

TRAUMATIC INJURIES: INITIAL ED MANAGEMENT OF AN INJURED CHILD - SCH PROCEDURE[®]

DOCUMENT SUMMARY/KEY POINTS

- Initial management of the injured child commences with handover from pre-hospital staff as per the MIST structure.
- Ideally before patient transfer to **resus bed**, with the assembled Trauma Team attentive.
- A Primary Survey lead by the Team Leader should follow.
 - A - Airway including cervical spine control
 - B - Breathing
 - C - Circulation
 - D - Disability (Neurological)
 - E - Exposure

This document reflects what is currently regarded as safe practice. However, as in any clinical situation, there may be factors which cannot be covered by a single set of guidelines. This document does not replace the need for the application of clinical judgement to each individual presentation.

Approved by:	SCHN Policy, Procedure and Guideline Committee	
Date Effective:	1 st September 2020	Review Period: 3 years
Team Leader:	Staff Specialist	Area/Dept: Emergency Department - SCH

CHANGE SUMMARY

- SCH document due for review.
- Minor change in Trauma Call flow chart for updated Emergency number.
- Change in cervical immobilisation to foam collar as per updated SCHN C-Spine policy.

READ ACKNOWLEDGEMENT

- All SCH ED clinical staff: Medical Officers and Nurses must read and acknowledge this document.
- SCH Trauma Team: Surgical Registrars; Social Workers; Radiographers; and After Hours Nurse Managers should be aware of this document

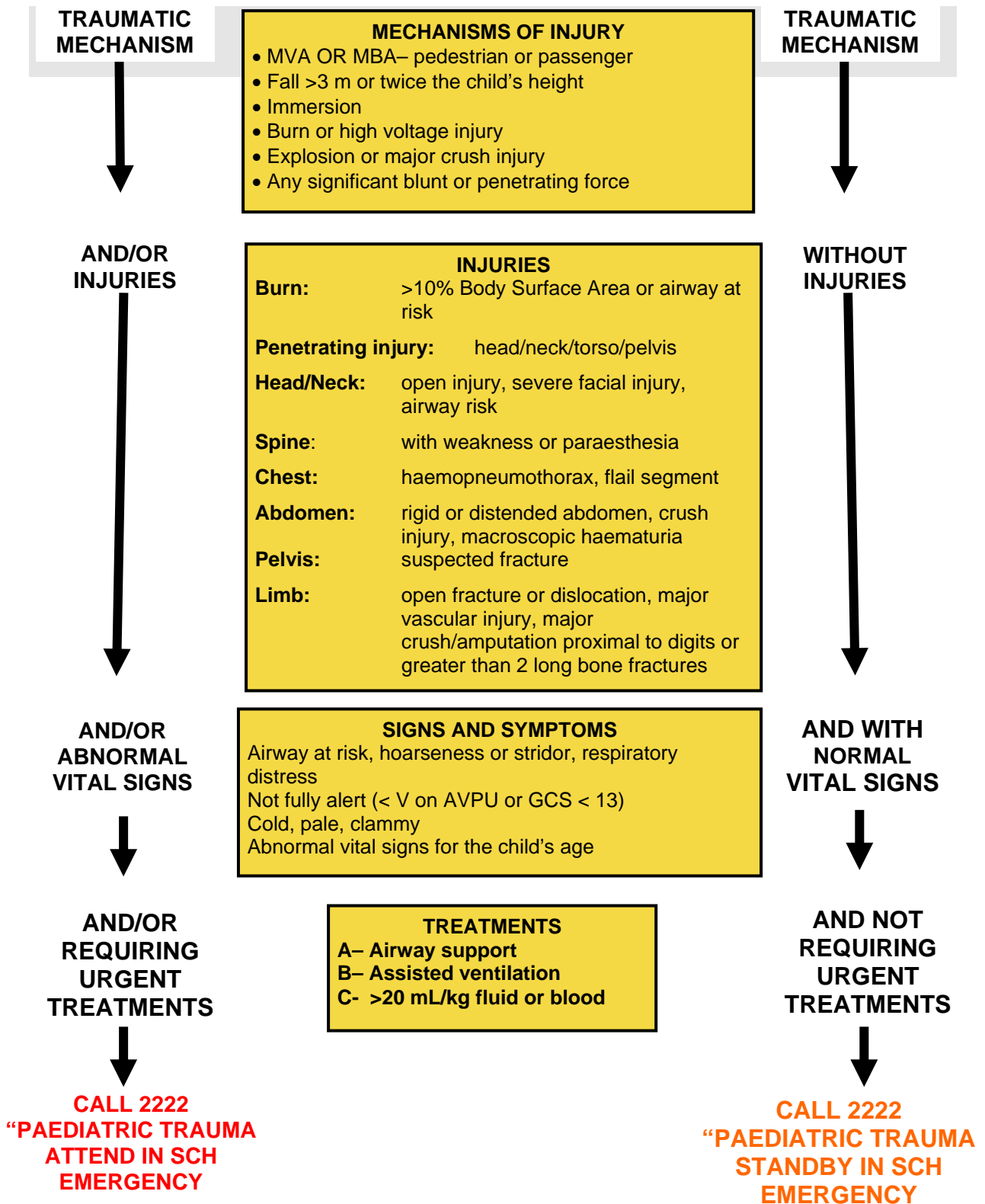
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SCH ED Trauma Call Criteria



Trauma Team must attend ED
 Contact ext. 21000 if unable

Trauma Team not required to attend.
 Surgical registrar to contact ED on ext 21000

Change from "STANDBY" to "ATTEND at any stage if required

"A PAEDIATRIC TRAUMA ATTEND" call should be activated whenever experienced senior staff are not available to rapidly assess and manage children with potentially serious injuries in the Emergency Department

Patient prehospital notification and arrival

If the pre-hospital notification specifies activation of Code Crimson this indicates a patient who requires expedited transfer to an operating theatre or angiography suite to arrest life-threatening haemorrhage. ([ITIM Trauma Code Crimson Pathway](#)). Children in **Traumatic Cardiac Arrest** should have modified CPR as per **guideline**: [Paediatric Traumatic Cardiac Arrest](#) The vast majority of patients, however, arrive with pre-hospital MIST notification allowing trauma team activation as per the **Trauma Call Criteria**: [Trauma Call Criteria - ED - SCH](#). **In addition immediate consultant surgical and anaesthetic notification is needed if penetrating neck or torso trauma.**

Assemblance of the trauma team is facilitated by the **Trauma Team Roles**: [Trauma: Team Roles - ED - SCH](#). Patient arrival handover should occur from pre-hospital staff as per the MIST structure.

- **Mechanism, Injuries, Signs/Symptoms, Treatment.**

Ideally this should take place before patient transfer to resus bed, with the assembled Trauma Team attentive. If the patient is deemed unstable, however, transfer to resus bed should occur prior to handover.

A Primary Survey with associated resuscitation, led by the Team Leader, with roles as per the Trauma Team Roles, should follow as below

- A - Airway including cervical spine control
- B - Breathing
- C - Circulation
- D - Disability (Neurological)
- E - Exposure

Airway

Assessment

1. Look, listen and feel for air movement.
2. Check for abnormal sounds - stridor, gurgling, hoarseness
3. Briefly assess level of consciousness.

Management may involve

4. Minimise unnecessary neck movement
5. Apply oxygen to all (NRB)
6. Jaw thrust manoeuvre
7. Suction airway
8. Oropharyngeal airway and/or nasopharyngeal airway if no suspicion of facial/BOS fractures
9. BVM Ventilation
10. Endotracheal intubation

Cervical spine management: [Cervical Spine \(suspected\) Injury \(Paediatric\): Patient Management](#)

Maintain cervical spine in the neutral position and minimise unnecessary movement using a foam cervical collar which may need to be cut to size for smaller children

Considerations for Endotracheal Intubation:

1. Apnoea and/or Respiratory failure or saturations < 90% on NRB
2. GCS < 9 or Unprotected airway
3. Hypotension
4. Upper airway obstruction or impending airway threat (burns, facial trauma)
5. Suspected raised intracranial pressure
6. Combative and unable to assess

Breathing

Assessment

1. Expose the chest
2. Observe rate and effort of respiration
3. Inspect and palpate chest wall for abnormal movement/injury
4. Check tracheal position
5. Auscultate the chest.

Management

1. Give 100% oxygen via non rebreather mask at 10 - 15L/min
2. Assist ventilation with bag-valve-mask
3. Treat cause of respiratory compromise.

Common Causes of Respiratory Compromise:

Tension Pneumothorax

- Do not wait for a chest x-ray.
- Immediately perform a needle thoracentesis - Insert a large cannula (14-16 Gauge) in the 2nd intercostal space in the midclavicular line. Leave open to air.
- Follow with an intercostal catheter. At or above 5th intercostal space, mid axillary line.

Haemothorax

- Fluid resuscitation prior to insertion of an intercostal catheter, attached to 'Atrium' Under Water Sealed Drain. **Immediate surgical presence** needed if haemothorax associated with penetrating trauma

Flail Chest with Pulmonary Contusion

- Need for ventilation depends on degree of respiratory compromise

Open Pneumothorax

- Cover wound with a sterile dressing, secured on three sides.
- Insert intercostal catheter.

Circulation

Assessment

1. Check skin temperature, colour and capillary refill time.
2. Assess pulse rate and quality. Monitor BP.
3. Identify exsanguinating haemorrhage – rapidly search 5 sites of possible blood loss
 - Skin – don't underestimate scalp bleeding
 - Long bones
 - Chest, Pericardium – CXR, Extended FAST
 - Intraperitoneal – Spleen, Liver, Mesenteric– FAST
 - Retroperitoneal – Pelvic fracture, Renal injury – Pelvic Xray/ FAST

Management

1. Control bleeding with external pressure or sutures. **Immediate surgical consultant presence if penetrating injury**
2. Consider pelvic binding if pelvic pain, hypotension, intubated/unassessable
3. Insert two large intravenous lines into large veins.
4. Insert an intraosseous needle if delay > 2 minutes in achieving vascular access.
5. Take blood for Cross-match, Haematology and Biochemistry.
6. Administer crystalloid volume replacement if circulatory compromise. Initial bolus 10 mL/kg warmed 0.9% sodium chloride or Hartmann's fluid. Repeat 10 mL/kg of volume replacement if no response or relapse.
7. Administer Tranexamic acid if suspected or confirmed significant bleeding, as per **MTP guideline**: [Massive Transfusion Protocol \(MTP\) - Paediatric](#) at 15mg/kg (max 1gm) over 15-20 mins
8. Early consideration of warmed packed red blood cells at 10ml/kg if hypotensive for age, persistent tachycardia, poor response to 20ml/kg crystalloid in total, or non-compressible bleeding in chest or abdomen. Repeat 10 mL/kg warmed packed red blood cells if no response or relapse.
9. Consider activation of **MTP** if 20ml/kg blood transfused and ongoing volume replacement required
10. Consider other causes of hypotension. Tension pneumothorax, Pericardial tamponade, Spinal cord injury, Unidentified haemorrhage.
11. If blood transfusion required or +ve FAST – Ensure surgical Consultant and Anaesthetic consultant attend urgently to help guide management

FAST scan in paediatric trauma - Accredited clinicians can use bed side ultrasound to aid in decision making. Intra-abdominal fluid detection suggests bleeding and should result in,

- i. Urgent Surgical consultant attendance to aid in decisions regarding operative intervention
- ii. Blood products as the ideal replacement fluid
- iii. Further imaging with CT scan or US depending on stability

Blood tests:

- Cross-match. At least 2 mL in clotted "Blood Bank" tube.
- Haematology. Full blood count.
- Biochemistry. EUC, Amylase, BSL, LFT. BHCG in pubescent females
- Blood alcohol if 15 years or older.

Disability (Neurological)

Assessment:

1. Determine level of consciousness using AVPU.
 - A - Alert
 - V - Responsive to vocal stimulus
 - P - Responsive to painful stimulus
 - U - Unresponsive
2. Pupillary size and reaction
3. Asymmetry of limb movement

Management

Best neurological outcome depends on optimal management of ABC and secondary brain protection until CT scan can delineate injuries and guide urgent neurosurgical intervention. Only a haemodynamically stable child can undergo neurosurgery.

Secondary brain protection is crucial. Avoid

- **Hypotension for age**
- **Hypoxia** – (keep PO₂ > 100, but less than 200)
- Hypovolaemia
- Hypercarbia (keep PCO₂ 35-40)
- H⁺ (acidosis) (keep pH 7.4-7.45)
- Hyperthermia (keep temp < 37°C)
- Hyper/hypoglycaemia (BSL 5-8)
- Hypertonicity (seizures) – Anticonvulsant loading if ICH, contusion, depressed skull fracture, witnessed seizure

- Hyponatraemia (keep Na⁺ > 135mmol/L)

If signs of raised ICP – pupillary dilatation, Cushing's response (hypertension and bradycardia), consider

Hyperventilation to PCO₂ 30-35

Hypertonic saline 3% - administer 3mL/kg (but avoid Na⁺ > 160)

Exposure

Management:

1. Remove all clothing. Log roll to examine posterior aspects of patient
2. Minimise heat loss. Limit exposure time. Consider overhead heaters, warm blankets.

Monitoring

- ECG monitor
- Pulse oximeter
- Non-invasive blood pressure
- End-tidal CO₂ monitor (if intubated)

Urinary and Gastric Catheters

- A urinary catheter should be inserted, particularly in patients with circulatory compromise, perineal burns or intubated patients.
- Contraindications are the presence of blood at the urethral meatus, perineal/scrotal haematoma or pelvic fracture.
- A large orogastric tube should be considered in severe trauma, burns, abdominal injury, intubated patients. The gastric tube should be aspirated frequently and left on free drainage.

Radiology

All children at risk of significant injury should have the following x-rays performed urgently in the Emergency Department.

- Lateral cervical spine (with caudal arm traction) – looking for any fractures or dislocations
- Chest - looking for pneumothorax, haemothorax, rib fractures, subcutaneous/mediastinal emphysema, diaphragmatic hernias etc
- Pelvis – looking for displaced fractures or confirming adequate fracture reduction by pelvic binder
- Chest and abdominal xray – if gunshot wound
- CT and US – guided by team leader

Related links in this document

- [Paediatric Traumatic Cardiac Arrest](#)
- [Trauma Call Criteria - ED – SCH](#)
- [Trauma: Team Roles - ED – SCH](#)
- [Cervical Spine \(suspected\) Injury \(Paediatric\): Patient Management](#)
- [Massive Transfusion Protocol \(MTP\) – Paediatric](#)
- [ITIM Trauma Code Crimson Pathway](#)

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