



Clinical Practice Procedures: Access/Intraosseous – Long bones (Arrow® EZ-IO®)

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Date	April, 2021
Purpose	To ensure a consistent procedural approach to Intraosseous – Long bones (Arrow® EZ-IO®).
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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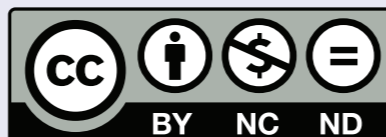
All feedback and suggestions are welcome. Please forward to: Clinical.Guidelines@ambulance.qld.gov.au

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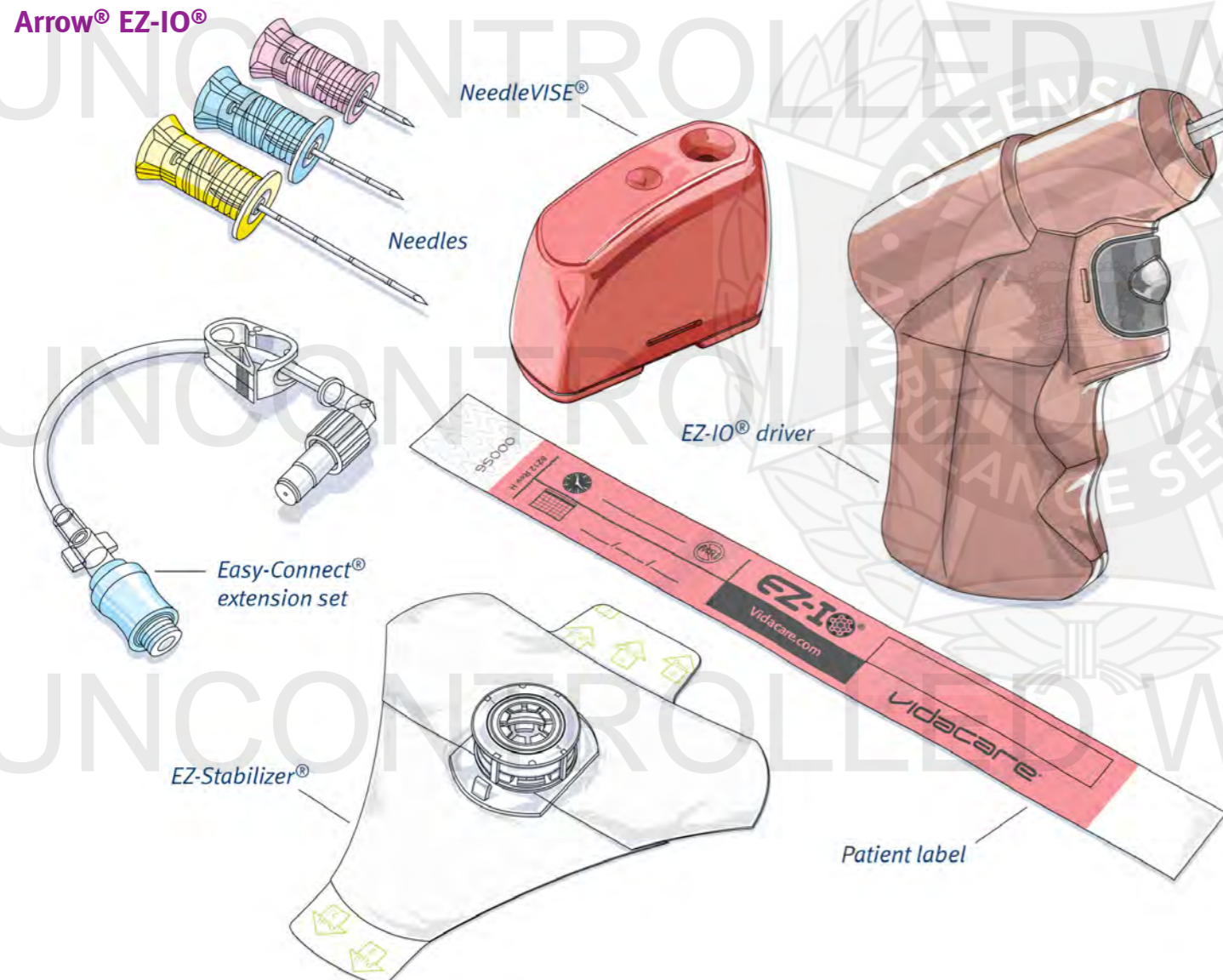
Intraosseous – Long bones (Arrow® EZ-IO®)

April, 2021

Intraosseous (IO) access involves inserting a needle into the intramedullary space enabling the administration of medications and/or fluids. The intramedullary cavity is composed of vascular rich sinusoids that promote the rapid transport of medications and/or fluids into the general circulation via the intramedullary venous system.

IO access is an invasive procedure and should only be considered when intravenous access is unachievable. Appropriate consideration must be given to its requirements in the pre-hospital setting.

The Arrow® EZ-IO®^[1] is a battery powered intraosseous access device suitable for use in all age groups.



Indications

- Emergent access for the administration of drugs and/or fluids when IV access is unachievable.

Contraindications

- Fracture in target bone
- Previous significant orthopaedic procedure at the site, prosthetic limb or joint
- IO catheter use in previous 48 hours (target bone only)
- Infection in the area of insertion
- Excessive tissue (severe obesity) and/or absence of adequate anatomical landmarks

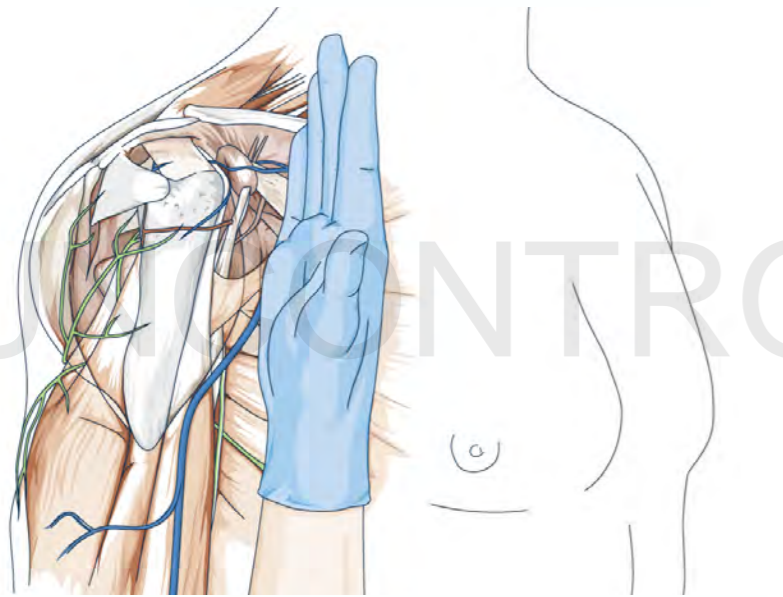
Complications

- Local or systemic infection
- Drug/fluid extravasation into superficial tissues (e.g. compartment syndrome)
- Fracture and/or epiphyseal plate damage
- Air embolus

Procedure^[1] – Intraosseous – Long bones (EZ-IO[®])

1. Apply required infection control measures (refer to the *QAS Infection Control Framework*).
2. Identify an appropriate insertion site. Options include:

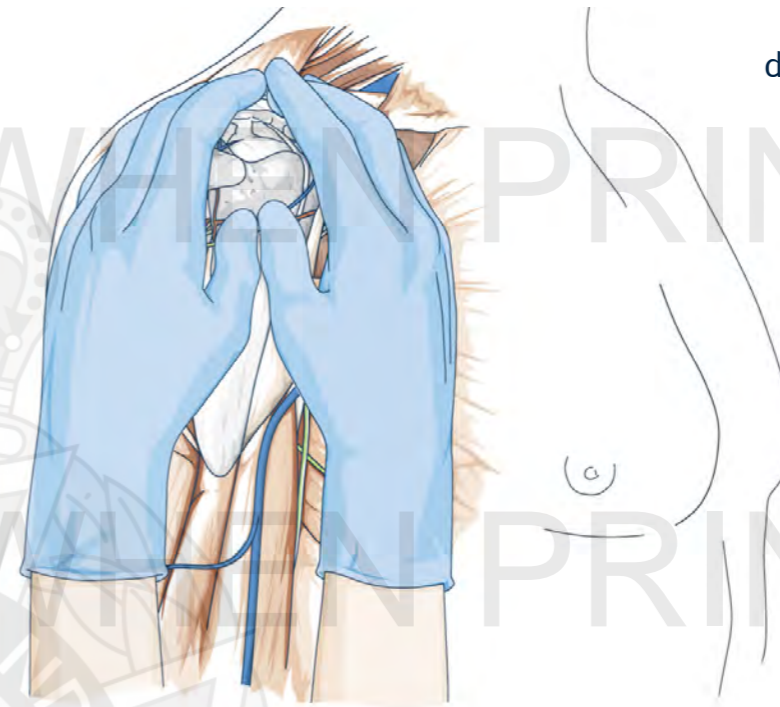
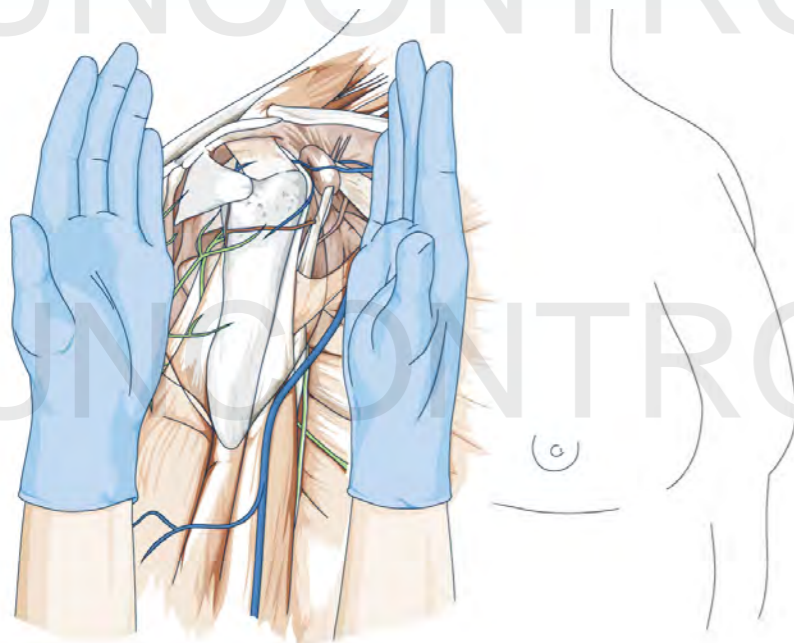
Adults (> 12 years) proximal humerus



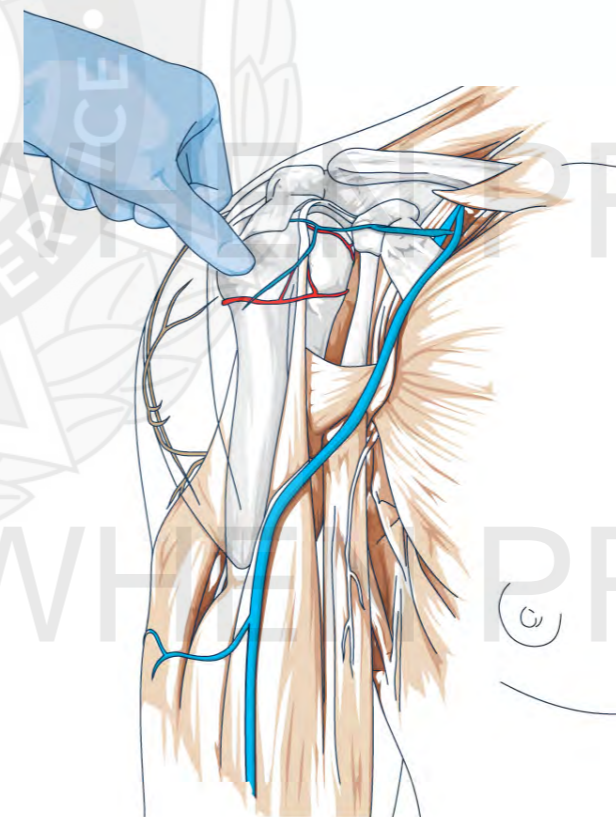
a) Place the patient's hand over the abdomen (to adduct the elbow and internally rotate the humerus).

b) Place the ulnar aspect of one hand vertically over the axilla.

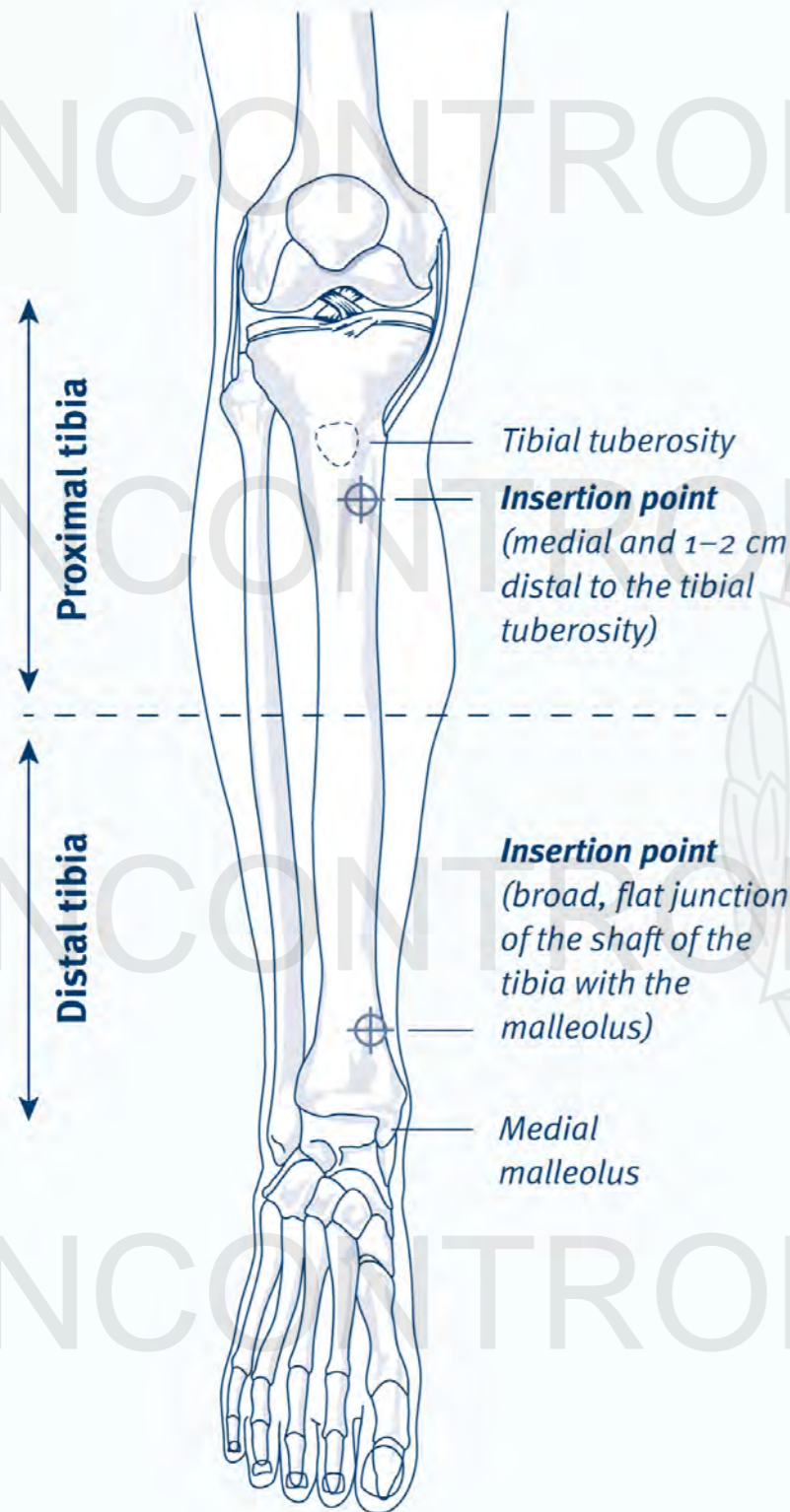
c) Place the ulnar aspect of the opposite hand along the midline of the upper arm laterally.



d) Place your thumbs together over the arm to identify the vertical line of insertion.



e) Palpate deeply as you climb up the humerus to the surgical neck. The insertion site is the most prominent aspect of the greater tubercle, 1–2 cm above the surgical neck.



**Adults (> 12 years)
proximal tibia**

- a) Extend the patient's leg.
- b) The insertion site is approximately 2 cm medial to the tibial tuberosity, or approximately 3 cm below the patella and approximately 2 cm medial, along the flat aspect of the tibia.

**Adults (> 12 years)
distal tibia**

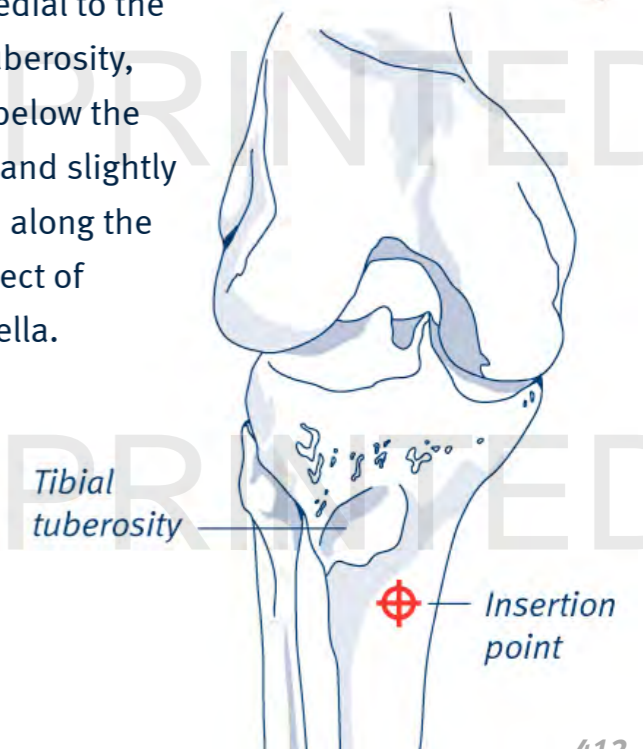
- a) Extend the patient's leg.
- b) The insertion site is approximately 3 cm proximal to the most prominent aspect of the medial malleolus, along the flat central aspect of the tibia.

Paediatric (infant/child) proximal tibia:

- a) Extend the patient's leg.
- b) Gently pinch the tibia between your fingers to identify the centre of the medial and lateral borders.



- c) The insertion site is approximately 1 cm medial to the tibial tuberosity, or just below the patella and slightly medial, along the flat aspect of the patella.



Procedure – Intraosseous – Long bones (Arrow® EZ-IO®)

3. Clean the intended insertion site with an appropriate antimicrobial swab using a 'back and forth' motion in two different directions (cross hatch method) for 15 seconds in each direction (total 30 seconds). A risk benefit analysis in view of the patient's condition is appropriate.
4. Allow the insertion site to completely dry (where clinically appropriate).
5. Prime the Easy-Connect® extension set with sodium chloride 0.9%.
6. Select the appropriate size Arrow® EZ-IO® needle, attach it to the driver and ensure it is securely seated.
7. Remove and discard the Arrow® EZ-IO® needle set safety cap.
8. Position the driver at the insertion site:
 - *Humerus*: 45° angle to the frontal plane and posteromedial.
 - *Tibial (distal/proximal)*: 90° angle to the centre of the bone.
9. Push the needle set tip through the skin until the tip rests against the bone – ensure 5 mm of the catheter is visible.
10. With a steady downward pressure gently squeeze the driver's trigger to penetrate the bone cortex.
11. Release the driver's trigger and stop the insertion process when:
 - a sudden 'give' or 'loss of resistance' is felt upon entry into the medullary space; and/or
 - the desired depth is obtained.
12. Stabilise the hub and remove the power driver.
13. Place the supplied NeedleVISE® on a flat stable surface.
14. While holding the plastic coloured hub of the EZ-IO® needle, gently unscrew the stylet and immediately insert the pointed tip straight down into the opening of the NeedleVISE® until it stops. **ENSURE TO KEEP YOUR FREE HAND AWAY FROM THE NeedleVISE® DURING INSERTION.**
15. Place the EZ-Stabilizer® dressing over the catheter hub.
16. Attach the primed Easy-Connect® extension set to the catheter's hub luer-lok.
17. Remove the adhesive from the back of the EZ-Stabiliser® dressing and apply it firmly to the patient's skin.
18. Consider the administration of IO lidocaine 1% (lignocaine 1%) for analgesia (refer to *DTP: Lidocaine 1% (lignocaine 1%)*).
19. Prior to flushing, aspirate slightly for visual confirmation of bone marrow.
20. Confirm patency by flushing the catheter with sodium chloride 0.9%:
 - *Adults*: 5–10 mL
 - *Paediatrics*: 2.5 mL
21. Administer medications and/or fluids as necessary.
22. Frequently monitor the insertion site for extravasation.

Additional information

- The use of medical gloves is not a substitute for hand hygiene. Hand hygiene should be performed before donning and after doffing medical gloves and immediately before and after any procedure.
- Eye protection must be worn by all clinicians. The potential of blood and body fluids exposure during this procedure is **HIGH**.
- Clinicians must remain vigilant when administering drugs via this route. It may take longer for the drug to take effect and it is important to avoid a cumulative toxic dose.
- In the event of Arrow® EZ-IO® driver failure, officers may disconnect the driver and gently manually twist the needle into the medullary space.
- Under **NO** circumstances is the Arrow® EZ-IO® to be used in the sternum.
- All opened EZ-IO® needles (used or clean) must be disposed of in a NeedleVISE®.
- The NeedleVISE® with the attached EZ-IO® needle may be disposed of directly into a yellow contaminated waste bag or a large sharps container.^[2]

NUMBER OF ATTEMPTS

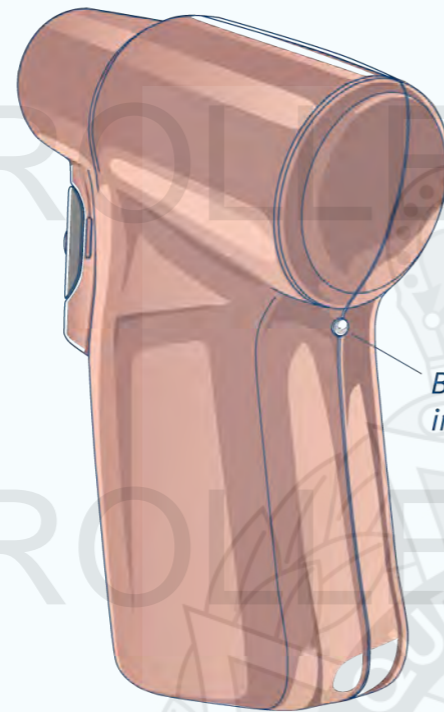
- This procedure is limited to **one** attempt in each limb.

Procedure – Intraosseous – Long bones (Arrow® EZ-IO®)

+ Additional information

BATTERY INDICATOR ALERTS (when trigger activated)

- **Solid green** – sufficient power
- **Blinking red** – 10% of battery life remaining, order replacement.



Removal instructions

All Arrow® EZ-IO® catheters must be removed within 24 hours, this will generally be done by the medical/nursing staff at the receiving health facility. In the unlikely situation that QAS clinicians will be required to remove the catheter, the following procedure must be followed: [1,2]

- Remove the EZ-Stabiliser® dressing and extension set from the catheter.
- Attach a 10 mL luer-lock syringe to the hub.
- While maintaining axial alignment, twist the syringe and catheter clockwise while pulling straight out – do NOT rock or bend the catheter during removal.
- Immediately dispose of the catheter into a sharps container.
- Apply gentle pressure as needed and apply a sterile dressing to the site.

