

PAEDIATRICS

TRAUMA

Although the principles of trauma management are the same in children and adults, anatomical and physiologic differences lead to different patterns of injury. The seven S's illustrate this:

- **Softer Skeletons:** bones tend to bend rather than break and significant internal injuries may be present despite an intact overlying skeleton. Fractures suggest high-energy trauma.
- **Surface Area:** high surface area to volume ratio leads to fast temperature loss. Hypothermia may lead to acidosis and coagulopathy which should be avoided in trauma patients at all costs.
- **Size:** small size and relative proximity of internal organs bestows a tendency for multiple injuries.
- **Shape:** larger heads in proportion to body size leads to more frequent blunt brain injury.
- **Sequelae:** trauma may impact on future growth and development.
- **Psychology:** children often regress when ill or injured. The reassuring presence of a parent is often helpful to aid with communication. Children in major trauma are also at risk of post-traumatic stress disorder.
- **Stuff:** equipment size and drug doses are different in children. The paediatric resus bay should have all the equipment you need.

Head Injuries

Children's brains have less cushioning due to a smaller subarachnoid space and higher metabolic requirements than adults increase susceptibility to secondary brain injury. In children <12-18 months the cranial sutures are not closed and a bulging fontanelle (below) may be present. Prevent secondary brain injury by treating hypoxia, hypovolaemia, hypercapnia, cerebral oedema, hyperthermia, seizures and infection.



GCS in young children

- V5: alert, babbles/coos/words
- V4: less than usual ability/irritable cry
- V3 : cries to pain
- V2: moans to pain

Indications for CT

- Witnessed LOC >5 mins
- Amnesia (anterograde/retrograde >5 mins)
- Abnormal drowsiness
- >2 episodes of vomiting
- Clinical suspicion of NAI
- Post-traumatic seizure without history of epilepsy
- Suspected open/depressed skull fracture/bulging fontanelle
- Any sign of base of skull fracture
- Focal neurological deficit
- Dangerous mechanism
- Age <1 year: >5cm bruise/swelling/laceration on head
- Age <1 year: GCS <15
- Age >1 year: GCS <14

Chest Injuries

Chest injuries are commonly encountered in paediatric multisystem trauma. The child's chest wall is compliant, allowing transmission of forces to internal structures. If rib fractures are present it suggests a high energy mechanism of trauma. Children have limited respiratory reserve due to their high metabolic rate and underdeveloped thoracic musculature and rapid desaturation may follow injury.

Pulmonary contusions are common and, due to the mobility of mediastinal structures, children are more prone to tension pneumothorax. Injuries such as diaphragmatic rupture, aortic transection, flail chest and cardiac contusion are rarer when compared with adults.

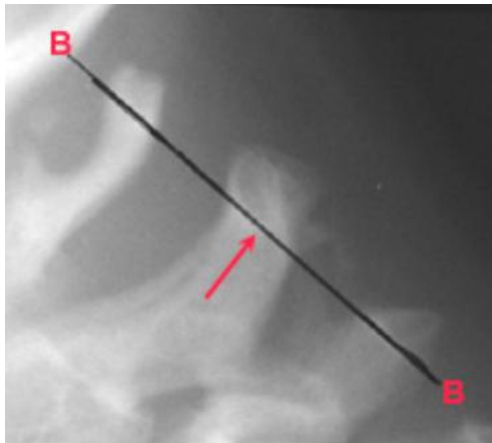
The management is similar to that of adults: oxygen, chest drainage and/or intubation.

Abdominal Injuries

A thin abdominal wall, compliant ribs and shallow pelvis offer less protection to the abdominal contents than in adults. Imaging is with FAST scanning and CT scan. Treatment is with blood/fluid for hypovolaemia and referral to the paediatric surgeons.

Spinal Injuries

Pseudosubluxation is the normal, physiological anterior displacement of C2 on C3 in children <8 caused by lax ligaments. Pathology can be ruled out with the absence of soft tissue swelling or neurology and a normal Swischuk's line (and a senior/radiology opinion!).



Swischuk's Line

A line is drawn between the posterior arch of C1 and C3.

The posterior arch of C2 should be between 2mm of this line.

Spinal injuries are rarer in children than adults. Anatomical differences include:

- More flexible inter-spinous ligaments. Momentary displacement of the spine causes cord injury without detectable injury to the bones or ligaments (SCIWORA: spinal cord injury without radiological abnormality). **Normal XR does not exclude injury.**
- A proportionally larger head exerts more force on the upper neck than in adults. C-spine injuries tend to affect C1-3.