



Queensland Trauma Education

TRAUMATIC BRAIN INJURY

Closed head injury

Immersive scenario

Facilitator resource kit

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

Traumatic Brain Injury – Closed head injury: Immersive scenario – Facilitator resource kit Version 2.0

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About this training resource kit

This resource kit provides healthcare workers with the knowledge and skills on how to assess and manage a closed head injury following traumatic incident.

National Safety and Quality Health Service (NSQHS) Standards



Target audience

Emergency department medical and nursing clinicians.

Duration

45-60 minutes.

Group size

Suited to small group participation.

Learning objectives

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

- Perform the assessment of a trauma patient with a closed head injury.
- Identify the need for neuroprotective measures in a traumatic brain injury.
- Perform required neuroprotective treatment.
- Demonstrate early definitive management.

Facilitation guide

1. Facilitator to discuss the pre-simulation briefing and deliver the immersive scenario.
2. Utilise the supporting documents to maximise the learning throughout immersive scenario.
3. Utilise the debriefing guide to evaluate participant performance and provide feedback.

Supporting resources (in Printable Resources)

- Pre-simulation briefing poster
- Clinical and radiological features of closed head injury – infographic poster
- ABG/VBG template
- CXR pre intubation
- Pelvic xray

Simulation event

This section contains the following:

1. Immersive scenario
2. Resource requirements
3. Handover card
4. Scenario progression
 - a. State 1
 - b. State 2
 - c. State 3
 - d. State 4
5. Debriefing guide

Immersive scenario

Type	Immersive scenario
Target audience	Emergency department medical and nursing clinicians.
Overview	<p>58yr old male patient. Allegedly assaulted 1 hour ago. He has sustained a closed head injury and is confused with the ambulance.</p> <p>The patient is brought to the emergency department by ambulance confused and agitated. His vital signs with the ambulance are HR 100 BP 150/80 sats 98% RA and RR 20. He has a large bruise over his left parietal region.</p> <p>He is agitated, moving his limbs to painful stimuli but not obeying commands despite 10mg IV morphine prehospital.</p>
Learning objectives	<ul style="list-style-type: none"> • Perform the assessment of a trauma patient with a closed head injury. • Identify the need for neuroprotective measures in traumatic brain injury. • Perform required neuroprotective treatment. • Demonstrate early definitive management (may include retrieval services).
Duration	45 minutes, including debrief.

Resource requirements

Physical resources

Room setup	Resus bay in emergency
Simulators	1 manikin – SimMan3G / ALS Simulator
Simulator set up	<ul style="list-style-type: none"> • Street clothes • Haematoma to left parietal region
Clinical equipment	<ul style="list-style-type: none"> • Standard resuscitation equipment for emergency department. • Medications: <ul style="list-style-type: none"> • intravenous analgesia, sedation and muscle relaxants. • intravenous fluids + osmotic agents.
Access	2 x PIVC setups, with no IV stickers attached
Other	Clinical Pathway – Closed Head Injury (Adult) https://qheps.health.qld.gov.au/_data/assets/pdf_file/0026/2158307/SW214.pdf

Human resources

Faculty	2 facilitators (Dr/Nurse with debriefing experience) to take on roles of scenario commander and primary debrief.
Simulation coordinators	1 for set up and to control of manikin.
Confederates	Ambulance officer.
Other	<p>All participants in room to receive handover from ambulance officer.</p> <p>Initially, 1 nurse and 1 doctor in room. The other nurses and doctors outside to be called when needed.</p>

Handover card

Handover from ambulance officer

This is John. He is a normally well 58-year-old man who was involved in an altercation with another person one hour ago. He has been allegedly assaulted with multiple blows to his head. He was initially alert and GCS 15 on scene but has become more confused during our transport to ED.

His vital signs currently are GCS 14 (E4, V4, M6), HR 90, BP 120/80, sats 99% RA and respiratory rate 20. He has a large haematoma to his left parietal region.

He has had 10mg IV morphine with minimal relief.

Thanks for looking after him.

Scenario progression

STATE 1: INITIAL ASSESSMENT				
Vital signs		Script	Details	Expected actions
ECG	SR	John I've got a terrible headache	Primary survey results A. Maintaining own, anterior neck normal, no wounds/lacerations. B. Nil chest wall tenderness, nil crepitus, nil subcutaneous emphysema, equal BS bilaterally. C. Nil obvious bleeding; well perfused peripherally, warm peripherally. D. GCS 14, confused to place and time, eyes open to voice, obeying commands. Pupils small and reactive, moving all limbs. E. Haematoma to left parietal region.	Commence primary survey <input type="checkbox"/> Assess airway. <input type="checkbox"/> Assess breathing. <input type="checkbox"/> Assess circulation. <input type="checkbox"/> Assess disability. <ul style="list-style-type: none"> • GCS. • Focal neurological deficits. • Pupils. <input type="checkbox"/> Expose patient.
HR	90			
SpO₂	99%			
BP/ART	120/80			
RR	20			
Temp	36.7			
BGL	5.0			
GCS	14 (E4V4M6)			
Pupils	3mm bilaterally			

STATE 2: DETERIORATION IN CONSCIOUS STATE				
Vital signs		Script	Details	Expected actions
ECG	SR	<p>John Moaning, groaning. Incomprehensible sounds.</p> <p>Confederate To examine head and mention that patient has a large haematoma to left parietal region.</p>	<p>Secondary survey</p> <p>Head – large bruise to L parietal region.</p> <p>Abdomen – soft, no other wounds.</p> <p>Pelvis – aligned, non-tender to palpation.</p> <p>Long bones and limbs – nil injury.</p> <p>Log roll – NAD.</p> <p>Results - see printable resources</p> <ul style="list-style-type: none"> • VBG – normal. • CXR – normal. • Pelvic Xray – normal 	<p>Secondary survey</p> <ul style="list-style-type: none"> <input type="checkbox"/> Perform head to toe assessment. <input type="checkbox"/> Arrange further analgesia. <input type="checkbox"/> Ensure oxygenation adequate. <input type="checkbox"/> Consider cx spine injury and discuss cx spine collar role. <p>Investigations</p> <ul style="list-style-type: none"> <input type="checkbox"/> Bloods – trauma panel- FBE, chem 20, Group and hold, lipase, coags. <input type="checkbox"/> CXR / Pelvic Xray. <input type="checkbox"/> VBG - normal. <p>Management</p> <ul style="list-style-type: none"> <input type="checkbox"/> Recognition of progressive and deteriorating traumatic brain injury. <input type="checkbox"/> Consider possibility of cervical spine injury. <input type="checkbox"/> Recognise need for intervention for neuroprotective measures. <input type="checkbox"/> Call for help early (communication and liaison with neurosurgical services/RSQ as applicable).
HR	80			
SpO₂	95%			
BP/ART	160/90			
RR	12			
Temp	36.7			
BGL	5.0			
GCS	9 (E2V3M5)			
Pupils	L – 4mm R – 1mm			

STATE 3: PATIENT DETERIORATION				
Vital signs		Script	Details	Expected actions
ECG	SB	<p>John Unresponsive.</p> <p>Confederate To check pupils and verbalise that pupils are now unequal and that John is not responding.</p>	<p>Reduced GCS and pupillary dilatation.</p> <p>Assessment results</p> <p>A Patent.</p> <p>B Equal breath sounds.</p> <p>C Warm peripherally, slow pulse.</p> <p>D GCS 3.</p> <p>Scenario progression</p> <p>If failing to recognise reduced GCS, prompt participants with a further drop of SpO₂ to 85% to guide towards intubation.</p>	<p>Assessment</p> <ul style="list-style-type: none"> <input type="checkbox"/> Repeat primary survey. <input type="checkbox"/> Recognition of need to instigate neuroprotection. <p>Management</p> <ul style="list-style-type: none"> <input type="checkbox"/> Prepare for intubation. <ul style="list-style-type: none"> • Equipment. • Sedation plan. • Team roles. • Consideration of manual in-line stabilisation. • Pre-brief.
HR	40			
SpO₂	88%			
BP/ART	190/100			
RR	8			
Temp	37.4			
BGL	5.0			
GCS	3 (E1V1M1)			
Pupils	L – 6mm R – 2mm			

STATE 4: INTUBATION				
Vital signs		Script	Details	Expected actions
ECG	SB		<p>Assessment results</p> <p>A Intubated.</p> <p>B Equal breath sounds. Post intubation: ETCO2 55 (reduce to 40 if adequate ventilations and RR), RR (as per ventilator settings), SpO2 - increase to 97% if FiO2 1.0.</p> <p>C Well perfused. HR increase to 65 and BP reduce to 150. 150/90 if effectively intubated and ventilated.</p> <p>D GCS 3</p>	<p>Management</p> <ul style="list-style-type: none"> <input type="checkbox"/> Perform intubation. <input type="checkbox"/> Neuroprotective management: <ul style="list-style-type: none"> • Choice of sedation and paralytic medications. • Hypertonic saline/ mannitol. • CO2/O2 end points. • Supportive care – loose ties/head up/orogastric tube. <input type="checkbox"/> Definitive care: <ul style="list-style-type: none"> • Communication/liaison with neurosurgical/RSQ as appropriate. • Demonstrate effective handover of patient.
HR	40			
SpO₂	88%			
BP/ART	190/100			
RR	8			
Temp	37.4			
BGL	5.0			
GCS	3 (E1V1M1)			
Pupils	L – 6mm R – 2mm			

Debriefing guide

Scenario objectives

- Understand the clinical presentation in traumatic brain injury.
- Perform a primary and secondary survey assessment.
- Recognise clinical neurological deterioration and importance of localising signs in traumatic brain injury.
- Understand management principles of neuroprotection.

Example questions

Exploring diagnosis

- Explain your thought process in assessing a trauma patient for life threatening injuries.
- Do you have a system for rapid assessment following trauma?
- What clinical features suggest a raised intracranial pressure? What is Cushing's reflex?
- How do you classify mild/moderate/severe traumatic brain injury?

Discussing management

- What are your strategies to manage this patient's neurological deterioration?
- What are your options to manage his presumed raised intracranial pressure?
- What are the indications for intubation?
- What features on history would necessitate maintenance of spinal precautions during intubation in this patient?
- How do you decide on who needs osmolar therapy (mannitol/hypertonic saline)? Is there any evidence for agent used?
- What is the optimal timing for CT imaging (if available)?

Discussing teamwork / crisis resource management

- Calling for help early – Who do you call? Why did you call?
- How do you prioritise the team to manage the falling GCS?
- What would you do with your team to provide optimal conditions to perform the intubation?
- Where would that ideally occur in your department?

Key moments

- Systematic assessment of trauma presentation.
- Recognition of management priorities in major traumatic brain injury.
- Decision making for calling for help early.
- Decision making for intubation, timing and procedure.
- Analgesia/sedation/intubation strategy.
- Use of osmolar agents, end points for ventilation, supportive care management options.

Acronyms and abbreviations

Term	Definition
GCS	Glasgow coma scale
NAD	Nil abnormalities detected
CXR	Chest xray
VBG	Venous blood gas
FBE	Full blood examination
CT	Computed tomography
RSQ	Retrieval Services Queensland

References

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