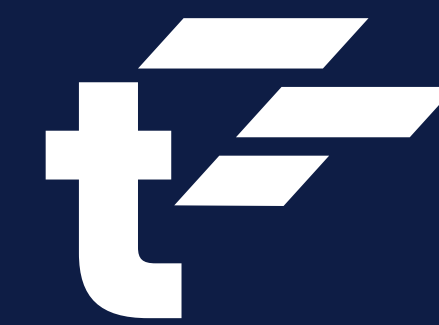


Pediatric Multisystem Trauma Algorithm



Preparation

Significant mechanism with injury + abnormal vital signs +/- decreased LOC:

1. Assemble team and allocate roles for resuscitation
2. Don PPE and prepare age-specific equipment, medications, blood products, other resources needed

Prepare for immediate life threats:

- Airway/respiratory compromise, tension pneumo/hemothorax (PTX/HTX), pericardial tamponade, hemorrhagic shock, severe head injury

Transfer of Care

Before receiving handover, in 5 seconds confirm patient has:

1. Patent airway
2. Central pulse
3. No catastrophic hemorrhage

Then use a structured handover tool such as IMIST-AMBO: **I**dentification, **M**echanism, **I**njuries, **S**igns (vitals + GCS), **T**reatment, **A**llergies, **M**edications, **B**ackground, **O**ther

Initial Interventions with Primary Survey

- Cardiorespiratory monitoring; 100% O₂ by non-rebreather
- 2 large-bore antecubital IVs; IO access if 2 failed IV attempts or **immediately** in setting of traumatic arrest/peri-arrest
 - o If need 1 IO, highly likely to need 2 IOs; consider proximal humeral IO when volume resuscitation is required
- Labs: **Type & Screen and VBG are priority**, add CBC, lytes, LFTs, amylase/lipase, lactate, fibrinogen, INR/PTT, if possible
- POCT glucose if decreased LOC and/or infant/young child; if blood glucose <2.6 mmol/L, give D10W 5mL/kg IV push; recheck glucose in 5 min

Alert Pediatric Trauma Centre EARLY

Arrange Critical Care Transport

Primary Survey: <C> ABCDE

	Recognize	Assess for	Manage
<C>	Catastrophic bleeding	External hemorrhage	<ul style="list-style-type: none"> • Apply direct pressure/compression bandage • Tourniquet for extremity bleeding (note time applied)
A	Airway compromise	Position/patency/protection LOC with rapid AVPU	<ul style="list-style-type: none"> • Spinal motion restriction when indicated; ensure neck exposed to assess for injury • Jaw thrust to open; oral suction; oral airway (if obtunded) • Early intubation with manual in-line stabilization (MILS) if c-spine not cleared
B	Respiratory failure	Apnea/poor effort Signs of tension PTX Open PTX	<ul style="list-style-type: none"> • Assist with BVM/prepare for drug-assisted intubation • Use POCUS to assess for PTX/HTX and/or pericardial tamponade • Immediate chest decompression if tension PTX: needle/finger thoracostomy followed by chest tube(s) • Consider chest tube insertion for any intubated patient with PTX • Apply occlusive dressing (taped on 3 sides) for open chest wound
C	Hemorrhagic shock	↑HR +/- ↓BP Cool skin, cap refill > 2 sec Find bleeding source Note: ↓BP is a LATE sign of shock Femur # unlikely cause of shock in prepubertal children Scalp/subgaleal hemorrhage may cause shock in infants	<ul style="list-style-type: none"> • Bind pelvis if hemodynamically unstable/known or potential pelvic fracture • If compensated shock give crystalloid 10-20 mL/kg IV rapid bolus followed by warmed PRBCs 10-20 mL/kg IV; if perfusion remains compromised, repeat PRN • If active bleeding/hypotension transfuse with warmed uncrossmatched PRBCs 20 mL/kg IV • If ongoing need for blood after 20mL/kg PRBCs activate massive hemorrhage protocol & arrange transport ASAP • If within 3 hrs of injury and need for transfusion, consider tranexamic acid 15 – 30 mg/kg/dose (MAX 1000 – 2000 mg) IV over 10 – 20 min. If bleeding continues and vascular access allows, follow bolus with IV infusion of 5-10 mg/kg/hr (MAX 125 mg/hr) for the lesser of 8 hrs or until bleeding stops. • Consider eFAST exam if hemodynamically unstable or suspect internal hemorrhage
D	Severe head injury	GCS ≤ 8 Responds to pain only/ unresponsive	<ul style="list-style-type: none"> • Contact Neurosurgery • Reverse Trendelenburg position with head midline; loosen cervical collar or change to MILS • Drug-assisted intubation with MILS, maintain O₂ sats > 95%, ETCO₂ 35-40 mm Hg, avoid hyper/hypotension • Treat seizures with benzodiazepines as per TREKK Status Epilepticus Algorithm and consider seizure prophylaxis in discussion with Pediatric Trauma Centre and Transport Team
	Impending herniation	Unilateral fixed/dilated pupil Cushing's triad: ↓HR, ↑BP, irregular respirations	<ul style="list-style-type: none"> • Give 3% NaCl 5 mL/kg/dose IV (MAX 250 mL/dose) over 10 min (repeat PRN) +/- mannitol 1 g/kg/dose (MAX 100 g) over 15 min using filter • Initiate BRIEF period of hyperventilation until responsive pupil, normalized vital signs
	Neurogenic shock	↓HR, ↓BP; Abnormal tone, ↓strength	<ul style="list-style-type: none"> • Start norepinephrine infusion for bradycardia/hypotension at 0.05-0.1 mcg/kg/min IV/IO; titrate to effect in 0.02 mcg/kg/min increments; MAX 2 mcg/kg/min OR start epinephrine infusion at 0.05-0.1 mcg/kg/min; titrate to effect in 0.02 mcg/kg/min increments; MAX 1 mcg/kg/min
E	Exposure		<ul style="list-style-type: none"> • Maintain normothermia during assessment (warm blankets, forced-air warmer, warmed fluids) • Document temperature • Log roll with 30° tilt, digital rectal exam only if concern for spinal cord injury

Ongoing Care

- **Re-evaluate primary survey and interventions, vital signs, pain and analgesia**
- **Complete secondary survey**, obtain CXR, obtain pelvic x-ray (if hemodynamically unstable, abnormal pelvic exam, concern for intra-abdominal injury, and/or femur fracture) and consider eFAST exam
- **Treat pain:**
 - o Fentanyl 1.5 mcg/kg/dose intranasal (MAX 100 mcg)/dose or 1 mcg/kg/dose IV/IO (MAX 50 mcg/dose) q1h PRN; low dose ketamine 0.15-0.3 mg/kg/dose IV/IO (MAX 7.5-15 mg/dose). Slow infusion bolus over 15 minutes may decrease risk of dissociation. Or if hemodynamically stable, can use morphine 0.1 mg/kg/dose (MAX 10 mg/dose) IV/IO q2h PRN.
 - o Consider strategies like distraction in less severely injured patients (see [TREKK Pain Recommendations](#))
 - o Splint long bone fractures
 - o Fentanyl 1 mcg/kg/hr IV/IO. If further sedation required and hemodynamically stable add midazolam 50 mcg/kg/hr IV/IO. If hemodynamically unstable consider adding ketamine 300 mcg/kg/hr IV/IO, not midazolam.
- **Family presence:**
 - o Helps calm child, ease parental stress and enable more accurate assessments
- Antibiotics/tetanus prophylaxis for open fractures
- **Do not delay transport to obtain CT imaging unless instructed by receiving MD**
- **Limit non-value added time** and transfer as expediently as possible once stabilized

CAUTION!

- Optimize hemodynamic stability before intubation
- Do NOT rely on hypotension as marker of shock in children
- Limit crystalloid, initiate PRBCs early if shock present
- Avoid hypoxia, hypotension, hyper/hypocarbica, hypothermia

Pediatric Referral Centre Discussion

- Review threats to life or limb
- Assess need for rapid head CT
- Initiate transport
- Review [transport checklist](#)



Scan or click the QR code to learn more, to see a list of key references, and development team members.

Disclaimer: The purpose of this document is to provide emergency healthcare professionals an approach to the assessment and management of Pediatric Multisystem Trauma. The TREKK Network is not liable for any damages, claims, liabilities, costs or obligations arising from the use of this document, including loss or damages arising from any claims made by a third party.



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