



## PAEDIATRIC ACUTE CARE GUIDELINE

### Fractures - Overview

<b>Scope (Staff):</b>	All Emergency Department Clinicians
<b>Scope (Area):</b>	Emergency Department

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<http://kidshealthwa.com/about/disclaimer/>

## Fractures - Overview

This guideline is an overview of the approach to limb fractures in children. There are specific guidelines for each fracture.

### Background

- Musculoskeletal injuries account for 10-15% of Emergency Department presentations
- Fractures in children are more likely than sprains and ligamentous injury due to relatively lower bony strength
- Anatomical and physiological differences between adults and children account for the unique fracture types seen in paediatrics such as torus (buckle), greenstick, bowing, physeal and avulsion fractures

### General

#### Types of Fracture

Fractures in children should be described in terms of:

##### 1. Whether the fracture is:

- **Simple:** Fracture results in only two pieces or fragments
- **Compound/Open:** Any fracture where damage to overlying skin and soft tissue results in exposure of the bone

##### 2. The type of fracture (relates to the mechanism of injury):

- **Complete fractures**

- Transverse
- Oblique
- Spiral
- Comminuted – several fracture lines resulting in at least three fragments



- **Incomplete Fractures - unique to children:**

	<b>Plastic deformity (bowing)</b>	Results from stress beyond the bone's capacity for recoil. The periosteum and bone cortices remain intact. Seen most frequently in the fibula and ulna, and typically with fracture of the paired long bone.
	<b>Buckle (torus) fracture</b>	Usually occur at the metaphysis, and are the result of relatively mild compression / impaction forces along the long axis of the bone. The periosteum remains intact, and it is a relatively stable fracture.
	<b>Greenstick fractures</b>	Usually incomplete fractures unique to children. They tend to be angulated, but not displaced. The periosteum and cortex are disrupted on one side, but the thick periosteum typical of children is preserved on the opposite side. Some degree of impaction occurs on this side, so that buckling of the concave side may be seen. If angulation is not corrected, the intact periosteum on the concave side may undergo overgrowth or scarring which will result in progressive worsening of the deformity.

### 3. Relationship of the bone ends relative to each other:

<b>Displacement</b>		The percentage of the bone's diameter (at the level of the fracture) by which one fragment is displaced from or overrides the other.
<b>Angulation</b>		Angulation of the distal fragment relative to the proximal fragment.
<b>Rotation</b>		Rotation (in the axial plane) of the distal fragment relative to the proximal.
<b>Shortening</b>		Complete fractures are unstable, and muscle traction forces may result in the distal fragment being pulled proximally resulting in a relative shortening of the bone.

### 4. Part of the bone involved:

- Diaphysis
- Metaphysis
- Growth plate (physis) – unique to children. See Salter-Harris classification below.
- Epiphysis

## Salter-Harris Classification

Any fracture that involves a growth plate must be referred to the Orthopaedic Surgical Team.

- Salter-Harris I and II fractures – refer within 1 week
- Salter-Harris III, IV and V fractures – immediate referral



<b>Salter-Harris I</b>	Growth plate separation within the physis. No damage to the metaphysis or epiphysis.
<b>Salter-Harris II</b>	Fracture line across the growth plate with a component of the metaphysis attached to the displaced epiphysis (triangular fragment).
<b>Salter-Harris III</b>	Fracture line enters the epiphysis from the physis. Commonly involves the articular surface with separation of the epiphysis fragment.
<b>Salter-Harris IV</b>	Fracture line extends across the growth plate from the articular surface into the metaphysis.
<b>Salter-Harris V</b>	Compression of part or all (rarely) of the growth plate. Very rare. Initial X-rays appear normal.

## Assessment

- Suspect a fracture if there is pain, swelling or deformity
- Examine joints above and below the point of injury, especially with midshaft fractures
- Assess for neurovascular compromise

## History

- Document a clear mechanism of injury. The mechanism will provide an idea of the type of fracture expected.
- Neonates and young infants may present with irritability and/or distress

## Examination

- Look for bruising, swelling, tenderness and deformity. Self immobilisation of the limb may be evident.
- Assess for neurovascular compromise – check distal pulses and perfusion, sensory and motor function

- Look for puncture wounds and lacerations (open fracture)
- Assess the joints above and below the injury. Assess passive and active movements.
- Look for other injuries – especially in multi trauma patients

## Investigations

- X-Ray the area where a fracture is suspected. See [Radiology Requests – Limb X-Rays](#).

## Differential diagnoses

- Soft tissue injury
- Osteomyelitis
- Septic arthritis
- Non accidental injury (especially if injury does not fit with mechanism or other multiple injuries/bruises)

## Management

- [Analgesia](#)
- Immobilise suspected fracture before X-Rays (e.g. splint, board)
- Neurovascular deficit is to be treated urgently – refer to Orthopaedic Team

## Initial management

- [Analgesia](#)
- Examine for neurovascular injury – if deficit evident manage immediately (urgent Orthopaedic Team referral)
- Ice and elevation of the affected limb
- Immobilise the limb
- Intravenous [antibiotics](#) and [tetanus](#) booster for compound/open fractures
- Some fractures (e.g. toddler and scaphoid) may be subtle on X-Ray. If a fracture is suspected and the X-Ray looks normal, treat the patient as if a fracture is present and repeat the X-Ray in 1-2 weeks.
- Complete an Injury Proforma form for children under 2 years (A3 folded sheet, located in the Doctor's offices)

## Further management

Refer to the following guidelines for management of specific fractures:

### Upper Limbs:

[Clavicle Fractures](#)

[Humerus – Proximal and Shaft Fractures](#)

[Elbow Region Fractures](#)

[Forearm Fractures](#)

[Distal Forearm/Wrist Fractures](#)

## Lower Limbs:

[Femur Fractures](#)

[Knee Region Fractures](#)

[Lower Leg Fractures](#)

[Ankle Joint Fractures](#)

[Foot Fractures](#)

## Referrals and follow-up


- **Orthopaedics:** will see the majority of fractures in the Orthopaedic/Fracture Outpatient clinic. See [Outpatient Clinics](#). For urgent referrals, call the Orthopaedic Registrar via switchboard on their mobile.
- **Plastics:** will see hand and finger fractures in the Plastics Outpatient clinic. See [Outpatient Clinics](#). For urgent referrals, call the Plastic Surgical Registrar via switchboard on their mobile.
- Suspected fractures, in the case of a **highly athletic child/elite athlete**, advise that they may choose to take the child to their own or a club recommended sports physician, if the waiting time for the fracture clinic will impact on sporting commitments. This is the parents' choice and will be at their own cost.
- All patients who have a plaster blackslab placed should get the Plaster checked at 24 hours. They can return to the Emergency Department at PMH to see the triage nurse.

## Health information (for carers)

- [Patients with Plasters](#) Health Fact Sheet
- [Pain Management](#) Health Fact Sheet

This document can be made available in alternative formats on request for a person with a disability.

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