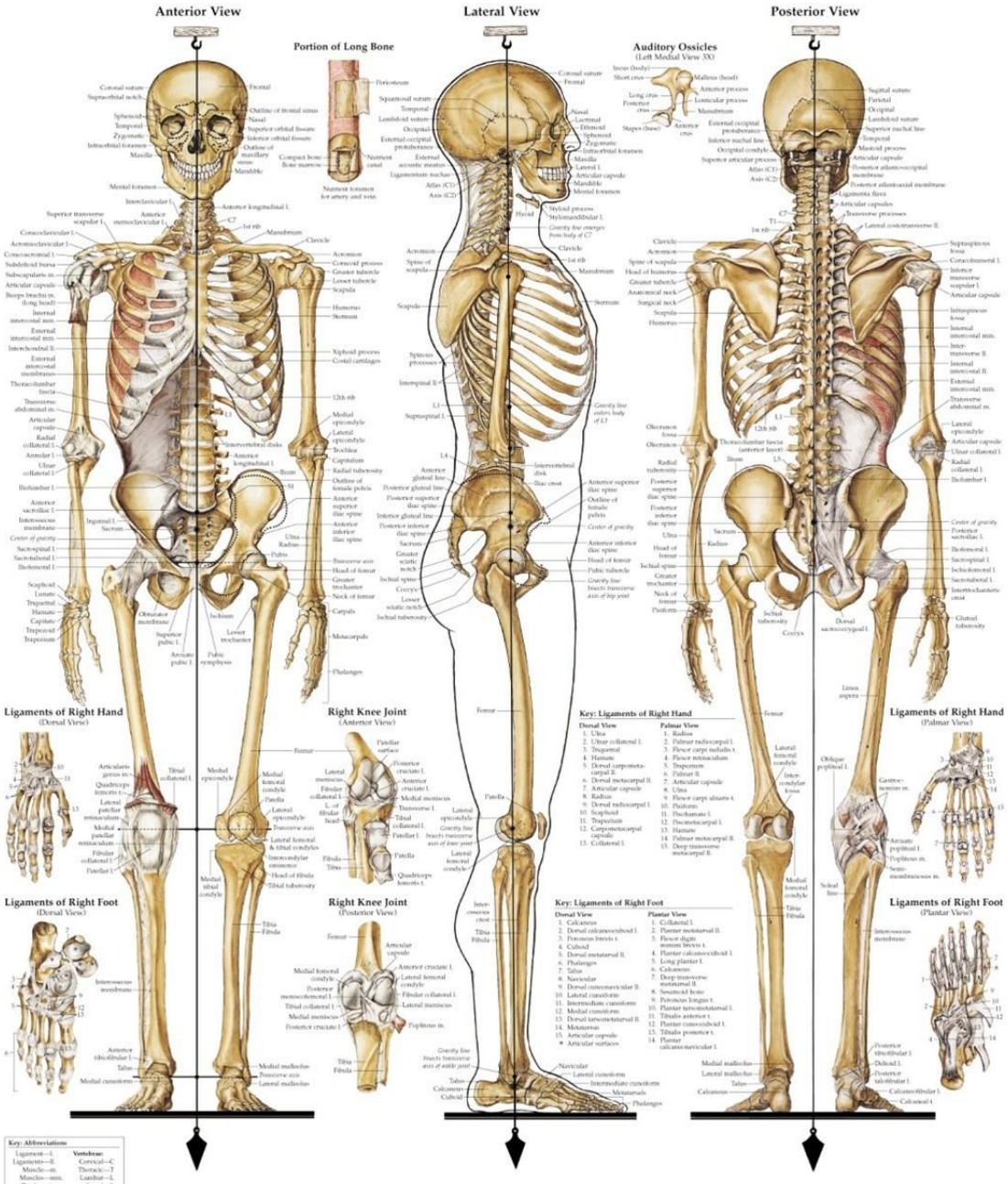
THE SKELETAL SYSTEM



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Lippincott Williams & Wilkins

Adult Fracture Management in A&E

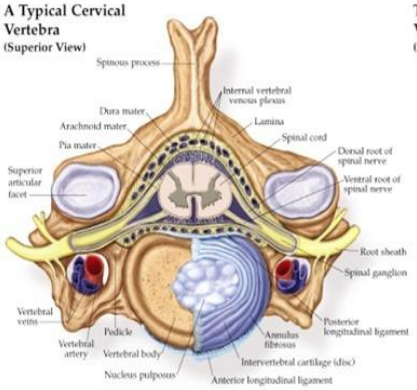
SPINE

Diagnosis	Initial A&E Treatment	Management
C-spine Fractures	Immobilize with cervical collar Neurological examination.	Refer to Ortho oncall who will liase with oncall Neuro surgical Registrar.
T-spine fracture	Neurological examination	Refer Ortho on-call
L-spine fracture	Neurological examination	Refer Ortho on-call
C-Spine sprains/whiplash injuries	Analgesia Neurological examination	Discharge with Acute Neck Injury - patient information leaflet. Ł
Non Traumatic Muscular-Skeletal C-Spine pain **without** neurology. ? Herniated disc	Analgesia Assess for red Flags of back pain π and investigate Neurological examination	1. Refer to GP to manage in community. If still in pain GP to arrange Outpatient orthopaedic review. 2. If still in pain refer to Ortho on-call for in hospital analgesia control.
Non Traumatic Muscular-Skeletal C-Spine pain **with** neurological Deficit. ? Herniated disc	Analgesia Assess for red Flags of back pain π and investigate Neurological examination	Refer to Ortho on-call
Simple Low Back Pain	Analgesia Assess for red Flags of back pain π and investigate Neurological examination	Encourage activity Discharge with Back pain advise leaflet Ł
Non-traumatic L-Spine **without** neurology.	Analgesia Assess for red Flags of back pain π and investigate Neurological examination	1. Refer to GP to manage in community. If still in pain GP to arrange Outpatient orthopaedic review.. 2. If still in pain refer to Ortho on-call for in hospital analgesia control.
Non Traumatic Muscular-Skeletal L-Spine pain **with** neurological Deficit and urinary retension Cauda Equina	Analgesia Assess for red Flags of back pain π and investigate Neurological examination bladder Scan	Refer Urgent to Ortho on-call
Nasal Fracture	Analgesia No role for Xrays if indicated urgently manipulate check for septal haematoma	Discharge with nasal injury advise leaflet Ł

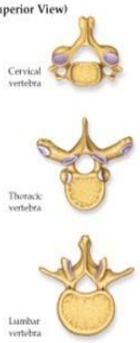
HUMAN SPINE DISORDERS

Anatomy

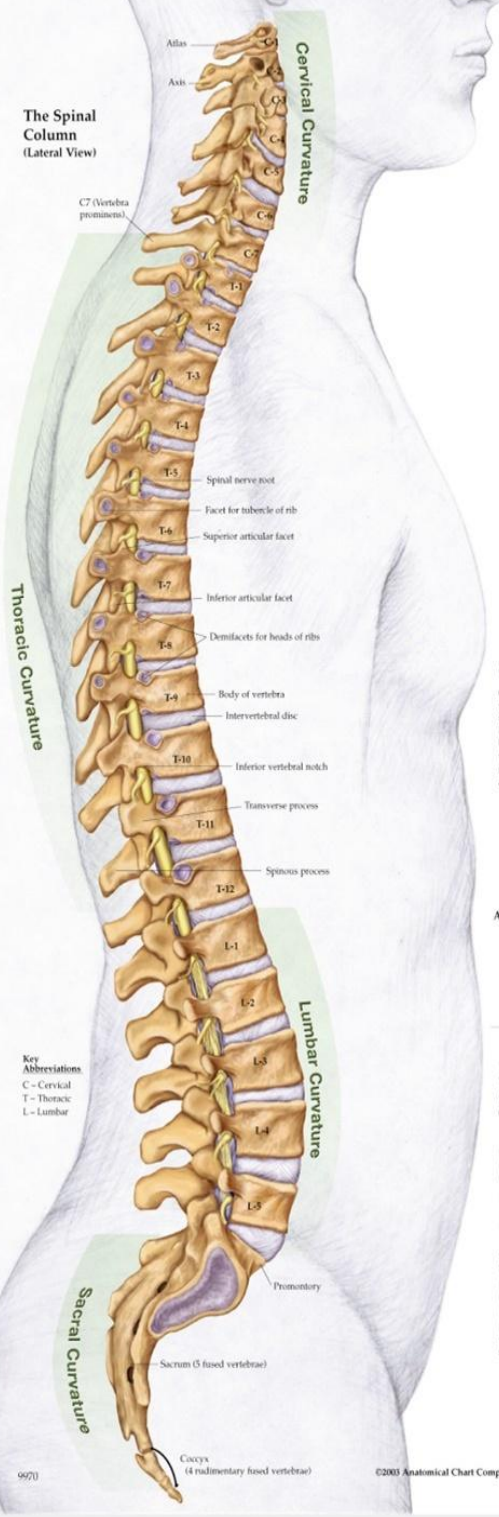
A Typical Cervical Vertebra (Superior View)



Typical Vertebrae (Superior View)



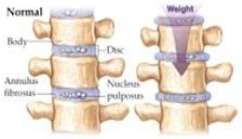
The Spinal Column (Lateral View)



Structural Features of an Intervertebral Disc (Schematic)

The nucleus pulposus is the central gelatinous cushioning part of the intervertebral disc enclosed in several layers of cartilaginous laminae. The nucleus pulposus becomes dehydrated with age.

Function of Intervertebral Discs



The disc, which contains nucleus pulposus, functions to protect the vertebrae from pressure.

Pathology

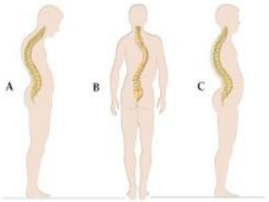
Osteoporosis

Osteoporosis develops when the body loses bone more quickly than it can make new bone. As a result, bones become less dense at the core and lose thickness at the surface. This increases the bones' susceptibility to fracture.

When osteoporosis involves the lumbar region, the vertebral bodies become markedly biconcave and the discs are ballooned.

Compression fractures commonly occur at the thoracolumbar vertebral junction, resulting in wedge-shaped vertebrae.

* Fractures of laminae, pedicles, or transverse processes of the vertebrae are common.



A. Hyperkyphosis
An excessive rounding of the thoracic vertebral column (humpback or hunchback).

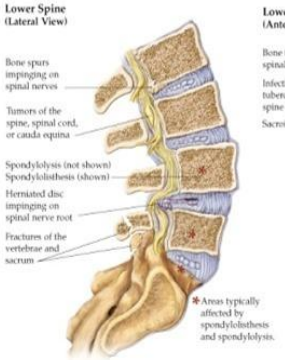
B. Scoliosis
A curvature of the spine, often with twisting of the spinal column.

C. Hyperlordosis
A forward/anterior curvature of the cervical and lumbar (lower back) regions of the spine. In the lumbar region, it is also called "swayback."

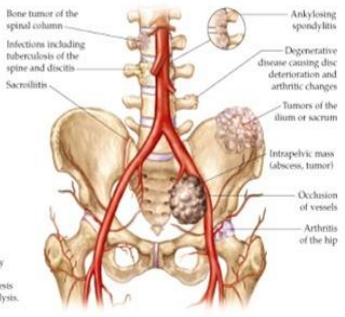
Causes of Pain in the Back or Extremities

Shown below are other causes of pain that the examining physician should consider in making the diagnosis.

Lower Spine (Lateral View)



Lower Spine and Pelvic Region (Anterior View)



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LIPPINCOTT WILLIAMS & WILKINS

Adult Fracture Management in A&E

UPPER LIMB

				
Single collar and cuff	**Double collar and cuff**	**Poly Sling**	**Broad arm Sling**	**High arm sling**

Diagnosis	Initial A&E Treatment	Management
Sterno Clavicular joint Dislocation – Anterior	Polysling, Analgesia	Refer to virtual fracture clinic
Sternoclavicular joint dislocation	Polysling, Analgesia	Refer to Ortho on-call team
Clavicle fractures - Open fracture, threat to skin and/or neurovascular compromise	Polysling/double loop collar and cuff Analgesia	Refer to Ortho on-call team
Clavicle Fracture - Closed injury, no threat to skin or neurovasular compromise	Polysling/double loop collar and cuff Analgesia	Refer to virtual fracture clinic Discharge with Analgesia (Pain Killers) - patient information leaflet Ł
Acromioclavicular joint injuries	Polysling/double loop collar and cuff Analgesia	Refer to virtual fracture clinic Discharge with Analgesia (Pain Killers) - patient information leaflet Ł
Proximal biceps tendon injuries and Rotator Cuff tears	Polysling or double loop collar & cuff Analgesia	Email referral to samehansara@nhs.net Physiotherapy referral Discharge with Shoulder Injury Advice Leaflet Ł
Distal Bicep tendon rupture	Polysling or double loop collar & cuff Analgesia	Refer to Ortho on-call

SHOULDER AND ELBOW

Socket of Right Shoulder Joint

(Lateral view)

Ligaments Shown:
A – Posterior inferior glenohumeral ligament
B – Middle glenohumeral ligament
C – Anterior inferior glenohumeral ligament

Posterior View of Right Shoulder

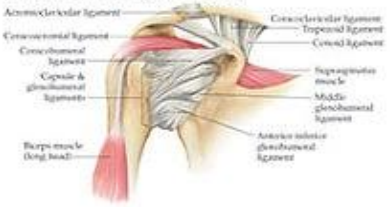
Lateral View of Right Shoulder

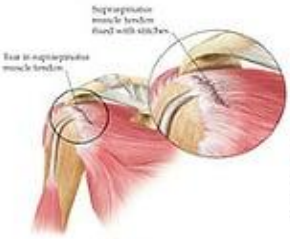
Superior View of Right Shoulder

Anterior Dislocation of Humerus

The most common type of shoulder dislocation is anterior. It occurs when there is excessive force on the abducted and externally rotated arm, resulting in anterior displacement of the humeral head and a disruption of the shoulder capsule.

Anterior View of Right Shoulder





Lateral View

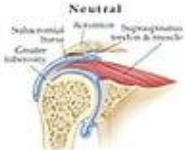
Acromioplasty

Acromioplasty is a type of surgery done to surgically remove the coracoacromial ligament (a) and the anterior tip and undersside of the acromion (shaded gray) (b).

Rotator Cuff Tear

The rotator cuff is made up of the tendons from the subscapularis, the supraspinatus, the infraspinatus, and the teres minor muscles. Tearing of these tendons, which are primarily responsible for shoulder joint motion, can result from trauma or chronic impingement. Surgical repair may be necessary to restore function.

Neutral

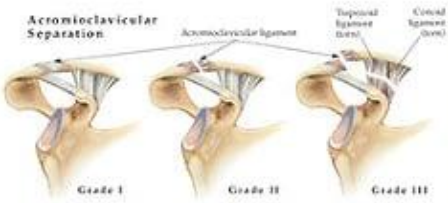


Abduction

Impingement Syndrome

Impingement syndrome is one of the most common shoulder problems. When the arm is abducted past 90°, the greater tuberosity of the humerus compresses the rotator cuff against the acromion causing pain and decreased motion in the shoulder.

Acromioclavicular Separation



Sagittal Section of Right Elbow

(Medial View)

Supination

Pronation

Extension of Right Elbow

(Posterior View)

Flexion of Right Elbow

(Posterior View)

Fractures

T- or Y-shaped fractures typically happen when an indirect force causes the olecranon to hit the joint surface of the humerus, causing the end to split.

Tennis Elbow

Tennis elbow is a degenerative process in which the injury occurs deep within the tendon itself. It may result in chronic pain on the lateral aspect of the elbow.

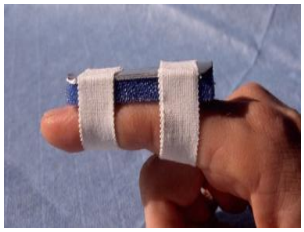
Anterior Shoulder dislocations	Analgesia * Assess Neurology (especially axillary nerve) before and after procedure Reduce Broad arm Sling	Refer to virtual fracture clinic * Consider Sedation Leaflet if appropriate
Posterior shoulder dislocations First presentation.	Analgesia Assess Neurology *Seek advice from ortho oncall before attempting to reduce Reassess Neurology Broad arm Sling	Refer to virtual fracture clinic * Consider Sedation Leaflet if appropriate
Previous multiple posterior shoulder dislocations (normally due to multidirectional instability)	Analgesia Assess Neurology Reduce Reassess Neurology Broad arm Sling	Refer to virtual fracture clinic * Consider Sedation Leaflet if appropriate
Acute Atraumatic Shoulder Pain (including Calcific Tendonitis)	Exclude Red flags of painful joints. π Analgesia Collar & Cuff (single or double loop)	Refer to GP for further management and physiotherapy. Discharge with Shoulder Injury Advice Leaflet Ł
Proximal humeral fractures Greater tuberosity and or surgical neck fracture	Single loop Collar & Cuff Analgesia	Refer to virtual fracture clinic
Humeral shaft fractures Open fracture, significantly displaced or radial nerve injury	Triangle Sling for comfort analgesia	Refer to Ortho on-call
Humeral shaft fractures Closed fracture, reasonable alignment & radial nerve intact	Analgesia Functional Humeral Brace ex: Beagle Brace	Refer to virtual fracture clinic
Lateral Epicondylitis (Tennis Elbow) https://osamds.com/lateral-epicondylitis-tennis-elbow-video/	Analgesia	Discharge Physiotherapy
Medial Epicondylitis (Golfer's Elbow) https://osamds.com/medial-epicondylitis-golfers-elbow-video/	Analgesia	Discharge Physiotherapy

Olecranon fractures Undisplaced	Above elbow backslab Collar and Cuff Analgesia	Refer to virtual fracture clinic
Olecranon fractures - Displaced	Triangle Sling for comfort Analgesia	Refer to Ortho on-call
Radial head/neck fractures Radiohumeral joint normal anatomy & no associated fracture of ulna.	Collar & cuff (single or double loop) Analgesia	Discharge with Radial Neck or Head Fracture advice leaflet Ł
Radial head/neck fractures Radiohumeral joint subluxed or dislocated and or associated fracture of ulna	Triangle Sling for comfort analgesia	Refer to Ortho on-call Admit for ORIF
Dislocated elbow	Relocate under sedation Above elbow back slab with elbow in 90 degrees flexion Analgesia	Refer to virtual fracture clinic
Radial & ulna midshaft fractures Eg: galeazzi fracture, monteggia fracture etc.	Triangle Sling for comfort analgesia	Refer to Ortho on-call Admit for ORIF

Adult Fracture Management in A&E
Hand and Wrist

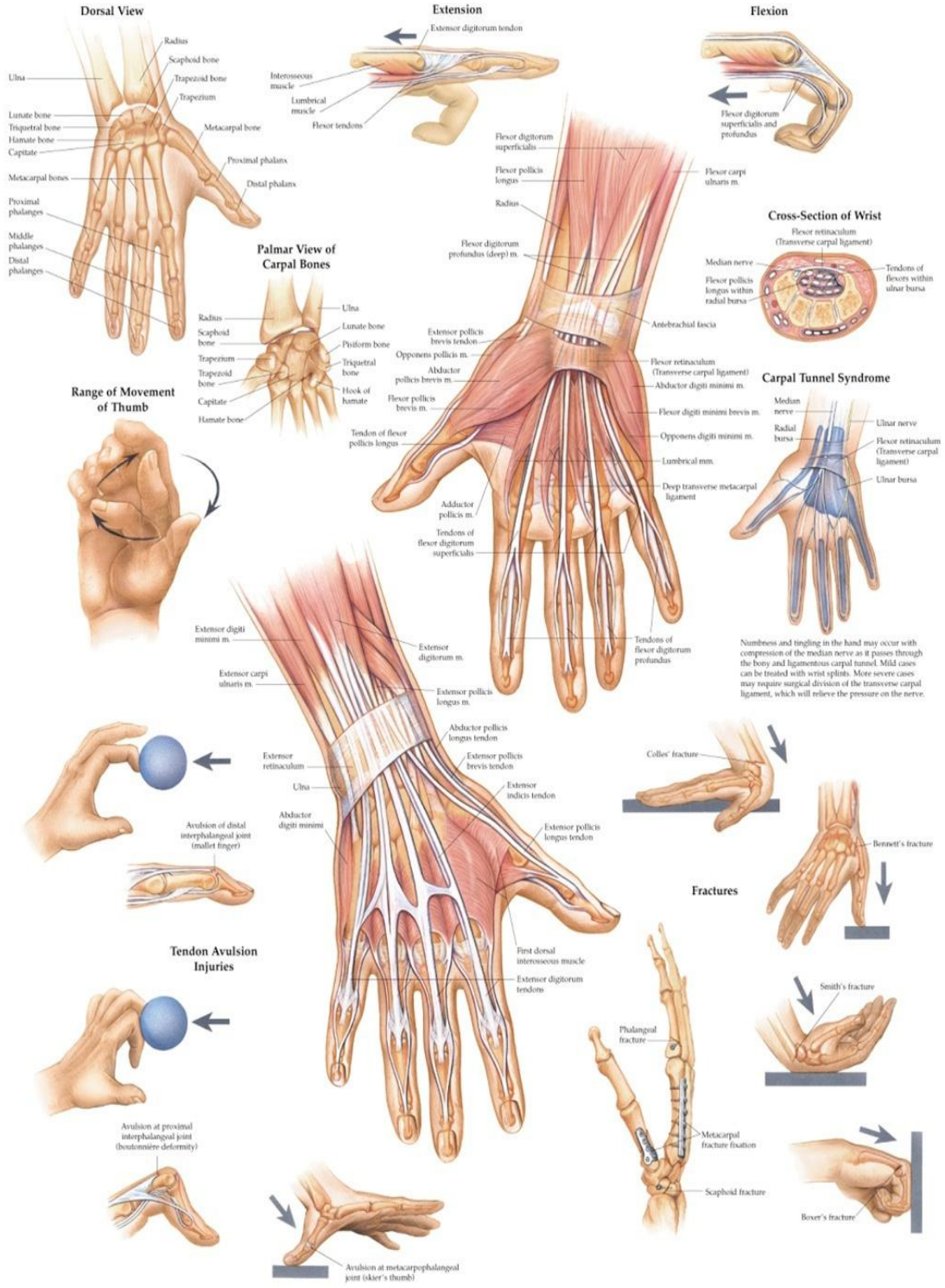
Diagnosis	Initial A&E Treatment	Management
High pressure injection injury	Analgesia	Urgent referral to Ortho on-call
Open fracture / joint fracture **Possible tendon injury** **Possible nerve injury** **Crush injury** **Concerning open wound** **Concerning infection** **Irreducible dislocation**	**Analgesia**	**Refer to Ortho on-call**
Displaced Distal radial fractures – Colles Fracture - check median nerve	Reduce if appropriate Back slab	Refer to virtual fracture clinic * Consider Sedation Leaflet if appropriate Ł
Displaced Distal Radius fracture - Smiths / Bartons Fracture	Analgesia Triangle sling / Back slab for comfort	Refer to Ortho on-call admit for ORIF
Injured wrist - no obvious fracture/possible scaphoid	Analgesia Orfit Gauntlet Thumb Position Splint	Refer to ED Review clinic in 2 weeks. Discharge with Gauntlet Splint advice leaflet Ł
Suspected Scaphoid Fracture	Analgesia Xray (Scaphoid view) Gauntlet Splint	Arrange ED returns clinic in 10-14 days for review and repeat Scaphoid Xray. If in pain consider MRI.
Scaphoid fracture	Analgesia Scaphoid cast / backslab	Refer to virtual fracture clinic.
Other carpal fracture/injury – check median nerve	Analgesia Xray (Scaphoid view) Back slab if appropriate	Refer to Ortho on-call
Thumb fractures - Distal phalanx	Analgesia Reduce if needed Mallet splint	Refer to virtual fracture clinic
Other fractures of thumb or ligament injury (Radial collateral or ulnar collateral ligament)	Analgesia Reduce if needed Gauntlet Splint / Thumb cast	Refer to Ortho on-call
Metacarpal Closed fractures Displaced Fracture / Rotational deformity	Analgesia Buddy strap for comfort	Refer to Ortho on-call

Metacarpal Closed fractures(II – IV) – Neck Undisplaced	Bedford Splint / Buddy strap neighbouring finger	Refer to virtual fracture clinic
Metacarpal Closed fracture(V - little finger) – Neck Undisplaced	Bedford Splint / Buddy strap neighbouring finger	Discharge with 5th Metacarpal neck Fracture advice leaflet Ł
Metacarpal Closed Fractures – Shaft Undisplaced	Futura Splint	Refer to virtual fracture clinic
Metacarpal Closed Fractures – Base Undisplaced	Back slab / Futura splint	Refer to virtual fracture clinic
Phalangeal fractures	Reduce if needed Bedford Splint / Buddy strap	Refer to virtual fracture clinic
Ulnar collateral ligament Injury **Skiers Thumb without fracture** Skier's thumb is a partial or complete rupture of the ulnar collateral ligament of the metacarpophalangeal joint of the thumb. **https://osamds.com/thumb-ulnar-collateral-ligament-ucl-injury-video/**	Analgesia https://www.youtube.com/watch?v=sAzgUuvUDvo Xray Gauntlet Splint	Discuss with ortho on-call

Volar Plate Injuries A hyperextension injury causes an avulsion flake fracture from the volar surface of the base of the middle phalanx https://osamds.com/volar-plate-injuries-video/	Neighbour strapping (buddy splint) to adjacent finger. Buddy strapping allows the injured finger to move whilst also protecting it.	Discharge with Volar Plate Injury – Discharge advice leaflet **Ł** *If associated Fracture > 50% of the total surface of the phalanx please discuss with ortho on call.
Central Slip Avulsion fracture an avulsion fracture from the dorsal surface of the base of the middle phalanx https://osamds.com/boutonniere-deformity-video/	 Flexion block Zimmer Splint for 4 weeks	Refer to virtual fracture clinic
Mallet Fingers Extensor tendon is avulsed from the base of the distal phalanx with or without a bony fragment. The distal phalanx droops down when the patient holds their fingers in extension https://osamds.com/mallet-finger-video/	 Mallet Splint for 8 weeks	No follow-up by GP or fracture clinic is required. No follow-up x-ray is needed Discharge with **Mallet Finger** Advice leaflet **Ł** *If associated Fracture > 50% of the total surface of the phalanx please discuss with ortho on call.

	
Gauntlet splint	Futura Splint

HAND AND WRIST



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Adult Fracture Management in A&E

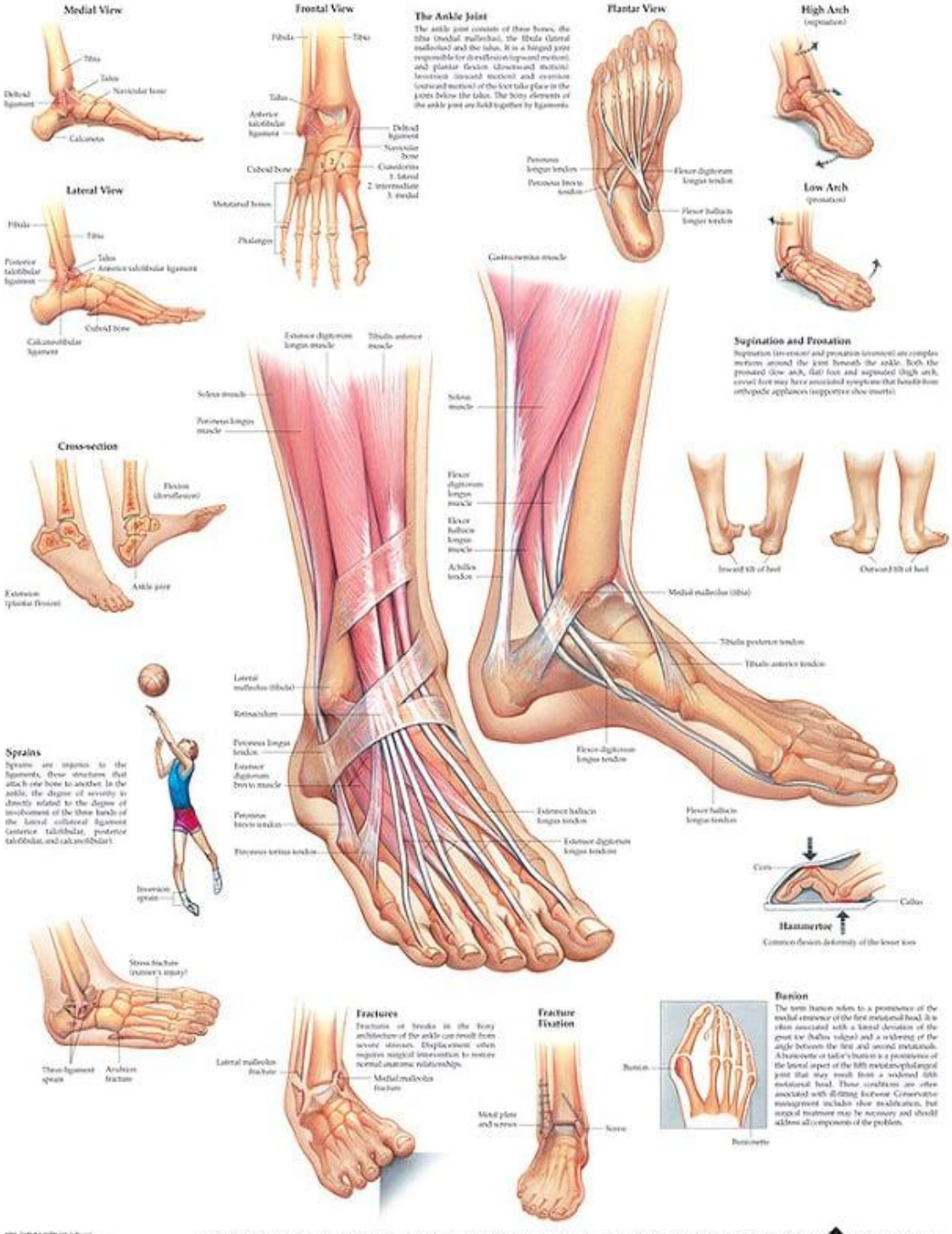
Lower Limb

Diagnosis	Initial A&E Treatment	Management
Pelvic fracture Anterior Posterior Compression Lateral Compression Vertical Sheer	Treat Hypovolaemia Pelvic binder Analgesia	Urgently Refer to Ortho on-call
Pelvic Fracture Low energy – Pubic rami Fractures	Analgesia Investigate cause of Fall	Discharge if Mobilising Full weight bearing or nursing home resident Admit under the Orthopaedic team if not weight bearing/ unsafe discharge
Pelvic Fracture Avulsion Fracture	Analgesia	Refer to virtual fracture clinic
Acetabular fracture		Refer Ortho on-call
Neck of Femur Fracture (NOF)	Please follow NOF pathway	Refer Ortho on-call
Dislocated Native Hip or First Total hip replacement.	Analgesia	Refer Ortho on-call For reduction in theatre
Dislocated Total hip replacement with previous dislocations	Analesgia	Refer Ortho on-call Admit under Orthopaedics
Hip pain post fall, no fracture on plain x-ray	Analgesia	Discharge If able to fully weight bear If unable to Fully weight bear admit under ortho oncall.
Femoral shaft fracture	Analgesia Fascia Illiacus Nerve Block Assess for Hypovolaemia Apply Thomas Splint before Xray	Refer Ortho on-call
Distal femoral fracture	Analgesia Assess for Hypovolaemia Apply Thomas Splint	Refer Ortho on-call
Thigh injury/haematoma	Exclude compartment syndrome	Refer to GP Physiotherapy review
Calf Muscle Tear example Gastronemius tear	Analgesia Assess for compartment syndrome Crutches, Boot and wedges for comfort if required. Advised to wean off wedges as soon as able.	Arrange an appointment in ED Returns Clinic Discharge with Weight bear as tolerated. If unable to weight bear or unsafe discharge refer to Ortho oncall

Achillian Tendon Rupture – Complete or partial If diagnosis in doubt consult A&E senior or Ortho Registar on-call	Analgesia Equinas Cast DVT profilaxis	Please follow Achillian tendon rupture pathway and arrange Fracture clinic appointment.
Soft tissue knee injuries Mild soft tissue knee injury	Analgesia Reassure likely to resolve with time Mobilise FWB	See GP 6/52 if still symptomatic
Soft tissue knee injuries Suspected meniscal or ligament injury, with full extension		Refer to ED Returns Clinic Discharge with Weight bear as tolerated. IF significant On-line referral to virtual fracture clinic
Soft tissue knee injuries Patella tendon rupture or quads tendon rupture Suspected meniscal or ligament & block to full extension		Refer as locked knee to Ortho on-call Tubigrip or cricket pad splint
Atraumatic swollen knee Apyrexial, normal CRP & WCC. No infection or other red flags.	Analgesia	Refer to Medical On-call.
Atraumatic swollen knee pyrexial, raised CRP & WCC – Septic arthritis , recent surgery	Analgesia	Refer to Ortho on-call
Patella Fracture Un-displaced	Analgesia	Cricket pad splint Full weight bearing Refer to virtual fracture clinic
Patella Fracture Displaced or vulnerable to displacement	Analgesia Knee brace splint	Refer to Ortho on-call
Patella dislocation	Reduce AP, Lateral & Skyline x-ray	Knee brace splint Full WB, crutches if required Refer to virtual fracture clinic
Tibial plateau fractures	Above knee backslab	Refer Ortho on-call
Tibia Proximal	Analgesia Above knee backslab	Refer Ortho on-call
Tibia Shaft: undisplaced	Analgesia Above knee backslab	Refer Ortho on-call
Tibia Shaft: displaced	Analgesia Reduce & above knee backslab	Refer Ortho on-call
Tibia Distal/Pilon fractures		Refer Ortho on-call

Proximal and Mid-shaft fibula fractures	Screen for ankle pain/possible maisonneuve injury. If positive, refer to Ortho on-call. If negative: Crutches Weight bear as tolerated	Refer to virtual fracture clinic
Mid-shaft fibula fracture	Screen for ankle pain/possible maisonneuve injury. If positive, refer to Ortho on-call. If negative: Boot for comfort (optional) Crutches Weight bear as tolerated	Refer to virtual fracture clinic

FOOT AND ANKLE



Adult Fracture Management in A&E
Ankle and Foot

Soft tissue ankle injury/sprain	Analgesia Weight bear as tolerated	Discharge with Ankle Injury - patient information leaflet See GP 6/52 if still symptomatic
Ankle Fracture Weber A fibula fracture	Analgesia Black boot Weight bear as tolerated	Refer to virtual fracture clinic
Ankle fracture Weber B fibula fracture No talar shift	Black boot Weight bear as tolerated	Refer to virtual fracture
Ankle fracture Weber B fibula fracture With Talar shift	Analgesia Reduce Backslab	Refer Ortho on-call
Ankle fracture Weber C No talar shift	Analgesia Black boot	Refer to virtual fracture clinic
Ankle fracture Weber C Talar shift	Analgesia Reduce Backslab	Refer Ortho on-call
Ankle fracture Bimalleolar/trimalleolar if significant neurovascular compromise	analgesia Reduce Backslab	Refer Ortho on-call
Ankle fracture Isolated medial malleolus Undisplaced	Analgesia X-Ray of full length tibia/fibula must be done to rule out proximal fibula fracture. If fracture identified, refer to ortho on call.	If no proximal fibula fracture: Black boot Weight bear as tolerated. On-line referral to virtual fracture clinic
Ankle fracture Isolated medial malleolus Displaced	Analgesia Reduce if indicated	Refer Ortho on-call
Hindfoot injuries Talus fractures +/- dislocation	Analgesia Assess other foot for injuries CT Backslab	Refer Ortho on-call

Hindfoot injuries Small avulsion fractures of talus / calcaneum	Analgesia Assess other foot for injuries Black boot Weight bear as tolerated	Refer to virtual fracture clinic
Hindfoot injuries Calcaneus fracture (Undisplaced or displaced)	Analgesia Assess other foot for injuries CT Backslab	Refer Ortho on-call
Midfoot injuries Tarsal fractures - Undisplaced Lis-franc fracture / dislocation Including suspected on basis of mechanism / swelling / planter bruising	Backslab CT Non Weight bearing	Refer Ortho on-call
Ist metatarsal fracture	Black boot / Barouq shoe Heel weight bear	Refer to virtual fracture clinic
2nd-4th metatarsal - single or multiple fractures	Black boot / Barouq shoe Weight bear as tolerated	Refer to virtual fracture clinic
5th Metatarsal Fracture	Black boot/loose shoe Weight bear as tolerated	Discharge with Fracture of base of 5th metatarsal fracture leaflet Ł
Hallux phalanx fracture - intra-articular	Black boot/loose shoe Weight bear as tolerated	Refer to virtual fracture clinic
Hallux Phalanx fracture - undisplaced	Black boot three weeks Weight bear as tolerated	Discharge
Hallux Phalanx fracture - displaced	Reduce Black boot three weeks Weight bear as tolerated	Refer to virtual fracture clinic
Lesser phalanx fracture	Neighbour strap two weeks Weight bear as tolerated	Discharge
Toe dislocations	Reduce Neighbour strap two weeks Weight bear as tolerated	Discharge unless reduction is unstable no follow up If unstable, Refer to virtual fracture clinic.
Hallux phalanx fracture - intra-articular	Black boot/loose shoe Weight bear as tolerated	Refer to virtual fracture clinic