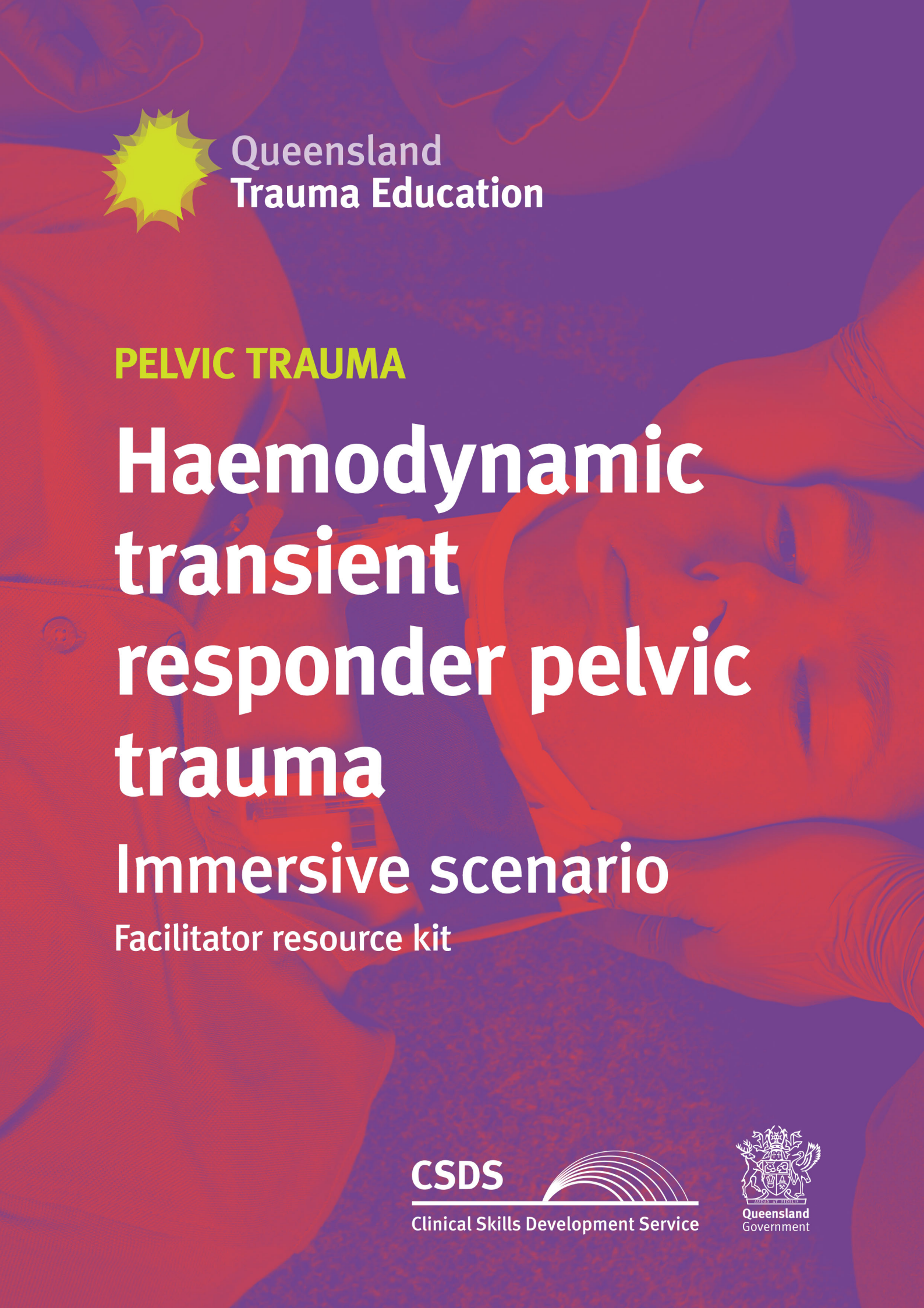

Queensland
Trauma Education

PELVIC TRAUMA

Haemodynamic transient responder 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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Reviewed by
Education Working Group, Statewide Trauma Clinical Network – Clinical Excellence Queensland

Queensland Trauma Education
Pelvic Trauma – Haemodynamic transient responder pelvic trauma: Immersive scenario – Facilitator resource kit
Version 1.0

Published by the State of Queensland (Clinical Skills Development Service), 2021

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 a transient responder 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 to definitive care.

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 patient with pelvic trauma and transient haemodynamic responder.
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 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 the mechanism of injury and need for operative management.

Major pelvic injury occurs in 3% of skeletal injury, with major pelvic disruption found in younger patients with significant multisystem trauma.

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

Pelvic trauma: 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

RBWH Pelvic Binder Management	
Organisation	Queensland Health
Link	https://qheps.health.qld.gov.au/__data/assets/pdf_file/0033/2521779/005472.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 staff
Overview	A 23-year-old male patient is transported to ED after falling 7 metres off an overpass 45 minutes ago. He is initially haemodynamically unstable, confused and pale. His haemodynamic parameters improve with fluid resuscitation. He complains of pain over L lower quadrant of his abdomen and R hip. He has a vertical sheer pelvic injury demonstrated by pelvic Xray.
Learning objectives	• The assessment of a transient responder trauma victim to identify a major pelvic injury. • Apply external pelvic compressive device to aid haemorrhage management. • Use of haemostatic resuscitation strategy. • 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. • Cervical collar in situ. • Pelvic binder available but not applied. • Moulage: anterior bruising across lower abdomen/pelvis. • 2L via nasal prongs in situ.
Clinical equipment	• Standard precautions PPE. • Resuscitation/trauma bay role allocation stickers (if applicable to local area). • Standard resus bay equipment: monitors, resus trolley, infusion pumps, blood warmers. • Fluids/blood products: N/saline/Hartmann's, packed red blood cells/blood components. • Medications: IV analgesia, TXA 1g. • Pelvic binder (available for application) and sling/bandage to tie feet into internal rotation.
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 Ben Wright. Ben is 23 years old and he's fallen off the overpass approximately 45 minutes ago and was found by bystanders walking past. We estimate he has fallen over 7-metres in height.

When the first crew arrived, he was reportedly never knocked out and remains GCS 14 throughout QAS care, being confused to place and time. He has no other focal neurological deficits, pupils are 3mm and reactive bilaterally.

His other vital signs are: HR 140, BP 110/60mmHg, saturations 95% 2L NP and respiratory rate 28. He is complaining of pain in his L 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.

He doesn't have any past medical history, no medications and no known allergies.

Many thanks for your ongoing care of Ben.

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">Ben
Moaning loudly,
“I am in so much pain - please help me.”</td><td rowspan="9">Primary survey results
A: Cervical collar in situ - nil midline tenderness, airway patent, nil anterior neck injury
B: Nil chest wall tenderness, nil crepitus, nil subcutaneous emphysema, equal breath sounds bilaterally
C: Nil external bleeding, poor perfusion peripherally, L pelvis and lower abdo tenderness, bruising across lower abdomen/pelvis, scrotal/penile bruising
D: GCS 14 (confused), nil neurological deficits
E: temp. 35.6</td><td rowspan="9">Commence primary survey
❑ Assess airway/breathing
○ optimise oxygenation and ventilation.
❑ Assess circulation
○ recognise abnormality in circulation
○ gain further IV access.
❑ Assess disability and expose patient
❑ Call for help early. Identify resources available to local area.</td></tr>
<tr><td>HR</td><td>140</td></tr>
<tr><td>SpO_2</td><td>95% 2LNP</td></tr>
<tr><td>BP/ART</td><td>110/60mmHg</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 E4V3M6</td></tr>
<tr><td></td><td></td></tr>
</table>

STATE 2: ONGOING MANAGEMENT / SECONDARY ASSESSMENT				
Vital signs		**Script**	**Details**	**Expected actions**
ECG	ST	**Ben** Complains of pain to pelvis.	**Secondary survey results** If not examined above: **Abdomen/pelvis**: pelvis and lower abdo tenderness, bruising across lower abdomen/pelvis, scrotal/penile bruising, L ASIS higher than R. No wounds to suggest compound injury. **Long bones**: NAD **Log roll**: sacral midline bony tenderness/bruising, perianal sensation normal. **Results** **CXR**: NAD **Pelvic Xray**: vertical sheer pelvic fracture **EFAST**: negative	**Secondary survey** ❑ Perform head to toe assessment ❑ Identify major pelvic injury and circulation compromise ❑ Arrange analgesia ❑ Ensure oxygenation is adequate - can change sats to 100% with increased FiO2. **Initiate investigations** ❑ Bloods - trauma panel - FBE, chem20, XMatch, lipase, coags/ROTEM ❑ Bedside tests: UA, ECG, VBG ❑ Imaging: CXR, Pelvic Xray & EFAST **Management** ❑ Apply pelvic binder and strap feet in internal rotation ❑ Reduce vertical sheer fracture ❑ Commence fluid/haemostatic resuscitation - blood/blood products as preference ❑ Warm patient ❑ Administer analgesia
HR	120			
SpO_2	100% 15l NRB			
BP/ART	80/50mmHg			
RR	28			
Temp	35.6			
BGL	7			
GCS	14			

<table>
<tr><th colspan="4">STATE 3: MANAGEMENT</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">Ben
“I still have pain but it feels a little better since the thing on my hips was put on…”</td><td rowspan="9">If pelvic binder applied and fluid resuscitation commenced patient - haemodynamics improve.

If no pelvic binder or fluid resuscitation initiated - haemodynamic parameters worsen.</td><td rowspan="9">Assessment
❑ Repeat primary survey

Management
❑ CTA abdo/pelvis with improvement in haemodynamic status for IR
OR
❑ OT if remains unstable

Referral to surgical/ortho team for ongoing operative management.</td></tr>
<tr><td>HR</td><td>100</td></tr>
<tr><td>SpO_2</td><td>100% 15L NRB</td></tr>
<tr><td>BP/ART</td><td>100/70mmHg</td></tr>
<tr><td>RR</td><td>26</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</td></tr>
<tr><td></td><td></td></tr>
</table>

Supporting documents

The following supporting documents are provided for this immersive scenario:

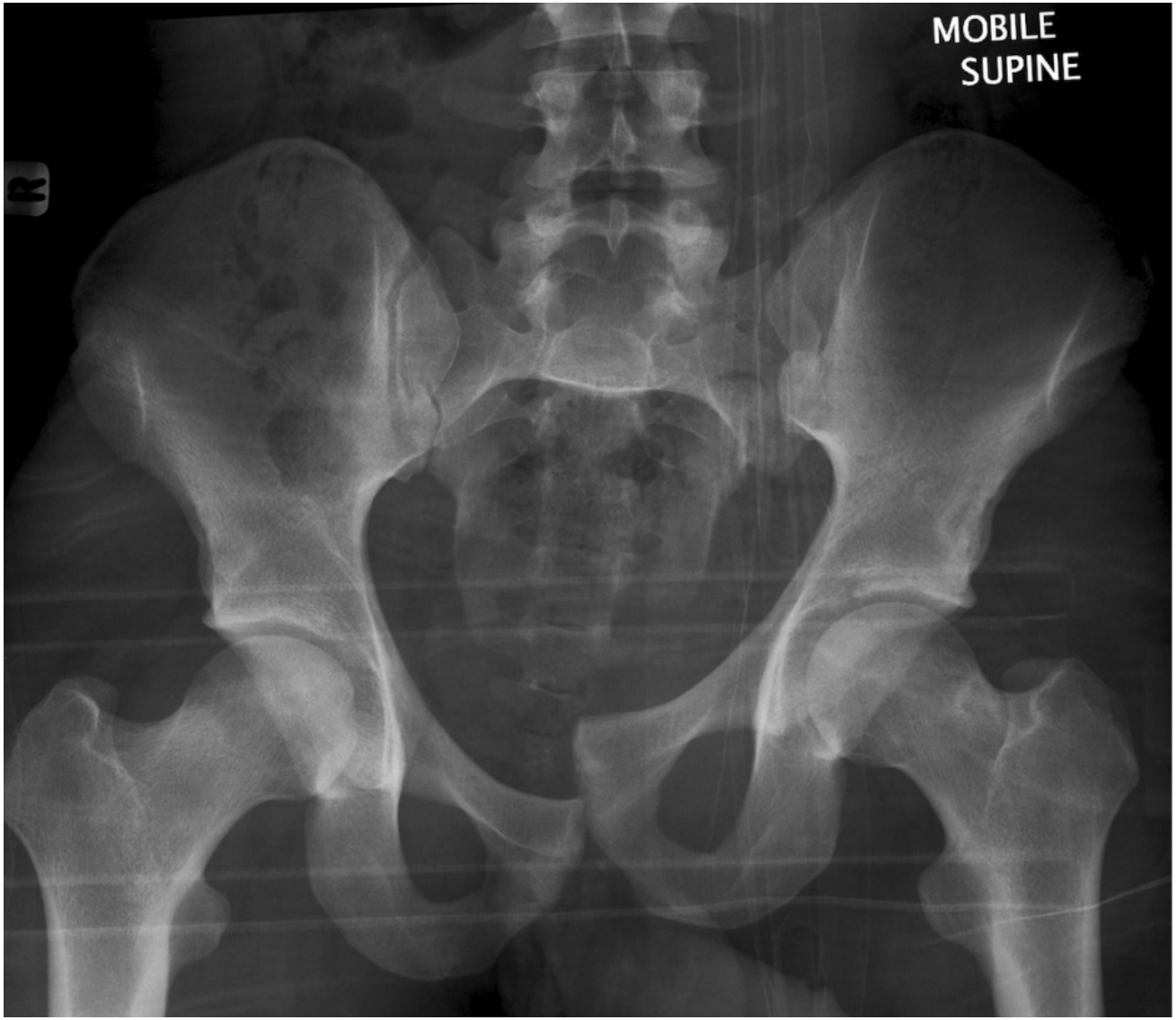
Radiology results

1. Pelvic Xray1: vertical shear L hemipelvis
2. Pelvic Xray2: Post binder application
3. CXR: NAD
4. EFAST: RUQ/Morrisons: negative
5. EFAST: LUQ/splenorenal: negative
6. EFAST: Bladder/pelvic: negative
7. EFAST: Cardiac/subxiphoid: negative

Pathology results

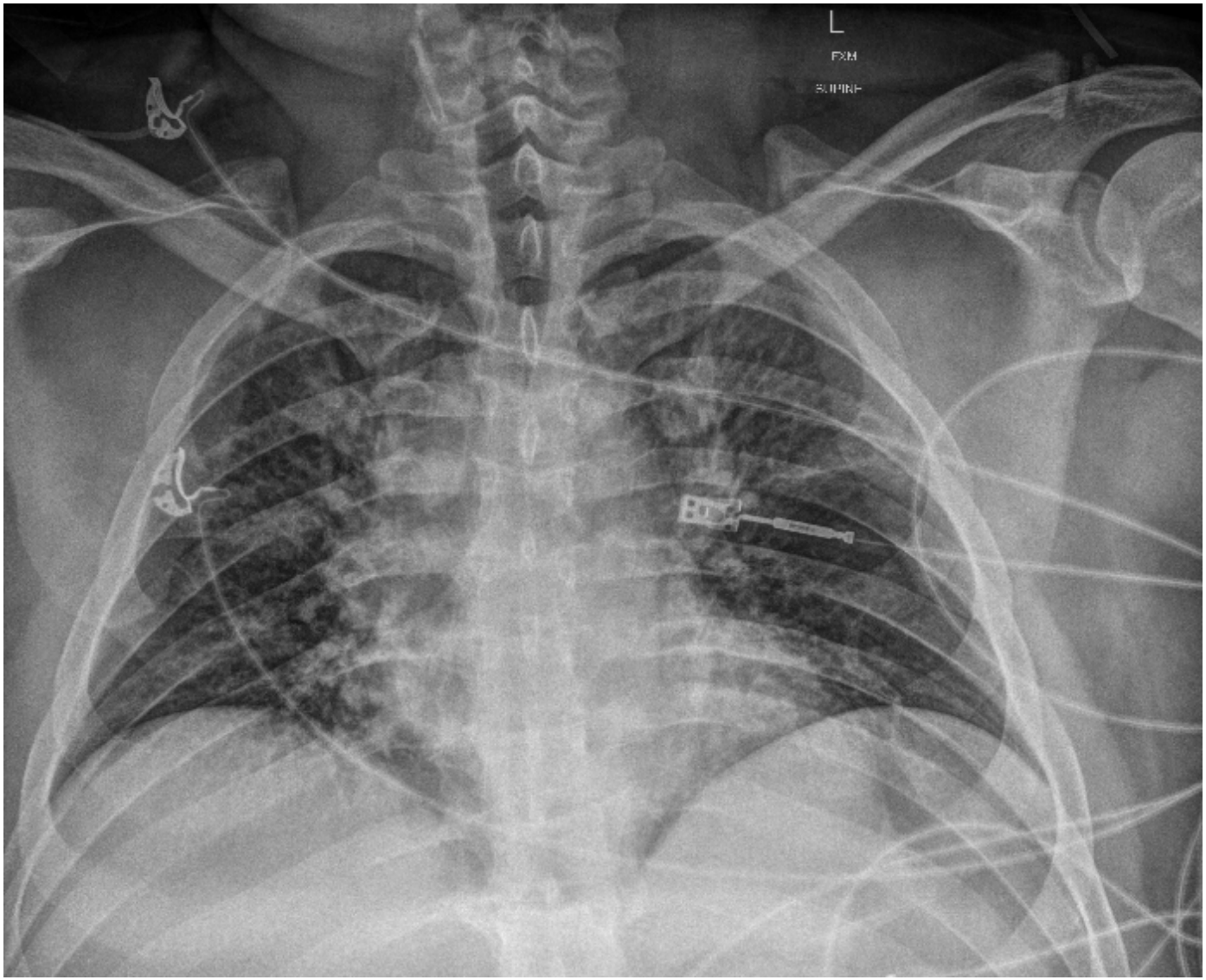
8. Venous Blood Gas 1
9. Venous Blood Gas 2
10. ROTEM: FFP replacement suggested

Pelvic Xray 1

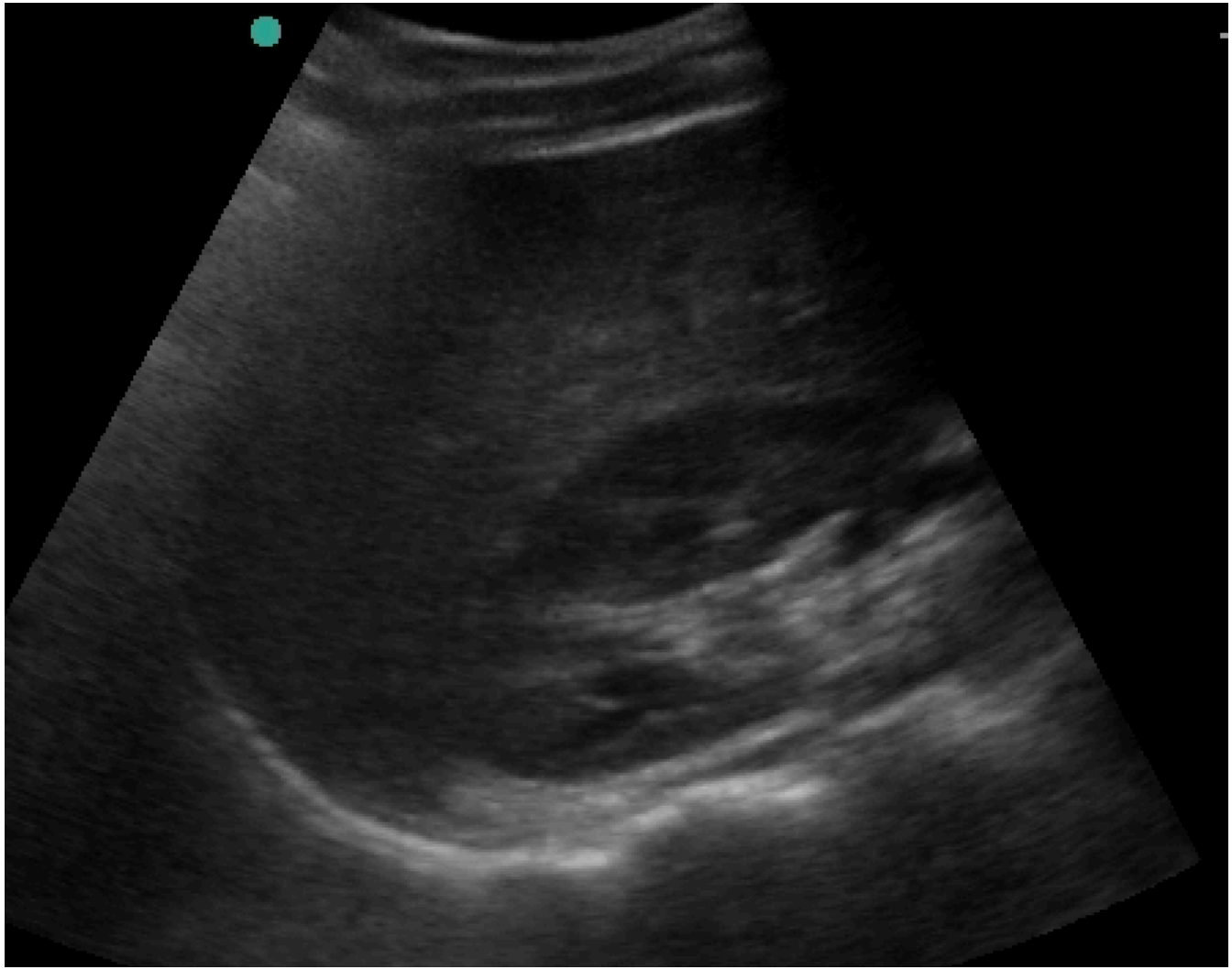


Pelvic Xray 2

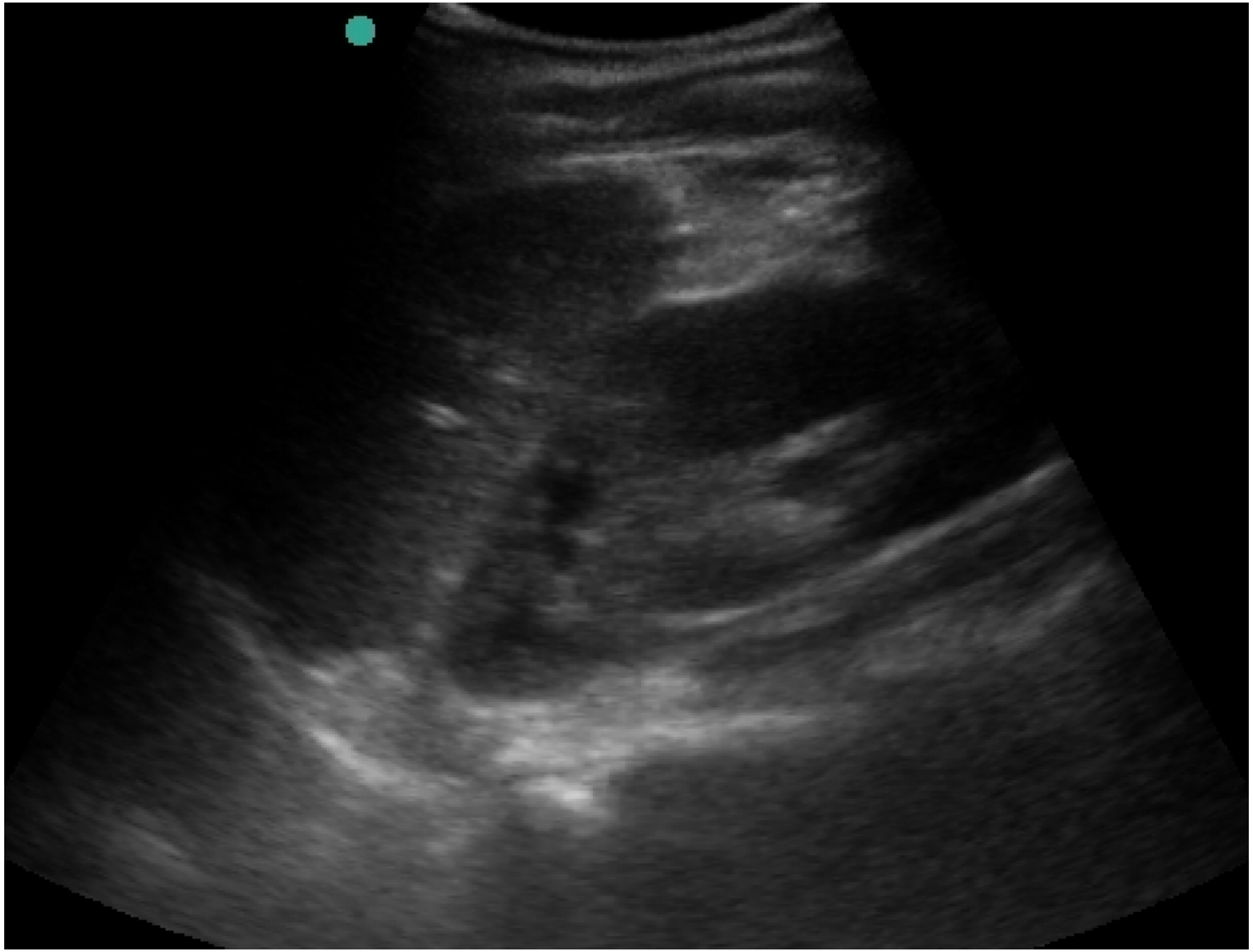
CXR



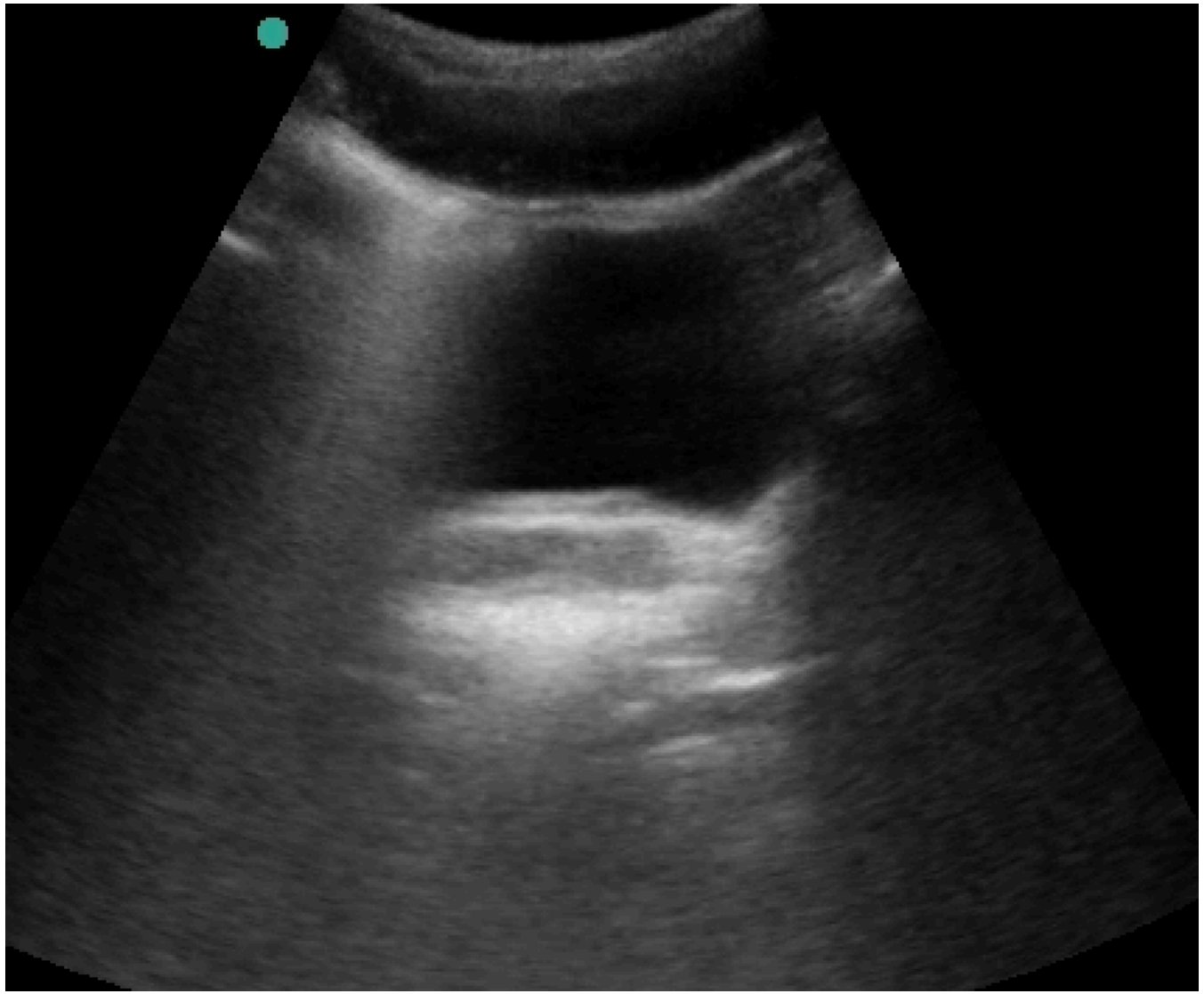
EFAST RUQ/Morrisons



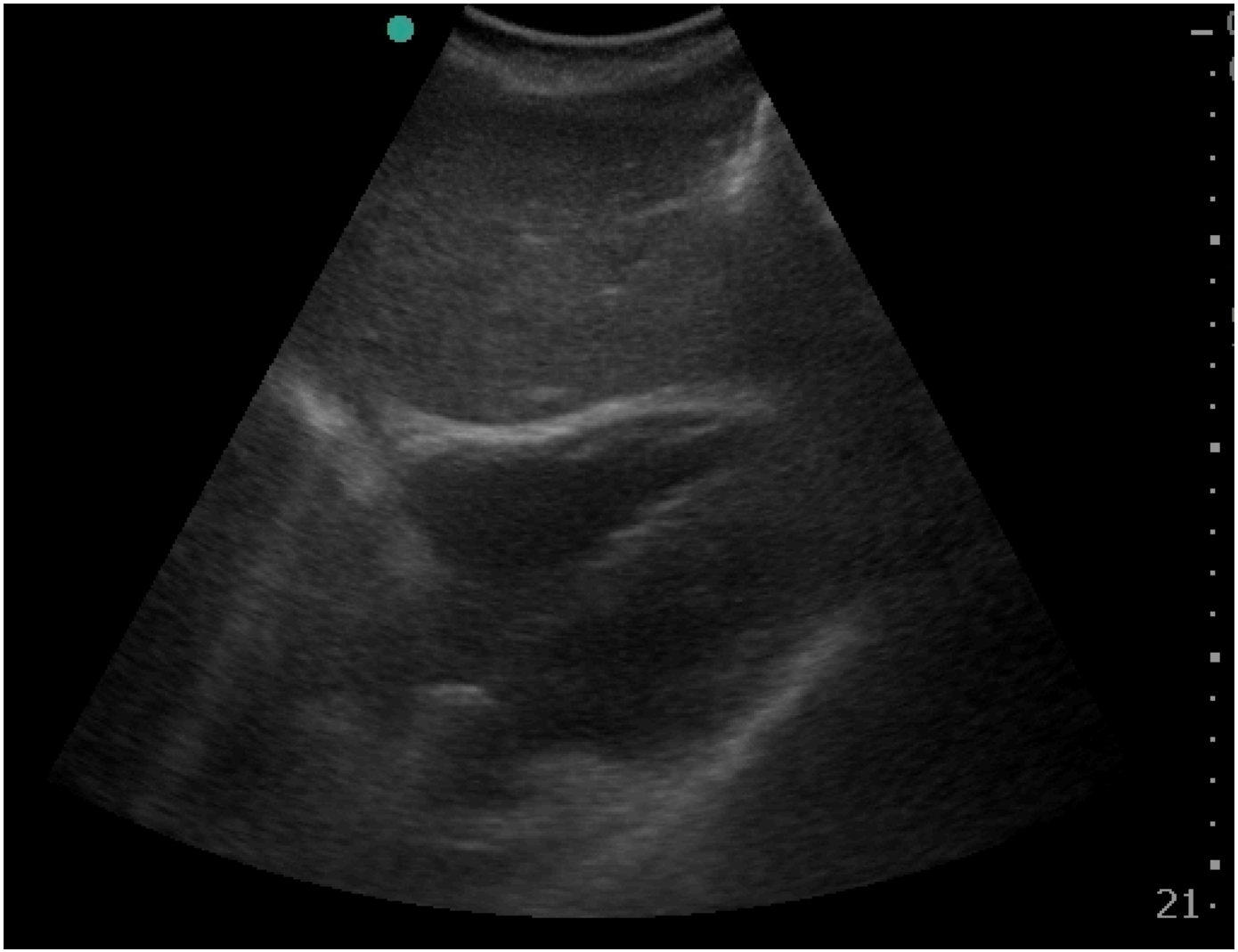
EFAST LUQ/splenorenal



EFAST Bladder/pelvic



EFAST Cardiac/subxiphoid



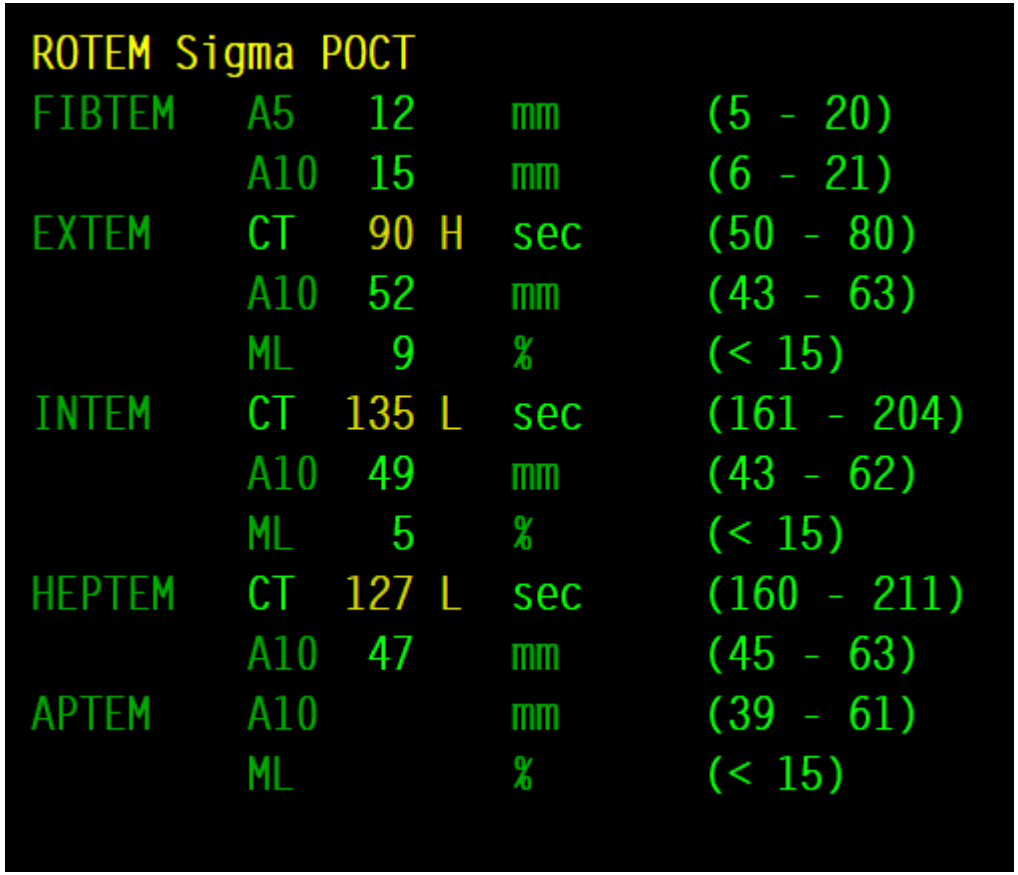
Venous Blood Gas 1

Venous			Temp.	37.0	Degree C	Na	142	mmol/L
Airway			Corr pH	7.28		K	3.9	mmol/L
FIO2	0.50		Corr pCO2	52	mmHg	Cl	108	mmol/L
pH	7.28 L		Corr pO2	40	mmHg	Anion Gap	10	mmol/L
pCO2	52	mmHg	Total Hb	140	g/L	Creatinine		umol/L
pO2	40 C	mmHg	Oxy Hb	66	%	Ca (Ionised)	1.18	mmol/L
O2 Sat.	67	%	Carboxy H	0.4	%	Glu	6.5	mmol/L
p50	31.3 H	mmHg	Met Hb	0.6	%	Lact	1.9	mmol/L
HCO3-	24	mmol/L	Sulph Hb					
ABE	-2.9 L	mmol/L				Bili (Total)		umol/L
						Fetal Hb		%
Comp. Val.	Yes		MODE 1			MODE 2		
COMMENT:								

Venous Blood Gas 2

Arterial			Temp.	37.0	Degree C	Na	137	mmol/L
Airway			Corr pH	7.31		K	4.1	mmol/L
FIO2	0.40		Corr pCO2	44	mmHg	Cl	110	mmol/L
pH	7.31 L		Corr pO2	95	mmHg	Anion Gap	5	mmol/L
pCO2	44	mmHg	Total Hb	123 L	g/L	Creatinine		umol/L
pO2	95	mmHg	Oxy Hb	95	%	Ca (Ionised)	1.17	mmol/L
O2 Sat.	96	%	Carboxy H	0.4	%	Glu	8.7 H	mmol/L
p50	31.6 H	mmHg	Met Hb	0.7	%	Lact	1.1	mmol/L
HCO3-	22 L	mmol/L	Sulph Hb					
ABE	-3.7 L	mmol/L				Bili (Total)		umol/L
						Fetal Hb		%
Comp. Val.	Yes		MODE 1			MODE 2		
COMMENT:								

ROTEM



ROTEM Sigma POCT					
FIBTEM	A5	12		mm	(5 - 20)
	A10	15		mm	(6 - 21)
EXTEM	CT	90	H	sec	(50 - 80)
	A10	52		mm	(43 - 63)
	ML	9		%	(< 15)
INTEM	CT	135	L	sec	(161 - 204)
	A10	49		mm	(43 - 62)
	ML	5		%	(< 15)
HEPTEM	CT	127	L	sec	(160 - 211)
	A10	47		mm	(45 - 63)
APTEM	A10			mm	(39 - 61)
	ML			%	(< 15)

Debriefing guide

Scenario objectives

- The assessment of a transient responder trauma victim to identify a major pelvic injury.
- Apply external pelvic compressive device to aid haemorrhage management.
- Use of haemostatic resuscitation strategy.
- Demonstrate early targeted management.

Example questions

Exploring diagnosis

- Explain your thought process for the rapid assessment of 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 a vertical sheer pelvic fracture?

Discussing management

- What was your priority to manage the haemodynamic instability?
- Why is binding the feet in internal rotation useful?
- What do the terms transient responder and non-responder mean in trauma?
- How does this affect your management decisions?
- 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?
- Do you use a shared mental model as the team leader?

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
ASIS	Anterior superior iliac spine

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Queensland Trauma Education
Pelvic Trauma – Haemodynamic transient responder pelvic trauma: Immersive scenario – Facilitator resource kit

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