

Simulation Scenario Template

Section 1: Case Summary

| | |
|----------------------------|---|
| Scenario Title: | Polytrauma in Rural ED |
| Keywords: | Trauma, head injury, shock, airway |
| Brief Description of Case: | Blunt polytrauma presents to urban ED with requirement for airway, head injury and hemorrhagic shock management |

| Goals and Objectives | |
|----------------------------------|--|
| Educational Goal: | Appropriate application of trauma management and transfer of trauma patient |
| Objectives: (Medical and CRM) | <ol style="list-style-type: none"> 1) Recognize key elements of pre-arrival history and make specific preparations for care based on this information 2) Apply a stepwise, organized approach to a trauma patient 3) Recognize the need for airway management in an unstable trauma patient 4) Resuscitate with blood products in a timely fashion 5) Ensure appropriate use of imaging and consulting services available in a rural care setting |
| EPAs Assessed: | |

| Learners, Setting and Personnel | | | | |
|-------------------------------------|---|---|---|---|
| Target Learners: | <input checked="" type="checkbox"/> Junior Learners | <input checked="" type="checkbox"/> Senior Learners | <input checked="" type="checkbox"/> Staff | |
| | <input checked="" type="checkbox"/> Physicians | <input type="checkbox"/> Nurses | <input type="checkbox"/> RTs | <input type="checkbox"/> Inter-professional |
| | <input type="checkbox"/> Other Learners: | | | |
| Location: | <input checked="" type="checkbox"/> Sim Lab | <input checked="" type="checkbox"/> In Situ | <input type="checkbox"/> Other: | |
| Recommended Number of Facilitators: | Instructors: 1 | | | |
| | Sim Actors: n/a- appropriately equipped mannequin | | | |
| | Sim Techs: 1 | | | |

| Scenario Development | |
|-------------------------------|---------------------------------------|
| Date of Development: | September 2023 |
| Scenario Developer(s): | Dr. Trystan Nault, Dr. Jeanne Macleod |
| Affiliations/Institutions(s): | UBC, St Pauls Hospital |
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| Last Revision Date: | N/A |
| Revised By: | - |
| Version Number: | 2 |



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Section 2A: Initial Patient Information

| A. Patient Chart | | | | | |
|--|--------|----------|------------------------------|-------------------------|----------------------|
| Patient Name: John Driver | | Age: 35 | Gender: M | Weight: 70kg | |
| Presenting complaint: Rollover MVC | | | | | |
| Temp: 36.7 | HR:120 | BP:95/60 | RR: 24 | O ₂ Sat: 94% | FiO ₂ : - |
| Cap glucose: 5.6 | | | GCS: 9 (E2 V3 M4) | | |
| Triage note: Driver of a rollover MVC, brought in by ambulance. Hypotensive at scene, altered LOC. VS as above, straight to trauma. | | | | | |
| Allergies: unknown | | | | | |
| Past Medical History: unknown | | | Current Medications: unknown | | |

Section 2B: Extra Patient Information

| A. Further History | |
|---|--|
| <p><i>Include any relevant history not included in triage note above. What information will only be given to learners if they ask? Who will provide this information (mannequin's voice, sim actors, SP, etc.)? – per EHS:</i></p> <p>Rollover MVC, belted, airbags deployed. Not ejected. No other passengers, no other vehicles. Extricated easily upon arrival. Possible head injury, GCS initially 12 at scene.</p> <p>Complaining of severe left hip/pelvic pain.</p> <p>1L fluid given, IV access x1.</p> | |
| B. Physical Exam | |
| <p><i>List any pertinent positive and negative findings</i></p> | |
| Cardio: tachy. Pale. Decreased pulses left leg. | Neuro: CS: 9 (E2 V3 M4) |
| Resp: Airway patent, speaking at first. Good air entry bilaterally without adventitia. No flail chest. Trachea midline. | Head & Neck: bruising to Lt temple. PERL 3mm. C collar applied. |
| Abdo: nil. Negative FAST. | MSK/skin: Bruising over left hip/pelvis. decreased pulses in left leg. |
| Other: Extremities cool. | |



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Section 3: Technical Requirements/Room Vision

| A. Patient |
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| <input checked="" type="checkbox"/> Mannequin (<i>specify type and whether infant/child/adult</i>) Adult, standard. |
| <input type="checkbox"/> Standardized Patient |
| <input type="checkbox"/> Task Trainer |
| <input type="checkbox"/> Hybrid |
| B. Special Equipment Required |
| Airway equipment (VL/DL, size 8 ET tube, stylet, boujee, OPA, bag valve mask, ETCO2 hookup, suction) C spine collar Sheet/pelvic binder |
| C. Required Medications |
| Blood, TXA, Ketamine, Rocuronium, Fentanyl |
| D. Moulage |
| None required |
| E. Monitors at Case Onset |
| <input type="checkbox"/> Patient on monitor with vitals displayed |
| <input checked="" type="checkbox"/> Patient not yet on monitor |
| F. Patient Reactions and Exam |
| <i>Include any relevant physical exam findings that require mannequin programming or cues from patient (e.g. – abnormal breath sounds, moaning when RUQ palpated, etc.) May be helpful to frame in ABCDE format.</i> |
| Initially inappropriate, confused words- then changing to moaning, no words following initial primary survey |



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Section 4: Sim Actor and Standardized Patients

| Sim Actor and Standardized Patient Roles and Scripts | |
|---|--|
| <i>Role</i> | <i>Description of role, expected behavior, and key moments to intervene/prompt learners. Include any script required (including conveying patient information if patient is unable)</i> |
| EHS | <p>Rollover MVC, belted, airbags deployed. Not ejected. No other passengers, no other vehicles. Extricated easily upon arrival. Possible head injury, GCS initially 12 at scene.</p> <p>Complaining of severe left hip/pelvic pain.</p> <p>1L fluid given, unable to obtain IV access.</p> |



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Section 5: Scenario Progression

| Scenario States, Modifiers and Triggers | | | |
|---|----------------|---|--|
| Patient State/Vitals | Patient Status | Learner Actions, Modifiers & Triggers to Move to Next State | Facilitator Notes |
| Pre-Arrival | | <p><u>Expected Learner Actions</u></p> <p>Scenario will allow up to an extra 2 minutes of pre-arrival time in which preparations can be made based on the initial EHS story. Such preparations can include:</p> <ul style="list-style-type: none"> - Prepping airway equipment and drugs (induction, paralytic) - Activating MTP or getting blood ready (see facilitator notes) - Activating the Trauma team, prepping imaging modalities etc - Placing a pelvic binder onto the bed - Preparing other medications such as TXA - Outlining team structure and roles | <p>Regarding MTP/blood products:</p> <ul style="list-style-type: none"> - If ordered, please prompt stating that they need to specify initial ratios and amounts of blood products for this patient as well as any other specific monitoring/logistical aspects of giving blood products that are important in trauma - Ideally: 4 units prbc, 4 units plasma, 1 dose platelets (can use uncrossmatched prbc's in the interim) - Especially in the prehospital phase, preparing a Rapid Infuser will allow for warming FFP, prbc and quicker administration overall when the patient arrives - Frequent temperature checks are critical to |



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| | | | | prevent hypothermia and exacerbate blood loss and shock in these cases |
| <p>1. Baseline State Rhythm: Sinus Tach HR: 120 BP: 95/60 RR: 24 O₂SAT: %94 T: °C 36.7 GCS: 9</p> | <p><i>Patient initially speaking but quite confused, inappropriate. Eyes open to pain. Localizing to pain. Initially complaining of pain to Lt hip. Arrives in a C collar. (GCS 9 E2V3M4)</i></p> | <p><u>Expected Learner Actions</u></p> <input type="checkbox"/> Bring patient into trauma bay <input type="checkbox"/> activate MTP, assign task of monitoring this process (see facilitator notes) <input type="checkbox"/> activate trauma team <input type="checkbox"/> Order 1g TXA (mention that another 1g needed in the next 8h) <input type="checkbox"/> systemic approach through primary survey <input type="checkbox"/> discussion of airway management, reasoning here- can wait, want to resuscitate first | <p><u>Modifiers</u> <i>Changes to patient condition based on learner action</i> - improved hypotension with fluids/blood – can't give unless IO/IV access obtained - improved hypotension with binder</p> <p><u>Triggers</u> <i>For progression to next state</i> - completion of primary survey or above interventions</p> | |
| <p>2. Nursing states they are having trouble getting an IV</p> | <p><i>Patient remains as previous, continues to c/o pain to Lt hip.</i></p> | <p><u>Expected Learner Actions</u></p> <input type="checkbox"/> Recognize the need for prompt access to resuscitate <input type="checkbox"/> Understand the preferred location for IO/IV trauma and | <p><u>Modifiers</u></p> <ul style="list-style-type: none"> - If supradiaphragmatic line isn't obtained, even if fluids/blood given, VS as follows and suggestion | |



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| <p>Rhythm: Sinus Tach HR: 120 BP: 95/60 RR: 24 O₂SAT: %94 T: °C 36.7 GCS: 9</p> | | <p>particularly this case where pelvic injury is a concern- humeral IO, subclavian or IJ CVC</p> | <p>from nursing/facilitator that alternative access may be more effective</p> <p>HR: 125 BP: 85/50 RR: 24 O₂SAT: %94 T: °C 36.7 GCS: 9</p> <p><u>Triggers</u></p> <ul style="list-style-type: none"> - Adequate IO/IV access is obtained | |
| <p>3.</p> <p>If 1 unit PRBC given with binder: HR: 110 BP: 100/65 RR: 24 O₂SAT: %94 T: °C 36.7 GCS: 9</p> <p>If 2 units PRBC given with binder: HR: 105 BP: 110/68</p> | <p>Patient to moan about pelvis hurting again here</p> | <p><u>Expected Learner Actions</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Place a pelvic binder <input type="checkbox"/> Give Blood products to treat shock- see facilitator notes regarding ratios, Rapid Infuser | <p><u>Modifiers</u></p> <p>-see VS column</p> <p><u>Triggers</u></p> <ul style="list-style-type: none"> - again, either completion of primary survey or above actions - if primary survey complete and multiple units of blood given without pelvic binder, move on to next stage | |



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| <p>RR: 24 O₂SAT: %94 T: °C 36.7 GCS: 9</p> <p>If blood given without binder, transient improvement in hypotension and tachycardia – but ultimately refractory, with vs returning to:</p> <p>HR: 120 BP: 95/60 RR: 24 O₂SAT: %94 T: °C 36.7 GCS: 9</p> | | | | |
| <p>4. VS as in the previous column based on learner actions- with GCS now 7</p> | <p>Patient no longer opening their eyes, moaning incomprehensibly – GCS 7</p> | <p><u>Expected Learner Actions</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> identify need for definitive airway with deteriorating LOC- GCS now 7 (E1V2M4) <input type="checkbox"/> Intubate the patient <input type="checkbox"/> manage shock with blood products, identify unbound pelvis if refractory | <p><u>Modifiers</u></p> <ul style="list-style-type: none"> - Pupils now 5mm, fixed bilaterally - Poor respiratory effort, requiring supplemental O₂ and Bagging to maintain sats -if intubation attempted despite unbound pelvis, ongoing | |



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| | | | <p>hypotension- successful, but VS now: HR 120 BP 80/50 RR20 Sat 95% T36.7</p> <p>-If intubation attempted with bound pelvis, after blood products: HR 110 BP 110/70 RR20 Sat 95% T36.7</p> <p><u>Triggers</u> -successful intubation</p> | |
| <p>5.</p> <p>See Modifiers column</p> | ET Tube placed | <p><u>Expected Learner Actions</u></p> <p><input type="checkbox"/> continue to resuscitate with blood products- if stable, call off MTP as appropriate</p> <p><input type="checkbox"/> identification of conditions that would make it safe to leave the trauma bay to go for imaging</p> <p><input type="checkbox"/> disposition – imaging, consultants (CT head to pelvis, IR, Neurosurgery, ICU)</p> | <p><u>Modifiers</u></p> <p>- If pelvis is bound already, VS as in above column HR 110 BP 110/70 RR20 Sat 95% T36.7</p> <p>- If pelvis is bound or blood given during this stage, VS: HR 110 BP 100/70 RR20 Sat 95% T36.7</p> <p>- If pelvis remains unbound, blood products given: HR 115 BP 90/70 RR20 Sat 95% T36.7</p> | <p>- Can consider a que such as- nursing is asking if the patient is ready to go for imaging, the scanner is ready</p> |



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| | | | <p>- if pelvis unbound and they go for imaging: patient arrests in the scanner</p> <p><u>Triggers</u></p> <p>- Learner states patient can go to scanner</p> | |
|--|--|--|---|--|



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Appendix A: Laboratory Results

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| <p><u>CBC</u> WBC 14 Hgb 85 Plt 170</p> <p><u>Lytes</u> Na 134 K 3.4 Cl 100 HCO₃ 24 AG 10 Urea 10 Cr 110 Glucose 5</p> <p><u>Extended Lytes</u> Ca 10 Mg 1.7 PO₄ 1 Albumin 50 TSH 1.5</p> <p><u>VBG</u> pH 7.36 pCO₂ 40 pO₂ 50 HCO₃ 24 Lactate 2.7</p> | <p><u>Cardiac/Coags</u> Trop 10 D-dimer 479 INR 1.2 aPTT 47</p> <p><u>Biliary</u> AST 32 ALT 20 GGT 17 ALP 55 Bili 15 Lipase 10</p> <p><u>Tox</u> EtOH <2 ASA -ve Tylenol -ve</p> <p><u>Other</u> B-HCG -ve</p> |
|---|--|



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Appendix B: ECGs, X-rays, Ultrasounds and Pictures

Paste in any auxiliary files required for running the session. Don't forget to include their source so you can find them later!

ECG (LITFL)



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CXR (radiopedia)



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Pelvic Xray (if asked for) (radiopedia):



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Appendix C: Facilitator Cheat Sheet & Debriefing Tips

Include key errors to watch for and common challenges with the case. List issues expected to be part of the debriefing discussion. Supplemental information regarding any relevant pathophysiology, guidelines, or management information that may be reviewed during debriefing should be provided for facilitators to have as a reference.

Prehospital

- Given hypotension, mechanism discussed, it wouldn't be wrong to activate Trauma team if available as well as blood products/MTP prior to arrival
- Ideally prepare a pelvic binder if possible, prior to transfer onto the stretcher
- If not given by EHS, 1g TXA should be prepared, given
- Organize team roles, consider calling RT for airway management

Airway

- Airway management is not immediately necessary here, and despite their tenuous status, they certainly will benefit from resuscitation with blood products prior to any induction is attempted
- They are oxygenating well enough, and while they may benefit from sedation and a secured airway to tolerate a scan, their hemodynamics need to be addressed first here. This serves to highlight the simultaneous nature of an ABC approach to trauma.
- Discuss induction agents and their potential harms in a hemodynamically unstable patient
- A C collar is already applied in this case but ensuring to be cautious and provide a collar in mechanisms like this is crucial. Maintaining inline stabilization during intubation is critical here.

Pelvis/hemorrhagic shock

- In this case, the patient is in shock secondary to hemorrhage- which should be presumed as the etiology in trauma patients
- Assessing for other causes including pneumothorax and tamponade are important differentials to consider in this case- here, cxr +/- pocus demonstrates neither of these causes
- Assessing pelvic stability is part of the initial circulation assessment and should not be overlooked as a potential source for life threatening hemorrhage.
- Whenever possible, even a simple sheet can be used to bind a pelvis prior to patient arrival
- Where should this binder be applied? Address misconceptions around iliac crests vs trochanteric application
- While it may be dramatic here for the patient to have potentially arrested in the scanner, it underscores the importance of a complete primary survey and a thorough understanding of sources of potentially significant hemorrhage- which include chest, abdomen, pelvis, long bones, floor and retroperitoneum
- Regarding resuscitation, generous administration of blood products should be a first approach here with our hypotensive patient.

Blood product administration

- Again, based upon the initial story and VS, not wrong to have blood products ready in the pre-hospital preparation



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- Elaborating on MTP- depending on the site, this may not be protocolized and it is important to understand the ratios in which this is done- 4 U prbc : 4 FFP : 1 platelets. In this case, they do not end up requiring substantial prbc beyond what is initially available in many ED's.
- Recognize that many ED's have uncrossmatched blood available- important to know how much and how quickly further blood can be accessed. Based on this story, not wrong to suspect that more than 2-4 units may be required.
- Administration of blood products via Rapid Infuser is critical as it will appropriately warm products prior to administration and ensure timely administration. Getting this ready prior to arrival is a great step that can be taken in this case.
- Frequent temperature checks are important when blood products are being given and generally in trauma settings to prevent hypothermia which can exacerbate blood loss and shock

Head injury

- Recognize the deterioration of the patient from GCS 9 to 7, now with blown pupils, requiring bagging
- Identify the need for airway management, imaging, and potentially neurosurgical intervention
- Can discuss the role of neuroprotective intubation here- vs prioritizing maintaining hemodynamics
- Discuss role for normocarbida, maintaining oxygenation, HOB elevation etc.

Imaging

- Attempting to have this shocky patient somewhat more stable for scanner is an important learning point here. Adequate resuscitation and thorough evaluation for causes of shock, sources of hemorrhage is important.
- For a patient with this mechanism and expected injuries (head, pelvis), ensuring a full trauma scan (head, C spine, Chest, abdomen, pelvis) is ordered is key

Disposition

- Recognize that this patient will need admission to ICU
- Discuss the role for gen surg vs IR to address pelvic injury resulting in hemorrhagic shock
- Recognize that this patient is deteriorating from a head injury and likely requires neurosurgical intervention- there is a lot to cover in this case already and facilitators can consider including a CT demonstrating an epidural hemorrhage given the temporal hematoma or simply discuss this in broader terms.

References

1. Galvagno, Samuel M., Jeffrey T. Nahmias, and David A. Young. "Advanced trauma life support® Update 2019: management and applications for adults and special populations." *Anesthesiology clinics* 37.1 (2019): 13-32.
2. Burns Ed, Robert Buttner and Ed Burns and Robert Buttner. "Sinus tachycardia." *Life in the Fast Lane • LITFL*, March 11, 2021. [Link].
3. Harvey H, Tan W, Shaggah M, et al. Pelvic fractures. Reference article, Radiopaedia.org (Accessed on 29 Jul 2023) <https://doi.org/10.53347/rID-15002>.

