



Clinical Practice Procedures:

Trauma/Orthopaedic splinting – Upper limb casting

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Date	June, 2023
Purpose	To ensure a consistent procedural approach to upper limb casting.
Scope	Applies to Queensland Ambulance Service (QAS) clinical staff.
Health care setting	Pre-hospital assessment and treatment.
Population	Applies to all ages unless stated otherwise.
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Author	Clinical Quality & Patient Safety Unit, QAS
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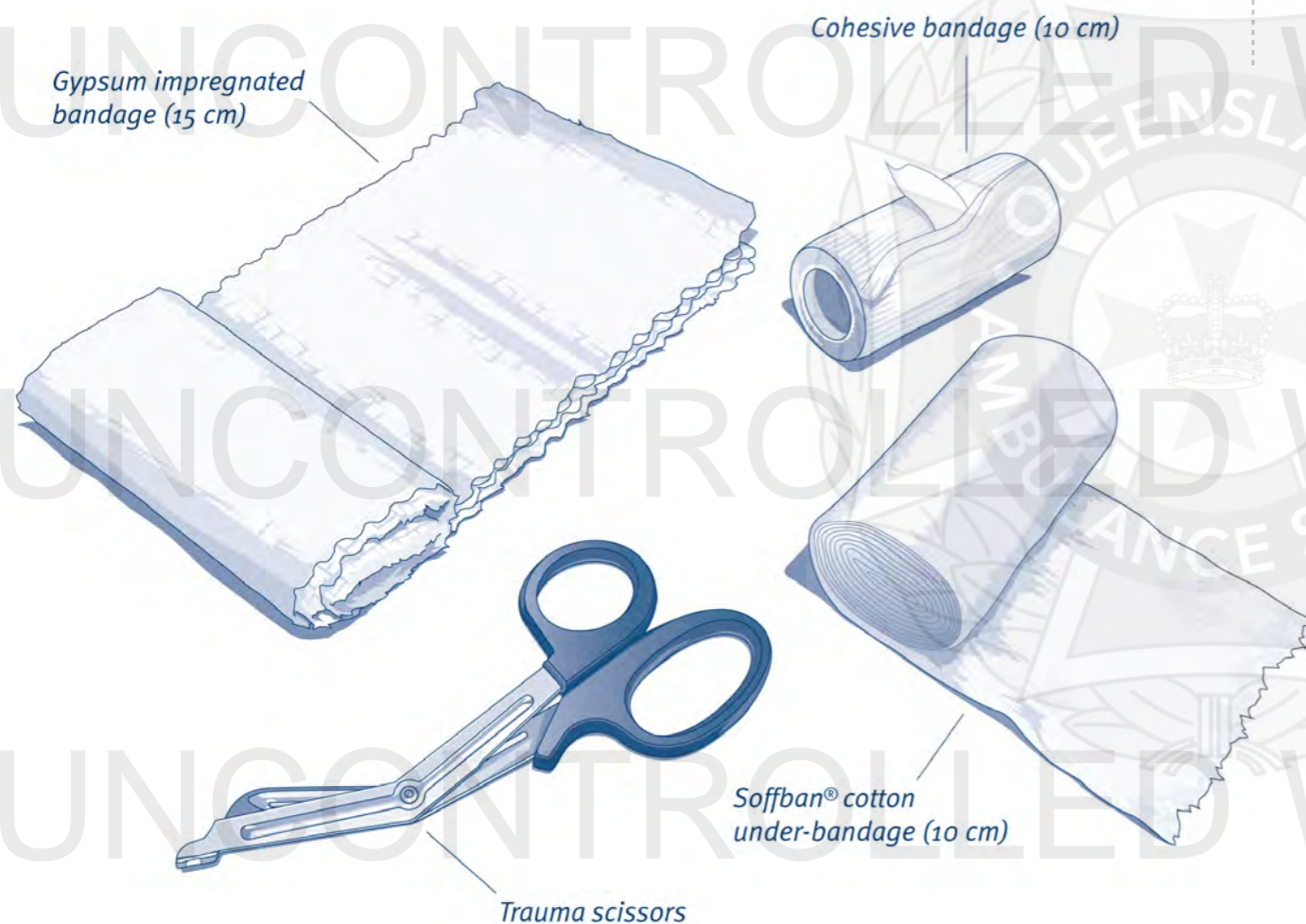
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Orthopaedic splinting – upper limb casting

June, 2023

Plaster of Paris (POP) limb casts are non-invasive orthopaedic splints designed to immobilise fractures during the healing process. They are created using gypsum impregnated bandages, that when submerged in water to form a thick plaster paste. Once moulded, the cast sets within a few minutes, however, can take 36–72 hours to fully dry and completely set.

Due to the risk of neurovascular complications associated with limb swelling in full circumference casts, QAS clinicians will only apply longitudinal half casts.



Indications

- Temporary stabilisation and pain relief for non-displaced upper limb fractures as authorised by the QAS Clinical Hub Medical Officer, specifically:
 - Distal radial fracture/s;
 - Scaphoid fracture/s; or
 - Metacarpal fracture/s

Contraindications

- Compound fractures
- Fractures requiring reduction/not in correct anatomical alignment
- Fractures with neurovascular compromise




Complications

- Thermal burns
- Skin irritations
- Neurovascular compromise
- Pressure areas (+/- infection)

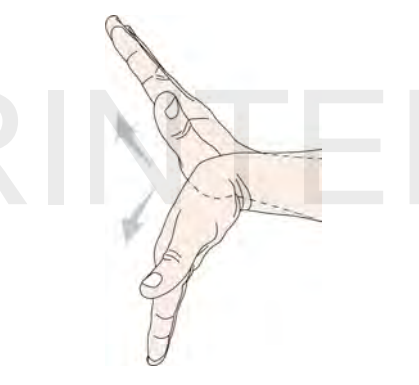
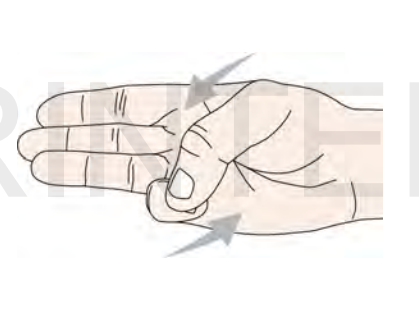
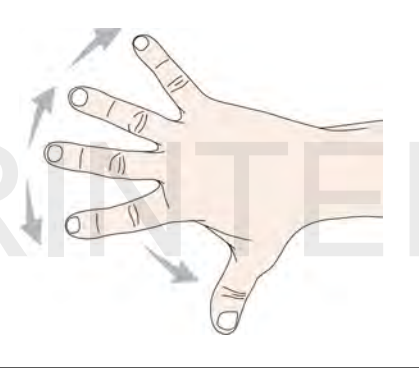
Procedure – Orthopaedic splinting – upper limb casting

1. Provide appropriate patient comfort, consider analgesia if required.
2. Fully expose the affected limb, remove any jewellery and/or nail polish.
3. Thoroughly inspect the limb for any evidence of trauma – if required, clean wounds and apply an appropriate non-stick dressing.
4. Confirm neurovascular limb integrity, by completing the following assessments:

i. Sensation

Radial nerve	Assess sensation by touching the dorsal surface of the hand, including the webbing between the thumb and index finger.	
Median nerve	Assess sensation by touching the palmar surface of the hand, including the webbing space between the thumb and index finger.	
Ulna nerve	Assess sensation by touching the dorsal and palmar surface of the hand between the little finger and the ring finger.	




ii. Motor function; and

Radial nerve	Assess the ability to extend the wrist and fingers at the knuckle joint.	
Median nerve	Assess the ability to bring the thumb and small finger together so they are touching.	
Ulna nerve	Assess the ability to abduct all fingers.	

iii. Perfusion (colour, temperature, capillary refill, swelling and pulses)

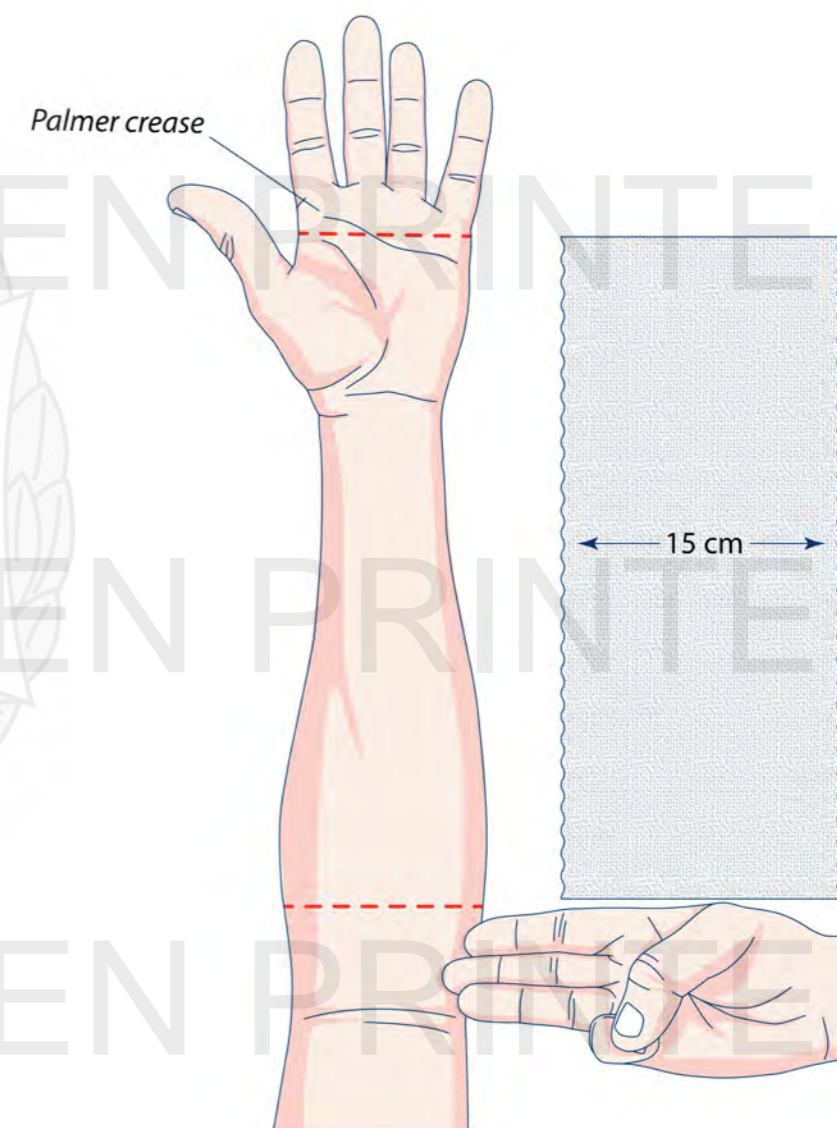
5. Confirm the suitability and requirement for a cast with the Clinical Hub Medical Officer, specifically:
 - i. Radial trauma cast – distal radius fractures
 - ii. Thumb spica cast – carpal fractures
 - iii. Volar position of safe immobilisation (POSI) cast – carpal/metacarpal fractures

6. Position the patient sitting with arm held in the prescribed anatomical casting position:

Cast	Anatomical casting position	Diagram representation
Radial trauma cast	<p><i>“Arm wrestling position”</i></p> <ul style="list-style-type: none"> • Elbow: flexed to 90 degrees • Forearm: neutral pronation and supination • Wrist: slight extension 	
Thumb spica cast	<p><i>“Holding the can of drink”</i></p> <ul style="list-style-type: none"> • Elbow: flexed to 90 degrees • Forearm: neutral pronation and supination • Wrist: 20 degrees extension • Thumb: Opposition towards middle finger 	
Volar POSI cast	<p><i>“The swan”</i></p> <ul style="list-style-type: none"> • Elbow: flexed to 90 degrees • Forearm: in supination • Wrist: 20–30 degrees extension • Metacarpal joints: 70–90 degrees flexion • Interphalangeal joints: full extension 	

Radial trauma cast

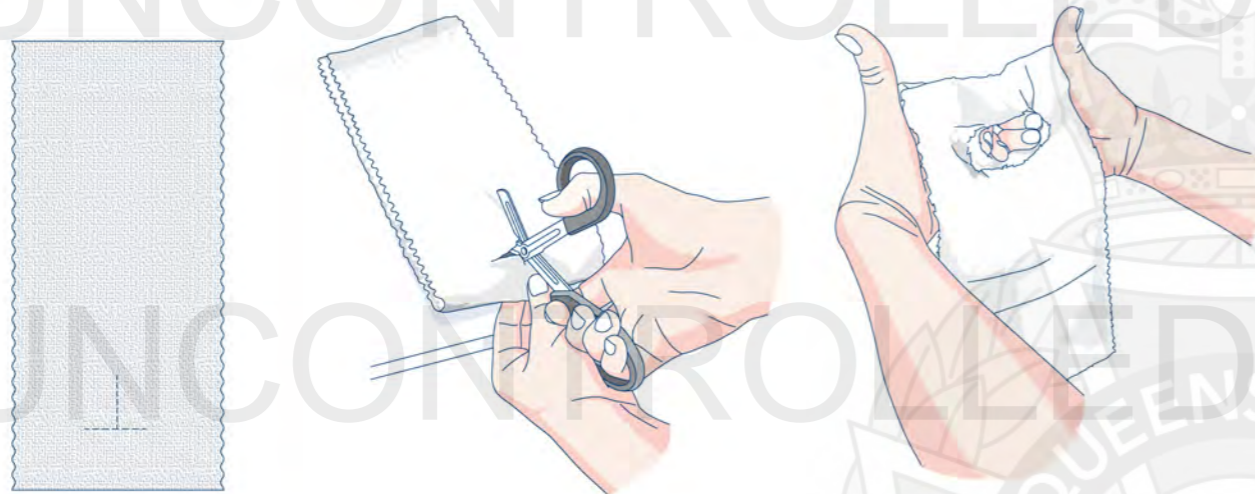
- a) Determine the required POP bandage length and cut to size:
- Length* – distance from the palmer crease to three finger widths from the elbow crease.
 - Width* – 15 cm (standard).



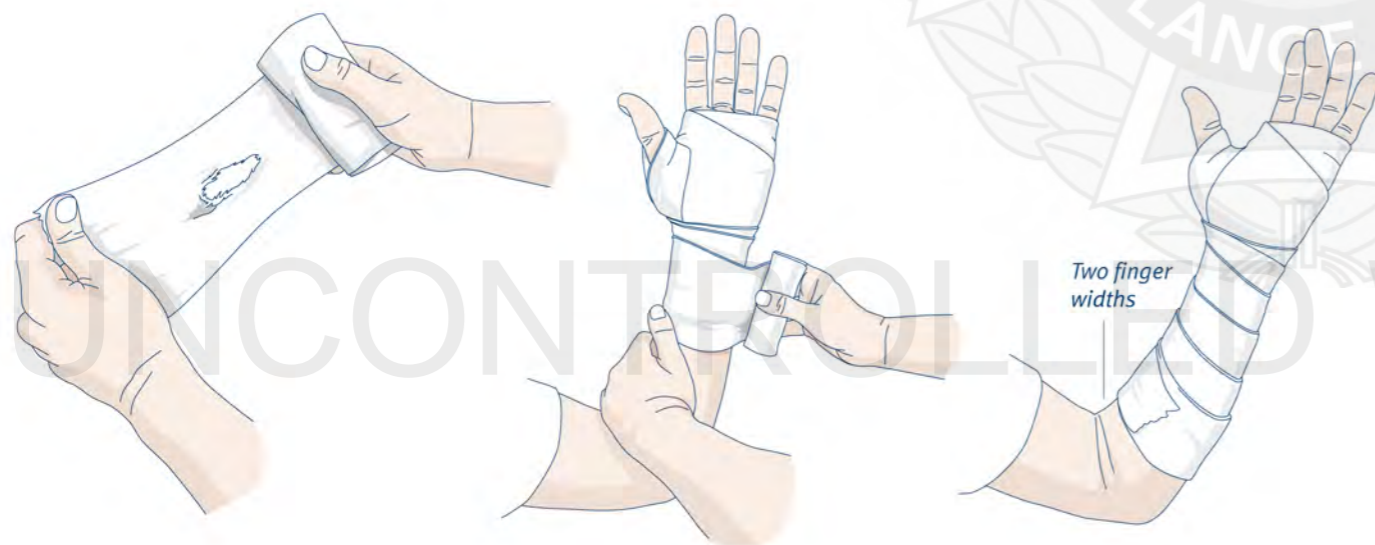
Procedure – Orthopaedic splinting – upper limb casting

b) Prepare 8–10 layers of POP bandage on a firm flat surface (i.e., 4–5 sheets doubled over).

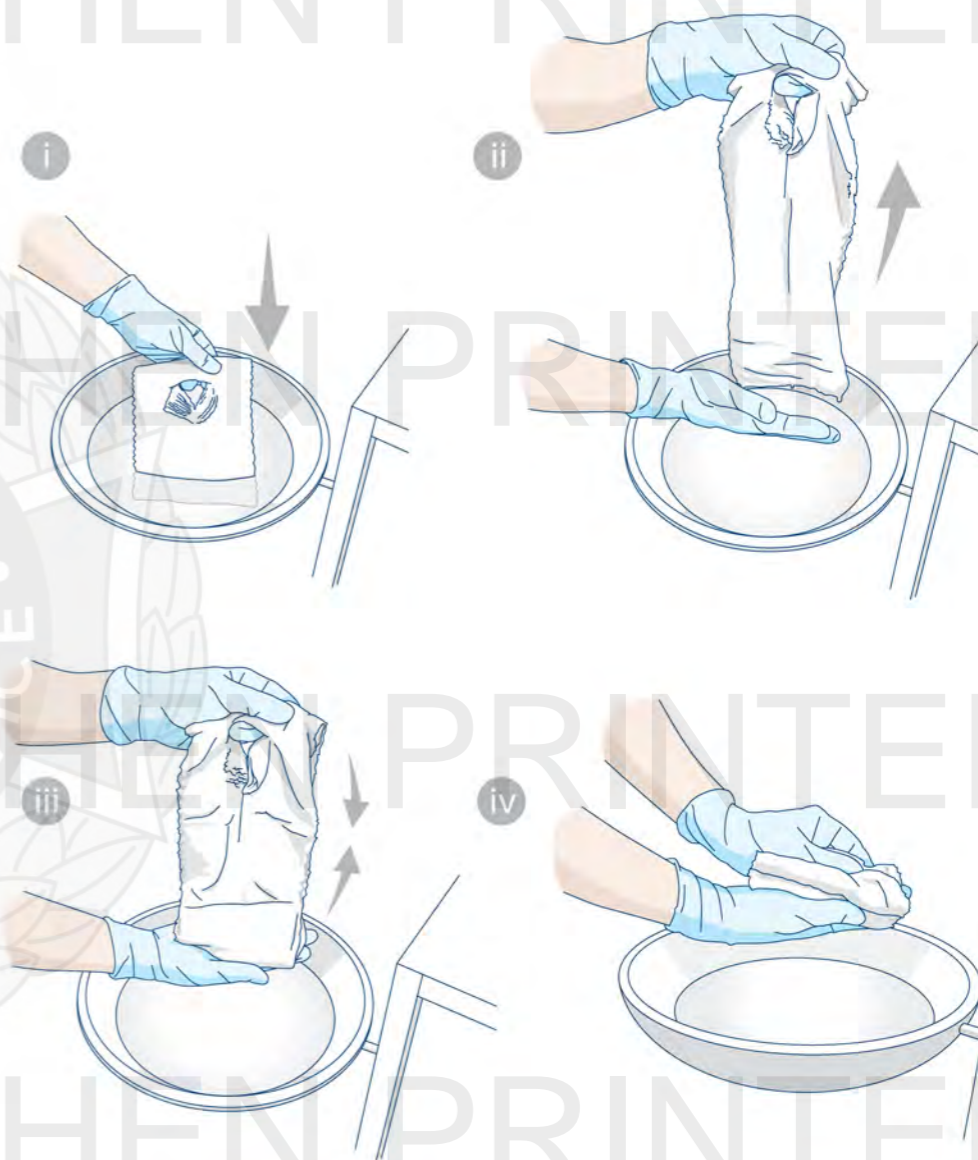
c) Approximate the thumb's position on the POP bandage and cut an inverted "T", slightly extending the opening with fingers to create an adequate thumb hole.



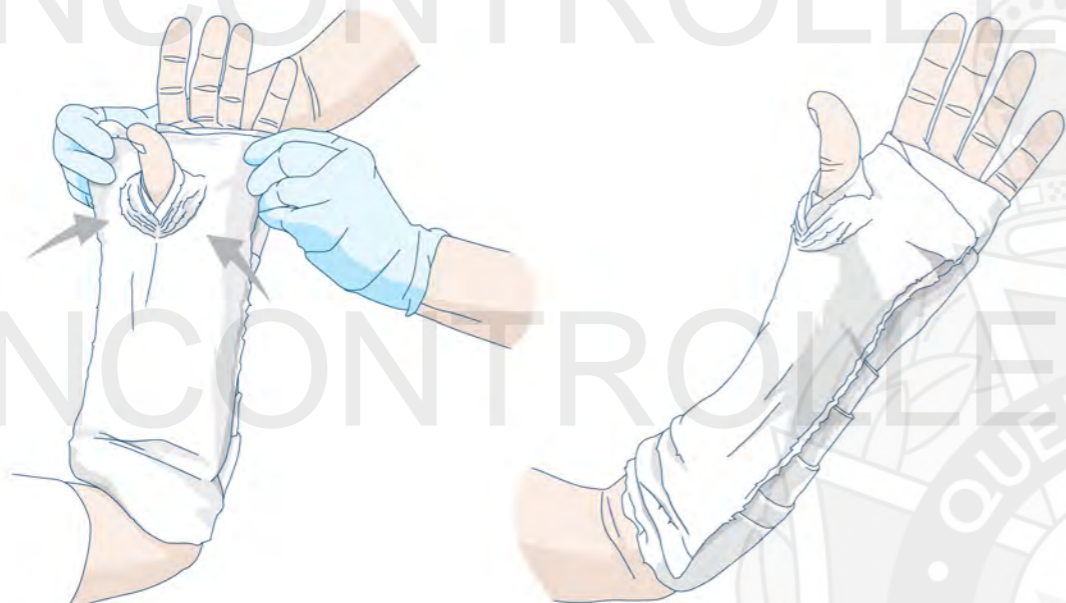
d) Make an opening in the cotton under-padding and place over the patient's thumb. Commence bandaging, ensuring the palmer crease and metacarpel heads are evenly covered with a 50% overlap. Continue proximally until 2 finger widths from the elbow crease; ensure no creases are visible.



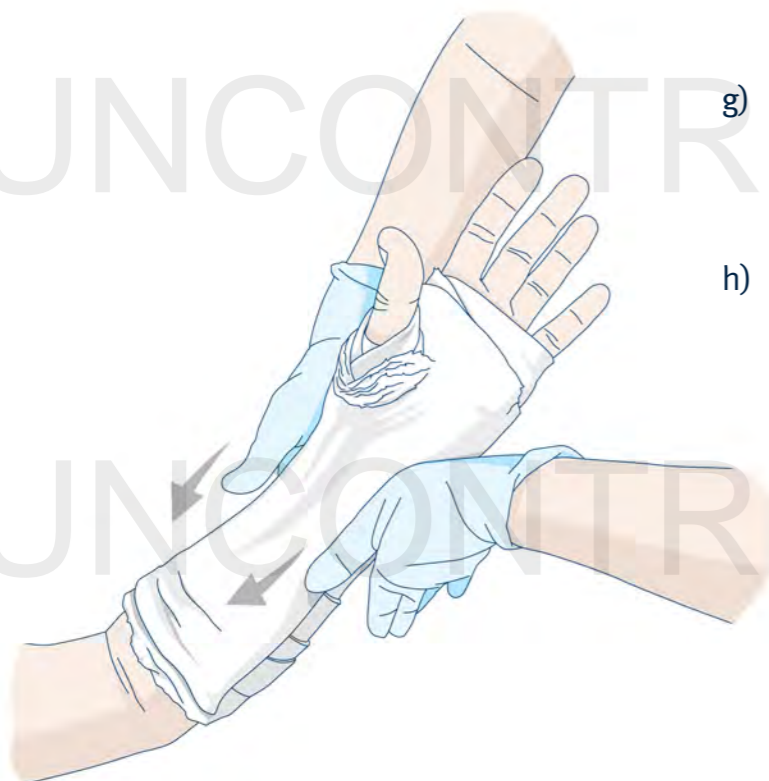
e) Submerge the prepared POP bandage in a bowl of room temperature tap water. Wait a few seconds and once bubbling has ceased, remove and gently concertina the bandage into a cupped hand to remove excess water.



- f) Place the thumb through the pre-cut hole and layer the POP longitudinally down the radial surface of the patient's arm. Ensure a minimum 1/3 circumference gap remains to prevent neurovascular compromise.



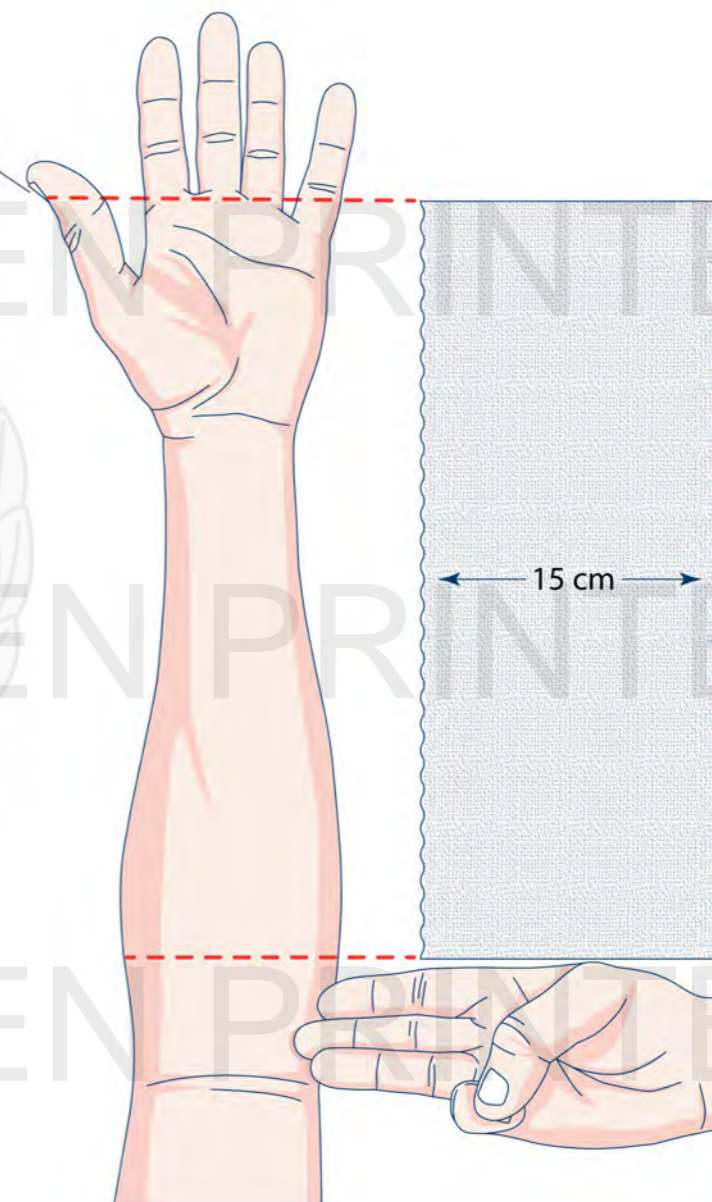
- g) Gently conform the slab using the flat palms of your hands.
- h) Instruct the patient to keep their arm immobilised while the cast sets.



Thumb spica cast

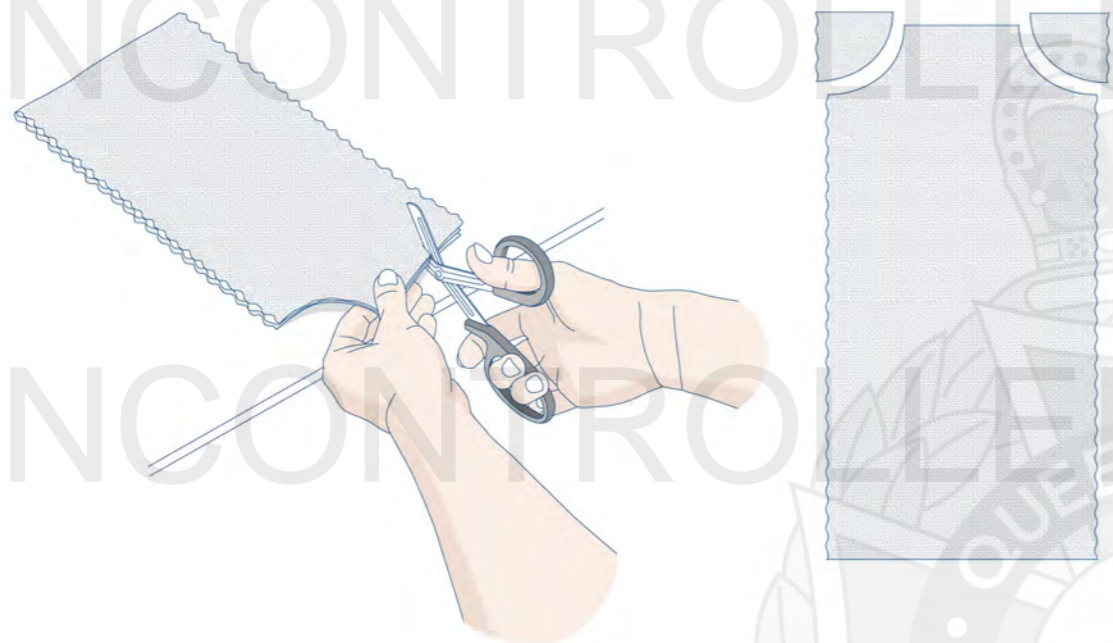
- a) Determine the required POP bandage length and cut to size:
- Length* – distance from the thumb's nail bed to three finger widths from the elbow crease.
 - Width* – 15 cm (standard).

Thumb's nail bed

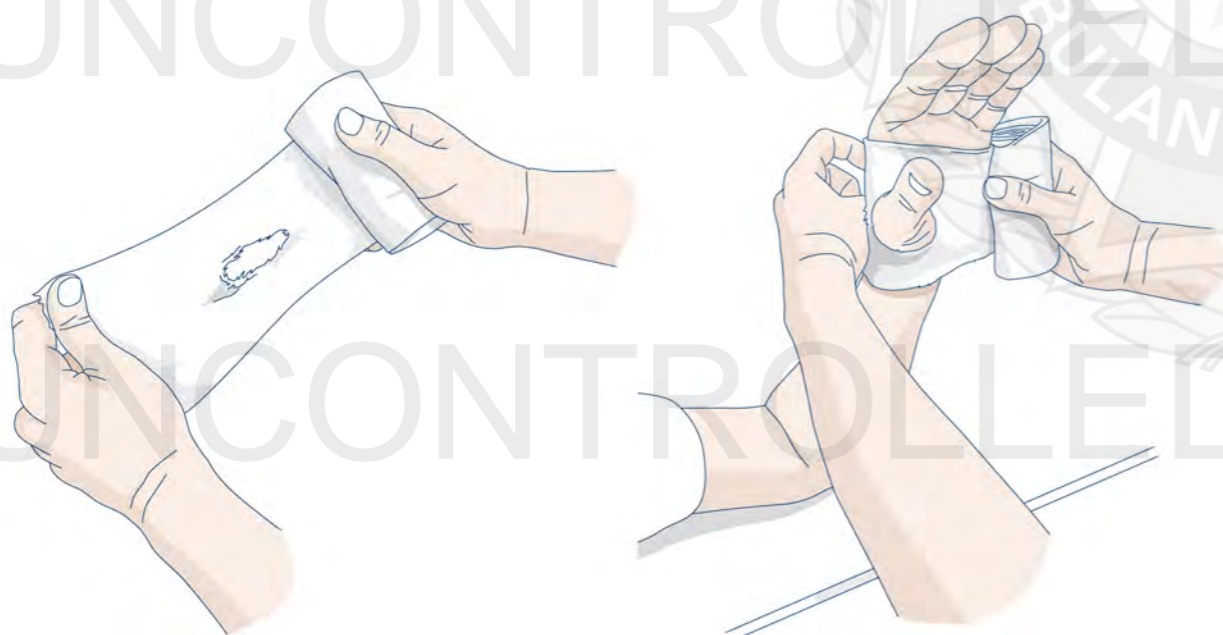


Procedure – Orthopaedic splinting – upper limb casting

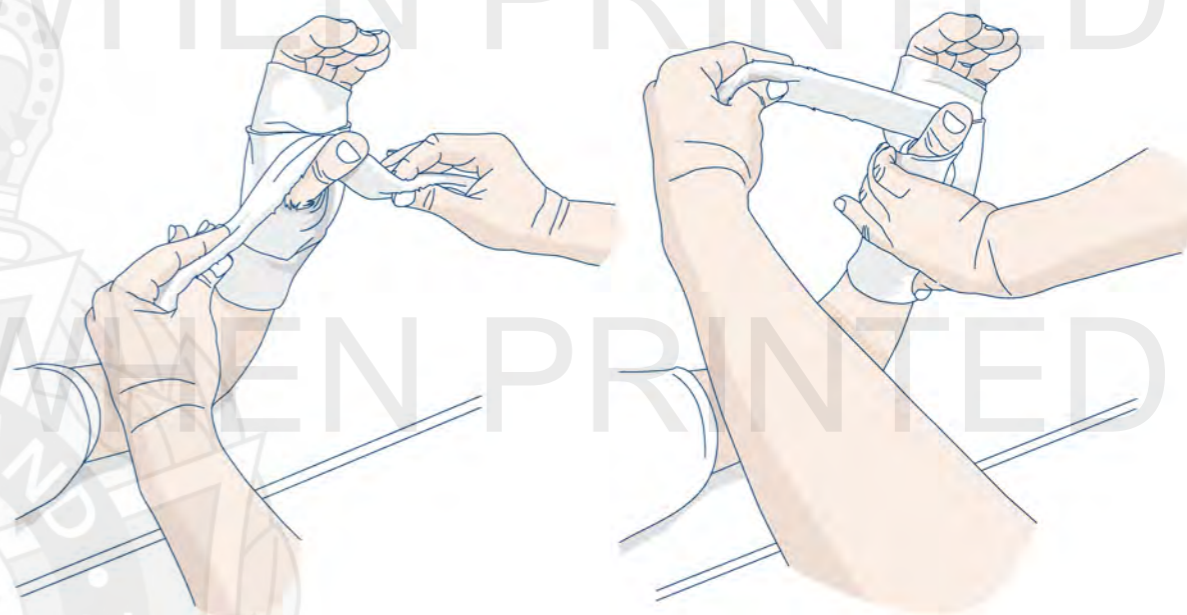
- b) Prepare 8–10 layers of POP bandage on a firm flat surface (i.e., 4–5 sheets doubled over).
- c) Cut the POP bandage to remove the segments as shown.



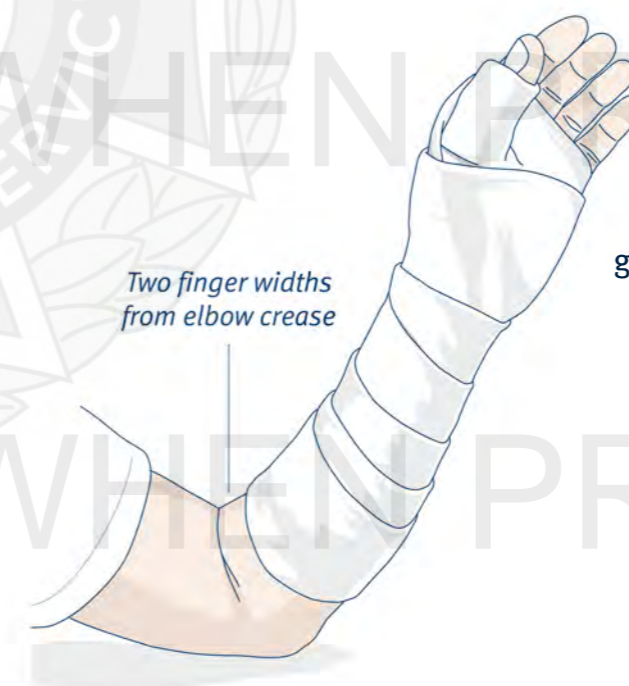
- d) Make an opening in the cotton under-padding and gently place it over the patient's thumb.



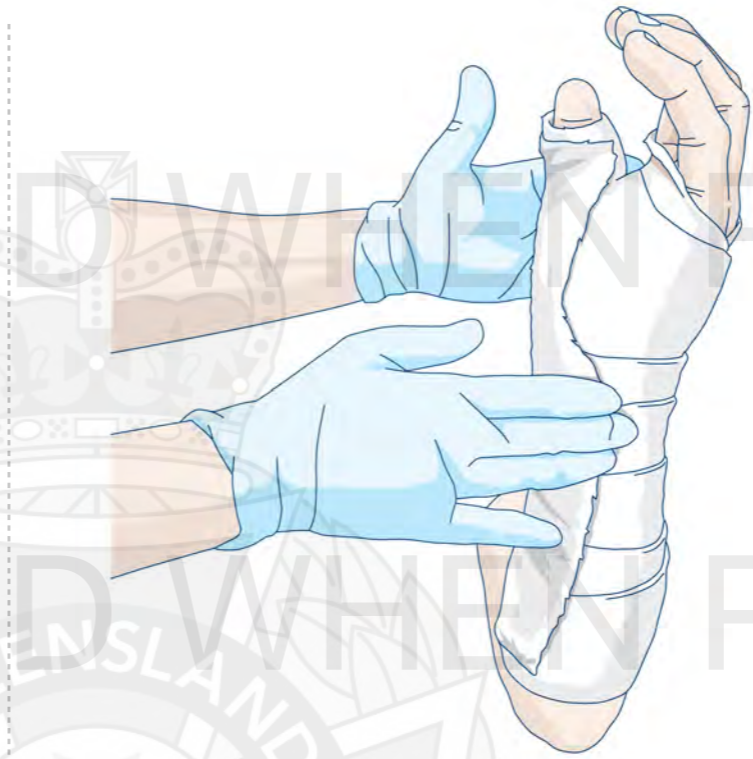
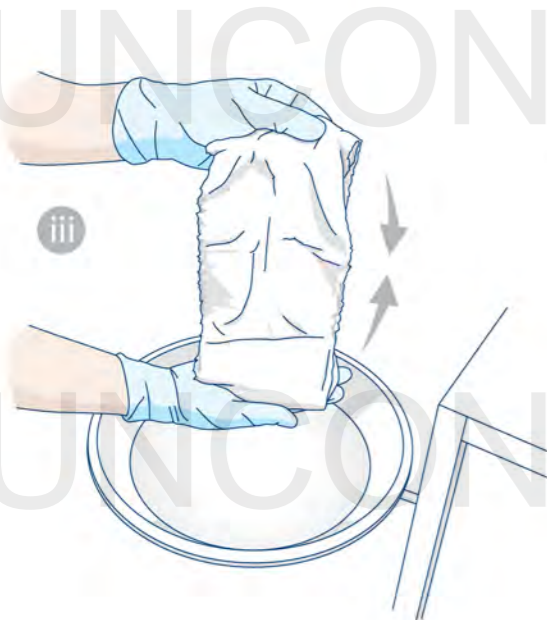
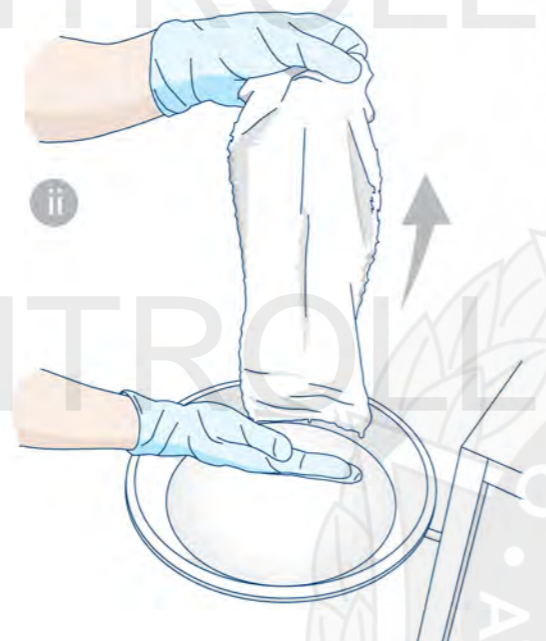
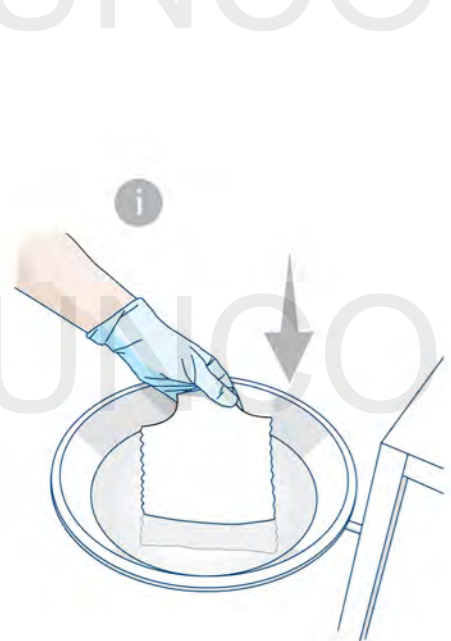
- e) Commence bandaging ensuring the palmer crease and metacarpel heads are evenly covered and continue bandaging to the wrist.
- f) Wrap the thumb with an additional strip of under-padding to provide adequate protection from the POP.



- g) Once the thumb and all bony prominences are fully covered with a 50% overlap, continue wrapping the under-padding proximally until 2 finger widths from the elbow crease; ensure no creases are visible.

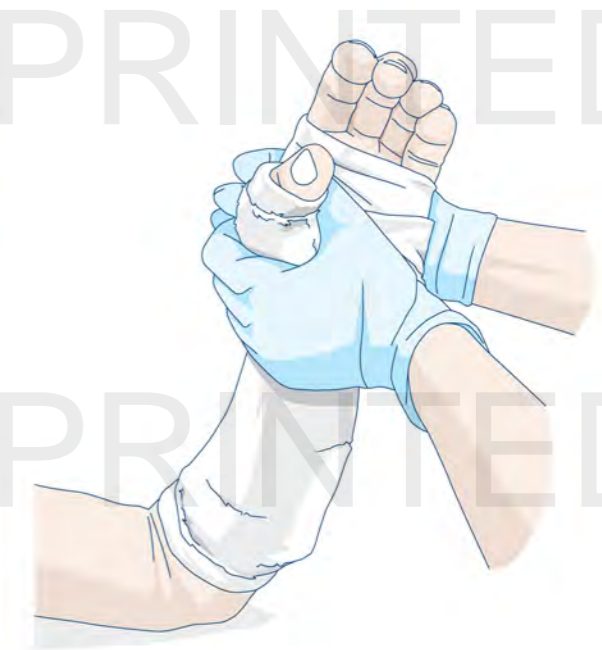
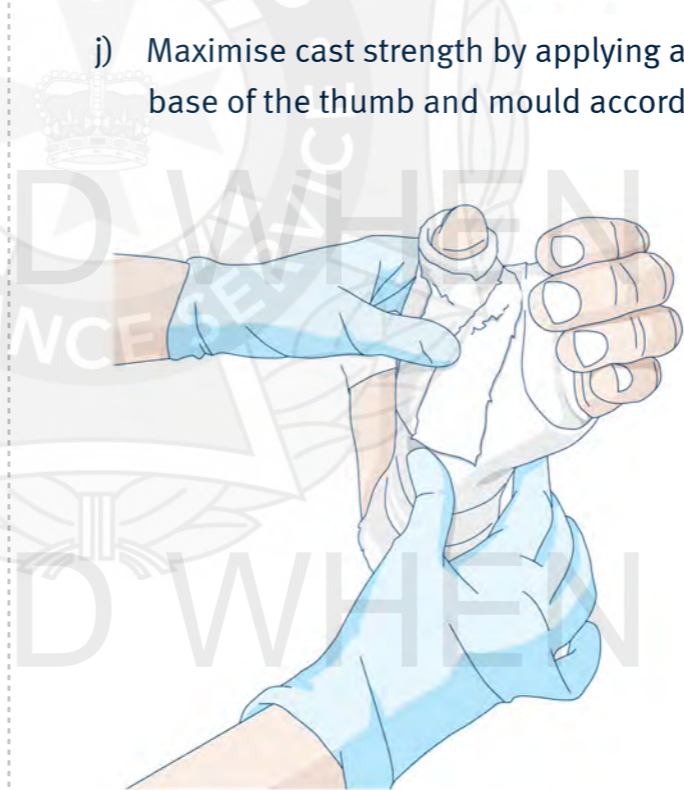


- h) Submerge the prepared POP bandage in a bowl of room temperature tap water. Wait a few seconds and once bubbling has ceased, remove and gently concertina the bandage into a cupped hand to remove excess water.



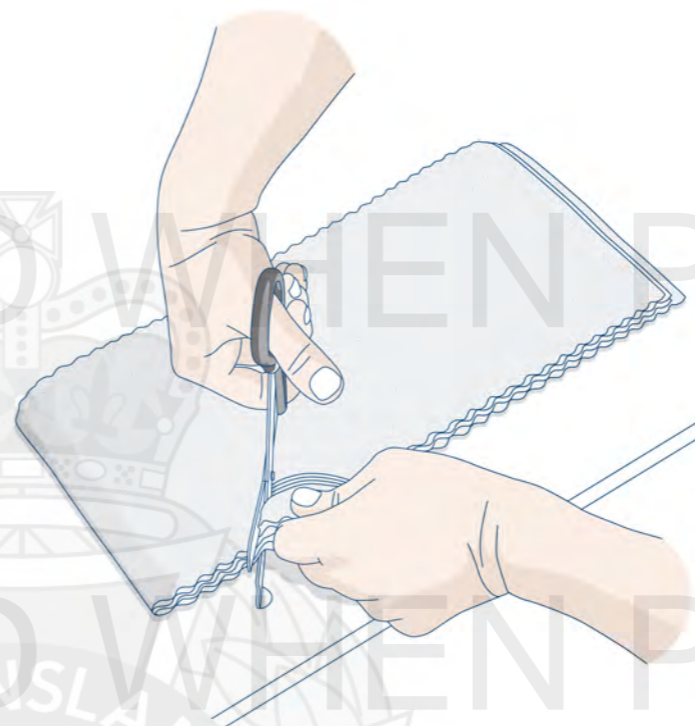
- i) Commencing at the thumb's nail bed, position the POP longitudinally on the patient's arm. Ensure a minimum 1/3 circumference gap remains to prevent neurovascular compromise.

- j) Maximise cast strength by applying additional layers of POP bandage to the base of the thumb and mould accordingly.





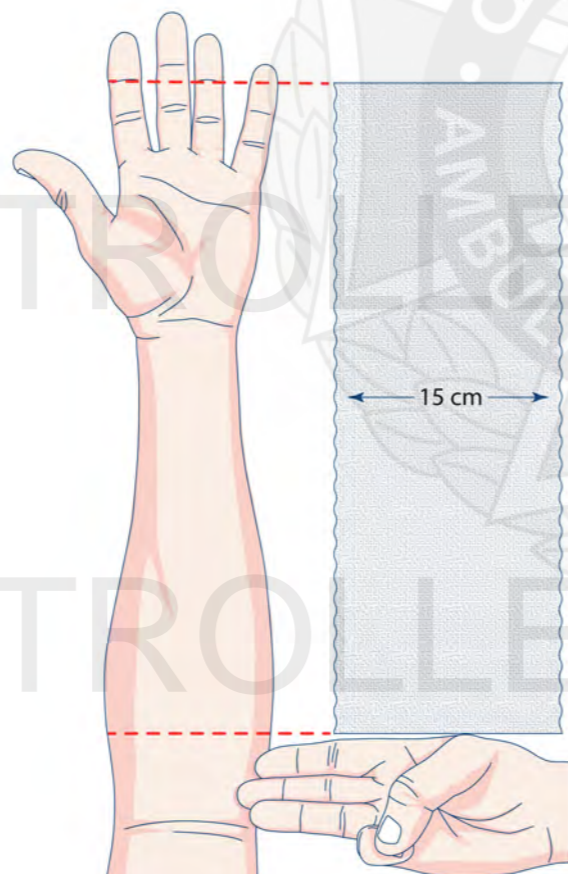
- k) Gently conform the slab to the limb using the flat palms of your hands.
- l) Instruct the patient to keep their arm immobilised while the cast sets.



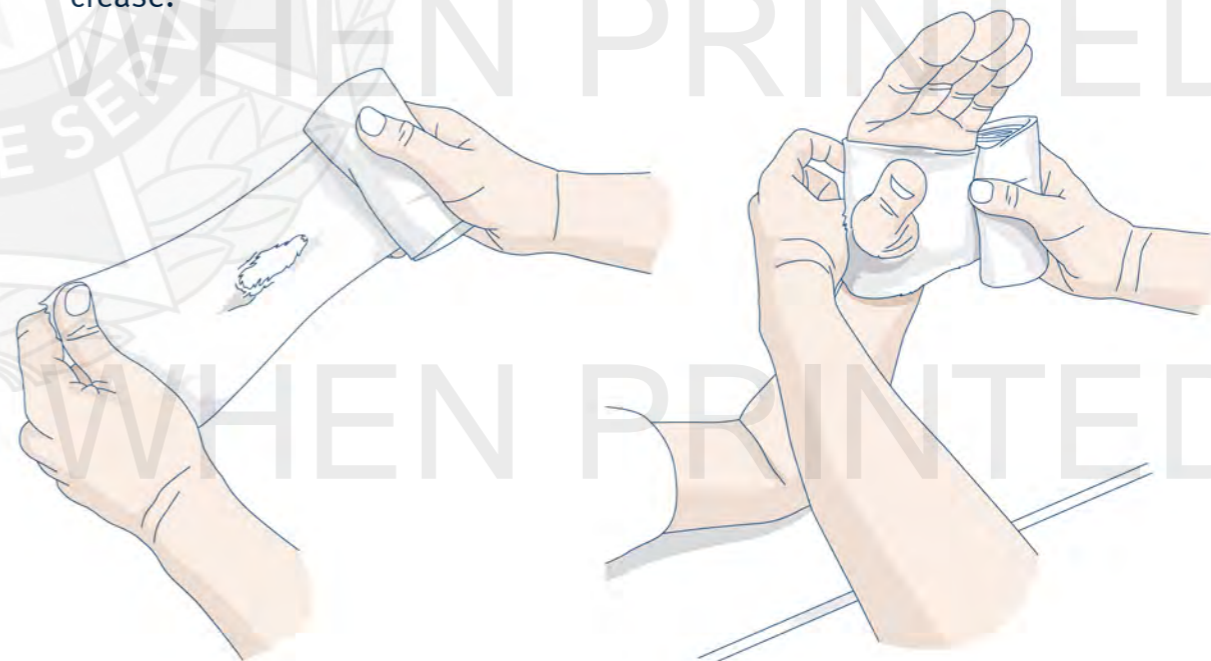
- b) Prepare 8–10 layers of POP bandage on a firm flat surface (i.e., 4–5 sheets doubled over).
- c) Approximate the thumb's position on the POP bandage and cut out a half circle.

Volar position of safe immobilisation (POSI) cast

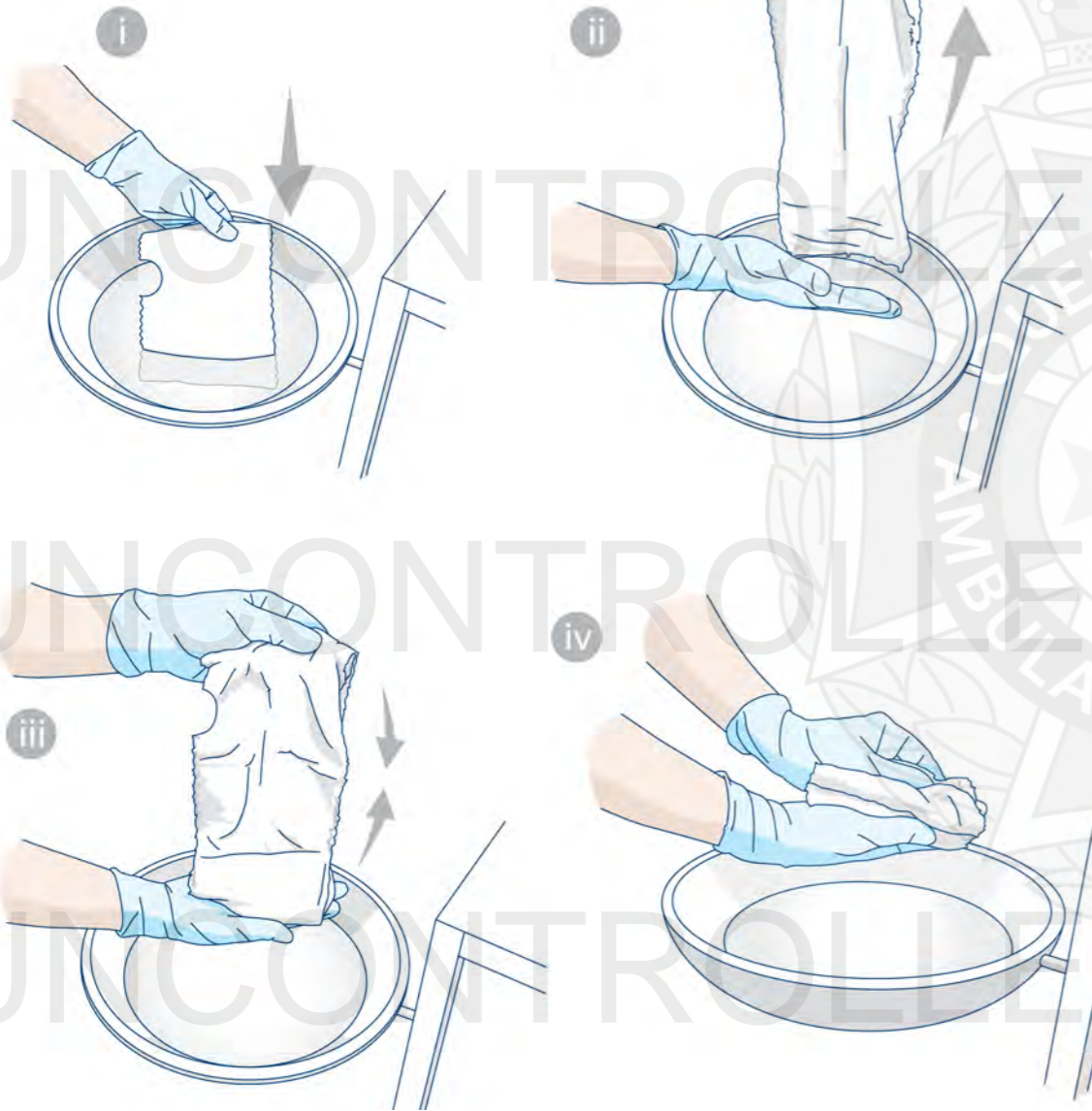
- a) Determine the required POP bandage length and cut to size:
 - i. *Length* – distance from the pointer finger's distal interphalangeal joint to three finger widths from the elbow crease.
 - ii. *Width* – 15 cm (standard).



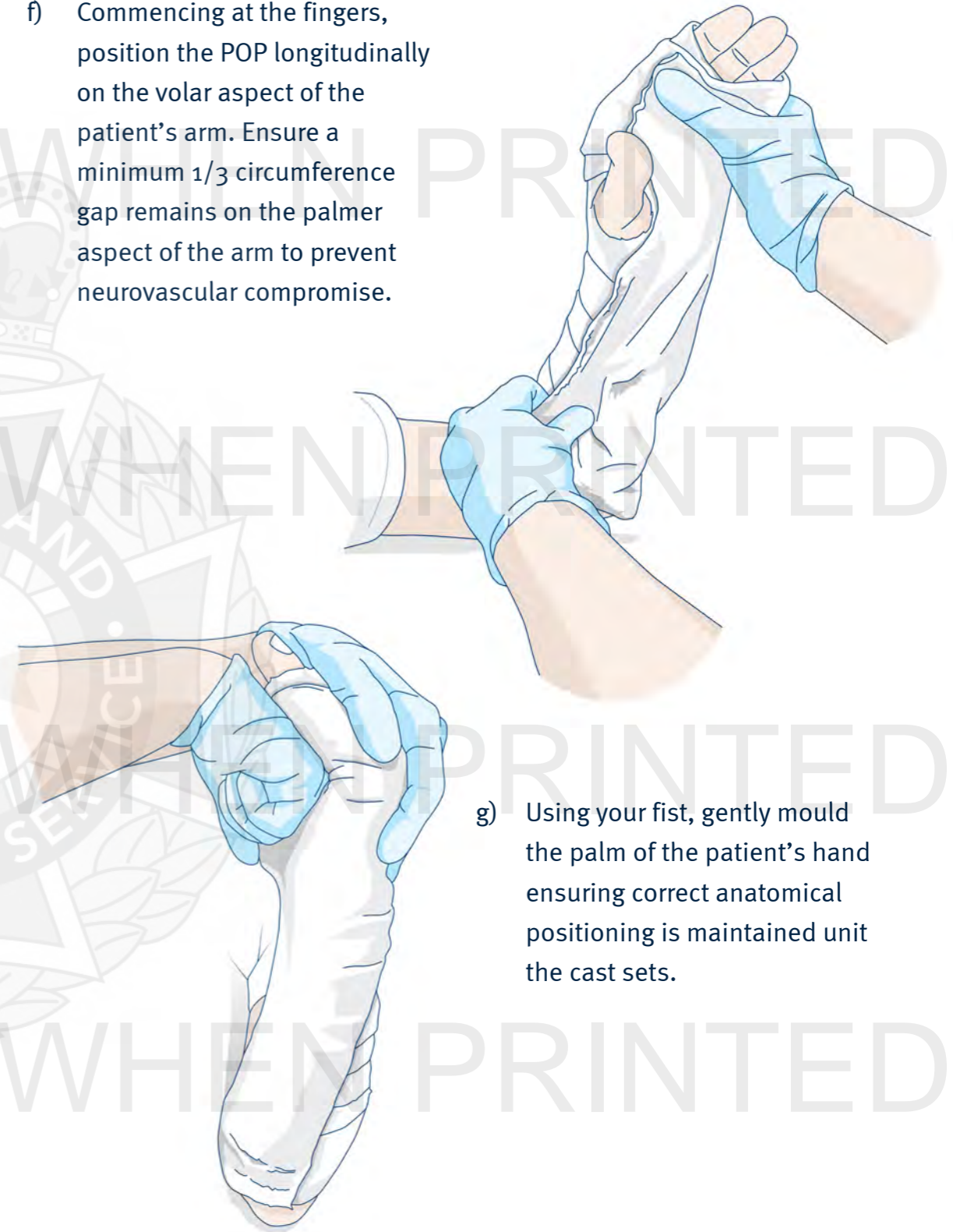
- d) Make an opening in the cotton under-padding and place over the patient's thumb. Commence bandaging ensuring the palmer crease and meta carpal heads are evenly covered with a 50% overlap. Once all bony prominences are protected, continue bandaging proximally until 2 finger widths from the elbow crease.



- e) Submerge the prepared POP bandage in a bowl of room temperature tap water. Wait a few seconds and once bubbling has ceased, remove and gently concertina the bandage into a cupped hand to remove excess water.



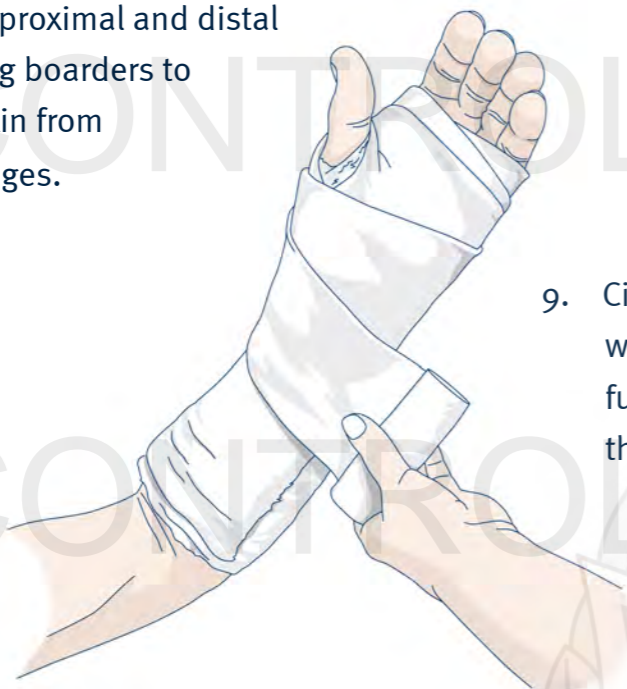
- f) Commencing at the fingers, position the POP longitudinally on the volar aspect of the patient's arm. Ensure a minimum 1/3 circumference gap remains on the palmar aspect of the arm to prevent neurovascular compromise.



- g) Using your fist, gently mould the palm of the patient's hand ensuring correct anatomical positioning is maintained until the cast sets.

7. Fold down or trim any excess plaster at both ends, ensuring the knuckles and the elbow crease are clearly visible.

8. Fold back the proximal and distal under-padding boarders to protect the skin from the plaster edges.



9. Circumferentially wrap with under-padding to fully cover and protect the POP surface.

10. When the plaster has set, apply a self-adhesive bandage circumferentially until the entire length of the plaster is covered.



11. Conduct a post application assessment to confirm the following:

- Does the cast have an acceptable gap to prevent possible neurovascular compromise?
- Does the cast immobilise the fracture and the joint above and below the fracture site?
- Is the patient free of unexplained pain or discomfort?

12. Obtain informed consent and send a photograph of the finalised cast (with the case number annotated in the subject line) via email QASLARU.Review@ambulance.qld.gov.au

13. Contact the QAS Clinical Hub and request that the cast photograph be reviewed to confirm application suitability.

14. Provide the patient/carer with a copy of the *QAS Fracture Fact Sheet* (see next page). Explain the fact sheet information and answer any questions asked by the patient/carer.

Plaster Cast Care Advice: Upper limb

Care for your limb



- Elevate the limb whenever possible to minimise swelling. During the first 24 hours, try to keep the limb above the level of the heart.
- Use a sling to support the arm when you are moving about.
- Keep the arm elevated on a pillow when you are resting or sleeping.
- Exercise the fingers and any other parts of the limb not covered by the cast, by wriggling/bending and stretching them with full range of movement to promote blood flow and reduce swelling.
- Avoid letting the limb hang down while sleeping or resting as this can increase swelling and pain.
- Avoid lifting heavy objects with the plastered limb.
- Take analgesia as directed by the clinician.

Care for your skin



- Periodically check for signs of any problems with the plaster, for example, the cast fitting too tightly, too loosely or rubbing on the skin which can cause irritation and skin damage.
- Avoid scratching under the plaster or inserting any objects such as knitting needles, chopsticks, rulers or pencils under the plaster, as these can cause skin irritation, tears or pressure that can lead to infection.
- Avoid using talcum powder, deodorant or perfumes to disguise any odours.

Care for your cast

- The cast takes about two days to dry completely. Avoid putting any pressure on the cast during this time to avoid distortion or cracking.
- Keep the plaster dry at all times and cover with a sealed plastic bag when showering.
- Keep the cast away from high heat (e.g. heaters, fire) as extreme heat may cause the cast to crack.
- Avoid cutting the cast in any way, including to loosen it around fingers etc.
- Avoid removing any of the padding from inside the cast as it is there to support the limb and protect the skin.

Seek medical provider help or advice?

If any of the following occurs and is not relieved by elevating the limb for 20–30 minutes, **seek help or advice:**

- Severe or increasing pain
- Increasing swelling to any part of the limb (a small amount of swelling is normal)
- Numbness or loss of sensation
- Pins and needles
- Loss of mobility of the fingers.

Also consult your medical provider:

- If the limb's skin colour changes to blue or white or fingers become very cold
- If the cast becomes loose, damaged, or wet
- If you develop a fever or notice any ooze or unpleasant odours from your cast that suggests a possible infection
- Make sure you attend all medical follow-up appointments.

If further advice is required contact your GP OR 13 HEALTH (13 43 25 84)

+ Additional information

- The limb's neurovascular status must be assessed and the findings documented prior to and following application of the cast.
- Using room temperature water to wet the plaster minimises the risks of exothermic reactions.
- When handling a setting plaster, ambulance clinicians should use the palms of the hands, not their fingers. This helps avoid making indentations in the plaster that can potentially compromise the integrity of the underlying skin.
- If emergency cast removal is required, use blunt ended shears to cut through the longitudinal gap between the plaster edges.
- The plaster should be set solid in approximately 5 minutes, however, will take up to 72 hours to fully dry.
- All equipment required for the application of upper limb casting will be supplied by the correctional facility responsible for the patient.
- For patients in correctional facilities, ambulance clinicians must ensure no equipment or material used for the application of the plaster cast can be used as a weapon and/or an aide to self harm. Ensure the length of all bandages is a maximum of 30 cm.

Audit:

- All fractures involving ambulance clinician applied plastering are subject to clinical audit and review.