruising<br>Results<br>CXR: NAD<br>Pelvic Xray: open book pelvic fracture<br>FAST: negative | **Secondary survey**<br>❑ Perform head to toe assessment<br>❑ Identify major pelvic injury and circulation compromise<br>❑ Arrange analgesia<br>❑ Ensure oxygenation is adequate<br><br>**Initiate investigations**<br>❑ Bloods - trauma panel - FBE, chem20, group and hold, lipase, coags/ROTEM (if applicable)<br>❑ Point of care tests: Hemocue, Istat CG4 (if applicable)<br>❑ Bedside tests: UA, ECG, VBG<br>❑ Imaging: CXR/Pelvic Xray & FAST<br><br>❑ **Management**<br>❑ Apply pelvic binder and strap feet in internal rotation<br>❑ Commence fluid resuscitation-blood/blood products as preference<br>❑ Warm patient |
| **HR** | 120 | | | |
| **$SpO_2$** | 97% 6L HM | | | |
| **BP/ART** | 80/50mmHg | | | |
| **RR** | 28 | | | |
| **Temp** | 35.6 | | | |
| **BGL** | 7 | | | |
| **GCS** | 14 | | | |

| STATE 3: MANAGEMENT | | | | |
|---|---|---|---|---|
| **Vital signs** | | **Script** | **Details** | **Expected actions** |
| **ECG** | ST | **Sam**<br>"I still have pain but it feels a little better since the thing on my hips was put on…" | If pelvic binder applied and fluid resuscitation commenced - patient haemodynamics improve.<br><br>If no pelvic binder or fluid resuscitation initiated - haemodynamic parameters worsen<br><br>- Confederate can prompt team to perform both actions. | **Assessment**<br>❑ Repeat primary survey<br><br>**Management**<br>❑ Consideration for CT abdo with improvement in haemodynamic status for IR (or OT if remains unstable) OR.<br>❑ Liaise with tertiary referral facility for consultation.<br><br>***Referral to surgical/ortho team for ongoing operative management OR Consult RSQ for retrieval.*** |
| **HR** | 110 | | | |
| **$SpO_2$** | 97% 6l HM | | | |
| **BP/ART** | 100/60mmHg | | | |
| **RR** | 24 | | | |
| **Temp** | 35.6 | | | |
| **BGL** | 7 | | | |
| **GCS** | 14 | | | |
| | | | | |

## Supporting documents

The following supporting documents are provided for this immersive scenario:

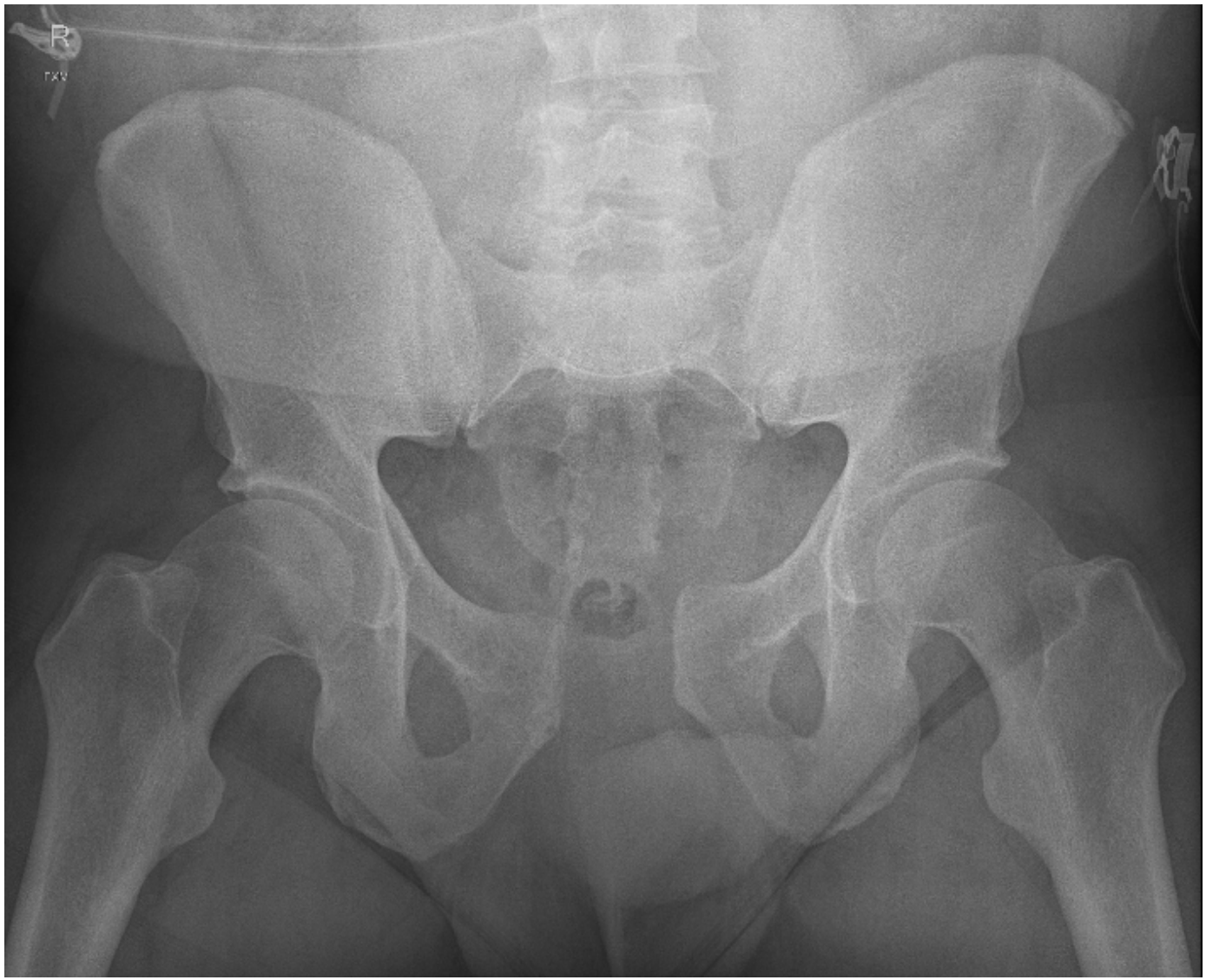
**Radiology results:**

1. Pelvic Xray
2. CXR
3. EFAST: RUQ/Morrisons: negative
4. EFAST: LUQ/splenorenal: negative
5. EFAST: Pelvis: negative
6. EFAST: Subxiphoid: negative

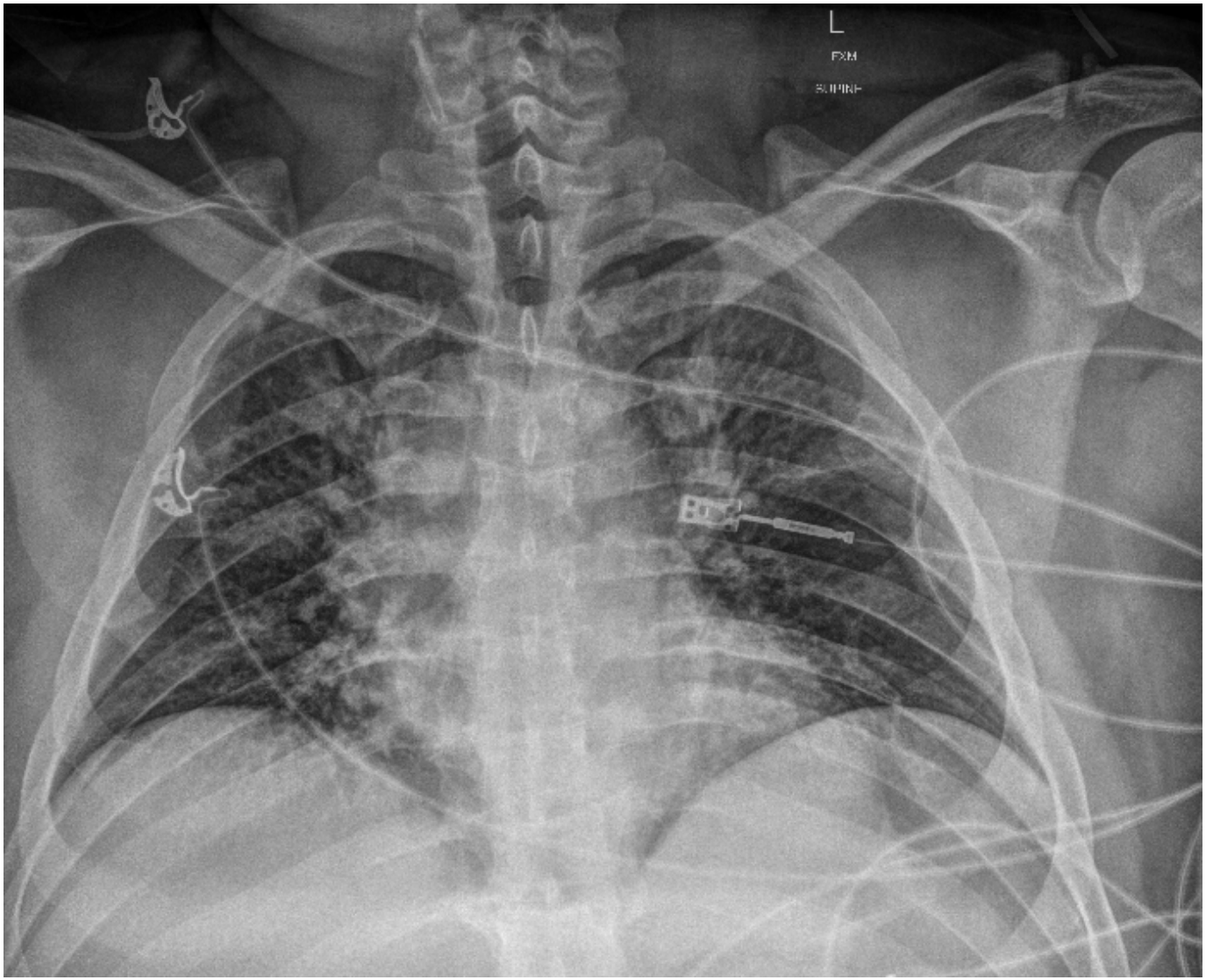
**Pathology results:**

3. Venous Blood Gas

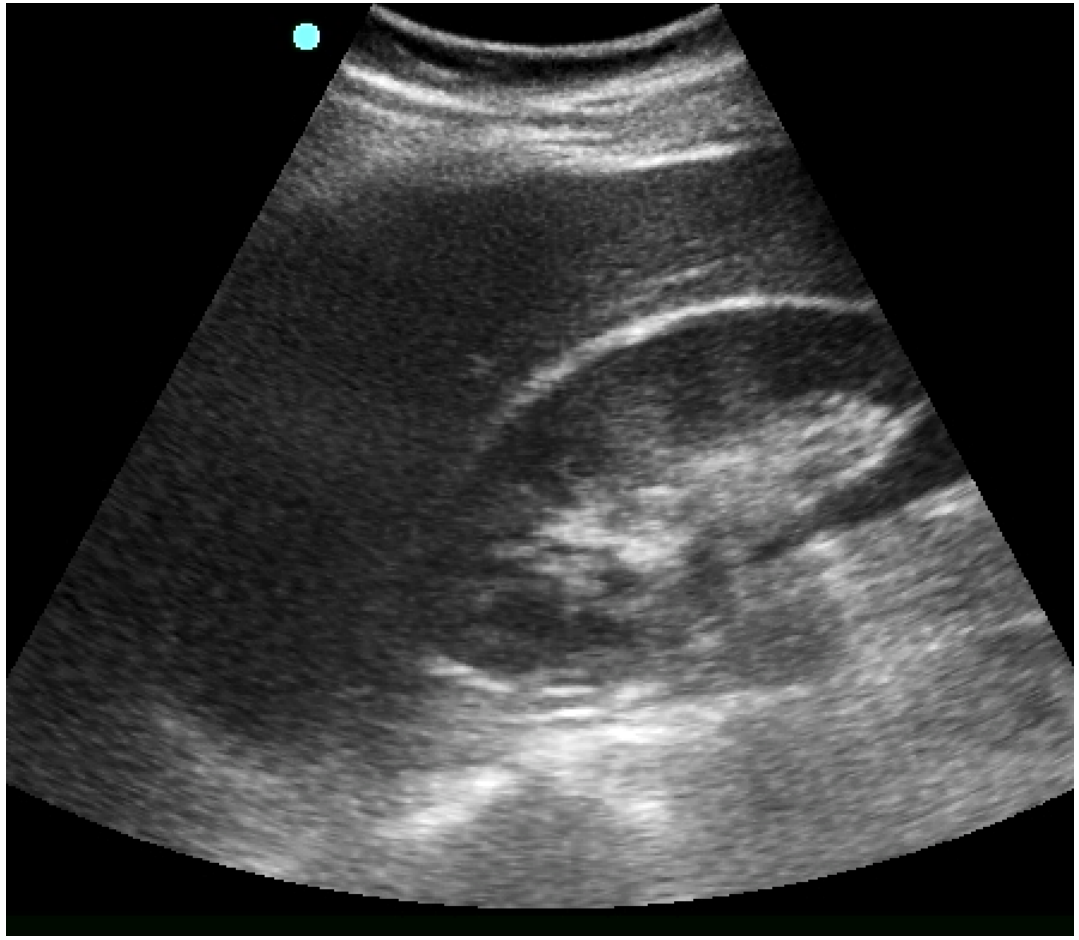
## Pelvic Xray



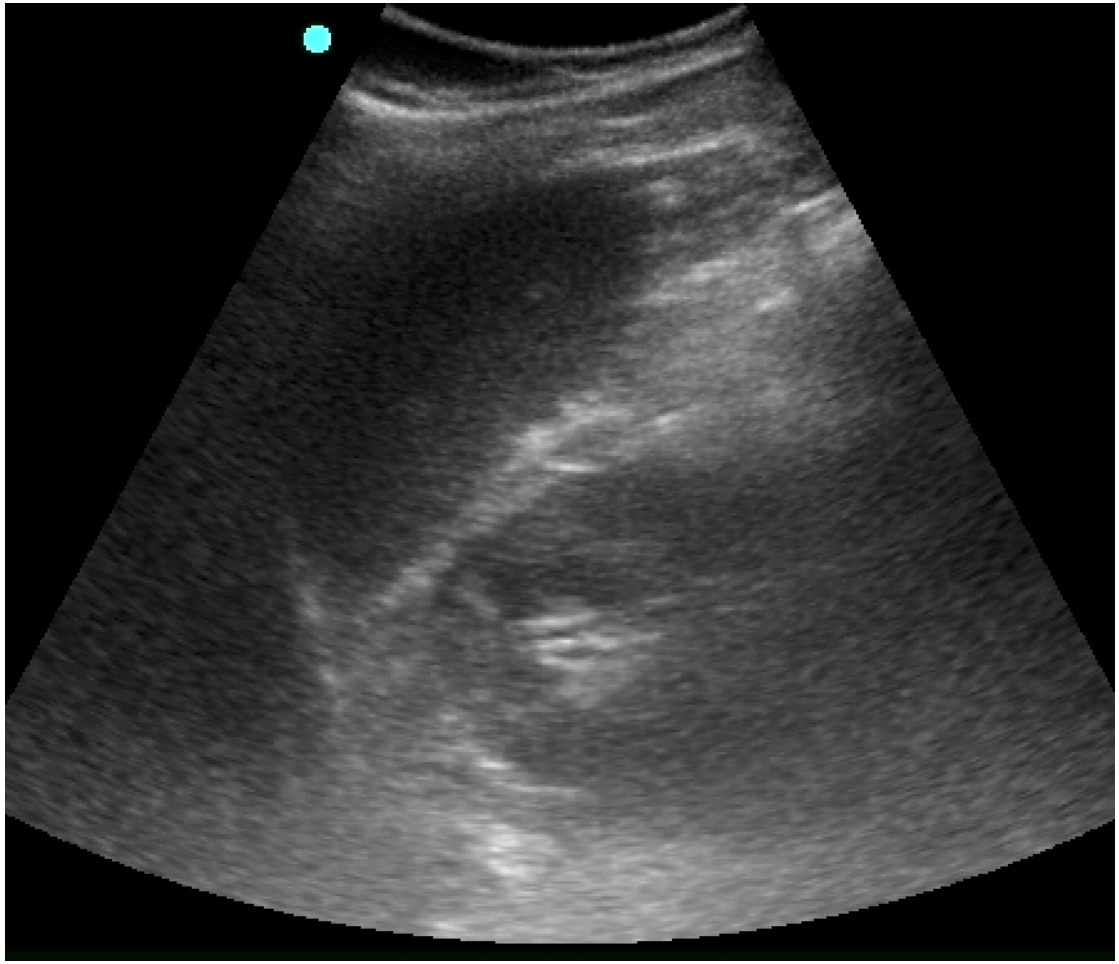
## CXR



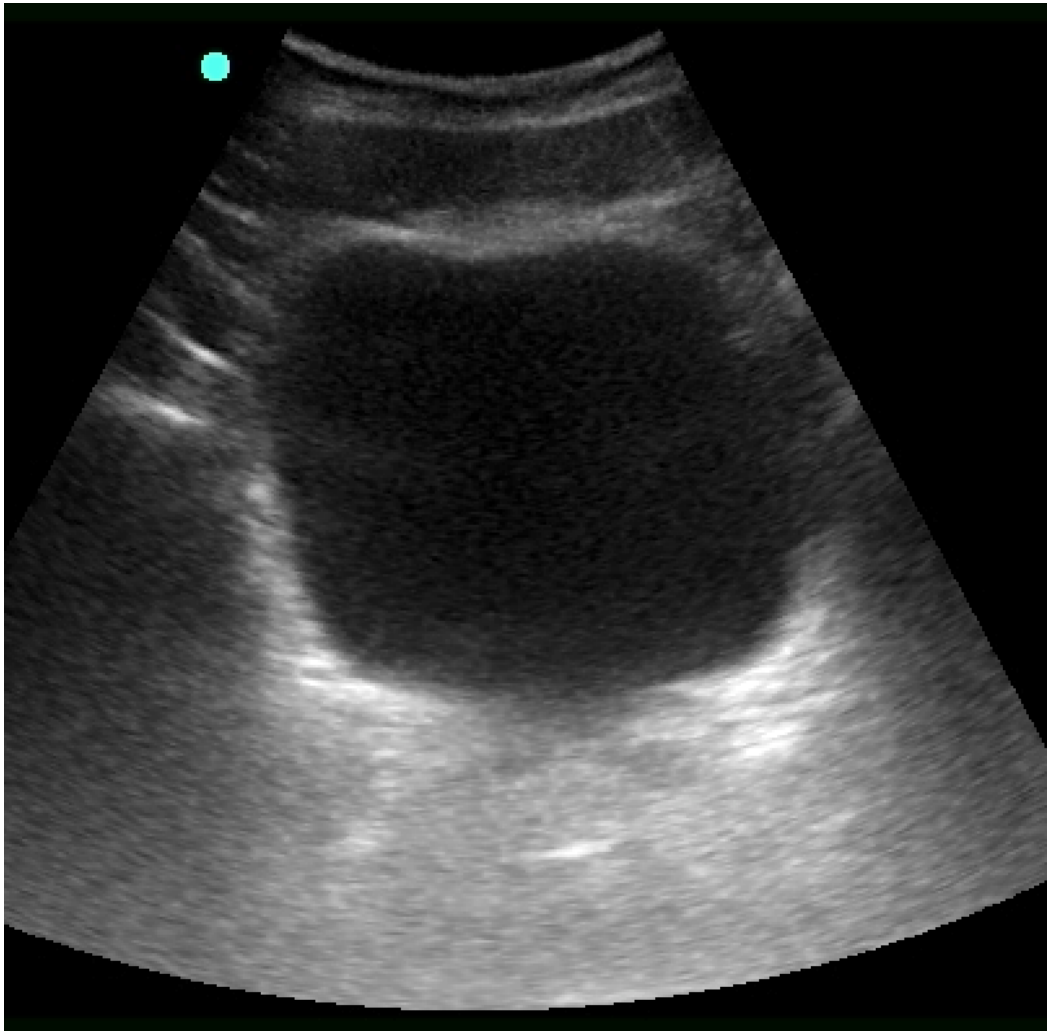
## EFAST: RUQ/Morrisons



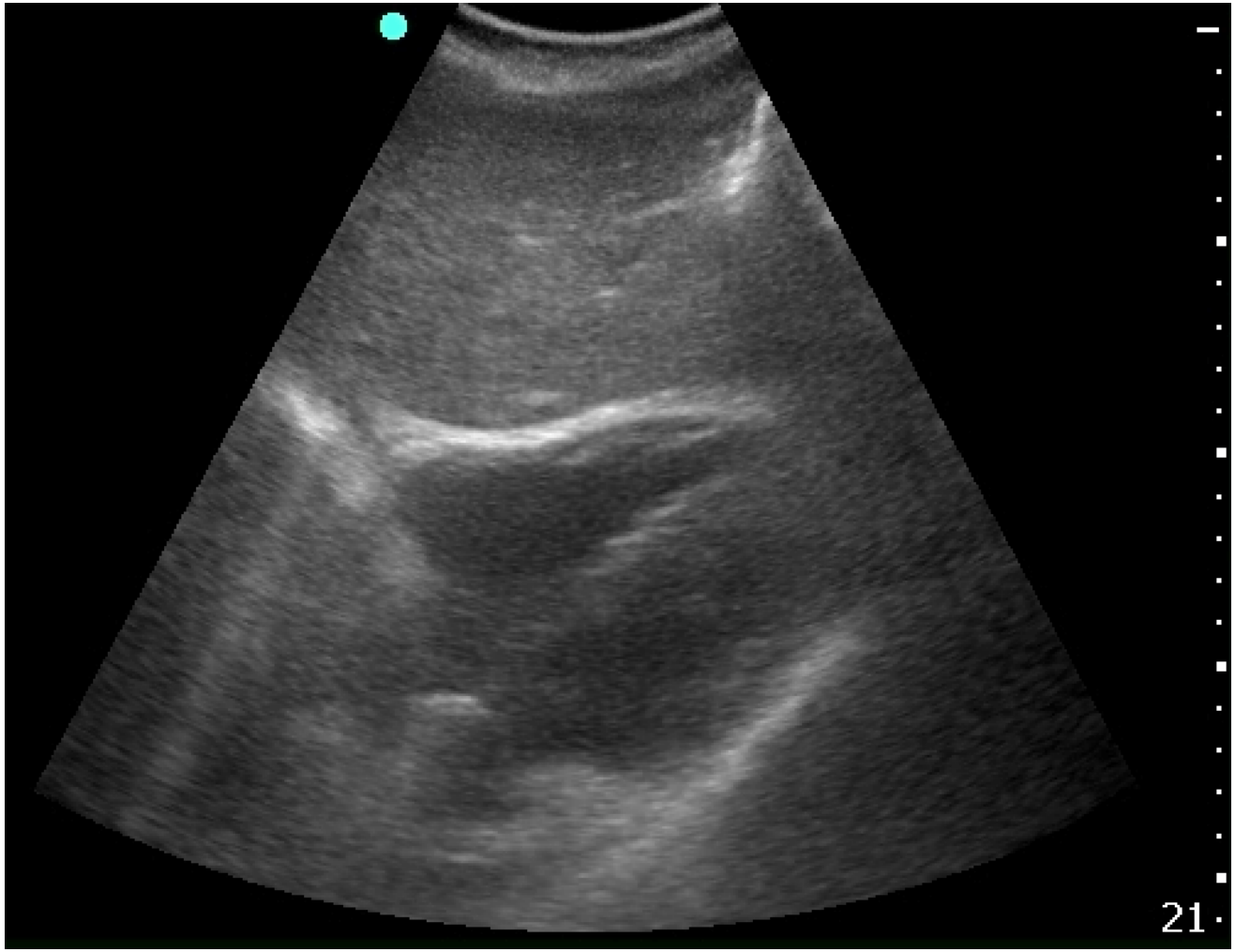
## EFAST: LUQ/splenorenal



## EFAST: Pelvis



## EFAST: Cardiac/Subxiphoid



## Pathology Results: Venous Blood Gas

| RADIOMETER ABL800 FLEX | | | | |
|---|---|---|---|---|
| ABL837 RH~RB<br>PATIENT REPORT | Syringe – S 250uL | | Sample # | 16538 |
| **Identifications** | | | | |
| Patient ID | SDC 240222 | | | |
| Patient Last Name | Johnson | | | |
| Patient First Name | Sam | | | |
| Sample type | Venous | | | |
| T | 35.8 | | | |
| FO2(l) | 1.0 | | | |
| Operator | B. Smith | | | |
| **Blood Gas Values** | | | | |
| pH | 7.11 | | [ 7.350 – 7.450 ] | |
| pCO2 | 36 | mmHg | [ 35.0 – 45.0 ] | |
| pO2 | 51 | mmHg | [ 75.0 – 100 ] | |
| cHCO3~(P)c | 15 | mmol/L | [ 21.0 – 27.0 ] | |
| cBase(B)c | -10 | mmol/L | [ -3.0 – 3.0 ] | |
| P50c | | mmHg | | |
| Baro. | | mmHg | | |
| **Oximetry Values** | | | | |
| aO2 | | % | | |
| ctHb | 71 | g/L | [ 105 – 135 ] | |
| Hct | | % | | |
| FO2Hb | | % | [ 94.0 – 98.0 ] | |
| FCOHb | | % | [ 0.0 – 1.5 ] | |
| FMetHb | | % | | |
| FHHb | | % | [ – ] | |
| **Electrolyte Values** | | | | |
| cNa+ | 136 | mmol/L | [ 135 – 145 ] | |
| cK+ | 4.2 | mmol/L | [ 3.2 – 4.5 ] | |
| cCl- | 111 | mmol/L | [ 100 – 110 ] | |
| cCa2+ | 1.12 | mmol/L | [ 1.15 – 1.35 ] | |
| AnionGap,K+c | | mmol/L | [ – ] | |
| **Metabolite Values** | | | | |
| cGlu | 7.0 | µmol/L | [ 3.0 – 7.8 ] | |
| cLac | 6.3 | µmol/L | [ 0.7 – 2.5 ] | |
| cCrea | | µmol/L | [ 36 – 62 ] | |
| ctBll | | µmol/L | [ – ] | |
| **Temperature Corrected Values** | | | | |
| pH(T) | | | | |
| pCO2(T) | | mmHg | | |
| pO2(T) | | mmHg | | |
| **Notes** | | | | |

# Debriefing guide

### Scenario objectives

- perform the assessment of a haemodynamically unstable trauma patient to identify a major pelvic injury
- apply external pelvic compressive device to aid haemorrhage management
- implement haemostatic resuscitation strategy demonstrate early targeted management.

### Example questions

Exploring diagnosis

- Explain your thought process for the rapid assessment of the haemodynamically unstable trauma patient for identification of life-threatening injuries.
- What clinical findings aided in the identification of bleeding source?
- Do the radiological investigations and EFAST help you identify the type of bleeding - arterial or venous?
- What clinical features aided the classification of shock state for this patient into mild/moderate/severe?
- What are the signs of associated urethral injury with an open book pelvic fracture?

Discussing management

- What was your priority to manage the haemodynamic instability?
- What is a system for classification of pelvic fractures and how does this affect your management?
- Is interventional radiology available at your hospital? What processes need to occur to activate this service?
- How do you activate a massive transfusion/VHA guided resuscitation protocol?
- Are there challenges in placing an indwelling catheter in this patient?

Discussing teamwork / crisis resource management

- Calling for help early - did you have enough team members to simultaneously manage the patient?
- How do you prioritise the management to improve his haemodynamic state?

### Key moments

- Rapid recognition of haemodynamic instability and assessment focused on identification of source of bleeding.
- Early application of pelvic binder with internal rotation of feet to aid haemorrhage control.
- Institution of haemostatic resuscitation.
- Decision making for disposition - CTA and IR vs OT.

# Acronyms and abbreviations

| Term | Definition |
|---|---|
| CTA | computed tomography arterial |
| IR | interventional radiology |
| OT | operating theatre |
| VHA | viscoelastic haemostatic assays |
| EFAST | extended focused assessment with sonography in trauma |
| UA | urinalysis |
| ECG | electrocardiogram |
| NAD | no abnormality detected |

# References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