



<b>PAEDIATRIC ACUTE CARE GUIDELINE</b>	
<b>Serious Injury</b>	
<b>Scope (Staff):</b>	All Emergency Department Clinicians
<b>Scope (Area):</b>	Emergency Department

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# Serious Injury

This guideline gives an overview of the approach to the seriously injured child including the primary and secondary survey.

## Background

- Trauma/serious injury is a leading cause of death in children in Australia
- Early <c>ABC interventions improve morbidity and mortality secondary to major trauma
- A trauma team approach should be used to manage seriously injured children
- Activate a 'Trauma Call' for all major trauma patients - see [PMH Trauma Call Pathway](#)

## General

- The main causes of serious injury in children are due to motor vehicle accidents and falls.
- Injury prevention is the biggest factor in reducing trauma mortality but unfortunately children still continue to be injured.
- Primary assessment and early <c>ABC interventions will avoid some deaths and prevent late complications in children involved in major trauma.
- At PMH, a trauma team consisting of staff from the Emergency Department, Paediatric Intensive Care Unit (PICU), surgical and anaesthetic teams manage major trauma as defined by mechanism of injury and physiological parameters.
- This multidisciplinary trauma team will follow a structured approach to manage seriously injured patients.
- This structured approach initially focuses on identifying and treating immediate threats

to life – the **primary survey**.

- Following this initial **primary survey** and resuscitation, the structured approach is again used as a **secondary survey** to identify other key injuries which require emergency treatment to stabilise the patient and prevent secondary insult.
- It is recommended that all healthcare workers who work with injured children undertake an Advanced Paediatric Life Support (APLS), Emergency Management of Severe Trauma (EMST) course or similar to provide the skills needed to assess and manage seriously injured children.

## Assessment

- A structured, systematic approach is essential when assessing seriously injured children.
- Primary survey using an “<c>ABCD” approach is a simple and highly effective method in major trauma.
- Assume **cervical spine injury** in all trauma patients.
- Treat problems immediately as they are found during the primary survey, before moving on.

## History

- A detailed history of the incident should be sought including:
  - Mechanism of injury
  - Time of injury
  - Other fatalities
  - Obvious injuries
  - Pre-hospital treatment

## Primary Survey

- The primary survey involves a rapid structured assessment of <c>atastrophic haemorrhage, **A**irway, **B**reathing, **C**irculation, **D**isability and **E**xposure.
- Treat life threatening issues immediately as they are discovered during the primary survey before moving on.

<b>&lt;C&gt;atastrophic Haemorrhage</b>	
<b>Control</b> obvious external haemorrhage – apply pressure.	
<b>Airway and C Spine</b>	
<b>Assume</b> C-Spine injury in any major trauma patient <b>Immobilise</b> C-Spine in a hard collar or manual in-line immobilisation	
<b>Assess</b> airway patency and signs of obstruction <ul style="list-style-type: none"> <li>• Stridor</li> <li>• Stertor</li> <li>• Hoarse voice</li> <li>• Bruising or swelling</li> </ul>	<b>Resuscitation</b> <ul style="list-style-type: none"> <li>• Suction if necessary</li> <li>• Jaw thrust (head tilt is contraindicated if there is suspicion of C-Spine injury)</li> <li>• Oropharyngeal airway (nasopharyngeal airway contraindicated if there is suspicion of a base of skull fracture)</li> <li>• Endotracheal intubation</li> <li>• Surgical airway</li> </ul>

<b>&lt;C&gt;atastrophic Haemorrhage</b>	
<b>Breathing &amp; Ventilatory Support</b>	
Fully expose the neck and chest Look, listen and feel Provide <b>oxygen</b> via a non-rebreather mask with a reservoir	
<p><b>Assess</b></p> <ul style="list-style-type: none"> <li>• Bruising, wounds</li> <li>• Symmetry of chest expansion</li> <li>• Trachea midline?</li> <li>• Rate</li> <li>• Effort – nasal flare, recession, accessory muscle use</li> <li>• Air entry</li> <li>• Oxygen saturations</li> <li>• Percussion note</li> <li>• Effects – heart rate, skin colour, mental state</li> </ul>	<p><b>Urgently exclude</b> and treat:</p> <ul style="list-style-type: none"> <li>• Airway obstruction</li> <li>• Tension pneumothorax</li> <li>• Open pneumothorax</li> <li>• Massive haemothorax</li> <li>• Flail chest</li> </ul> <p><b>Support ventilation</b></p> <ul style="list-style-type: none"> <li>• Bag valve mask ventilation</li> <li>• Intubation and positive pressure ventilation</li> <li>• Consider an oro-gastric tube</li> <li>• !6 G needle into 2ICS if suspect pneumothorax</li> <li>• 3 way occlusive dressing for tension pneumothorax (while preparing for drain0)</li> </ul>
<b>Circulation &amp; Haemorrhage Control</b>	
<p><b>Assess</b></p> <ul style="list-style-type: none"> <li>• Obvious external haemorrhage</li> <li>• Distended neck veins</li> <li>• Muffled heart sounds</li> <li>• Signs of shock</li> <li>• Heart rate</li> <li>• Pulse pressure</li> <li>• Central capillary return</li> <li>• Blood pressure</li> <li>• Skin colour</li> <li>• Mental state</li> </ul>	<p><b>Exclude</b> and treat</p> <ul style="list-style-type: none"> <li>• Cardiac tamponade</li> <li>• Shock</li> </ul> <p><b>Resuscitation</b></p> <ul style="list-style-type: none"> <li>• <b>Two</b> large bore cannulae (take blood for FBC and cross match)</li> <li>• Fluid resuscitation – 10ml/kg of warmed 0.9% saline and repeat if necessary</li> <li>• Tranexamic acid</li> <li>• <b>Consider Blood as initial resuscitation fluid if uncontrolled haemorrhagic shock</b></li> <li>• Consider activating <a href="#">massive transfusion protocol</a> if &gt;20ml/kg blood product transfused and ongoing shock</li> <li>• Surgical intervention to stop internal bleeding (chest, abdomen, pelvis)</li> </ul>
<b>Disability and Prevention of Secondary Insult</b>	
<p><b>Hypoxia and shock can cause a decrease in conscious level</b> Any ABC problem should be addressed before assuming a primary neurological problem</p>	
<p><b>Assess</b> level of consciousness, pupils, posture and blood glucose.</p> <ul style="list-style-type: none"> <li>• Conscious level – <b>A V P U</b> scale</li> <li>• Pupil size, symmetry and reactivity</li> <li>• Abnormal posturing (decorticate, decerebrate)</li> <li>• Seizure activity</li> <li>• Bedside glucometer reading</li> </ul>	<p><b>Resuscitation</b></p> <ul style="list-style-type: none"> <li>• Response to <b>Pain</b> or <b>Unresponsive</b> – consider intubation</li> <li>• Treat raised intracranial pressure – 20% mannitol or 3% saline</li> <li>• Correct hypoglycaemia – 2ml/kg of 10% glucose IV</li> <li>• Treat seizures</li> </ul>
<b>Exposure and Temperature Control</b>	
<p>Fully expose child and <b>assess</b> temperature and signs of injury.</p> <ul style="list-style-type: none"> <li>• Check core temperature</li> <li>• Don't forget to log roll and check the back</li> </ul>	Prevent hypothermia

## Investigations

- Take blood for FBC, U&E, LFT, venous blood gas and Group & Hold **or** Cross Match
- Trauma series X-rays – C-spine, chest
- If concerns re abdomen or pelvis -need CT
- Do CT neck rather than XR if doing CT head
- Other adjuncts to the primary survey include FAST scan, orogastric tube and bladder catheterisation

## Further management

### Secondary Survey

- A secondary survey is performed after treating any life threatening conditions detected during the primary survey.
- The secondary survey should be abandoned to repeat a primary survey if there is any deterioration in the patient's condition.
- The secondary survey involves a head to toe and front to back examination to detect any non life threatening injuries which require further management.
- Further investigations and management will be determined by injuries found on secondary survey, e.g. specific limb X-rays, CT scans etc.

### Medications

- Analgesia (See ED Guideline: [Analgesia](#))
- Tetanus prophylaxis (See ED Guideline: [Tetanus Prophylaxis](#))
- Consider antibiotics (See ED Guideline: [Antibiotics](#))

### Admission criteria

- All major trauma should be admitted under the General Surgical Team (which at PMH is the Trauma Team).
- Other surgical subspecialty involvement will be determined by the injuries sustained.

### Management paperwork

- All major trauma patients should have documentation done on an **ED Trauma Sheet**. These are A3 folded forms, located in the Resuscitation Bay and Doctor's offices.


### Tags

accident, airway, anaesthetics, apnoea, arrest, asystole, avpu, bleeding, breathing, c-spine, cardiac, cardiac tamponade, chest, circulation, collar, disability, frail chest, gcs, haemorrhage, haemothorax, hypoglycaemia, hypothermia, hypovolemic, hypoxia, hypoxic, icp, icu, injury, MVA, nai, neck, non accidental injury, obstruction, orthopaedics, pain, pneumothorax, primary, pu, raised icp, resus, resuscitation, secondary, seizure, serious, serious injury, shock, tachycardic, tension, trauma, trauma call, trauma team, X-Ray, xray

## References

- Advanced Paediatric Life Support: The Practical Approach. 5<sup>th</sup> ed Australia and New Zealand Version. Wiley-Blackwell, 2011.
- Textbook of Pediatric Emergency Medicine. 6<sup>th</sup> ed. Fleisher GR, Ludwig S. Philadelphia: Lippincott Williams & Wilkins, 2010.

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