

## SIMULATION EXERCISE

Curriculum Topic/Title: Massive Hemorrhage Protocol: PEDIATRIC MHP  
Developed by: Devin Singh, J Pirie, Natasha Colli, Suzanne Beno (MPH Pediatric WG), Teresa Skelton (MPH Pediatric WG), Heather O'Reilly (Department of Anesthesiology and Pain Medicine, CHEO)  
Creation/Modification Date: March 2020; mod: 2020-Jun-18

### Learning Objectives:

1. Demonstrate how to transfuse blood products and administer medications including tranexamic acid and calcium on a per kg basis;
2. Organize and initiate a timely patient transfer procedure to a tertiary care pediatric center; and
3. Recognize and treat key complications (hyperkalemia and hypothermia)

### References / Review Articles:

Callum JL, Yeh CH, Petrosioniak A et al. A regional massive hemorrhage protocol developed through a modified Delphi technique. CMAJ Open 2019; 7:E546–E561.

## PATIENT & SCENARIO INFORMATION FOR FACILITATORS

**Patient Name:** EDWARD CHAN

**Patient Info:** PMH, current problem/procedure, meds, allergies:

7-year-old male being brought in by emergency medical services (EMS). Found lying on ground, 10 feet away from an ATV, moaning in pain. EMS patches in Glasgow Coma Scale (GCS) score of 13 and extreme tachycardia and pallor. Estimated time-to-arrival (ETA) to resuscitation room is 10 minutes. Parents not available to provide remaining information.

**Location / Setting:** Emergency Department

## EQUIPMENT FOR EXERCISE:

### Comments:

- This exercise does NOT require a high fidelity mannequin, but could be used with one
- A method to communicate vital signs is required. Options include:
  - » Whiteboard or paper-based technique
  - » Tablet-based technique using app based software (example SimMon on and iPad)
  - » Software from high-fidelity mannequin

**Monitors required:**

Available	On patient		Available	On patient	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	NIBP	<input checked="" type="checkbox"/>	<input type="checkbox"/>	ECG
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Arterial line	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Temperature
<input checked="" type="checkbox"/>	<input type="checkbox"/>	CVP	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Pulse oximeter
<input type="checkbox"/>	<input type="checkbox"/>	PA Catheter	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Capnograph
<input type="checkbox"/>	<input type="checkbox"/>	Fetal heart monitor	<input checked="" type="checkbox"/>	<input type="checkbox"/>	IV (primary)
<input type="checkbox"/>	<input type="checkbox"/>	Urinary catheter	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Secondary IV
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Oxygen mask	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Interosseous (IO) line

**Other equipment required:**

- Equipment that would normally be available in this clinical area per institutional protocols should be available for this simulation.

**Simulation Video**

A video based on this exercise script is also available for training purposes. Available at this link:  
<https://transfusionontario.org/en/category/massive-hemorrhage-protocol/simulation-videos/>

**Supporting Files (assessment, labs, imaging, etc):**

1. Q30-60 minute labwork
2. Observational tool
3. Participant evaluation form available at:



**Scenario Content:**

***Information for Learner:***

(place on a separate page as we often give them this 'stem' to read, along with the anesthetic record / supporting documents if appropriate)

7-year-old male being brought in by EMS. Found lying on ground 10 feet from an ATV moaning in pain. EMS patches in GCS of 13 and extreme tachycardia and pallor. ETA to resuscitation room is 10 minutes. Parents not available to provide remaining information.

EMS arrival and handover: IO access (distal tibia) x1 established. One 20 ml/kg normal saline bolus pushing currently. GCS 12. Vital signs HR 150-160 bpm, BP 90/68 mmHg, RR 28, SpO2 92% on 100% O2 via facemask.

## Scenario Content:

### **Additional Information for Instructor only, including:**

**Roles of confederates or other participants**

**Type of HELP available:**

Instructor / Leader of this exercise will pre-determine the number and nature of respondents corresponding to realistic local resource availability

## Simulator Setup and Programming Notes:

One facilitator (not the leader) should be assigned to dissemination of current vital signs throughout the simulation. This individual should have sufficient medical knowledge to be able to alter the vital signs in a realistic fashion in response to events as they occur during the simulation.

## Baseline Simulator Physiologic State (leave blank if not relevant):

HR: **155**      BP: **85/52**      RR: **26**      SpO<sub>2</sub>: **95%**

Weight: **25 kg**

Neuro (LOC, orientation etc.): **GCS 12**

Respiratory: **tachypneic, no chest wall trauma, equal bilateral breath sounds**

Progress During Scenario: **Standard trauma management, including IV access, spine precautions, primary survey, which demonstrates a positive FAST and a fractured femur, with concern for intraabdominal injury as source of blood loss. . Patient responds appropriately to MHP and fluids. If high functioning team and scenario lasts long enough, labs will demonstrate hyperkalemia (K 5.9) which requires treatment.**

Laboratory, Radiology, or other relevant information, available initially or as the scenario progresses:

**need image of pediatric femur fracture**

## Key Processes During MHP Simulation

### **T7 Framework**

- Triggering
- Team
- Testing
- Tranexamic Acid
- Temperature
- Transfusion
- Termination

**Discussion and Teaching Points for Debriefing:**

- Minimum of 2 facilitators required, preferably interprofessional
- Notes should be taken during the scenario to identify processes well done and areas of improvement
- Team debriefing is required, with focus on system improvement and not individual performances

**Post Simulation Activities:**

- One or more individuals must, a priori, be tasked with compiling a summary from each simulation including areas for system improvement, individual(s) responsible for addressing the issues identified during the simulation
- This process should become part of the routine quality and safety processes at the institutional level
- Follow up, and repeat simulations are mandatory, as a single intervention without follow up will not lead to any improvement in patient care

## B. Blood work results for simulation

Lab work	On arrival	30 minutes	60 minutes	90 minutes
Hemoglobin (g/L)	85	75	78	95
Platelets (x10 <sup>9</sup> /L)	350	300	225	180
INR	1.9	1.6	1.5	1.5
Fibrinogen (g/L)	1.5	1.5	1.3	1.9
Sodium (mmol/L)	140	142	145	145
Potassium (mmol/L)	4.8	5.9	5.4	5.0
Ionized calcium(mmol/L)	1.30	1.05	1.4	1.25
Glucose (mmol/L)	8	9	10	12
Lactate	1.4	2.2	2.8	3.5
Arterial blood gas				
PH	7.25		7.35	
PO2 (mmHg)	250		175	
PCO2 (mmHg)	35		38	
HCO3 (mmol/L)	15		20	
Base Deficit	Minus 11		Minus 4	
FIO2 (%)	100		50	
Blood products and drugs ideally administered	RBC 20 ml/kg & FP 10-20 ml/kg; TXA load 15 mg/kg and infusion 5 mg/kg/hr	RBC 20 ml/kg; CaCl <sub>2</sub> 15 mg/kg or Calcium gluconate 45 mg/kg	RBC 20 ml/kg	TXA infusion 5 mg/kg/hr
Vital signs	Reflect 40% blood volume loss	Reflect on going 20% blood volume loss	Reflect slowing of blood volume loss (<20%)	Vitals stabilized

**ADVANCED SIMULATION EXERCISE**

<b>Title:</b>	Pediatric Massive Hemorrhage Protocol
<b>Creation date:</b>	March 2020
<b>Contributors:</b>	Suzanne Beno (MPH Pediatric WG), Teresa Skelton (MPH Pediatric WG), Heather O'Reilly (Department of Anesthesiology and Pain Medicine, CHEO)
<b>Original Scenario:</b>	Devin Singh, J Pirie, Natasha Collia
<b>References:</b>	Pediatric MHP toolkit, CMAJ modified Delphi article

**Learning Objectives:**

1. Demonstrate safe and proficient management of a pediatric patient with blunt abdominal trauma and significant bleeding.
2. Recognize need for massive hemorrhage protocol (MHP) and demonstrate ability to activate an institutional protocol.
3. Organize safe and proficient transfer of pediatric trauma patient receiving blood products.
4. Demonstrate efficient teamwork and effective communication skills in a simulated setting.

<b>Role/Competency</b>	<b>Objective</b>
Medical Expert	Recognize importance of early activation of massive hemorrhage protocol (MHP) in trauma when hemorrhagic shock is suspected
Medical Expert	Demonstrate ability to accurately use weight-based dosing for blood products and medication
Medical Expert	Recognize and manage potential unique complications of massive transfusion in children, including hypothermia and hyperkalemia
Communication	Demonstrate clear closed-loop communication and coordination of blood product orders pertaining to MHP
Collaborator	Demonstrate ability to effectively work with Laboratory, Blood Bank, Allied Health and Support personnel to efficiently and accurately activate and execute the MHP at your center
Manager	Demonstrate ability to use / delegate use of MHP Cognitive Aid
Manager	Demonstrate effective situational awareness and prioritization of management goals
Manager	Recognize need for early initiation of CritiCall and transfer protocols.

### Patient Scenario Information

**Patient Information:** Age, past medical history, current problem, medications, allergies:

7-year-old male being brought in by emergency medical services (EMS). Found lying on ground, 10 feet away from an ATV, moaning in pain. EMS patches in Glasgow Coma Scale (GCS) score of 13 and extreme tachycardia and pallor. Estimated time-to-arrival (ETA) to resuscitation room is 10 minutes. Parents not available to provide remaining information.

**Location/setting:** Resuscitation room / Emergency

**Monitors required:**

Available	On patient		Available	On patient	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	NIBP	<input checked="" type="checkbox"/>	<input type="checkbox"/>	ECG
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Vascular access	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Temperature
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Intra-osseous (IO) line	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Pulse oximeter
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Arterial line	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Capnograph
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Urinary catheter	<input type="checkbox"/>	<input checked="" type="checkbox"/>	100% O2 Non-Rebreather

**Other equipment required:**

<input checked="" type="checkbox"/>	Infusion Pumps	<input checked="" type="checkbox"/>	ICU ventilator
<input checked="" type="checkbox"/>	Defibrillator	<input checked="" type="checkbox"/>	Warming blanket
<input checked="" type="checkbox"/>	Fluid warmer	<input checked="" type="checkbox"/>	Ultrasound
<input checked="" type="checkbox"/>	Glide scope	<input checked="" type="checkbox"/>	FAST
<input checked="" type="checkbox"/>	Crash cart	<input checked="" type="checkbox"/>	EZ IO
<input checked="" type="checkbox"/>	ETT	<input checked="" type="checkbox"/>	Chest tube and tray
<input checked="" type="checkbox"/>	LMA	<input checked="" type="checkbox"/>	<b>MHP Coolers</b>
<input checked="" type="checkbox"/>	Laryngoscope	<input checked="" type="checkbox"/>	IV tubing and fluids



**Supporting Files and information:**

iSTAT or other available point-of-care-testing (POCT)  
Lab values  
Ultrasound findings  
Chest x-ray

**Time duration (minutes):**

Setup	
Simulation	
Debrief	

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**Scenario Content (provided to learner as stem at beginning and by EMS on arrival):**

7-year-old male being brought in by EMS. Found lying on ground 10 feet from an ATV moaning in pain. EMS patches in GCS of 13 and extreme tachycardia and pallor. ETA to resuscitation room is 10 minutes. Parents not available to provide remaining information.

**EMS arrival and handover:** IO access (distal tibia) x1 established. one normal saline bolus pushing currently. GCS 12. Vital signs HR 150-160 bpm, BP 90/68 mmHg, RR 28, SpO2 92% on 100% O2 via facemask.

**Simulator setup and programming notes:**

**Simulator and moulage:** Sim junior, bruising to abdomen.

**Medications:** Epinephrine (1:10,000), Normal Saline, Fentanyl, Rocuronium, Ketamine, RBCs, FP, Platelets, TXA, Calcium Gluconate or Calcium Chloride, D10W, Insulin, Sodium Bicarbonate, Ventolin, Vasopressors.

**IV access/fluids in place:** IO access x 1 with normal saline push ongoing

**Anesthesia or ventilation settings:** 100% O2 via non-breather facemask

Scenario flow:

Vital Sign Changes	Expected Actions and Transitions	Unexpected Actions & Complications	Facilitator Notes
HR: 155 bpm BP: 85/52 mmHg RR: 26 O2 Sats: 95% on 100% non-Rebreather	Attach monitors  Receive handover  Begin ATLS Primary Assessment beginning with <C>ABC (catastrophic hemorrhage, airway, breathing, circulation) assessment		Estimated weight 25 kg
<b>Stage 1</b>  <b>Assessment &amp; Diagnosis</b>  <b>Diagnose Shock, Suspect Hemorrhagic</b>  <b>0-5 min</b>			
<b>VS:</b> HR 160, RR 26, BP 80/51, SpO2 95% with 100% O2  <b>&lt;C&gt;:</b> no active external bleeding  <b>A:</b> Patent, moaning in pain  <b>B:</b> Tachypneic. Equal and bilateral breath sounds. No chest wall trauma.  <b>C:</b> Cap refill 4 seconds, pale lips. Abdomen distended. Pelvis stable. Deformed right thigh with apparent closed right femur fracture.	<b>A:</b> Continue 100 % oxygen, ensure C spine immobilization.  <b>B:</b> No intervention at this time, team may prepare for intubation and ventilation in event of patient decompensation.  <b>C:</b> Establish vascular access(x2) IV access successful x 1 (AC) Consider second IO.	Recognize need for potential analgesia  Recognize hemorrhagic shock and need to assess for source of bleeding; bind pelvis if child remains unstable. Begin fluid resuscitation and call for blood or activate MHP.  If no recognition of need for transfusion: <ul style="list-style-type: none"> <li>• Increase tachycardia</li> <li>• Decreased BP</li> <li>• Decrease GCS</li> </ul>	iStat or POCT pending  Bedside glucose 7.2 mmol/L  EFAST:  + fluid RUQ/pelvis, normal lung sliding

Vital Sign Changes	Expected Actions and Transitions	Unexpected Actions & Complications	Facilitator Notes
<p><b>D:</b> Pupil 4 mm, equal &amp; reactive GCS 12 M – 5, E – 4, V - 3 R forearm deformed at wrist. Pulse present.</p> <p><b>E:</b> Temp 36.1°C.</p> <p>Log Roll reveals extensive abrasions and bruising along R flank.</p>	<p>Order 2U uncrossmatched RBC Consider need to activate MHP</p> <p>Fluid bolus: RL or 0.9% NS up to total 20 ml/kg rapid bolus.</p> <p>Assess need for pelvic binder</p> <p>iStat or POCT and emergent lab work, cross-match (most important) + trauma labs (consider fem arterial stick to obtain blood)</p> <p><b>D:</b> Maintain spinal motion restriction</p> <p><b>E:</b> Warm Room, warm blankets, remove clothes and safely remove from spine board.</p> <p>Consider IV 1 mcg/kg fentanyl (or low dose ketamine) for analgesia</p> <p>Call Criticall for Pediatric TTL and initiate transfer.</p>	<p>Reduce and immobilize right leg.</p> <p>If no warmed blankets or fluids, temp starts to drop to 35.0°C</p>	<p>CXR, pelvis Xray, R femur and +/- lateral neck to be completed after primary survey and simultaneously with ongoing interventions. Team members wear lead to facilitate no delays.</p>
<p><b>Stage 2</b></p> <p><b>Recognize abdomen and potentially pelvis as sources of concealed bleeding.</b></p> <p><b>Activate MHP and Initiate Communication with Criticall.</b></p> <p><b>5-10 min</b></p>	<p>Include role of Lab and Blood Bank preparing MHP Coolers.</p> <p>Include role of Porter to transport Coolers.</p>	<p><b>Intubation Medications:</b> Resuscitate child in shock with fluid and/or blood prior to giving induction medications.</p> <p><b>Induction:</b> Fentanyl 1 mcg/kg (PRN – not recommended if hemodynamics unstable) Ketamine 1-2 mg/kg IV (decrease dose to 0.5-1 mg/kg in unstable patient)</p> <p><b>Paralysis:</b> Rocuronium: 1-1.2 mg/kg IV (onset 1min, lasts 20-45min, consider 1.2 mg/kg if induction agent dose lowered)</p>	

Vital Sign Changes	Expected Actions and Transitions	Unexpected Actions & Complications	Facilitator Notes
<p><b>VS:</b> HR 165, RR 26, BP 82/50, SpO2 92 with O2 100% non-rebreather</p> <p><b>A:</b> Patient continues to moan</p> <p><b>B:</b> Shallow tachypneic breaths. Equal bilaterally and no adventitia.</p> <p><b>C:</b> Cap refill 4 sec. Cool skin.</p> <p><b>D:</b> 4mm, equal &amp; reactive GCS 8 M – 4, E – 2, V - 2</p> <p><b>E:</b> Temp 35.0C</p>	<p><b>A:</b> Patent but now unprotected due to GCS 8, will require intubation.</p> <p><b>B:</b> Shallow but equal.</p> <p><b>C:</b> Rapid transfusion of PRBC 2 units of uncrossed PRBCs available while MHP protocol being activated. Warm fluids.</p> <p>Multiple IVs established (2nd large bore AC). Consider Prox humeral IO if needed.</p> <p><b>E:</b> Warmed blankets and warm room</p>	<p>Recognize need for intubation due to decreasing GCS.</p> <p>If no recognition of need for intubation:</p> <ul style="list-style-type: none"> <li>• Increase tachypnea</li> <li>• Decrease SpO2</li> <li>• Decrease GCS</li> </ul> <p>Recognize need to activate MHP and transfuse blood.</p> <p>Activate local MHP</p> <p>If no recognition of need for transfusion:</p> <ul style="list-style-type: none"> <li>• Increase tachycardia</li> <li>• Decrease BP</li> <li>• Progress to PEA</li> </ul> <p>If no warmed blankets or fluids, temp starts to drop to 34.5</p>	<p>Initial iStat:</p> <p>Hb 80</p> <p>Na 135</p> <p>K 4.8</p> <p>Pre-intubation VBG:</p> <p>pH 7.28 / PCO2 60 / pO2 70/ HCO3 16 (mixed metabolic and respiratory acidosis)</p> <p>Glucose 7.2</p> <p>Team may consider central line access, if peripheral access inadequate (stress large bore peripheral access better for rapid transfusion)</p>
<p><b>Stage 3</b></p> <p><b>Hypovolemic Shock – Utilization of MHP &amp; Intubation (if not done already)</b></p> <p><b>10-15 min</b></p>		<p><b>Intubation Medications:</b></p> <p>Resuscitate child in shock with fluid and/or blood prior to giving induction medications.</p> <p>Fentanyl 1 mcg/kg (PRN – not recommended if hemodynamics unstable)</p> <p>Ketamine 1-2 mg/kg IV (decrease dose to 0.5-1 mg/kg in unstable patient)</p> <p><b>Paralysis:</b></p> <p>Rocuronium: 1-1.2 mg/kg IV (onset 1min, lasts 20-45min, consider 1.2 mg/kg if induction agent dose lowered)</p> <p><b>Vasopressors:</b></p> <p><b>Phenylephrine:</b> 0.5-1 mcg/kg IV/IO</p> <p><b>Epinephrine:</b> 0.5-1 mcg/kg/IV/IO</p> <p>*** pressors if used must be in conjunction with fluid delivery; not used when permissive hypotensive strategy employed</p>	

Vital Sign Changes	Expected Actions and Transitions	Unexpected Actions & Complications	Facilitator Notes
<p><b>VS:</b> HR 160, RR 20, BP 78/46, Intubated: SpO2 93% Intubated and ventilated via BVM/ETT on 100% O2 <i>Not Intubated: SpO2 85% on 100% non-rebreather, or SpO2 90% if BMV</i></p> <p><b>A:</b> Intubated, patent. (If not yet intubated, patient becomes obtunded)</p> <p><b>B:</b> BVM/ETT or ventilator. SpO2 93%</p> <p><b>C:</b> HR 160, BP 78/46. Peripherally cold to touch. Cap refill 4 sec. Abdomen becoming more distended.</p> <p><b>D:</b> If intubated, patient should be sedated. If not intubated then patient becomes unresponsive.</p> <p><b>E:</b> Temp 35.9C (If warming blanket and fluid warmer used) Temp 34.5C if no warming devices used.</p>	<p><b>A:</b> Intubated – Clear. <i>Non intubated, airway becomes obstructed, improves with BMV.</i></p> <p><b>B:</b> BVM/ETT or ventilator. Equal bilaterally. No Adventitia.</p> <p><b>C:</b> MHP</p> <ul style="list-style-type: none"> <li>Cooler 1(2U RBC) - 20ml/kg given</li> <li>Cooler 2 (2U RBC + 2U FP) –20 ml/kg of each infusing now</li> <li>Check Plt count; order Plts if &lt;50; anticipate ordering plt if ongoing active hemorrhage</li> <li>TXA 30 mg/kg (max 2g) over 10 min if not yet given; order infusion (10 mg/kg/hr)</li> <li>Calcium gluconate 60 mg/kg slow IV push</li> <li>Cooler 3 (2U RBC + 1U FP + 2g fibrinogen) – on the way</li> </ul> <p><b>D:</b> Warmed blankets. Insert foley.</p> <p>Criticall – Ornge dispatched and will be 20 min.</p>	<p>Cooler 2: 2U RBC + 2U FP Transfuse 20ml/kg each</p> <p>If no use of hotline warmer or rapid transfuser body temperature will decrease to 34.5C</p>	<p>Bloodwork Results: INR: 2.2 PTT: 50 Fibrinogen: 0.75 PLT: 210 K: 5.8</p>
<p><b>Stage 4</b></p> <p><b>Manage Hyperkalemia and Prep for Transport</b></p> <p><b>15-20 min</b></p>			

Vital Sign Changes	Expected Actions and Transitions	Unexpected Actions & Complications	Facilitator Notes
<p>VS: HR 150, RR bagged, BP 88/44, SpO2 96%</p> <p>A: Bagging via ETT</p> <p>B: Equal and bilateral, no adventitia</p> <p>C: Cap refill 4. Repeat POCUS – no pericardial effusion; + FAST</p> <p>Central pulses: palpable peripheral pulses: thready and weak, cooler extremities</p> <p>ECG showing Peaked T waves and intermittent PVCs</p> <p>D: If already intubated: GCS 3</p> <p>Pupils 3-4mm sluggishly reactive. No fixed pupils.</p> <p>E: Temp 36.0C (If warming fluids and warming blanket) remains 34.5C if no warming measures.</p>	<p><b>A:</b> Continue bagging; capnography; secure tube. Prep airway equipment and medications for transfer.</p> <p><b>B:</b> Continue bagging vs. ventilator if intubated. Prep O2 tank.</p> <p><b>C:</b> Recognize potential for Hyperkalemia, Repeat iStat and treat.</p> <p>Planning for ongoing 1-2:1 RBC: FP transfusion ratio during transport and anticipate further product needs while en route including PCC and/or fibrinogen. Start Cooler 3 if ongoing instability; otherwise have ready for transport.</p> <p><b>Plan to bring rescue meds:</b> Epinephrine Rescue Dose for Cardiac Arrest (ie CODE DOSE): Epi: 0.01mg/kg IV/IO (0.1cc/kg of 1:10,000) <b>* Follow traumatic arrest algorithm to reverse reversible causes as a priority should patient lose VS. ALS measures such as epi are simultaneous but not priority.</b></p> <p>Epinephrine for Pressor Support: Epi: 0.5-1 mcg/kg or 0.005-0.01 cc/kg of 1:10,000)</p> <p><b>D:</b> Plan to bring sedation/paralytic medications.</p> <p><b>Do not forget to sedate a paralyzed patient.</b></p> <p><b>E:</b> Warm blankets</p>	<p>Treat Hyperkalemia: <b>Goal 1: Stabilize cardiac membrane.</b> Calcium gluconate 60 mg/kg slow IV Push or Calcium chloride 20mg/kg IV if central or large bore peripheral access without concern for extravasation</p> <p><b>Goal 2: Shift K intracellularly</b></p> <ul style="list-style-type: none"> <li>• Ventolin (through ETT)</li> <li>• Insulin 0.1 U/kg/dose in Dextrose 5 ml/kg/dose over 30 minutes</li> <li>• Bicarbonate (8.4%) 1-2 ml/kg/dose IV -Hyperventilate</li> </ul> <p><b>Goal 3: Enhance elimination</b></p> <ul style="list-style-type: none"> <li>• Lasix 1mg/kg IV (max 10 mg)</li> <li>• Kayexalate 1g/kg/dose pr (if able)</li> </ul> <p><b>Be prepared for malignant arrhythmia / prepare crash cart</b></p> <p>Consider things that can go wrong on Transport:</p> <ul style="list-style-type: none"> <li>• Dislodged tube</li> <li>• Continued blood loss</li> <li>• Electrolyte abnormalities</li> <li>• ATC (acute traumatic coagulopathy) secondary to severe trauma</li> <li>• Progressive hypotension and Loss of Vitals (PEA/Vtach/Vfib/asystole)</li> </ul> <p>Prepare for Arrival of Ornge</p> <ul style="list-style-type: none"> <li>• Review Transport Checklist</li> <li>• Have documents and chart ready to go. Images scanned on CD</li> <li>• Ensure tubes secure</li> <li>• Ensure medications ready</li> <li>• Ensure access adequate</li> <li>• Notify receiving hospital when patient leaves</li> <li>• Handover bedside and provide all records to Ornge using MHP handover SBAR tool (see included)</li> </ul>	<p>K: 6.8</p>

POCT # 1

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VBG pH 7.28 / PCO2 60 / pO2 70/ HCO3 16

Hb 80

Na 135

K 4.8

Glucose 7.2

Labs

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WBC 11,000

HGB 78

PLT: 210

INR: 2.2

PTT: 50

Fibrinogen: 0.75

K: 5.8

ALT 44

POCT # 2

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VBG pH 7.31 / PCO2 40 / pO2 88/ HCO3 17

Hb 88

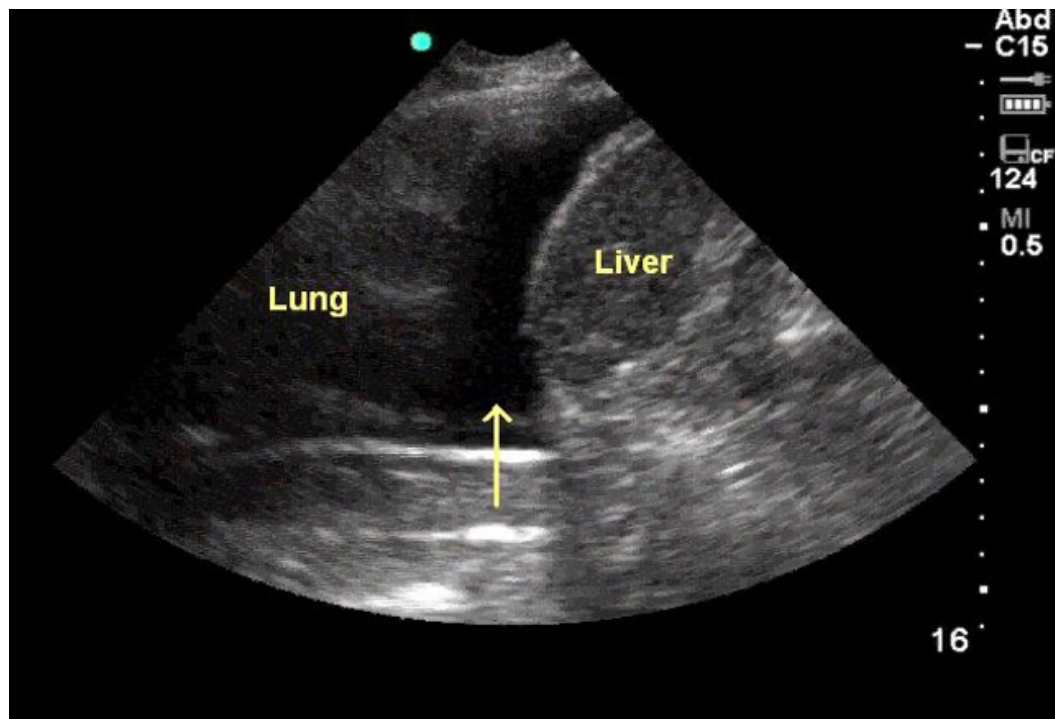
Na 135

K 6.8

Glucose 7.2

Imaging

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## PEDIATRIC MASSIVE HEMMORHAGE PROTOCOL OBSERVATION TOOL

1	2	3	4	5
<b>Poor</b>	<b>Marginal</b>	<b>Acceptable</b>	<b>Good</b>	<b>Not Observed</b>
Performance endangered or potentially endangered patient safety	Performance indicated cause for concern, considerable improvement needed	Performance was of satisfactory standard but could be improved	Performance was of a consistently high standard, enhancing patient safety	

Objectives	Questions	Comments	Rating (consider Likert)
Triggering	<p>Were there any errors in the method of activation?</p> <p>Did the patient meet the activation criteria?</p> <p>Were there any delays in triggering the MHP or the arrival of pack 1 (&lt;15 minutes)?</p>		
Team	<p>Was the appropriate team mobilized (appropriate type and number of personnel)?</p> <p>Did the team leader manage the team well?</p> <p>Was the team functioning well as a unit to complete the appropriate steps needed during the MHP?</p>		
Testing	<p>Was a timely Group &amp; Screen collected and sent both at baseline and as a second verification sample?</p> <p>Were appropriate labs collected (at baseline then at least hourly) and managed appropriately?</p>		
TXA	<p>Was TXA administered within 1 hour of MHP activation?</p> <p>Was the proper dose by weight used?</p>		

Objectives	Questions	Comments	Rating (consider Likert)
Temperature	<p>Was the temperature checked at baseline?</p> <p>Was it checked frequently enough and kept at or over 36°C?</p> <p>Where warming measures required and if so, were they applied appropriately?</p>		
Transfusion	<p>Were uncross-matched RBCs available at the bedside within 10 minutes of activation?</p> <p>Were appropriate and timely blood products ordered and made available?</p> <p>Were blood products administered using weight based dosing?</p> <p>Did the patient receive appropriate ratio based resuscitation at a minimum of 2RBC:1Plasma?</p> <p>Note: plasma and platelets may be unavailable in a community setting.</p>		
Termination	<p>Was the MHP terminated in the appropriate manner?</p> <p>Was MHP termination communicated well?</p> <p>Were the remaining blood products returned in the appropriate storage containers?</p> <p>Were any blood products wasted?</p>		