

10 Musculoskeletal system

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Broken bones — simple and compound fractures



For joint injuries — see *Reduction of dislocated or pulled joints (p263)*, *Joint sprains and strains (CARPA STM p393)*

Managing possible fractures

Remember — *Assessing trauma – primary and secondary survey (p27)*.

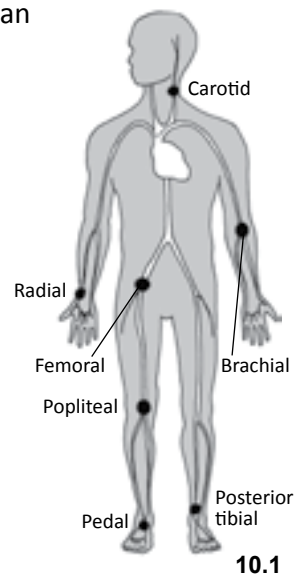
Ask

- About pain — when it started, is it getting worse
- About swelling and disability
- How it happened, were there any witnesses
- What caused the break
 - High speed, eg car accident — could be more serious compound fracture
 - Low speed, eg simple fall — could be underlying pathological cause, eg osteoporosis
 - Repetitive movement causes pain, eg running — could be stress fracture

Check

- **For signs of fracture/dislocation**
 - Swelling
 - Most injuries swell. Keep checking to see how much swelling there is — very important if bandages, splints, casts or slabs used
 - If swelling happens very quickly — think about fracture, dislocation, ligament/tendon rupture
 - Skin — compound fracture will have break in skin
 - Bones — at wrong angle (deformity), tender when palpated on *any* side
 - Gently feel bones that may be broken
 - **Do not** palpate obviously broken bone — causes pain
 - **Do not** actively look for bone grating (crepitus)
 - Joints — abnormal shape (deformity) or movement
 - Movement — may be limited
- **Joints** — joints on either side of injury (proximal and distal)
- **For signs of problems caused by fracture/dislocation**
 - Cool or cold limbs — may mean arterial injury
 - Sensation — reduced or altered feeling may mean nerve injury

- Peripheral pulses — F 10.1. Weak or none may mean damage to artery
- Worsening pain or tense/firm muscle group — may mean **compartment syndrome** (*below*)
- Related injuries and complications, eg internal bleeding, organ damage, nerve damage
- Allergies or adverse reactions that will affect choice of analgesia, dressings, antibiotics
- Age
 - Children — consider greenstick fractures, growth plate injuries, physical abuse
 - Elderly — bones may be weakened by disease (eg osteoporosis, cancer) and break with very little force (pathological fractures), injury may be caused by existing medical condition, eg fall due to dizziness, sepsis, arrhythmia, stroke, internal bleeding, medicines



Compartment syndrome

- Surgical emergency
- Diagnosed using the Ps
 - **P**ain keeps getting worse even after pain relief, worse than expected for injury
 - **P**assive movements make pain worse, especially bending toes or fingers back (extension)
 - **P**aresthesia (tingling) and **P**rogressive **P**aralysis follow
 - **P**oor circulation (cool skin) — **P**allor (hands, feet) and **P**ricking skin are late signs
 - **Do not** wait for loss of **P**eripheral **P**ulses — F 10.1. Too late to save limb

Do not

- **Do not** use the following (HARM) in first 2 days (48 hours) — they will make associated soft tissue injuries worse
 - **H**eat
 - **A**lcohol, aspirin, anti-inflammatory medicines
 - **R**unning, strong exercise
 - **M**assage

Do

- **If signs of nerve or circulation problems** (cool, pulseless limbs) — gently straighten limb, apply firm traction until pulse returns. **Medical consult**
- Give pain relief, eg analgesics, splints

- Take off any jewellery, watches, rings. Keep them somewhere safe
- If you suspect compartment syndrome — loosen bandages/slabs/splints, elevate limb as much as possible. **Medical consult**
- Treat with **RICE** — relieves pain, stops further damage by reducing swelling and keeping injury still
 - **R**est — immobilise broken limb using sling, splint/slab
 - **I**ce — apply ice or frozen peas for 15–20 minutes every 1–2 hours, then gradually less often over next 24 hours. **Do not** put frozen material directly on skin
 - **C**ompression — apply compression bandage over splint/slab to reduce swelling, give support, immobilise. Bandage should be firm but not tight enough to cause pain. Put on during and after ice
 - **E**levation — lift (elevate) in sling or with pillows after putting on splint/slab, to prevent swelling. Lower limb fracture should be higher than pelvis
- See *Bandaging (p230), Splinting (p235), Slings (p233), Fibreglass (p258), Plaster of Paris slabs and casts (p241)*
- See *Fracture types (p227)*

Keep checking

- **End of limb for signs of poor blood supply** (circulation) — see *Compartment syndrome (p225)*
- How much swelling — are bandages too tight

Compound fractures

If bone exposed to outside environment — compound or open fracture.

- Bone does not always poke through skin, may just be small skin puncture
- Treat all wounds near broken bone as compound fracture
- When skin broken — high risk of infection of tissues and bone
- Treat facial fractures involving sinuses as compound fractures

Check

- Look for exposed bone
- Tetanus status, give if needed (*CARPA STM p438*)

Do not

- **Do not** poke or probe wound
- **Do not** suture wound if there could be fracture underneath
- **Do not** let person eat or drink anything — will need operation

Do

- Control any bleeding

- Clean and wash out wound with **normal saline** in syringe
- Cover wound with sterile, saline-soaked dressing
- Put on back slab or splint, depending on site of wound
- **Medical consult** about IV antibiotics and fluids

Fracture types

Fractured skull

- See *Skull fracture (CARPA STM p83)*

Fractured jaw

- See *Broken jaw (CARPA STM p361)*

Fractured collarbone (clavicle)

- See *Splinting collarbone (p235)*

Fractured hand/arm

- See *Splinting (p235), Plaster of Paris slabs and casts (p241)*

Fractured fingers/toes

- See *Splinting single finger/toe (p237)*

Fractured ribs

- Most fractured ribs are not complicated
- If a lot of pain or person unwell — think about
 - Flail chest (*CARPA STM p75*)
 - Damage to organs under fracture, eg lungs, liver with right lower rib fractures, spleen with left lower rib fractures

Check

- For pain when you spring chest. Gently squeeze chest once from side to side or front to back
 - If no pain — unlikely to be fractured rib
- Pulse, BP, RR, O₂ sats

Do

- Give pain relief (*CARPA STM p399*)
- Encourage person to do regular coughing and breathing exercises (10 deep breaths and 2 coughs every hour) to lessen risk of pneumonia
 - If they can't do this — **medical consult**, may need to go to hospital

- X-rays of little use — unless worried about pneumothorax

Remember: Pneumothorax may develop over time. Think about this if having trouble breathing later (*CARPA STM p72*)

Fractured pelvis

- It takes a lot of force to fracture pelvis
- In high energy trauma, often bladder and/or abdominal injuries as well

Check

- Signs of internal bleeding (haemorrhage) eg fast heart rate, low BP, poor perfusion. Can be immediately life threatening
- Posture — rotation/shortening of lower limb
- Pain around hips when moving
- Palpate for focal tenderness
- For blood coming from urethra, scrotal/perineal bruising
- U/A for blood

Do not

- **Do not** spring pelvis
- **Do not** let person eat or drink anything — may need operation

Do

- Give **oxygen** by non-rebreather mask, 15L/min
- Splint (*p238*)
- Put in 2 IV cannula (*p85*), largest possible. Start IV fluids — maintain hydration and blood volume
- **Medical consult**
- Think about indwelling urinary catheter (female *p410*, male *p498*)

Fractured knee, ankle or foot

Do

- Use Ottawa rules to help assess injury
 - If x-ray not needed — see *Joint sprains and strains (CARPA STM p393)*
- See *Splinting (p235)*, *Plaster of Paris slabs and casts (p241)*

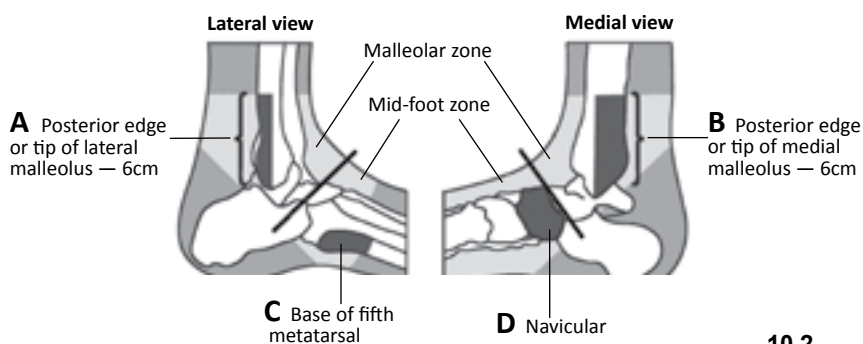
Ottawa knee rules

- Knee x-ray only needed if any of
 - Under 18 or over 55 years
 - Tenderness of knee cap (patella) only — no bone tenderness in other parts of knee

- Tenderness at head of fibula
- Unable to bend leg to 90°
- Not able to bear weight straight after injury or when examined in clinic
 - Takes 4 steps — can't bear weight twice on each leg even when limping

Ottawa ankle rules — F 10.2

- Ankle x-ray only needed if pain in malleolar zone *AND* any of
 - Bone tenderness at A — posterior edge (6cm) or tip of lateral malleolus
 - Bone tenderness at B — posterior edge (6cm) or tip of medial malleolus
 - Not able to bear weight straight after injury or when examined in clinic
 - Takes 4 steps — can't bear weight twice on each leg even when limping



10.2

Ottawa foot rules — F 10.2

- Foot x-ray only needed if pain in mid-foot zone *AND* any of
 - Bone tenderness at C — base of 5th metatarsal
 - Bone tenderness at D — navicular
 - Not able to bear weight straight after injury or when examined in clinic
 - Takes 4 steps — can't bear weight twice on each leg even when limping

Bandaging



Attention

Remember — *Assessing trauma – primary and secondary survey (p27).*

Circulation and sensation — after bandaging check hands/fingers, feet/toes for colour, warmth, sensation, movement, capillary refill, peripheral pulses — F 10.1 (p225). If any not normal — take off bandage.

- Ask person if bandage is too tight or too loose
- Remember, the bigger the limb, the bigger the bandage
- Start bandaging from inside of limb, wind bandage on so you cover a bit more than half the bandage you have just laid down

What you need

- Bandages for size of limb
- Tape to secure bandage

What you do

Bandaging a head

- Simple way to cover head wound using triangular bandage — F 10.3, F 10.4.



10.3



10.4

Bandaging an arm

- Wrap end of bandage around wrist twice — F 10.5
- Move up arm, finish at elbow or top of arm — F 10.6
- Check circulation and sensation (*above*)



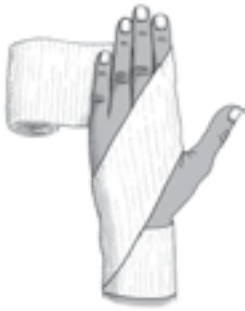
10.5



10.6

Bandaging a hand

- Wrap end of bandage around wrist twice
- Cross bandage over back of hand to between thumb and index finger — F 10.7 (p231)
- Go around knuckles once — F 10.8 (p231)
- Go over hand again, crossing from little finger to wrist — F 10.8 (p231)
- Repeat until hand covered — F 10.9 (p231)
- Can use sling to rest hand after bandaging



10.7



10.8



10.9

- Triangular bandage can be used — good to control bleeding palm
 - Make hand into fist while holding combine or non-adherent dressing
 - Cover whole hand with triangular bandage, tie at wrist
- Check circulation and sensation (p230)

Bandaging a finger/toe

- Use stretchy tubular bandage
- Cut length 4 times longer than finger
- Flatten tube, cut along length with scissors to about halfway down
- Put uncut end over finger, twist strip at fingertip — F 10.10
- Bring cut ends back over finger and tie around palm and wrist — F 10.11
- Make sure ends around wrist are wide. More comfortable, less risk of cutting off circulation
- Check circulation and sensation (p230)



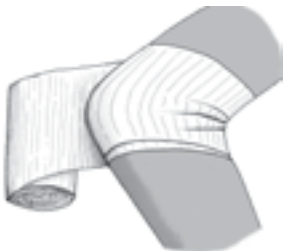
10.10



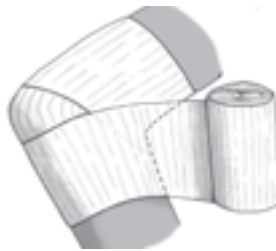
10.11

Bandaging elbow or knee joint

- Have person bend elbow/knee slightly. Put pillow under thigh to help lift knee
- Wrap bandage around arm/leg below elbow/knee twice — F 10.12
- Go over inside of elbow/knee and around arm/leg above joint — F 10.13
- Go over inside of elbow/knee and around arm/leg below joint again — F 10.14
- Check circulation and sensation (p230)



10.12



10.13

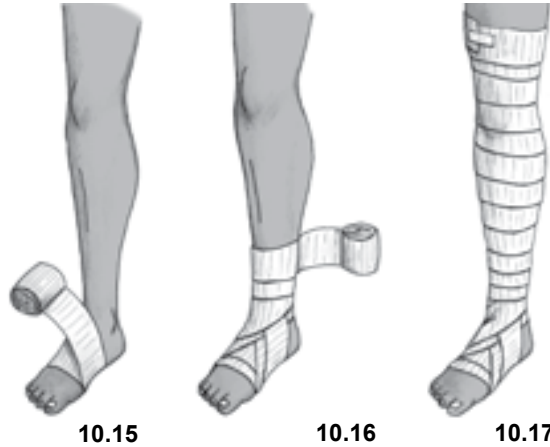


10.14

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Bandaging a leg

- Wrap end of bandage around foot twice — F 10.15
- Bandage ankle — F 10.16
- Go up leg — F 10.17
- Check circulation and sensation (*p230*)



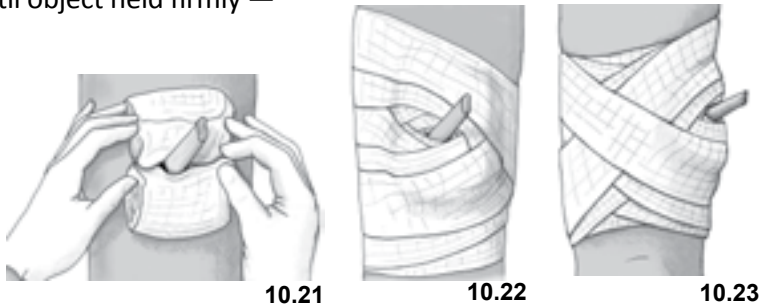
Bandaging a foot

- Wrap end of bandage around ankle twice
- Cross bandage over top of foot to little toe, then wrap around foot — F 10.18
- Come from under foot near big toe, cross over top of foot to ankle — F 10.19. Repeat — F 10.20
- Check circulation and sensation (*p230*)



Bandaging wounds with protruding objects

- **Do not** take object (eg knife, spear, glass) out of wound
- **Do not** poke around in (probe) wound
- Put rolled bandage on each side of object to support it firmly — F 10.21
- Use figure of 8 technique and 2 more bandages to bandage around the 2 support rolls until object held firmly — F 10.22, F 10.23
- Check circulation and sensation (*p230*)



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Slings



Used to support or lift up (elevate) arm after injury to arm or shoulder. Also for elevation to decrease bleeding and swelling.

Attention

- When tying sling/cuff behind neck — have knot off to one side so it doesn't rub
- 5 minutes after putting on sling, check it hasn't come loose, stretched, dropped down, changed position
- If you don't have proper sling — use whatever you can find, eg towels, sheets, bandages etc, but watch for stretching

Circulation and sensation — after putting on sling check hands/fingers, feet/toes for colour, warmth, sensation, movement, capillary refill, peripheral pulses — F 10.1 (p225). If any not normal — take off sling.

Simple sling

What you need

- Triangular bandage
- Safety pin/tape

What you do

- Support injured arm at wrist and bend elbow
- Open up bandage and place under injured arm — F 10.24
- Tie 2 far ends of sling together around neck
 - Make sure hand is slightly higher than elbow — F 10.25
- Bring loose end around elbow and pin/ tape down, so it doesn't get caught on furniture, door handles etc



10.24



10.25

Collar and cuff sling



10.26



10.27



10.28

Elevation sling



10.29



10.30



10.31

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Splinting



Used to support and immobilise bone you suspect is broken, or for painful soft tissue damage.

Attention

Remember — *Assessing trauma – primary and secondary survey (p27).*

Circulation and sensation — after putting on splint check hands/fingers, feet/toes for colour, warmth, sensation, movement, capillary refill, peripheral pulses — F 10.1 (p225). If any not normal — take off splint.

- **Padding** — use combines, shirts, jumpers, towels, blankets, cushions etc
- **Splints** — best if made for the job, but you can use any rigid or firm material, eg thick folded blankets, sticks, cardboard boxes
- **Bandages for splinting** — thick, strong triangular bandages used for slings are best, but ordinary bandages will do
- Tie all knots **away** from injured area
- Check bandages are not too tight or uncomfortable — ask person, check circulation
- Splint needs to cover joints on either side of injury to prevent movement

Remember: Offer pain relief before splinting (*CARPA STM p399*), check distal circulation before and after splinting.

Splinting collarbone

What you need

- Padding
- 2 triangular or ordinary bandages

What you do

- Offer pain relief (*CARPA STM p399*)
- Person sits in comfortable chair
- Put padding under armpit on side of injury — F 10.32 (p236)
- Tie first bandage around upper arm and chest — F 10.33 (p236)
- Put on elevation sling (p234) — F 10.34 (p236) or collar and cuff sling (p234)
- Check circulation and sensation in hand (*above*)



10.32



10.33



10.34

Splinting upper arm — break not close to elbow

What you need

- Padding
- 3 triangular or ordinary bandages

What you do

- Offer pain relief (*CARPA STM p399*)
- Person sits on comfortable chair
- Put on a collar and cuff sling (*p234*) — F 10.35
- Put padding between arm and chest
- Tie one bandage around arm and chest below break, another above break — F 10.36
- Check circulation and sensation in hand (*p235*)



10.35

Splinting wrist or forearm

Attention

- Splint needs to go from elbow to fingertips

What you need

- Splint
- 4 triangular bandages

What you do

- Offer pain relief (*CARPA STM p399*)
- Person sits in comfortable chair
- Put forearm and hand on splint, palm downwards — F 10.37
- Tie 1st bandage around arm and splint, between elbow and the break — F 10.38



10.36



10.37



10.38



10.39

- Tie 2nd bandage around arm and splint, between hand and the break — F 10.38
- Tie 3rd bandage around hand and splint — F 10.38
- Use 4th bandage to make simple sling (p233) — F 10.39
- Check circulation and sensation in hand (p235)

Splinting hand or finger/s

What you need

- Padding
- Splint
- 2 ordinary bandages
- 1 triangular bandage
- Tape or pin for bandage



10.40

What you do

- Offer pain relief (*CARPA STM p399*)
- Person sits in comfortable chair
- Put injured hand on padded splint, palm down — F 10.40
- Put rolled bandage under palm to support it — F 10.40
- Bandage hand and forearm to splint, starting at tips of fingers and going up to elbow — F 10.41
- Put on elevation sling (p234) or simple sling (p233) to raise (elevate) hand/fingers
- Check circulation and sensation in fingers (p235)



10.41

Splinting single finger/toe

What you need

- 2 clean gauze swabs

- Splint, eg aluminium foam splint, 2 x tongue depressors, sticks
- Paper dressing tape

What you do

- Offer pain relief (*CARPA STM p399*)
- Tape broken finger/toe to next finger/toe — F 10.42 *OR* ones on either side if middle finger/toe ('buddy splint'). This will act as natural splint
 - Put strip of gauze between fingers/toes to protect skin if needed
- *OR* Put splints on both sides of straightened finger/toe, tape around splint and finger/toe
- Check circulation and sensation in fingers (*p235*)



10.42

Splinting pelvis

Can use this method but pelvic sheeting (*below*) preferred.

What you need

- Padding
- 2 triangular or ordinary bandages

What you do

- Offer pain relief (*CARPA STM p399*)
- Person lies on stretcher or immobilisation board, knees bent slightly and supported by folded blanket — F 10.43
- Put some padding under small of back (lumbar area)
- Put soft padding between knees, legs, ankles
- Tie triangular bandage around feet and ankles in figure of 8
- Tie broad bandage around knees
- Support pelvis on either side with rolled up blankets
- Check circulation in feet



10.43

Pelvic sheeting

Preferred option. Used for rotationally unstable pelvic fractures.

What you need

- Bed sheet or towel
- Helpers

What you do

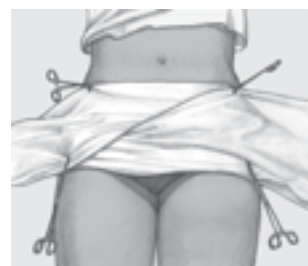
- Offer pain relief (*CARPA STM p399*)
- With helpers, log-roll person (*p64*) and put folded sheet/towel under their buttocks (between top of hip bones and buttock crease)
- Roll person back onto folded sheet/towel, pull through so there are equal amounts on both sides — F 10.44
- Cross sheet/towel over hip bones, pull firmly in both directions so it tightly fits around and stabilises pelvis — F 10.45
- With helpers holding it in position, clamp sheet/towel at 4 points — F 10.46
- If no clamps available — use large safety pins or tie sheet to stretcher
- Check circulation and sensation in feet (*p235*)



10.44



10.45



10.46

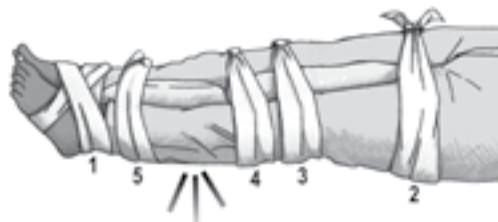
Splinting lower leg

What you need

- Padding
- 5 triangular or ordinary bandages
- Pillow

What you do

- Offer pain relief (*CARPA STM p399*)
- Support fractured area with pillow
 - *OR* Put folded padding between thighs and lower legs
- Tie ankles and feet together using figure of 8 bandage
- Tie 2nd bandage around both thighs
- Tie 3rd bandage around both knees
- Tie 4th bandage around both legs, above broken bone
- Tie 5th bandage around both legs, below broken bone — F 10.47
- Check circulation and sensation in feet (*p235*)

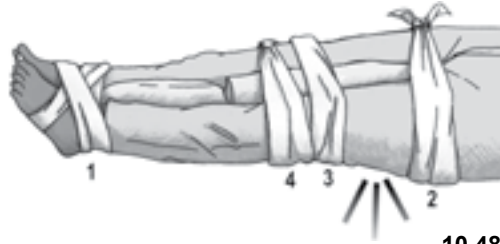


10.47

Splinting upper leg

What you need

- Padding
- 4 triangular or ordinary bandages



What you do

- Offer pain relief (*CARPA STM p399*)
- Put folded padding between thighs and lower legs
- Tie ankles and feet together using a figure of 8 bandage
- Tie 2nd bandage around both legs, above broken bone
- Tie 3rd bandage around both legs, below broken bone
- Tie 4th bandage around both knees — F 10.48
- Check circulation and sensation in feet (*p235*)

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Plaster of Paris slabs and casts



Plaster of Paris (POP) is traditional and most widely-used material for immobilising fractures or joints, and for splinting acute injuries.

Attention

- Examine carefully to accurately diagnose injury and need for immobilisation
- Decide whether to use slab or cast
- If limb very swollen or still swelling — use slab for support until swelling resolves/lessens, to prevent compartment syndrome (*p225*)
- Give pain relief if needed (*CARPA STM p399*) before positioning limb, putting on plaster

Circulation and sensation — after putting on plaster check hands/fingers, feet/toes for colour, warmth, sensation, movement, capillary refill, peripheral pulses — F 10.1 (*p225*). If any not normal — take off slab or cast.

Applying

- Messy — protect person's and your own clothes
- Starts to set in 3–5 minutes. Full strength in 24–48 hours
- Helper holds limb in place for about 3 minutes, or until plaster cast/slab hard enough to support injury
- Warn person it will feel quite hot as it dries
- Handle plaster bandage with care, wet or dry, or it will be damaged and weak
- **Use flat of your hands** to shape and smooth plaster. **Do not** use your fingers — you will make dents in plaster that press into person's flesh
- Never tip POP waste down drain. Line water container with plastic bag, drain off water after use, throw away waste

Water

- Use wide bowls deep enough for plaster bandage to be fully submerged
- Water temperature will affect POP setting time
 - **Do not** use hot water — plaster will set too fast, may cause thermal burns
 - **Do not** use very cold water — plaster will set too slowly
 - **Use cool water** — time to lay and mould plaster before it dries

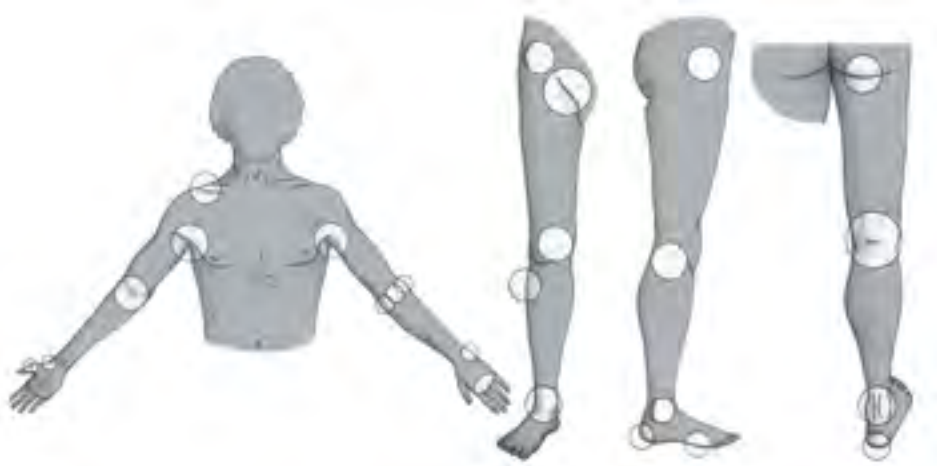
Protecting skin

- Put on stockinette
 - **Do not** use product containing elastic
 - Loose — or may cut in (constrict), cause swelling

- 3–5cm longer than area plaster will cover, to fold back over rough ends of plaster
- Put on plaster wool
 - Lay gently around limb — F 10.49. **Do not** pull tight, make creases or ridges
 - Each layer should overlap previous by about half. Usually 2 layers for arm, 3–4 layers for leg
 - Tear to shape around joints
 - Use 2 extra layers to protect joints or prominent areas — F 10.50
 - Bandage 5cm further than area plaster will cover, to fold back over rough ends of plaster



10.49



10.50

Positioning limb

- Make sure limb in right position **before** you start to plaster
- Moving limb after cast/slab is on makes creases in plaster that can damage skin, cause pressure areas

Plaster of Paris slabs

General principles

- Used to immobilise injured limb or suspected fracture during transport, while waiting for x-ray, until swelling lessens
- Can be used as main support for soft tissue injuries
- These procedures are just some of the basic methods
- **Application steps**
 - Stockinette and plaster wool
 - Slab
 - Crepe bandage

Attention

- Slabs need to be wide enough to fit around curve of limb like a shallow bowl, but not cover more than $\frac{2}{3}$ of limb circumference — F 10.51



10.51

- **Before you wet plaster bandage** make sure
 - Right length — allow extra 10% as plaster bandage shrinks when wet
 - Shaped, eg fanned if needed
 - Person's limb is in correct position

Remember: Use flat of your hands to shape and smooth plaster. Do not use your fingers.

Circulation and sensation — after putting on slab check hands/fingers, feet/toes for colour, warmth, sensation, movement, capillary refill, peripheral pulses — F 10.1 (p225). If any not normal — take off slab.

- If slab needs to stay on for a few days — make it stronger by laying strips of plaster (spines) longways over weak areas, eg F 10.70, F 10.71 (p248), F 10.78 (p250)

If person returns to clinic complaining of pain and/or fingers/toes show signs of poor blood or nerve supply — **take slab off straight away.**

What you need

- A helper
- Plastic aprons
- Blueys or plastic covers
- Bucket/bowl lined with plastic bag, filled with cool water
- Plaster wool, stockinette
- Crepe bandages (size depends on size of limb), tape
- Lead pencil
- Strong scissors or plaster shears

- Plaster rolls
 - 5cm for hands, 7.5cm for lower arms, 10cm for upper arms and legs
 - 5–10 layers depending on age and size — provide support but keep light

What you do

Preparation

- Cover area around work site with blueys/plastic, put water nearby
- Put on stockinette and plaster wool. See *Protecting skin* (p241)

Measuring and cutting slab

- Measure length of slab with crepe bandage or tape measure — F 10.52
 - Use uninjured limb if injury very painful
- Lay dry plaster bandage on flat surface to measured length, layer backwards and forwards until right number of layers — F 10.53
- If plaster bandage not wide enough for limb — layers can be fanned out to widen slab — F 10.54. Weakens slab, so use extra layers
- Wrap last layer all the way around slab to middle of opposite side so both ends held in place by a loop — F 10.55. Hold slab by edges to stop damage to plaster
- Using template and/or pencil mark shape of slab, cut using plaster shears or strong scissors
- Hold slab against limb to check size before putting in water



10.52



10.53



10.54

Wetting slab

- Lift slab by holding one looped end, lower into water until whole slab wet — F 10.56
- OR Hold long slabs (eg full leg) in concertina shape so they fit in water bowl — F 10.57
- Hold under water until bubbles stop
- Lift slab out by holding upright — F 10.58
- Run 2 fingers down length to squeeze out excess water



10.55



10.56



10.57



10.58

Applying

- Check position of limb, fingers/toes. Ask helper to hold, if needed

Clinical Procedures Manual for remote and rural practice, 3rd ed (2014), updated 30-Sept-2014.
 Note: Online versions of the manuals are the most up-to-date.

- Lay slab. Start at knuckles/wrist/toes (extremities) and go towards body — F 10.59
- **Use flat of your hands** to shape around joints and smooth as you go. Smooth from fingers/hands or toes/feet towards body
- Fold extra stockinette and plaster wool back over ends of slab to protect skin
- Bandage around slab and limb with damp crepe bandage to keep slab firmly in place. Bandage from end of limb/slab towards body
- Hold limb in correct position for 3 minutes
- Put arm in sling. Keep leg lifted, leg on pillows
- Clear away equipment
- Check circulation and sensation (p243)
- If slab being left in place as main treatment — tell person to undo bandage every day and rebandage firmly, or slab will get loose as swelling goes down
- Organise specialist review



10.59

Lower arm slab — radial or universal

Used for Colles or distal forearm fractures.

What you do

Preparation

- Person sits in comfortable chair or lies on examination couch
- Put on stockinette and plaster wool — from middle of fingers to middle of elbow
 - Put 2 extra layers of plaster around wrist and thumb
- Measure from base of knuckle joints to 3 finger widths below elbow crease — elbow joint must move freely
- Make slab then cut an area for thumb — elephant trunk template — F 10.60
- Put arm, hand, fingers in line



10.60

Applying

- Wet plaster, lay slab on upper forearm from base of knuckles to 3 finger widths below elbow crease
 - Displaced Colles — ulna deviation and wrist flexion — F 10.61
 - Undisplaced Colles — neutral position (10° wrist extension) — F 10.62



10.61



10.62

- **Use flat of your hands** to shape and smooth as you go, over wrist and up arm
 - Thumb joint moves freely — thumb and little finger can touch — F 10.63
 - Metacarpophalangeal joints have full 90° flexion
- Fold stockinette and plaster wool back over ends of plaster
- Bandage around slab with damp crepe bandage
- Hold in correct position for 3 minutes
- Clear away equipment
- Check circulation and sensation (*p243*)
- Organise specialist review



10.63

Lower arm slab — scaphoid

Used for fracture of scaphoid bone or first metacarpal that hasn't moved out of alignment (not displaced).

Used for soft tissue injury to/around thumb.

What you do

Preparation

- Person sits in comfortable chair or lies on examination couch, with arm as straight as possible
- Put on stockinette and plaster wool — around thumb, across palm to middle of elbow
 - Put 2 extra layers of wool around thumb
- Measure inside of arm from centre of palm to 3 finger widths below crease of elbow — elbow joint must move freely
- Make slab and cut to fit around thumb and clear knuckles — echidna template — F 10.64
- Put arm and hand/fingers in line



10.64

Applying

- Wet plaster, lay slab along thumb (radial) side of arm from just below middle joint of thumb and from centre of back of hand to 3 finger widths below elbow crease
- Slight radial deviation, 20° wrist extension, thumb forward — glass holding position — F 10.65



10.65

- **Use flat of your hands** to shape and smooth as you go, around thumb and up arm
 - Joint at base of thumb shouldn't move, but middle joint is free
 - Thumb and middle finger should just meet — F 10.66. Like holding a pen
- Fold stockinette and plaster wool back over ends of plaster
- Bandage around slab with damp crepe bandage
- Hold position for 3 minutes
- Clear away equipment
- Check circulation and sensation (p243)



10.66

Full arm slab

- Used for fracture of middle and proximal thirds of radius or ulnar or lower humerus that hasn't moved out of alignment (not displaced).

What you do

Preparation

- Person sits in comfortable chair
- Get helper to hold person's elbow at 90°, fingers in air, in 'nose thumbing' position — F 10.67
- Put on stockinette and plaster wool — from fingers to 3 finger widths below armpit, and another layer of wool from tips of fingers to elbow
 - Put extra layer of wool around elbow
 - Put 2 extra layers of wool around wrist
- Measure from centre of palm, around outside of elbow, to 3 finger widths below armpit — F 10.68
- Make slab. Cut area for thumb, then cut longways slit half way up slab — elephant with 'legs' template — F 10.69
- Check limb in correct position



10.67



10.68

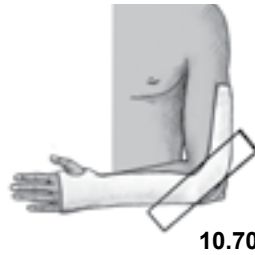
Applying

- Wet slab, lay it starting at back of hand, opposite palmar crease
- Shape end strips on either side of elbow. Make sure there is no plaster on elbow, ends don't meet

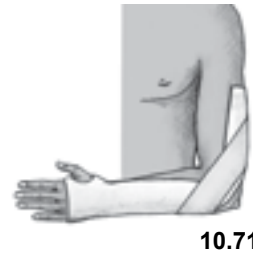


10.69

- Use flat of your hands to shape and smooth as you go, over wrist and up towards armpit
- Make reinforcing strip (5 layers thick) by measuring from mid forearm to mid upper arm. Apply as shown — F 10.70, F 10.71



10.70



10.71

- Do not have plaster across elbow
- Fold stockinette and plaster wool back over ends of plaster
- Bandage around slab with damp crepe bandage
- Hold correct position for 3 minutes
- Clear away equipment
- Check circulation and sensation (p243)
- Organise specialist review



10.72

Lower leg slab

Used for fracture of distal tibia, fibula, tarsus or proximal metatarsals that hasn't moved out of alignment (not displaced) — F 10.72.

Used for soft tissue injuries to lower leg or foot.



10.73

What you do

Preparation

- Person lies on bed on stomach with knee and ankle flexed (bent) to 90° — F 10.73
- OR Person sits up or lies back with injured foot over edge of bed and ankle flexed to 90°. Use rolled towel to flex knee slightly (15–20°) on injured side — F 10.74



10.74

- Put on stockinette and plaster wool — from tip of toes to middle of knee
- Put 2 extra layers around ankle
- Measure back of leg from base of toes to 3 fingers widths below base of knee — F 10.75
- Make slab. Fan plaster if legs large, or only narrow plaster rolls available
- Check ankle at 90°



10.75

Applying

- Wet plaster slab, lay on back of leg from bottom of toes to 3 finger widths below base of knee
- **Use flat of your hands** to shape and smooth as you go, over ankle and up leg — F 10.76. Make sure slab isn't cutting into toe creases
- Fold stockinette and plaster wool back over ends of plaster
- Bandage around slab with damp crepe bandage
- Hold in position for 3 minutes. Make sure ankle kept at 90°
- Clear away equipment
- Check circulation and sensation (p243)
- Organise crutches
- Get advice from plaster technician on how to make walking heels or plaster shoes suitable for out bush



10.76

Full leg slab

Used for fractures of upper leg or knee.

Attention

- Leg must be set in alignment
 - Line up (align) from space between big and second toe, to middle of kneecap (patella), to hip bone (iliac crest)
 - Helper should watch to make sure this line is kept while you apply plaster

What you do

Preparation

- Position person for lower leg slab first
 - Person lies on bed on stomach with knee and ankle bent to 90° (easier) — F 10.73 (p248)
 - *OR* Person sits or lies with injured foot over edge of bed, ankle flexed to 90°. Use rolled towel to flex knee on injured side slightly (15–20°) — F 10.74 (p248)
- Helper needs to support ankle while lower leg slab applied, and leg while thigh slab applied
- Put on stockinette and plaster wool — from tips of toes to groin
 - Put 2 extra layers around ankle, knee, head of fibula
- Make slab in 2 halves
 - Lower leg slab (p248). Trim end to match slope of toes
 - Thigh slab — overlap lower leg slab from mid calf, extend to buttock crease. Make sure it won't cut into groin area
- Use 10 layers of plaster. Fan plaster if large leg, or using narrow plaster rolls

Applying

- Check alignment of leg
- Apply lower leg slab (*p248*)
- Apply 10cm plaster as a stirrup across mid sole and up sides of slab to reinforce it against ankle flexion
- Bandage around lower leg slab with single layer of crepe bandage, leave top half of calf slab bare to attach thigh slab
- Have person on their back, knee bent slightly in 15–20° flexion
- Wet thigh slab, apply to back of leg overlapping lower leg slab — F 10.77
- **Use flat of your hands** to shape and smooth as you go, under knee and up towards body. Make sure slab isn't cutting into groin
- To reinforce cast, apply 2 plaster strips (5 layers thick) to inside and outside of cast from mid-calf to mid-thigh — F 10.78
- Fold stockinette and plaster wool back over ends of plaster
- Bandage around both slabs with damp crepe bandages
- Rest on pillows until plaster set — no pressure on heel (so plaster not indented), ankle at 90°, knee in 15–20° flexion



10.77



10.78

Plaster of Paris casts

General principles

Used to hold broken bone still while it heals.

Do not put cast on until after broken bone seen on x-ray and checked by specialist, swelling has gone down.

Attention

- Casts usually left on for 6–10 weeks. Need to be strong and well made to last this long
- Position limb carefully before putting on plaster
- Helper must hold limb **without** pressing fingers into plaster
- Work quickly so there is time to mould plaster before critical setting period

- If wound under plaster cast that needs dressing — use plaster saw to cut window in plaster when it is dry — F 10.79
- **Do not** have extra plaster around fracture or middle of cast. Avoid laying down layers of plaster bandage directly on top of each other
- Reinforce casts where they cross joints by adding plaster strips lengthways along outside



10.79

Circulation and sensation — after putting on cast check hands/fingers, feet/toes for colour, warmth, sensation, movement, capillary refill, peripheral pulses — F 10.1 (p225). If any not normal — take off cast.

What you need

- Helper
- Plastic apron
- Blueys or plastic covers
- Bucket/bowl lined with plastic bag and filled with cool water
- Stockinette — big enough to fit loosely over limb
- Plaster wool — size and amount depends on limb

Main cast usually made using 6–8 layers of plaster

- Short arm — 2 rolls of 7.5 or 10cm bandage
- Long arm — 3 rolls of 7.5 or 10cm bandage
- Below knee, non weight-bearing — 3 rolls of 10cm bandage
- Below knee, weight-bearing — 4 rolls of 10cm and 1 roll of 7.5cm bandage
- Full leg — 6–8 rolls of 10cm bandage

Amount will vary depending on size of person's limbs.

What you do

Preparation

- Cover area around work site with blueys/plastic, put water nearby
- Put stockinette loosely over whole area to be plastered and cut 3–5cm longer so it can be folded back over each end of cast
- Put on plaster wool (p242) over stockinette
- Get helper to hold and support limb
- Dip plaster rolls in water on end — allows air to escape, allows complete soaking of plaster. Bandages ready when bubbling stops
 - Dip and remove all rolls of plaster from water at same time
- Check position of limb

Applying

- Start bandage from hand/foot, move up arm/leg towards body. Bandage from inside to outside of limb with uniform thickness
- Lay bandage down evenly by letting it roll onto limb
 - **Do not** pull or wrap tightly
 - Tight cast can cause swelling of fingers/toes and cut off blood/nerve supply
 - Overlap as you do in normal bandaging
- **Use flat of your hands** to smooth and shape around joints, get a firm flat finish as you go
 - Smooth each roll before starting a new one
- Smooth from fingers/hand or toes/foot towards body — F 10.80
- **Do not** crease POP. Creases can make cast too tight, cut off blood/nerve supply
- Keep going until total area is covered with 6–8 layers
- Fold stockinette and plaster wool back over ends of plaster
- Clear away equipment
- Check circulation and sensation (*p251*)



10.80

Always tell person

- Come straight back to clinic if pain gets worse, swelling or blueness of fingers/ toes, plaster feels too tight or too loose. Cast needs to be removed
 - **Do not** put any weight on cast for at least 48 hours, and then only very light pressure
 - **Do not** put things down cast to scratch
 - **Do not** pull out padding
 - **Do not** get cast wet, knock or damage it
- Put arm in sling, or tell person to keep leg lifted and resting on pillows when they get home
 - Organise crutches if needed (*p261*)
 - **Record in file notes** — type of cast, material used, modifications to cast, instructions given, if crutches given, date of next appointment

Lower arm cast

Use for Colles, scaphoid, distal forearm fractures — F 10.81.

What you do

Preparation

- Person sits in comfortable chair, arm supported in normal position



10.81

- Put on loose stockinette from middle of fingers to elbow. Make hole for thumb
- Put on plaster wool — from middle of palm to 3 finger widths below elbow crease. Tear hole for thumb, or cover thumb for scaphoid fracture
 - Put 2 extra layers around wrist
- Check hand and limb position

Applying

- Wet 7.5cm plaster roll/s (1–2 rolls needed)
- Start plastering at wrist, using same technique as bandaging a hand (p230)
- To tidy thumb area, except for scaphoid fracture — bandage twice through space between thumb and finger, fold back stockinette, bandage twice more over the top of it
- Keep plastering up arm to 3 finger widths below elbow crease
- **Use flat of your hands** to shape and smooth as you go, over wrist and up arm
 - Thumb joint should move freely — except scaphoid fracture
 - For scaphoid fracture plaster thumb in place
- Shape hand into right position for fracture type
 - Colles
 - Displaced — ulna deviation, wrist flexion — F 10.82
 - Undisplaced — neutral position (10° wrist extension) — F 10.83
 - Thumb joint should move freely — thumb and little finger can touch
 - Metacarpophalangeal joints have full 90° flexion
 - Scaphoid
 - Slight radial deviation, 20° wrist extension, thumb forward. Glass holding position — F 10.84
 - Joint at base of thumb shouldn't move, but middle joint is free
 - Thumb and middle finger should just meet. Like holding a pen
- Fold stockinette and plaster wool back over ends of plaster
- Hold in position for 3 minutes
- Clear away equipment
- Check circulation and sensation (p251)



Full arm cast

Used for fractures of proximal forearm or mid-forearm

Attention

- Make sure thumb joint can move around fully (rotate) when wrist is plastered
- Apply cast as high as possible without digging into armpit



10.85

What you do

Preparation

- Person sits in comfortable chair with elbow bent to 90°
 - If fracture close to elbow — **palm facing upwards**
 - If fracture in mid-forearm — **palm facing body** — F 10.85
- Put on loose stockinette from tips of fingers to top of shoulder. Make hole for thumb
- Put on plaster wool — from base of fingers to armpit, tear hole for thumb
 - Put 2 extra layers around wrist and elbow
- Check arm and hand in correct position

Applying

- Wet 7.5cm plaster rolls (3–5 rolls needed)
- Apply lower arm cast (p252)
- Check elbow bent to 90°, get helper to hold still
- Using 1–2 more 7.5cm plaster rolls, start plastering again from wrist, continue up to 7cm below top of arm, as high as comfortable
 - Plaster around elbow using bandaging an elbow technique (p231)
- **Use flat of your hands** to shape and smooth as you go, over wrist and elbow, up arm
- To strengthen elbow area, make 10cm slab of plaster 5 layers thick and put it over cast already there
 - Smooth down but be careful not to press or crease plaster
- Using 1 more 7.5cm plaster roll, bandage again from wrist over elbow slab and up to where plaster finishes
- Fold stockinette and plaster wool back over ends of plaster
- Hold in position for 3–4 minutes
- Clear away equipment
- Check circulation and sensation (p251)

Lower leg cast

Used for fractures of lower leg, ankle, foot — F 10.86.

Attention

- Make all these casts 'walkers' as most people will try to walk with them
 - Get advice from plaster technician on how to make walking heels or plaster shoes suitable for out bush



10.86

What you do

Preparation

- Person lies back on bed with pillow under knee on injured side
 - Ankle should be bent (flexed) to 90° and held by helper — F 10.74 (p248)
- Put on loose stockinette from tip of toes to middle of knee
- Put on plaster wool over stockinette
 - Put 2 extra layers around ankle
- Stand at end of bed and put person's foot on your stomach to support it and keep 90° bend at ankle

Applying

- Wet 10cm plaster rolls (2–3 rolls needed)
- Plaster from bottom of toes to 3 finger widths below knee (tibial tuberosity)
 - Use figure of 8 bandaging around ankle (p232)
 - Knee joint should move freely
 - Make sure slab isn't cutting into toe creases or covering little toe
- Keep going until all rolls are used
- **Use flat of your hands** to shape and smooth as you go, over ankle and up leg — F 10.87
- Fold stockinette and plaster wool back over ends of plaster
- Hold in position for 3 minutes



10.87

Below-knee walking cast

- Make slab from 10 layers of 10cm plaster bandage. Apply to cast along sole of foot from base of toes to just past heel — F 10.88
- Wrap 1 roll of 10cm plaster in figure of 8 fashion over this slab
- Clear away equipment
- Check circulation and sensation (p251)
- Organise crutches



10.88

Full leg cast

Used for fractures of bones in upper leg and knee.

Attention

- Leg must be set in alignment
 - Line up (align) from space between big and second toe, to middle of kneecap (patella), to hip bone (iliac crest)
 - Helper watches to make sure this line is kept while you apply plaster
- Always plaster as high up leg as you can without digging into groin to stop any twisting (rotation) of limb
- Knee usually bent (flexed) at 20° but may vary with different injuries
- Helper holding foot should stand at side of person's injured leg to start with and then move to end of bed. **Do not** drop leg
- Rest cast on pillows for 48 hours to dry properly, or it will crack. **No** weight bearing

What you do

Preparation

- Put person in correct position on bed
 - Put pillows behind their back, under buttock and thigh of good leg
 - Put pillows under knee and ankle of injured leg
 - Foot on injured side should hang about 5cm over end of bed
- Helper should stand on injured side holding person's toes
- Cut enough stockinette to cover whole leg plus 12cms
- Take out ankle pillow and pull loose stockinette over leg as far as knee, leaving 8cm over toes for assistant to hold
- While you support leg and foot, helper moves to end of bed to support person's foot. Put foot on helper's chest so it can't drop, or knee straighten
- Take away knee pillow and pull stockinette up to groin
- Put on plaster wool — from toes to groin
 - Put 2 extra layers around ankle and knee
- Put knee pillow back
- Hold knee bent (flexed) at 20° and ankle at 90° — F 10.89 with helper supporting



10.89

Applying

- Wet 10cm plaster rolls (4–6 rolls needed)
- Plaster from bottom of toes to centre of calf
 - Use figure of 8 bandaging technique around ankle (*p232*)
 - Make sure cast isn't cutting into toe creases or covering little toe
 - Use 2–3 rolls
- **Use flat of your hands** to shape and smooth as you go, over ankle and up leg — F 10.87 (*p255*)
- Take away knee pillow
- Bandage over first plaster, starting at ankle and working over knee to top of leg
 - Use technique for bandaging a knee (*p231*) over knee
 - Use 2–3 rolls
- **Use flat of your hands** to shape and smooth as you go, over ankle and knee, up leg towards groin
- Fold stockinette and plaster wool back over ends of plaster
- Put knee and ankle pillows back and rest cast for 10 minutes
- Clear away equipment
- Check circulation and sensation (*p251*)
- Organise crutches

Fibreglass

Compared to plaster of Paris

Advantages

- Stronger
- Lighter
- More breathable
- If applied with stretch-relax technique — allows better for swelling, causes less skin surface pressure
- Pre-padded fibreglass slab material available in various widths

Disadvantages

- Sets faster — must be experienced enough to work very quickly
- Skin irritant — must wear gloves when using
- Not as easy to shape
- If not applied with stretch-relax technique — more pressure on skin
- Edges can be sharp and need extra padding
- Very dusty to remove
- May need 2 electric saw cuts to remove. Saw blade heats up quickly, can burn person
- Can't be removed with plaster cutter (too springy)

Applying

- Same as plaster of Paris (*p241*) *BUT* use
 - Cool water
 - Stretch-relax — pull roll of tape away from limb to stretch and unwind, release pressure on tape to let it relax, wind tape on limb
- *OR* To give more working time and allow adjustments to casting position after each roll placed (for less experienced clinician)
 - **Do not** moisten fibreglass tape. Apply directly out of packaging
 - Spread water based gel evenly over each roll after it is applied

Taking off a cast



- Take off **plaster (POP) casts** with
 - Plaster saw (best)
 - *OR* Plaster cutters (harder)
 - *OR* Soak cast for 10–20 minutes, tear it apart bit by bit, soaking as you go (much harder)
- **Fibreglass casts** can only be taken off with plaster saw

Attention

- **If using saw** — always steady (brace) hand holding saw against plaster cast and/or work surface
- **Saw blade can cut person** or give a burning sensation on skin, so go carefully, especially over bony areas
- Do outside or in well-ventilated area — makes a lot of noise, dust, mess

What you need

- Plaster saw or plaster cutters
- Cold wet towel — soak in bowl of ice cubes
- Plaster spreaders or very strong wrists
- Hearing protection (ear muffs or plugs) for you and person
- Goggles and mask to protect eyes and lungs from dust particles

What you do

- For **plaster** — make 1 cut down back of limb
- For **fibreglass** — make 2 cuts, one down either side of limb, eg radial and ulna borders

Using plaster saw

- Brace saw by resting knuckles on cast — F 10.90
- Cut plaster in short movements going down then up, then forward
- **Do not** push or drag blade — increases friction and heats saw blade more
- Saw blade gets very hot, can burn person. Stop every few minutes, cool blade with cold, wet towel
- Monitor cutting process by asking person if they feel any heat at cutting site
- **Stop** when you feel a slight give in plaster and plaster wool can be seen
- Split whole length of cast with saw



10.90

Using plaster cutters

- Start cutting from hand/foot end of cast, take care not to bruise skin and bone underneath

When cast split

- Open up plaster cast using plaster spreaders — or a lot of wrist strength. You can also soak plaster to loosen it
- Cut through plaster wool and stockinette with blunt-ended scissors and gently take off cast
- Check limb for bruises, lesions
- Wash with soap and water to remove dead skin or dirt

Tight cast

If cast too tight but new one can't be put on in your clinic

- Saw down 1 side, open cast with spreaders but **leave in place around limb**
- Cut plaster wool and stockinette with blunt-ended scissors
- Pad between cut edges of plaster with cork, wads of gauze etc to stop it closing again, bandage
- Send for re-plastering and review

Using crutches

Crutches are used to help stop person putting weight on injured limb, and/or plaster of Paris cast or slab, especially before it has set.

Attention

- Crutches should fit comfortably and cause no pain or tingling in arms or shoulders
- Crutches that are too long put pressure on armpit, can damage large network of nerves running from neck to arm (brachial plexus) causing drop hands (crutch palsy)
- Check crutches have all nuts, bolts, screws firmly in place and have good non-slip rubber tips
- Person needs shoes with good grip
- Practise procedures yourself before teaching to others

What you do

Fit crutches

- With person standing upright on their good leg, make sure tops of crutches fit properly under their arms
 - Top of crutch should be 2–3 finger widths below armpit when standing straight
 - Person should not stoop down or lift shoulders up to make them fit
- Change height by moving position of bolt and nut on lower peg of wooden crutches, or using the push pins on aluminium crutches
- Hand grips should be level with top of hip
- Elbows should be a bit bent (15°) when holding hand grips

Demonstrate

- Shoulders should be slightly forward when using crutches
- Keep top of crutches tightly against sides using upper arms
- Take weight through hands, not under arms
- Don't rest armpits on top of crutches
- **Sitting to standing**
 - Good foot on ground close to edge of seat, bad foot just in front
 - Hold both crutches in 1 hand, use other hand to push up from chair
 - Lean forward and stand up
 - Put 1 crutch under each arm and stand up straight
- **Standing**
 - Hold crutches slightly to side of and just in front of feet

- **Walking**
 - Look ahead to where you are walking, don't look at feet
 - Put both crutches forward and bring bad foot level with crutches
 - Swing good foot just past crutches
 - Do this again — this is walking
- **Standing to sitting**
 - Make sure good leg is right back against edge of seat
 - Take crutches from under arms, hold in 1 hand
 - Bend hips and knees, reach down to seat with other hand, keep bad foot slightly forward
 - Lower bottom onto seat
 - Keep crutches nearby, **do not** put weight on injured limb
- **Going upstairs**
 - Get as close to first step as you can, put good foot up onto first step
 - Lift crutches and bad foot up onto same step
 - If hand rail — put both crutches in 1 hand, hold rail with other
 - Do this again — one step at a time
- **Going downstairs**
 - Get as close to first step as you can, put crutches and bad foot down onto first step
 - Put good leg down onto same step
 - Do this again — one step at a time

Reduction of dislocated or pulled joints



Used to put back joint knocked or pulled out of its proper place.

Attention

- Need person to be relaxed and comfortable. Speak calmly, move slowly to reassure them. Give sedation if needed
- Always think about possibility of fracture
- Always check and document circulation and sensation (neurovascular) status before trying any manipulation/reduction

Circulation and sensation — when finished, **always check** hands/feet (peripheries) for colour, warmth, sensation, movement, swelling, capillary refill, peripheral pulse — F 10.1 (*p*225) to make sure no damage to nerves, arteries, veins.

Front (anterior) dislocation of shoulder

Mostly seen in younger people following sports injury or fall.

Attention

- Always suspect fracture, especially in older people
- Longer the shoulder left dislocated, more the limb will swell, muscle will spasm, making it harder to reduce
- Person will need sedation **unless** dislocation has just happened, or is recurrent. If so, first try gently without sedation

- **Do not** try if you suspect a fracture — x-ray first
- If attempted reduction doesn't work, or **posterior** dislocation suspected (eg from fall caused by seizure in epileptic person) — refer for x-ray, specialist treatment

Stimson manoeuvre and scapular manipulation

What you need

- Firm, high, narrow examination couch, stretcher, or bench top
- 2.5–5.0kg weight, eg sandbag, plastic bottle full of water, 1L bag of IV fluid
- If person sedated — may need sheet to tie them to couch

What you do

- Lie person face down on couch so injured shoulder right on edge, arm hanging straight down — F 10.91
- If person sedated — tie sheet around them and couch to make sure they don't roll off
- Strap/tie weight to wrist of injured arm
- Wait 20–30 minutes to see if traction weight reduces dislocation
- **Reduction may be helped by trying following steps in order** — F 10.91
 1. Apply gentle traction down on arm
 2. Turn arm outwards (externally) until joint has 'clunked' back into position
 3. Turn arm inwards (internally)
- **If this doesn't work, try scapular manipulation**
 - Leave weight in place
 - Support (stabilise) upper part of shoulder blade (scapula) with one hand and push bottom tip of shoulder blade straight across towards spine (medially) as far as it will go — F 10.92
 - Can use thumb of supporting hand to help with push — F 10.93

Note: May be hard to tell when joint has gone back into position, as movement in arm and shoulder is very small. Ask person if it has worked

- Check circulation and sensation (p263)
- After reduction, strap arm with elevation sling (p234)
- Specialist review for follow-up, physiotherapy referral

Modified Kocher's method

What you need

- Chair or examination couch with back support

What you do

- Person sits on chair or couch, you sit on same side as dislocation
- With one hand, support and firmly grip elbow joint — enough to take weight from shoulder. Hold wrist in other hand — F 10.94



10.91



10.92

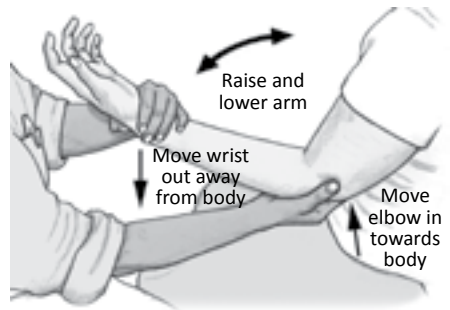


10.93



10.94

- Slowly and gently raise and lower forearm repeatedly (bending at elbow) while still supporting elbow. Helps to relax muscles. Talk to person as you do this to help them feel at ease with movement
- When person relaxed — keep raising and lowering forearm **AND** at same time slowly move
 - **Elbow in towards body** (shoulder adduction)
 - **AND Forearm and hand away from body** (shoulder external rotation)
 - That is ... elbow in, hand out — F 10.95
- If hard to move elbow or forearm — stop this and just keep raising and lowering forearm as before
 - Resistance should ease as muscles relax again and you can start moving elbow and forearm as before
- Keep moving **elbow in towards body** and **forearm away**, until you hear a 'clunk' as shoulder pops back into position
- As soon as this happens, put arm across person's body with their hand on opposite shoulder. Strap in place using elevation sling (p234)
- Check circulation and sensation (p263)
- Specialist review for follow-up, physiotherapy referral



10.95

Pulled elbow (dislocated radial head) in small child

Attention

- Often caused by adult lifting child from ground while holding them below elbow, eg forearm, wrist, hand
- Only do if clear story about how injury happened, otherwise send for x-ray
- Warn child's parents/carer that procedure may cause brief pain

What you do

- When child calm
 - Hold elbow, press thumb on head of radius — F 10.96
 - With your other hand hold wrist, then quickly and firmly twist arm from palm down — F 10.96 to palm up — F 10.97 (supination) while keeping constant pressure on radial head
- Check circulation and sensation (p263)



10.96



10.97

- If injury more than a few hours old — put sling on to rest arm. Take sling off after 24 hours
- Check if child needs specialist review

Dislocated elbow in adult

Attention

- Always do x-ray first
- If no wrist pulse — **send to hospital straight away**, get advice. May need to do reduction without x-ray

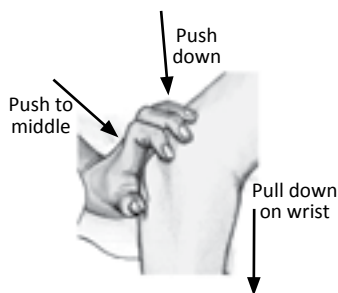
- Always check for fracture of radius bone

What you do

- Lie person on comfortable couch or flat surface off the floor so arm can hang over the side — F 10.98
- Check for wrist pulse (see *Attention* above), movement and feeling in elbow, lower arm and hand. If poor — might be nerve damage
- Hold wrist, pull down slowly and continuously along line of forearm until relaxed — F 10.98. May take a while
- When forearm muscles relaxed, use thumb and forefinger to move tip of elbow joint (olecranon) down and towards middle (medially). Should put joint back into position — F 10.99
- Check circulation and sensation (p263)
- Put arm in collar and cuff sling (p234), elbow needs to be kept bent at 90° for at least 1 week
- Specialist review for follow-up, physiotherapy referral



10.98



10.99

Dislocated finger (interphalangeal joint)

What you need

- Rough sticky tape/plaster

What you do

- Wrap sticky tape around dislocated finger so you can get a good grip — F 10.100
- Stand facing person, firmly hold end of taped finger or ends of tape



10.100

- Ask person to lean backwards while you hold finger or tape — F 10.101. Dislocated joint should slip back into position
- Check circulation and sensation (*p263*)
- Splint injured finger to finger beside (*p237*)
- Check if person needs specialist review



10.101

Lateral dislocation of kneecap (patella)

Most common in young people playing sports or from direct blow to knee.

Attention

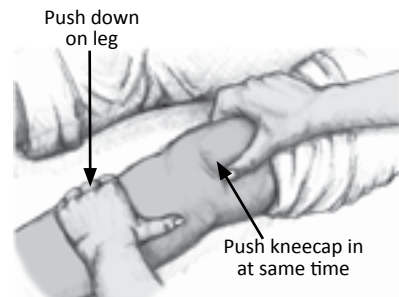
- If seen in elderly person — suspect fracture
- Only use this procedure if kneecap dislocated to outside of knee (laterally). Other dislocations very rare, need x-ray and specialist care
- Best to straighten leg quickly, as lessens pain and nervousness. If done slowly — person will tense leg muscles

What you need

- Examination couch
- Splint, eg plaster of Paris and plaster wool for slab, special knee immobiliser

What you do

- Sit person comfortably on couch, pillows supporting their back. Knee will be slightly bent from injury
- Hold kneecap — F 10.102
- With other hand
 - Push down on lower leg, just below knee (to quickly straighten leg)
 - **At the same time** push kneecap towards middle (medially) — F 10.102
- Kneecap should slide back into place over head of femur
- Check circulation and sensation (*p263*)
- Splint leg in straightened position, using knee immobiliser or plaster slab
- Specialist review for follow-up, physiotherapy referral



10.102

Joint aspirations and injections



Attention

Circulation and sensation — when finished **always check** hands/feet (peripheries) for colour, warmth, sensation, movement, swelling, capillary refill, peripheral pulses — F 10.1 (*p*225), to make sure no damage to nerves, arteries or veins.

- Most common joints to be injected/aspirated are knees, shoulders
- Principles for joint injection and aspiration the same
- If aspirating for healing (therapeutic) reasons — remove most of the fluid
- Local anaesthetic not always needed. Depends on size of needle used
- Always put needle in parallel to joint surfaces to prevent damage to cartilage
- Use ultrasound guidance for shoulder injection if available

Note: Leave a bit of air in preloaded syringe. Air can easily be injected into joint but not tissue (strong resistance), helps you know if you are in joint

Syringes and needle sizes

- Needle size depends on
 - Diagnostic or healing (therapeutic) aspiration
 - How much fluid and how thick
 - Size of joint
- Always use smallest needle size possible
 - For **aspiration** usually 21G
 - For **injection** usually 23G
- Needle length
 - Long, eg 32mm for shoulders or knees, 38mm for obese patients
- Needle and syringe size
 - Aspiration of toe/finger — 25G needle and 3ml syringe
 - Aspiration of knee/shoulder
 - 21G *OR* 18G needle if you expect thick or bloody fluid
 - 5ml syringe for diagnostic aspiration
 - 10–20ml syringe for healing (therapeutic) aspiration

Do not

- **Do not** do joint aspirations if
 - Bacteraemia present
 - Skin infection or severe dermatitis over joint
 - Joint too difficult to reach

- Severe lack of blood clotting (coagulopathy)
- Gout in big toe (classic first metatarsophalangeal gout), very painful, not needed for diagnosis
- **Do not** do steroid injection if
 - Bacteraemia present
 - Infectious arthritis
 - Close to bone infection (osteomyelitis)
 - Person having joint replacement surgery in less than a week
 - Bleeding into joint (haemarthrosis)

Reasons (indications) for joint aspiration

- **To help with healing (therapeutic)**
 - To relieve symptoms (pain, swelling)
 - To help stop damage to joint caused by infection
- **Diagnostic**
 - To improve joint movement so swollen joint can be fully examined
 - To find reason for unexplained fluid build-up in joint

Types of effusions

- **Bloody effusions**
 - Traumatic — most common
 - Bloody aspirate indicates soft tissue or bony injury
 - Fat globules in bloody aspirate indicate joint fracture
 - Usually contain streaks of clotted blood
 - Non-traumatic
 - Include haemophilia, anticoagulant therapy, malignant/benign tumours
 - Fluid is evenly bloody
 - May be caused by traumatic tap during joint aspiration — usually contains streaks and fresher looking blood
 - Don't need to send bloody aspirate to pathology unless you suspect septic arthritis, crystal arthropathy, malignant tumour
- **Non-traumatic effusions** are usually non-bloody. Send aspirate to pathology for diagnosis
 - Single inflamed joint could be septic arthritis. Very damaging
 - 20% of people with septic arthritis don't have a fever
 - 20% of cases of septic arthritis involve more than one joint

What you need

- Blueys
- Sterile dressing pack

- **Chlorhexidine 5%** in 70% alcohol solution or **povidone-iodine** antiseptic solution
- Syringes and needles (*p268*)
- Sterile needle holder or haemostat clamp (to keep needle still when changing syringes)
- Small sticking-plaster dressing
- Compression bandage

May need

- Large pillow
- 3ml syringe preloaded with local anaesthetic and/or steroid for injection
- Yellow cap sterile specimen container for aspirate
- Crutches

**Knee injection/aspiration
(medial and superolateral approach)**

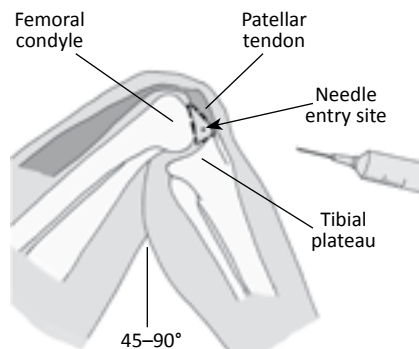
Attention

- Usually
 - Medial approach for injections and small (diagnostic) aspirations
 - Superolateral approach for large (healing/diagnostic) aspirations
- Use method you are most comfortable with

What you do

Medial approach

- Lie person on back with knee bent 45–90° over bluey-covered large pillow
- Find site for aspiration/injection — F 10.103
- Mark injection site by making indentation with tip of syringe
- Lay out dressing pack and equipment
- Wash hands and put on sterile gloves
- Clean site and drape with sterile towels
- Put needle
 - Into triangular space made by edge of femoral condyle, tibial plateau (make sure you can palpate edge of tibial plateau) and patellar tendon, 1cm medial to patellar tendon — F 10.103
 - Behind patella, aiming for femoral notch. Direct inward and slightly backward towards person's thigh for 2–3cm



10.103

Clinical Procedures Manual for remote and rural practice, 3rd ed (2014), updated 30-Sept-2014.
Note: Online versions of the manuals are the most up-to-date.

Superolateral approach

- Lie person on back with leg straight
- Put needle in 1–2cm above (superior) and 1–2cm to outside (lateral) of upper outer aspect of patella at 45° angle, and at 45° to skin surface — F 10.104



10.104

For both medial and superolateral approaches

- **If aspirating**
 - Connect aspirating needle and syringe
 - Put spare hand (or have helper put their hand) on thigh above knee, press distally to milk effusion into joint. Take care to keep area sterile
 - Insert needle, pushing in slowly while aspirating until you see fluid, then aspirate
 - Don't aspirate while needle being withdrawn through the skin. Can contaminate aspirate
- **If injecting**
 - Inject skin and deeper tissues at needle insertion site with local anaesthetic
 - Use sterile needle holder/forceps (with non-dominant hand in pencil grip) to hold needle in joint, disconnect syringe, attach steroid/**lignocaine** syringe
 - Put needle gently into centre of insertion site, push in slowly while aspirating until you see fluid or hit bone. If bone hit — pull back slightly
 - Inject
- **If aspirating and injecting**
 - Do aspiration (*above*)
 - Use sterile needle holder/forceps (with non-dominant hand in pencil grip) to hold needle in joint, disconnect aspiration syringe, attach steroid/**lignocaine** syringe
 - Inject

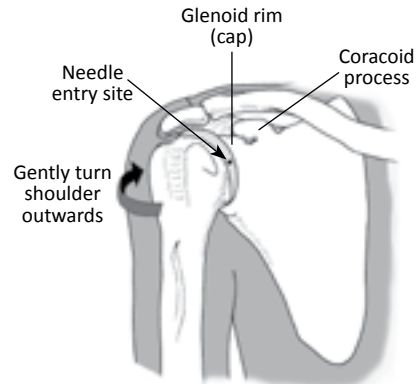
Now

- Take out needle, put firm pressure over site with thumb to stop any bleeding
- Put on sticking-plaster dressing
- If blood aspirated — put on firm bandage (*p231*), arrange crutches (*p261*)
- Put aspirate into specimen jar, store and transport under refrigeration
- Check circulation and sensation (*p268*)

Shoulder joint — injection/aspiration (lateral approach)

What you do

- Sit person comfortably on chair or couch facing you, arm hanging loosely by side, palm of hand turned forward
- To find site
 - Gently turn shoulder around from inside to outside to feel head of humerus
 - Find groove between head of humerus and glenoid rim
 - Needle entry site is in groove 1cm below and just lateral to coracoid process — F 10.105
- Mark site by indenting skin with tip of syringe
- Lay out dressing pack and equipment
- Wash hands and put on sterile gloves
- Clean front of shoulder
- Inject local anaesthetic into skin, if using
- Connect syringe to needle. If injecting only — remember to start procedure with smaller needle
- Put needle gently into shoulder at identified site. If you hit bone — pull back slightly
- Aspirate fluid
- Use sterile needle holder/forceps (with non-dominant hand in pencil grip) to hold needle in joint, disconnect aspiration syringe, attach steroid/**lignocaine** syringe
- Inject
- Take out needle, put firm pressure over site with thumb to stop any bleeding
- Put on sticking-plaster dressing
- Put aspirate in specimen jar, store and transport under refrigeration
- Check circulation and sensation (p268)



10.105

Shoulder joint — subacromial bursa injection

Attention

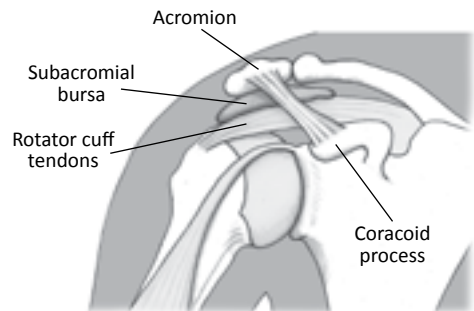
- Aim is to inject into soft tissue that lines non-cartilaginous surfaces (subacromial bursa)
- **Do not** inject into tendon. If needle enters tendon (gritty resistance) — pull out straight away
- If injection in right place — pain will be quickly relieved

What you need

- Sterile dressing pack
- **Chlorhexidine 5%** in 70% alcohol solution or **povidone-iodine** antiseptic solution
- Local anaesthetic and equipment (if using)
- 3ml syringe preloaded with **lignocaine 1%** and 1ml of steroid for injection
- Long 23G or 25G needle
- Small sticking-plaster dressing

What you do

- Ask person to put affected arm behind their back, with backs of fingers touching far waistline
- Palpate acromial margin laterally or posterolaterally
 - Injection is below acromial margin, laterally, directed upwards under acromion — aim for coracoid process
- Mark injection site by indenting with end of syringe
- Lay out dressing pack and equipment
- Wash hands and put on sterile gloves
- Clean site and drape with sterile towels
- Inject local anaesthetic into skin, if using
- Connect preloaded syringe and needle
- Guide needle tip into site, beneath acromion, angled slightly upwards and parallel to acromial undersurface — F 10.106
- Inject air you have left in syringe to see if you are in joint. If no resistance felt — inject **lignocaine** and steroid
- Take out needle, put firm pressure over site with thumb to stop any bleeding
- Put on sticking-plaster dressing
- Check circulation and sensation (p268)



10.106

Steroid injection

- Steroid injections give pain relief
- Adding local anaesthesia to steroid injection
 - Relieves pain at target site
 - Helps you work out if medicine has reached its target
 - Allows area to be re-examined while joint under anaesthesia
 - Helps to tell difference between local and referred pain
 - Gives volume to injection fluid
 - Distributes corticosteroid in large joints

Lignocaine concentration

- More concentrated, eg 2%, for small joints needing smaller volume
- Less concentrated, eg 1%, for large joints needing larger volume

Attention

- Infection after injection rare. Prevented by making sure person knows how to keep site clean
- **Post-injection flare** (2–5%). Painful condition, starts 6–12 hours after injection, lasts 2–3 days. Easily confused with infection. Prevented by
 - Avoiding weight bearing and vigorous activity with injected joint for 48 hours post-injection
 - Applying ice
 - NSAIDs (if not contraindicated) (*CARPA STM p404*)
- **Corticosteroid dose**
 - Reduce dose for young people, the elderly, those in poor health
 - Be careful with short-acting **corticosteroids** in people with diabetes. Risk of increased blood glucose levels for up to 3 weeks after injection

What you need

- See *What you need* (p269)
- 1ml **betamethasone** (eg *Celestone* 6mg/ml) mixed with 3–5ml of **lignocaine 1%**
- *OR* 1ml **methylprednisolone** (eg *Depo-Medrol* 40mg per ml) mixed with 3–5ml of **lignocaine 1%**
- Preloaded 3ml syringe with local anaesthetic and steroid

What you do

- See *What you do* for knees (p270) or shoulders (p272)

Joint fluid analysis

- Send non-bloody fluid to pathology for cell count, gram stain, bacterial culture and, if needed, special tests such as crystals, fluid-protein, fluid-glucose and fluid-LD levels
- Do cultures on all synovial fluids. Bacterial infections can look like or be present along with joint disease

Collection

- Need a minimum of 2ml aspirate in sterile yellow container for gram stain, culture, WBC, crystals
- For diagnosis
 - If enough fluid put 1–2.5ml in EDTA tube (purple lid) — gives more accurate analysis of WBC. Important if delay in transport
 - If septic arthritis suspected and enough joint fluid — put 2.5ml in blood culture bottle (aseptic technique)

Transport

- Best within 4 hours, but no later than 48 hours. Refrigerate if delay
- Use blood culture bottle

Results

Joint fluid analysis will fall into one of 3 categories, see Table 10.1 (p276).

1. Non-inflammatory
 - Degenerative, eg osteoarthritis, overuse syndrome
 - Trauma, if no blood in fluid
2. Septic, eg infective mono-arthritis
 - Non-gonococcal bacterial arthritis
 - Gonococcal bacterial arthritis
3. Inflammatory
 - Acute crystal arthropathy, eg gout, pseudogout
 - Any type of arthritis

Synovial fluid findings

Table 10.1: Microscopic findings

MC&S	Normal	Non – inflammatory	Inflammatory	Septic
WBC per mm³	Less than 200	200–2000	2000–150 000 (likely less than 75 000)	15 000–200 000 (likely more than 100 000)
PMN	Less than 10–25%	Less than 25%	Often more than 50%	More than 75%
Gram stain	–	–	–	+
Culture	–	–	–	+
Crystals	–	–	+	Possible
Chemicals (eg protein, glucose, LD) not routinely requested, need an extra 0.5ml aspirate.				

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Stiff neck

Attention

- Acute wry neck (torticollis) — sudden onset of severe neck pain with spasm of neck muscles. Causes person to bend or twist neck and head away from painful side
- May be caused by holding awkward position, often from day before, eg long distance driving
- Usually occurs on one side of neck, resolves by itself
- Common in young people — 12–30 years
- **Do not** drive when suffering from this condition
- Keep posture as normal as possible
- Keep moving neck as much as pain will allow — gentle exercise will speed up recovery

First procedure

Attention

- If person has pins and needles or numbness during procedure — **medical consult**

What you need

- Hot pack or ice pack — use what person tolerates best

What you do

- Lie person down in comfortable position with pillow supporting head
- Put hot/ice pack under neck
- Have person turn head towards painful side as far as comfortable, then towards non-painful side
- If no improvement — apply gentle manual traction to head
 - Hold back of skull with one hand and under chin with other hand — F 10.107
 - Pull gently and evenly for 20 seconds
 - If feels the same or better — repeat
- Advise mild pain killers, eg **paracetamol** (CARPA STM p400) (doses CARPA STM p465)



10.107

If this doesn't relieve symptoms — try hold-relax procedure (p278).

Second procedure — hold-relax

Attention

- Can be taught to person to do at home
- Turn head towards or away from painful side, depending on which hurts less
 - Turning towards painful side described, but technique the same for both

What you do

- Person sits in comfortable chair
- Turn head slowly and gently towards painful side until it starts to become uncomfortable, then stop
- Put one hand against side of head opposite to painful side
- Use other hand to steady neck — F 10.108
- Ask person to **turn** head against pressure of your hand (not push sideways)
- Keep even, firm pressure against head so that they just can't turn their neck, not so hard that you move their head
- At the same time, ask person to take a deep breath and hold it, look upwards to side where your hand rests
- Count 10 seconds then ask person to relax and breathe out
- Person should now be able to turn their head a little more towards painful side without your help
- Do this again 3–5 times in a row — there should be a great improvement in tension and pain



10.108

Feet

Foot examination

What you need

- 10g monofilament, or tissue/cotton wool

What you do

- Compare lower legs for size, evenness, muscle wastage, swelling (oedema) — F 10.109
- Look for sores, moles, rashes, scars, swollen veins (varicose veins) — F 10.109
- Feel both feet, check if they can move in all normal directions. Can they bend (flex) and straighten (extend)
- Check feet for skin colour, deformities, bunions, sores, ulcers, blisters, corns — F 10.110
- Check toes and nails for ulcers, blackened areas, dead tissue (necrosis) — F 10.110
- Check touch and pain sensation in toes and feet using monofilament, or if not available, cotton wool or tissue
- Feel for foot pulses (*p280*)



Diabetic foot

- Regular self-care can prevent diabetic foot problems, eg ulceration, infection, amputation
- Risk of foot problems increased by poor diabetes control, length of time person has diabetes, smoking, foot deformities
 - Risk decreased with regular foot checks, management

Foot checks

Attention

- All health practitioners should be able to screen diabetic feet
- Screen at least once a year, every 3 months if feet high risk (*p283*)
- Need management plan for feet identified as high risk

What you need

- 10g monofilament

Note: If no monofilament available — use tissue for rough assessment, compare sensation in feet and arms.

What you do

- **Feel for foot pulses** in both feet
 - Should be 2 pulses in each foot — F 10.111, F 10.112
- **Check sensation** using 10g monofilament
 - Test 3 sites on each foot (avoid hard skin and wounds) — F 10.113



10.111



10.112



10.113

- **Look for anomalies**
 - Calluses, hard skin, thick nails, cracks or fissures, wounds, infection
 - *AND/OR* Deformities, eg crooked toes, bunions, bony prominences
 - *AND/OR* Scars on sole of foot
 - *AND/OR* Amputations
- **Look and ask about self-care practices**
 - Are shoes worn
 - Can person care for their feet

High risk foot — may be one or both feet

- 1 or both pulses missing
- Sensation not felt at 1 or more sites
- Anomalies present
- Person doesn't know how or can't care for own feet

Foot management

- People with feet at **high risk** need
 - Management plan
 - To be taught daily foot care (p282)
 - 3 monthly checks
- People with feet at **low risk** (especially if new diagnosis of diabetes) need
 - To be taught daily foot care (p282)
 - Yearly checks

What you may need

- Soap and water
- Scalpel blade and handle
- Nail clippers, single use best
- Single use nail file
- Sorbolene cream or simple moisturiser
- If active lesion — sterile blunt end probe

What you do

- If you can't feel all pulses — refer for vascular studies or use hand-held doppler to check arterial blood flow to foot
- If sensation poor, eg person can't feel monofilament
 - Record area of nerve damage (peripheral neuropathy)
 - Remind person they need to check and feel their feet every day
 - Review diabetes management

Treat active foot lesions

- Remove thick hard skin with scalpel (debride) to relieve pressure, prevent ulcers forming
- Use nail clippers and file to reduce thick, long toenails. Can damage other toes or form ulcers under nail
- Debride ulcers, especially on sole of foot, to encourage healing
- If person dark skinned and area of thick skin has become darker in colour — is inflamed and/or stressed, needs attention straight away
 - Rest area from weight bearing by debriding calluses (*p283*), using protective padding, wearing shoes
 - Refer to podiatrist
- **Painless** wounds are sign of peripheral neuropathy. **Painful** wounds may be infected or have reduced blood flow (ischaemic)
 - Probe wound with sterile blunt end probe to check whether bone involved
 - If wound chronic or could involve bone — send for x-ray
 - Refer to podiatrist. Think about high-risk foot clinic referral/consult
 - Infections need antibiotics (*CARPA STM p299*)

Follow-up

- Teach daily foot care (*p282*). Make sure person understands activities and importance
- Monitor person's foot care practices whenever you can, eg during clinic and home visits, when doing other health checks
- Encourage to wear comfortable, soft-soled shoes to cushion and protect feet

Teaching daily foot care

Attention

- Talk about and show to people as part of routine health check
 - Daily foot care needs to be done **daily**
 - Wash hands before doing foot care
 - Take care not to injure skin. **Do not** use sharp instruments, eg scissors, razor blades, graters
- Advise to come to clinic if any wounds on feet



10.114

What you need

- Soap, liquid soap
- Clean cloth
- Clean towel
- Bucket
- Nylon pot scourer or fine grade sandpaper
- Sorbolene-based cream or simple moisturiser
- Nail clippers, single use best
- Single use nail file
- Clean socks
- Comfortable, soft-soled shoes



10.115



10.116

What you do

Show person how to

- Wash feet well with soap and cloth — F 10.114. Safer to do this seated with feet in bucket, not in shower
- Use nylon pot scourer or fine grit sandpaper with soap and water to reduce thick skin. **Do not** use sharp instruments
- Gently dry all skin surfaces with towel — F 10.115
- Look at and feel both feet all over including between toes. Check for blisters, cracks, injuries, changes in skin colour, temperature, texture
- Rub sorbolene-based cream or hand cream into dry skin — F 10.116
- Trim toenails straight across or follow natural curve — F 10.117. **Do not** cut down sides. Use file to smooth edges, lessen thickness of nail
- Clean and cover small skin sores (blisters, scratches, cracks) with simple dressing or sticking-plaster to keep dirt out
 - If sores get smelly or sticky (infected) — come to clinic straight away
- Protect feet by wearing socks and shoes. Thongs better than bare feet
 - Shake rubbish (eg sand, seeds, stones) out of shoes before putting on



10.117

Tell person

- To care for their feet they need to
 - Do foot care every day
 - Have feet checked regularly by health team
 - Control their diabetes — keep as active as possible, eat healthy food, take their medicines

Other foot conditions

Calluses and corns

Attention

- Caused by increased mechanical stress on foot, always at pressure area
- Can be painful, cause underlying necrosis
- Increased risk when on diabetic neuropathic foot
- Often misdiagnosed as warts
- Need to be removed (debrided)

What you need

- No. 10 scalpel blade and handle
- Well-fitting gloves
- Emery board

What you do

- Use thumb and index finger of free hand to stretch skin either side of callus/corn — F 10.118
- Use scalpel to debride callus/corn in layers — F 10.119
 - Use slicing motion, **not** scraping motion
- Shouldn't be painful. Callus/corn doesn't have nerve or blood supply
- Feel texture of surface skin with free thumb as layers removed. Will become more pliable as thickened (keratinised) skin removed
- Corn has central core, needs to be removed carefully with tip of scalpel
- Change scalpel blade as needed — becomes blunt quickly
- Smooth any rough edges with emery board



10.118



10.119

Plantar warts

Attention

- Caused by Human Papilloma Virus
 - Disturbs skin cells, produces thickened surrounding skin that protects virus from topical applications
- Not caused by mechanical stress, can be anywhere on bottom (plantar surface) of foot
- Often confused with corns and calluses
- Never penetrate into dermal layers of skin
- If small and not painful — can be left

What you need

- No. 10 scalpel blade and handle
- Well-fitting gloves
- Topical application (commercial **salicylic acid** solution, eg *Wartoff*)
- Occlusive tape, eg zinc oxide, sports tape. Blocks air and water

What you do

- Use thumb and index finger of free hand to stretch skin either side of callus/corn — F 10.118 (*p283*)
- Use scalpel to debride wart in layers — F 10.119 (*p283*)
 - Use slicing motion, **not** scraping motion
- Can contain capillary loops, will often bleed as layers of skin removed
 - Stop debriding as soon as bleeding seen
- Apply topical solution as per instructions
- Apply occlusive tape that will soften (macerate) wart tissue
- Debride weekly until all wart tissue removed