

**Care for Musculoskeletal Injuries**  
(summarized from *Outdoor Emergency Care, 4<sup>th</sup> edition*)

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**Clavicle (collarbone)**

**Sling & Swathe**

**Signs & Symptoms:** Pain in shoulder region. Usually self splinted. Injured shoulder usually held lower than uninjured shoulder. Skin occasionally 'tents' over clavicle fracture fragments.

**Concerns:** Clavicle lies over major arteries, veins and nerves.  
Neurovascular compromise is probable.

**Care:** Sling and Swathe.

British or French style sling will avoid clavicular region near the neck.

British style sling will also avoid clavicular region near the arm.

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**Scapula (shoulder blade)**

**Sling & Swathe**

**Signs & Symptoms:** Patient will often limit use of arm because of pain at fracture site  
(Injury is usually a result of a forceful, direct blow.)

Injured shoulder usually held lower than uninjured shoulder.

**Concerns:** May injure adjacent spine and underlying thoracic cage, lungs & heart.  
Associated chest or spinal injuries pose the greatest threat.

**Care:** Sling and Swathe.

American style sling will avoid scapular region and limit motion of adjacent arm.

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**Acromioclavicular joint (separated shoulder)**

**Sling & Swathe**

**Signs & Symptoms:** Point tenderness over A/C joint.

Often sprained in 'outside edge' falls if the skier lands on the point of the shoulder. If significant force involved, distal end of clavicle may protrude up, showing as an obvious shelf-like deformity. Point tenderness over A/C joint differentiates this injury from severely displaced clavicular fracture

**Concerns:**

**Care:** Sling and Swathe.

British or American style sling will avoid A/C joint region.

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**Shoulder joint dislocation (anterior dislocation)**

**Sling & Swathe**

**Signs & Symptoms:** With the most common anterior dislocation, patient will guard and protect the shoulder by holding the dislocated arm away from the chest with the forearm extended forward.

The shoulder joint will be locked and the cap will appear squared off and flattened.

In shoulder dislocation, patient is physically unable to bring hand across abdomen or chest (differentiation from clavicle, scapula, or proximal humerus fractures & A/C joint sprains).

Often sprained in 'outside edge' falls if the skier lands on the point of the shoulder.

**Concerns:** Possible nerve or circulation compromise.

**Care:** Blanket roll splint with additional sling and swathe to support forearm, hand and the weight of the arm. American style sling will avoid joint region.

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**Shoulder joint dislocation (posterior dislocation)**

**Airplane Splint**

**Signs & Symptoms:** With the rare posterior dislocation, the position of least pain shows the arm raised with the hand supporting the arm by grasping the head.

**Concerns:** Possible nerve or circulation compromise.

**Care:** Airplane splint held with four cravats: a long cravat cupped and wrapped about the base of the splint and tied across the opposite shoulder to support the weight of the splint and arm, cravats around the waist and the opposite shoulder from the lower frame, around the arm from the upper frame, and a cravat to secure the hand to the head.

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**Humerus fracture (proximal)** **SAM splint, Sling & Swathe**  
**Signs & Symptoms:** Significant swelling, but no major deformity.  
**Concerns:** Occasional neurovascular compromise (brachial plexus).  
**Care:** Immobilize in a sling and swathe.  
Use the chest wall as a splint by securing the arm to the chest wall.  
Place a short, padded board splint on the lateral side of the arm, under the sling, for additional support.

**Humerus fracture (midshaft)** **SAM splint, Sling & Swathe**  
**Signs & Symptoms:** Gross angulation of the arm.  
Marked instability and crepitus of the fracture fragments.  
**Concerns:** Possible neurovascular compromise.  
Possible entrapment of the radial nerve (patient cannot extend or dorsiflex the wrist or fingers or may report numbness on the dorsum of the thumb: classic 'wrist drop'.)  
**Care:** Immobilize with a padded splint. Apply sling and swathe for support and further immobilization.

**Humerus fracture (distal)** **SAM splint, Sling & Swathe**  
**Signs & Symptoms:** Significant swelling at the elbow.  
Marked instability and/or crepitus of the fracture fragments.  
**Concerns:** Possible neurovascular compromise.  
Possible damage to ulnar or median nerves  
**Care:** Immobilize with a padded splint bent to conform to the angle of the elbow. Apply sling and swathe for support and further immobilization.

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**Elbow injuries** **SAM splint, Sling & Swathe**  
**Signs & Symptoms:** Marked swelling and deformity in the elbow area, with tenderness, pain and ecchymosis.  
**Concerns:** All elbow injuries are serious and require careful management.  
Fractures are frequently complicated by nerve and blood vessel damage.  
Injury can be caused or worsened by inappropriate care or excessive manipulation of the joint.  
**Care:** Immobilize with a padded splint in the position found. Bend splint to conform to the angle of the elbow on the back and underside of the extremity. Apply sling and swathe for support and further immobilization.

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**Forearm and Wrist injuries** **SAM splint, Sling & Swathe**  
**Signs & Symptoms:** Point tenderness, often accompanying deformity.  
Fractures of radius and ulna show 'silver fork' deformity. Both radius and ulna may break when a fall is caught on an outstretched hand.  
**Concerns:**  
**Care:** Immobilize with a padded splint with wrist held in the position of function (cupping part of the splint or a gauze roll). Apply sling and swathe for support and further immobilization.

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**Hand injuries** **Dressings, Self-Splint**  
**Signs & Symptoms:** Point tenderness, often accompanying deformity.  
**Concerns:** Great variety of hand injuries, many with serious consequences.  
**Care:** Stabilize finger injuries against adjacent, undamaged fingers or hand.  
A bulky forearm/hand dressing makes an effective splint for hand and wrist injuries.

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### Fractures of the Pelvis

### Padding

**Signs & Symptoms:** High-velocity injury with discomfort in the lower back, lower abdomen or pelvic area. First, gently compress sides of pelvis with open palm. If no discomfort, second, gently rock pelvis back and forth with open palm on lateral pelvis. If still no tenderness, third, palpate anterior pubis with palm. Pain in abdomen and urge to urinate – fracture near center of anterior pelvic ring.

**Concerns:** This is a very serious injury. Often accompanied by life-threatening loss of blood due to laceration of internal blood vessels.

**Care:** Be prepared to take immediate steps to treat shock. Load and go. Very careful transfer to a long backboard for immediate transport to definitive care using bridge or strap lifts. Maintain position of patient if at all possible and pad carefully to immobilize and make transport as comfortable as possible. Keep knees partially flexed to relieve pressure on fracture area. Anticipate vomiting. Provide rapid transport to definitive care.

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### Dislocation of Hip

### Padding

**Signs & Symptoms:** High-force injury. Posterior dislocation shows flexed hip joint, with thigh rotated inward and adducted across the midline of the body. Anterior dislocation shows legs spread wide apart and locked in position.

**Concerns:** This is a serious injury accompanied by severe pain. Sciatic nerve injury is possible (Decreased sensation and muscle weakness in leg and foot. 'Foot drop'.)

**Care:** Support and splint the injury in the position of the deformity (*if possible, as found*). Place the patient supine on a padded section of a long backboard. Support the affected limb with pillows and rolled blankets, particularly under the affected knee. Secure the patient to the backboard so that the hip will not move. Provide rapid transport to definitive care.

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### Fracture of Proximal Femur (hip fracture)

### Padding, Self-Splint

**Signs & Symptoms:** High-force injury. A displaced fracture typically shows extremity externally rotated and the injured leg is usually shorter than the opposite, uninjured limb. This deformity is not present in non-displaced fractures. In all cases, patient is unable to walk or move leg due to pain in hip region, in the groin region, or inner aspects of the thigh. Hip region is usually tender and gentle rotation of the leg will cause severe pain. Pain is often referred to the knee.

**Concerns:** This is a serious injury accompanied by severe pain

**Care:** Be prepared to take immediate steps to treat shock. Gently splint the injured extremity to the uninjured leg by tying the patient's thighs and lower legs together. Log roll the patient toward the uninjured leg and transfer to a long backboard. Place a folded blanket under the knee of the uninjured extremity to keep it flexed and reduce tension in the injured area. Carefully secure the patient and provide rapid transport to definitive care.

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### Midshaft Fracture of the Femur

### Traction Splint

**Signs & Symptoms:** High-force injury. Usually shown as an externally rotated and shortened limb with a very tender thigh. The fracture is often angulated. The patient is usually in severe pain, has thigh muscle spasms and is unable to move the extremity.

**Concerns:** This is a very serious injury accompanied by severe pain. Severe internal bleeding is likely.

**Care:** Be prepared to take immediate steps to treat shock. If at all possible, the fracture should be stabilized with a traction splint. Carefully transfer the patient to a long backboard, secure the patient and provide rapid transport to definitive care.

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**Fracture of the Femur just above the Knee****Quick Splint**

**Signs & Symptoms:** High-force injury. Large, tender swelling in the lower thigh just above the knee, with pain, likely angulation deformity, and inability to move the knee.

**Concerns:** This is a serious injury accompanied by severe pain. Severe internal bleeding is likely.

**Care:** Stabilize the fracture with a rigid fixation splint (quick splint) that extends from just below the groin to the foot, or padded board splints applied to each side of the joint. Provide rapid transport to definitive care.

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**Injuries of Knee Ligaments.****Quick Splint**

**Signs & Symptoms:** Most common alpine skiing injury (80% involve MCL, 40% involve ACL). Ask if a 'pop' was heard, indicating a possible ACL injury.

**Concerns:**

**Care:** Stabilize the fracture with a rigid fixation splint (quick splint) extending symmetrically about the knee and transport to definitive care..

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**Dislocation of the Knee****Quick Splint or Airplane Splint**

**Signs & Symptoms:** Gross deformity, severe pain, and inability to move the joint..

**Concerns:** Severe ligament injury and very likely injury to popliteal artery. Severe internal bleeding is likely

**Care:** Splint the knee in the position in which it is found with a quick splint extending from the hip to the ankle and promptly transport the patient to definitive care. An airplane splint can also be effective at splinting the knee joint in position.

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**Dislocation of the Patella****Quick Splint**

**Signs & Symptoms:** Almost always a lateral dislocation causing the knee joint to assume a partially flexed position. The deformity is significant and quite characteristic.

**Concerns:**

**Care:** Splint the knee in the position in which it is found with a reversed quick splint extending from the hip to the ankle and promptly transport the patient to definitive care.

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**Fracture of the Proximal tibia, just below the Knee****Quick Splint**

**Signs & Symptoms:** Caused by same forces that trigger distal femur fracture or knee ligament injury. Large, tender swelling in the lower leg just below the knee, with pain, likely angulation deformity, and inability to move the knee.

**Concerns:** Internal bleeding is possible.

**Care:** Stabilize the fracture with a rigid fixation splint (quick splint) that extends from the hip to the ankle. Provide rapid transport to definitive care.

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**Fracture of the Tibia and Fibula****Quick Splint**

**Signs & Symptoms:** Often 'boot top' fractures or spiral fractures. Patient complains of severe pain, tenderness and is resistant to movement. Swelling and tenderness at the fracture site. When both the tibia and fibula are fractured, the extremity distal to the fracture is usually angulated or rotated.

**Concerns:** Internal bleeding is possible.

**Care:** Boot provides useful pressure to reduce hemorrhage. Carefully re-align the fracture to bring the leg into its proper anatomic relationship to the foot while applying a quick splint..

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**Ankle Injuries.****Quick Splint (Elastic Bandage)**

**Signs & Symptoms:** Pain and swelling in ankle region. Occasionally deformity of ankle.

**Concerns:**

**Care:** For mild sprains: Stabilize with a cravat ankle bandage or figure-of-eight made with elastic bandage..

Severe sprains and fractures of the ankle should be cared for with a fixation splint (quick splint).

Dislocation of the ankle should be cared for with quick splint that includes the shin, ankle and foot.

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**Foot Injuries.****Quick Splint or Padding**

**Signs & Symptoms:** Pain and swelling of foot.

**Concerns:** If patient is complaining of heel pain and has jumped or fallen from a height, assess spine (L2) for transmitted injury.

**Care:** If there is little swelling and only mild pain, the patient's boot or shoe may be used as a splint. Avoid placing any weight on the foot.

Suspected fractures should be splinted with a folded pillow, tightly rolled blanket, or with a quick splint.

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**Remember: Always check pulse and circulation distal to the injury site after splinting !**