



Clinical Practice Guidelines: Trauma/Extremity injury

Policy code	CPG_TR_EXI_0924
Date	September, 2024
Purpose	To ensure a consistent approach to the management of a patient with an extremity injury.
Scope	Applies to Queensland Ambulance Service (QAS) clinical staff.
Health care setting	Pre-hospital assessment and treatment.
Population	Applies to all ages unless stated otherwise.
Source of funding	Internal – 100%
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Review date	September, 2027
Information security	UNCLASSIFIED – Queensland Government Information Security Classification Framework.
URL	https://ambulance.qld.gov.au/clinical.html

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Extremity injury

September, 2024

Characterised by trauma to the upper and/or lower limbs, extremity injuries are one of the leading causes of morbidity and mortality worldwide.^[1] In clinical practice, these injuries vary in severity and are comprised of the following:

- (i) Traumatic amputation
- (ii) Open fractures
- (ii) Closed fractures
- (iii) Dislocations
- (iv) Soft tissue injuries and superficial injuries

Traumatic amputation

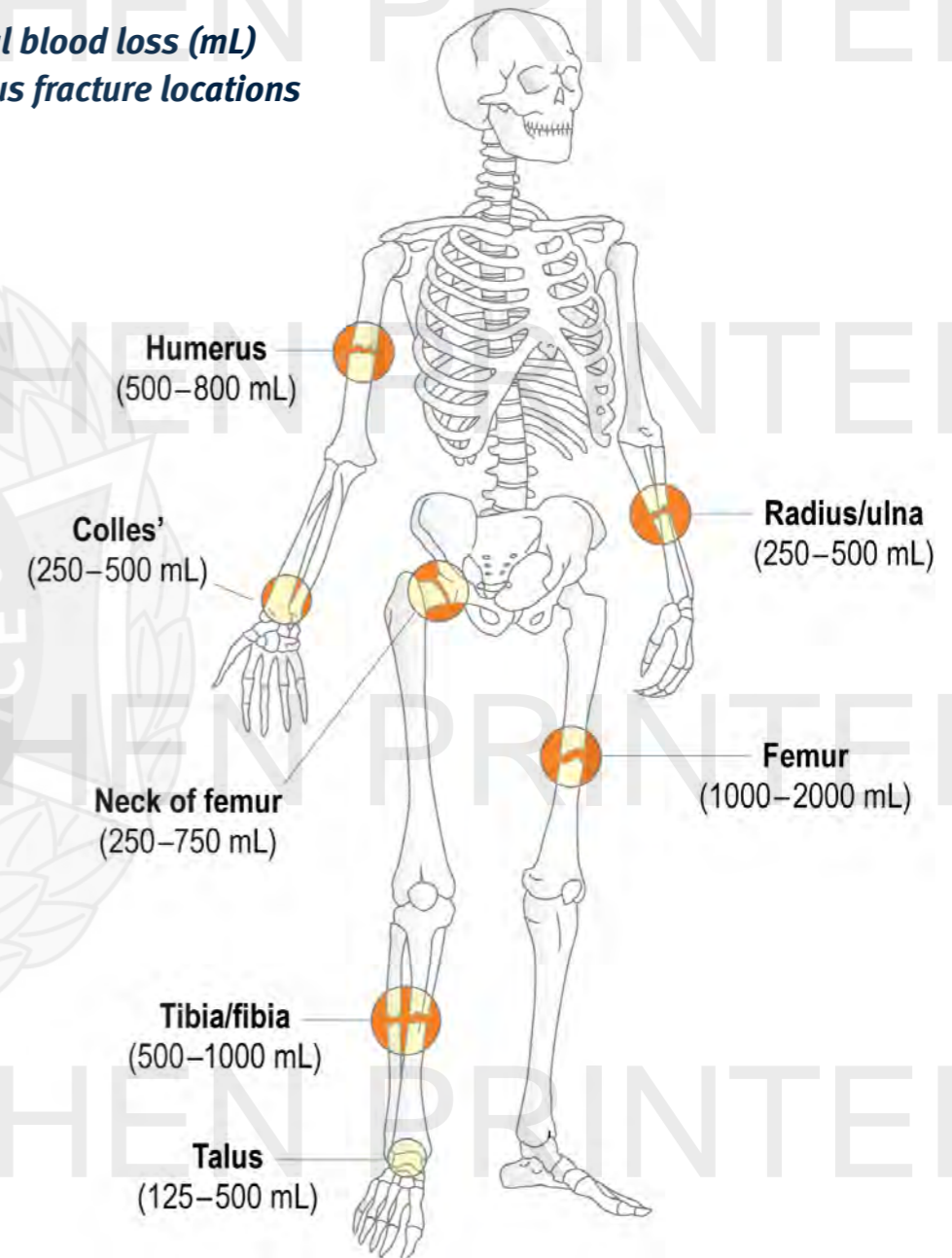
Traumatic amputations are defined as the sudden and unintended separation of a body part due to external forces and often occur secondary to high mechanism motor vehicle collisions, machinery accidents and explosions^[2]. Briefly, these amputations can be characterised as complete (full detachment of the limb or digit) or partial (some soft-tissue connection remains).

Open fractures

Open fractures are defined by the displacement of bone to the external environment.^[5] These injuries are considered time-critical orthopaedic emergencies and are associated with a high rate of complications such as osteomyelitis, malunion and vascular insult.^[3]

Annually, the QAS attends approximately 500 open limb fractures, with these predominantly occurring in the lower extremities.^[4]

Potential blood loss (mL) at various fracture locations



Closed fractures

Closed fractures are a common extremity injury encountered in the out-of-hospital environment and are defined as a break in the continuity of a bone that is not exposed to the external environment.^[7]

The overall incidence of fractures is bimodal. In the adolescent and young adult population, fractures are more prevalent in males rather than in females. This is true until the age of 35 when fractures become linked to osteoporosis and therefore become more prevalent in females.^[7]

Dislocations

Dislocations (also known as luxation) are defined by an abnormal separation of two or more bones where they meet at a joint. Typically, dislocations occur in ball and socket joints such as the shoulder and hip, with these typically occurring when unexpected or unbalanced force is placed on a ligament.^[8] These injuries are often sports related and can be a chronic or repetitive issue.^[8] Dislocations may occur in isolation, however, they can often be accompanied by open and closed fractures.^[8,9]

Soft tissue injuries and superficial injuries

Soft tissue and superficial injuries are a broad category of ailments that are comprised of sprains, strains, contusions, and simple uncomplicated lacerations. Briefly, soft tissue injuries can be categorised as either acute (secondary to sudden trauma) or overuse (following repetitive movement and progressive inflammation)^[10]. Superficial injuries are defined as minor uncontaminated simple lacerations where the dermis and epidermis of the skin is damaged. These injuries can often be managed through the provision of skin closure techniques that promote wound healing.

Clinical features



The presentation of extremity injuries varies depending on the severity of the injury, however, common signs and symptoms include:

- Pain
- Swelling
- Deformity
- Crepitus
- Reduction in mobility
- Neurovascular deficits
- Skin changes
- Haemorrhage/blood loss
- Emotional response

Risk assessment



- All patients that present with extremity injuries must receive a thorough clinical assessment that determines the following information:
 - Mechanism of injury
 - Time of injury
 - Patient demographics and comorbidities
 - Past medical history and current medications
 - Neurovascular function
- In the out-of-hospital setting, it can be difficult to determine the severity of the underlying injury due to the absence of diagnostic imaging. Ambulance clinicians therefore should have a low threshold for conveying patients for further assessment.



Risk assessment (cont.)

- In instances the attending paramedic considers that transport is not required, patients must be provided with appropriate self-care advice which includes information on analgesia and when to seek further medical advice if required.

+ Additional information

- Patients that present with life-threatening haemorrhage must be managed in accordance with the relevant CPG's.
- Patients that present with traumatic amputation and open fractures should be transported in accordance with *CPG: Pre-hospital trauma by-pass*.
- Open fractures must be irrigated with a minimum of 1–2 litres of sodium chloride 0.9%. Irrigation should be performed to remove gross contamination from the wound and be performed using an aseptic non-touch technique.
- Following irrigation, a sterile pad soaked in saline should be applied to cover the wound.
- The administration of cefazolin to patients with open fractures and traumatic amputations should be considered as soon as possible following the provision of standard care.

+ Additional information (cont.)

- All patients that present with a dislocated patella (including those with successful reduction) must be transported to an appropriate health facility for further assessment.
- Orthopaedic splinting should be applied above and below the fracture site to limit movement and immobilise the limb in a near-anatomical position. Following the application of a splinting device, continual neurovascular reassessment must be performed.
- Patients should be administered appropriate analgesia prior to the application of an orthopaedic splint.
- When practical, clinicians should consider photographing the injury (particularly open fractures) using the clinical images function within DARE, to show receiving hospital personnel.

Note: Clinicians must only perform procedures for which they have received specific training and authorisation by the QAS.

CPG: Clinician safety
CPG: Standard cares

Evidence of hypovolaemia or crush injury?

Manage as per CPG:

- Hypovolaemic shock
- Crush injuries

Assess the patient and manage the identified injury



Consider:

- Management and care of an amputated body part
- Arterial tourniquet
- Wound irrigation
- Bandaging
- Cefazolin
- Orthopaedic splinting
- Analgesia

Consider:

- Arterial tourniquet
- Wound irrigation
- Bandaging
- Fracture reduction
- Cefazolin
- Orthopaedic splinting
- Analgesia

Consider:

- Orthopaedic splinting
- Bandaging
- Analgesia
- Fracture reduction

Consider:

- Dislocation reduction – patella
- Orthopaedic splinting
- Analgesia

Consider:

- Orthopaedic splinting
- Skin closure
- Fishhook removal
- Analgesia

Transport to hospital. Pre-notify as appropriate.