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Arrow® EZ-IO® Intraosseous Vascular Access System

MC-004827rev3.1

Key Concepts of Intraosseous Vascular Access



Disclosures

Presenter Information
And
Disclosure as applicable

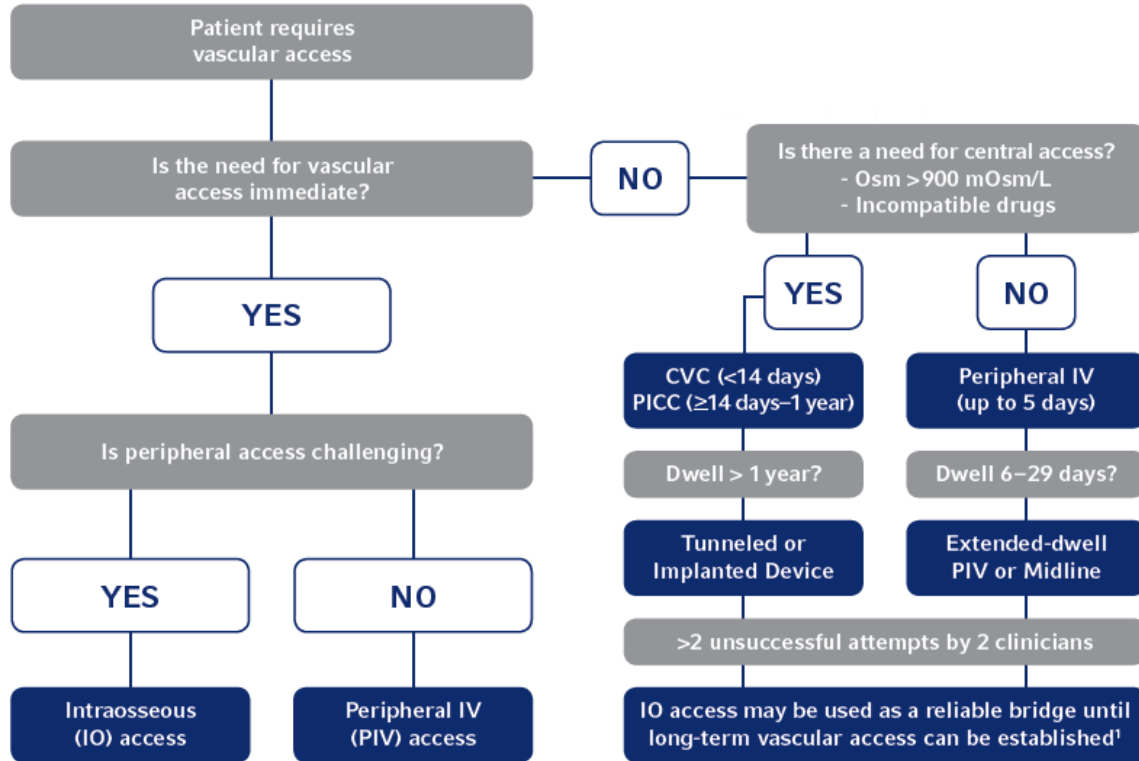
Objectives

- Verbalize indications and contraindications of the Arrow® EZ-IO® Intraosseous Vascular Access System
- List considerations for insertion site selection
- Recognize insertion sites and landmarking techniques
- Identify critical concepts for needle set selection
- Understand preparation for procedure and supplies
- Distinguish insertion technique recommendations
- Apply pain management technique for intraosseous (IO) infusions
- Understand utilization, care, and removal of the IO vascular access
- Discuss care and maintenance of the Arrow® EZ-IO® Driver
- Identify documentation and additional considerations

Indications and Contraindications

Arrow® EZ-IO® System

Difficult Vascular Access Algorithm



Indications

For intraosseous access anytime in which vascular access is difficult to obtain in emergent, urgent or medically necessary cases for up to 24 hours.

Adults (≥ 22 years old)	Pediatrics (≤ 21 years old)
<ul style="list-style-type: none">• Proximal humerus• Proximal tibia• Distal tibia	<ul style="list-style-type: none">• Distal femur• Proximal humerus• Proximal tibia• Distal tibia

For patients ≥ 12 years old, the device may be extended for up to 48 hours in the U.S. when alternate intravenous access is not available or reliably established.

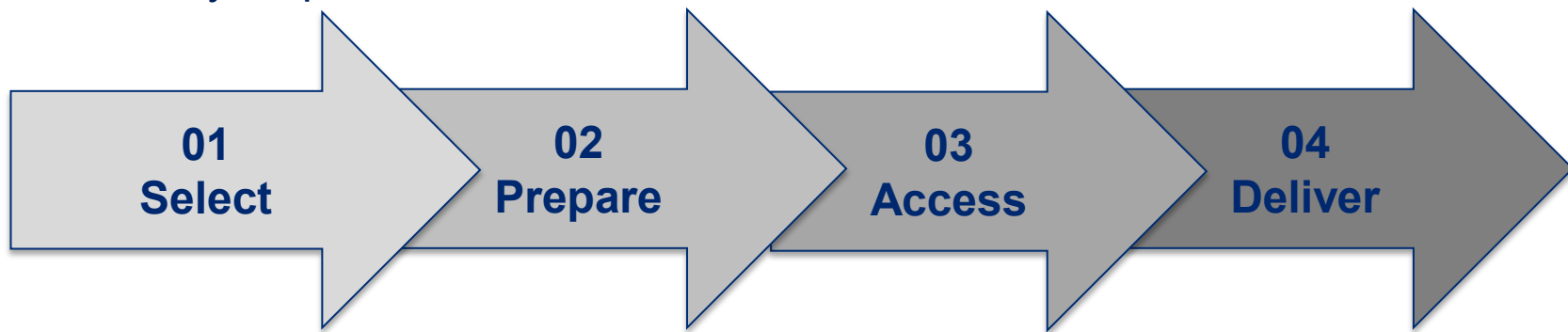
Contraindications

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



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Four easy steps:

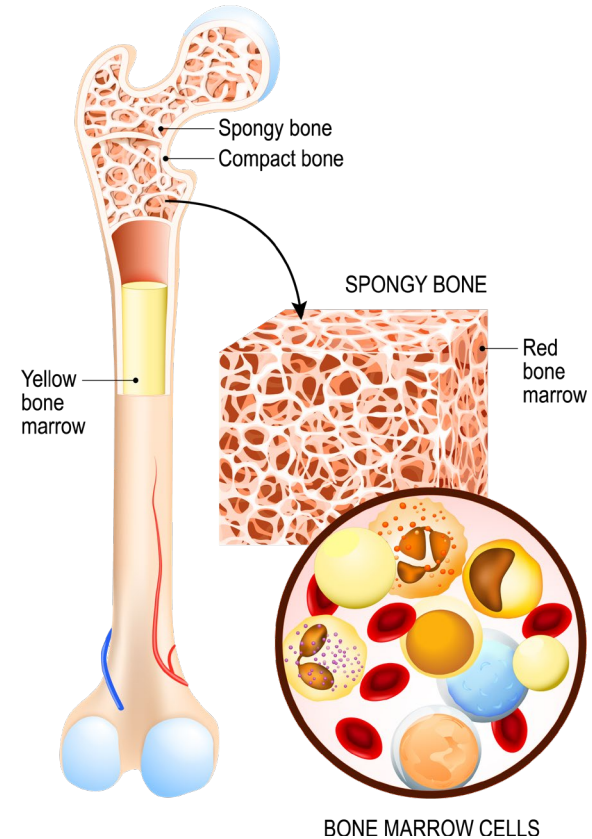
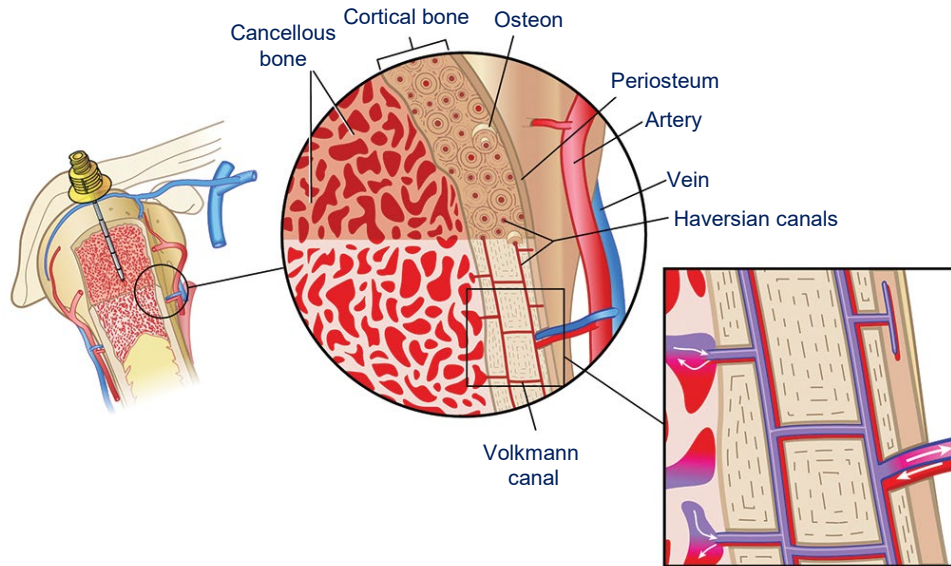


Anatomy and Insertion Site Selection

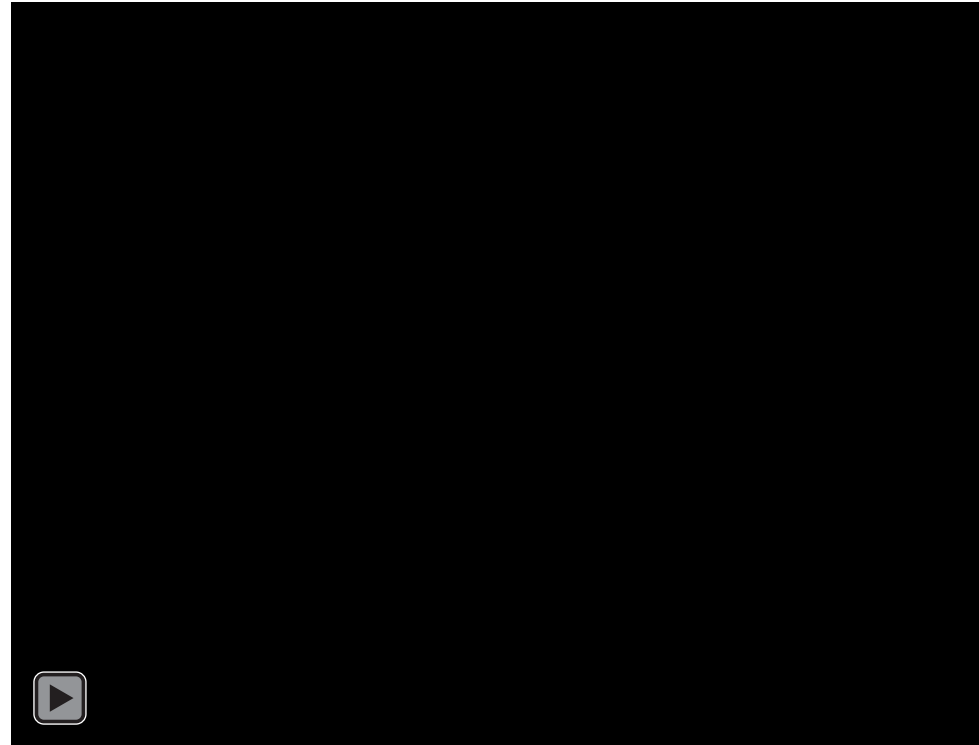
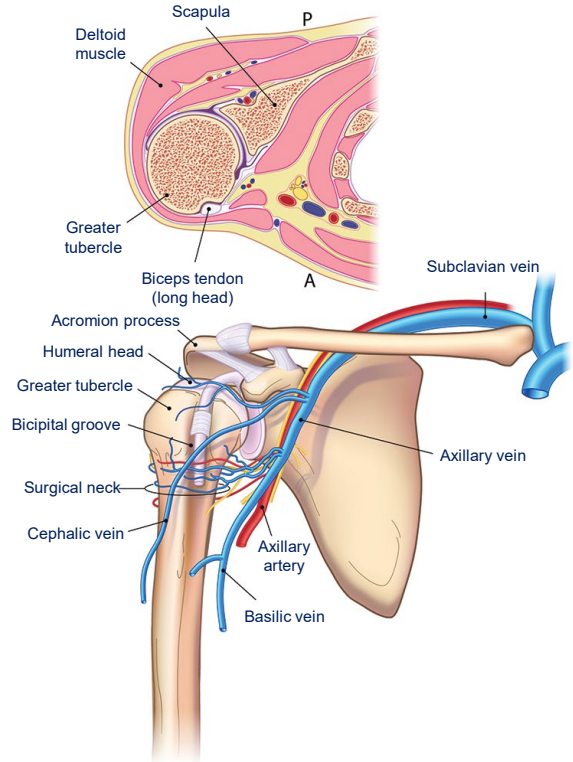


Anatomy and Physiology

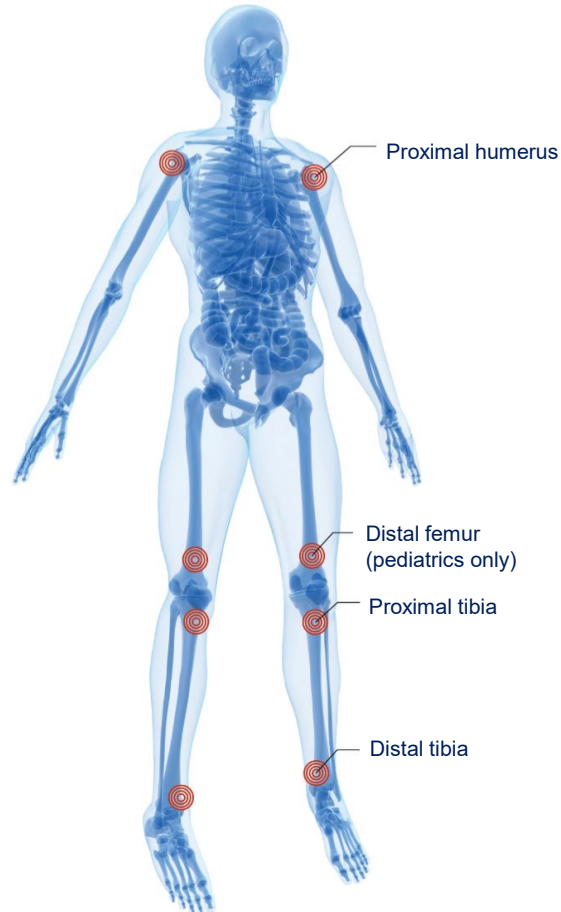
Highly vascular, non-collapsible access



Real-time Fluoroscopy – Human Model



Insertion Site Selection



- 3 seconds to heart with medication/fluids^{1*}
- Flow rates average 6.3 L/hr. under pressure^{2*}
- Less pain reported with saline flush^{3*‡}
- Less medication required for pain management during infusion^{3*‡}

- Insertion success rate of 98-100%⁴

- Flow rates average 1.0 L/hr. under pressure^{3†}

*Based on adult proximal humerus data

†Based on adult proximal tibia data

‡Compared to EZ-IO® System tibial insertions

Needle Set Selection



Arrow® EZ-IO® Needle Set Selection

Clinical judgment should be used to determine appropriate needle set selection based on patient weight, anatomy, and tissue depth overlying the insertion site



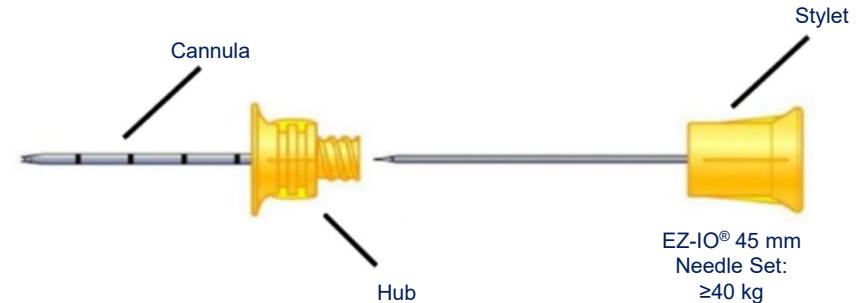
EZ-IO® 15 mm Needle Set: 3-39 kg



EZ-IO® 25 mm Needle Set: ≥3 kg

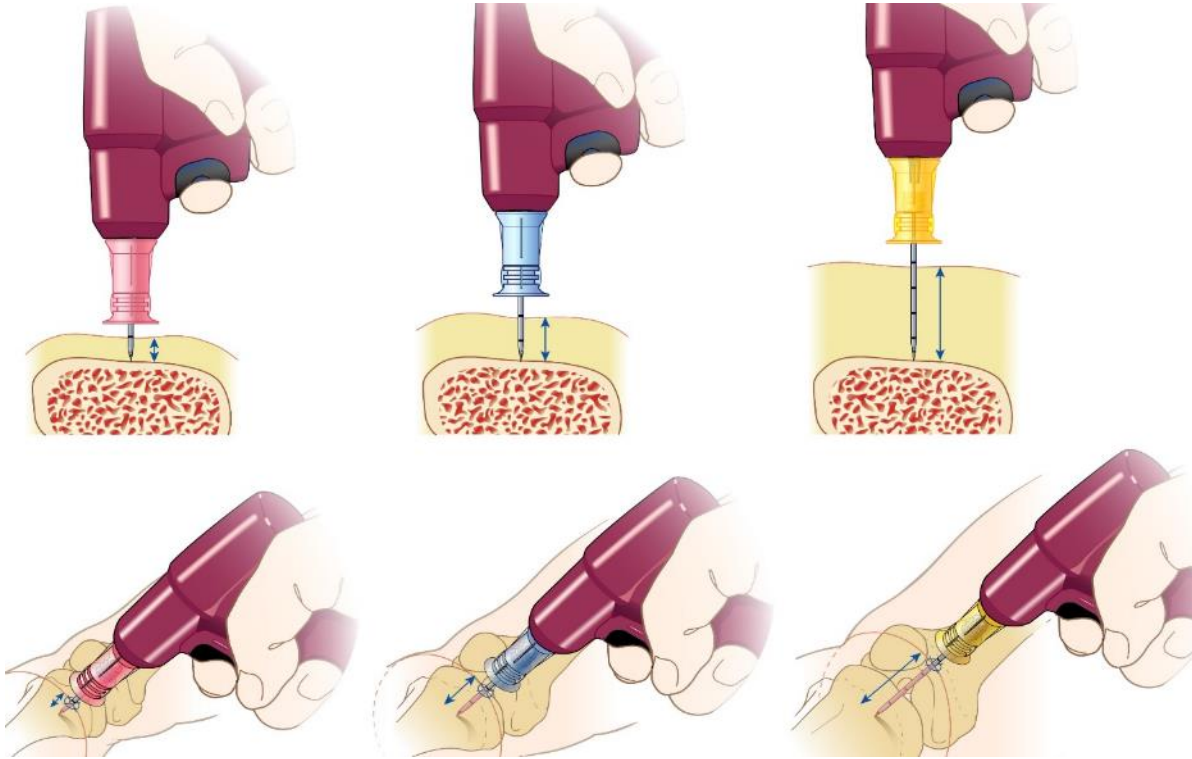


EZ-IO® 45 mm Needle Set: ≥40 kg

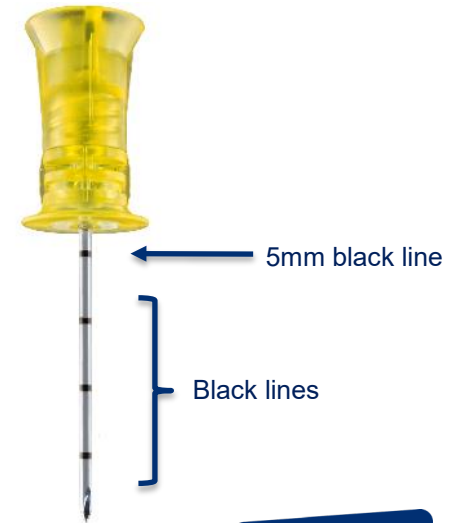


EZ-IO® 45 mm
Needle Set:
≥40 kg

Needle Set Selection Tips



With the tip of the needle set touching bone, at least one black line must be visible above the skin



Insertion Site Identification



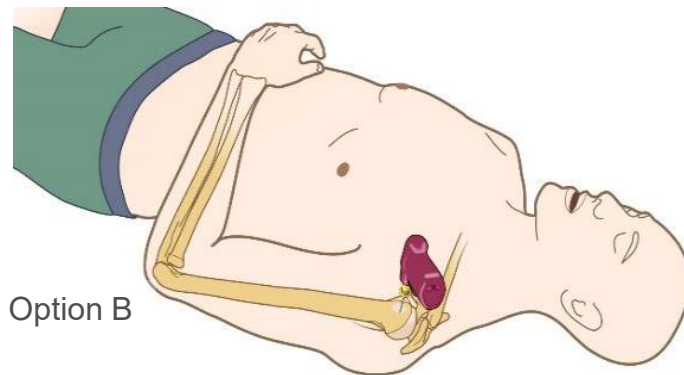
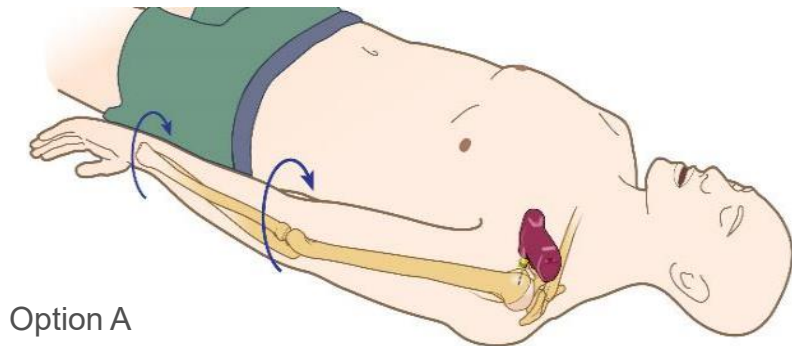
Positioning for Proximal Humerus Site Identification

Using either method below, adduct elbow to rotate humerus internally

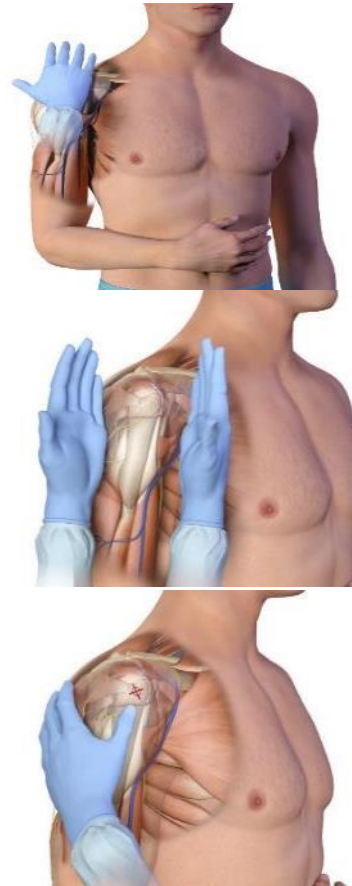
Place the arm tight against the body; rotate the hand so the palm is facing outward, thumb pointing down

OR

Place the patient's hand over the abdomen with arm tight to the body

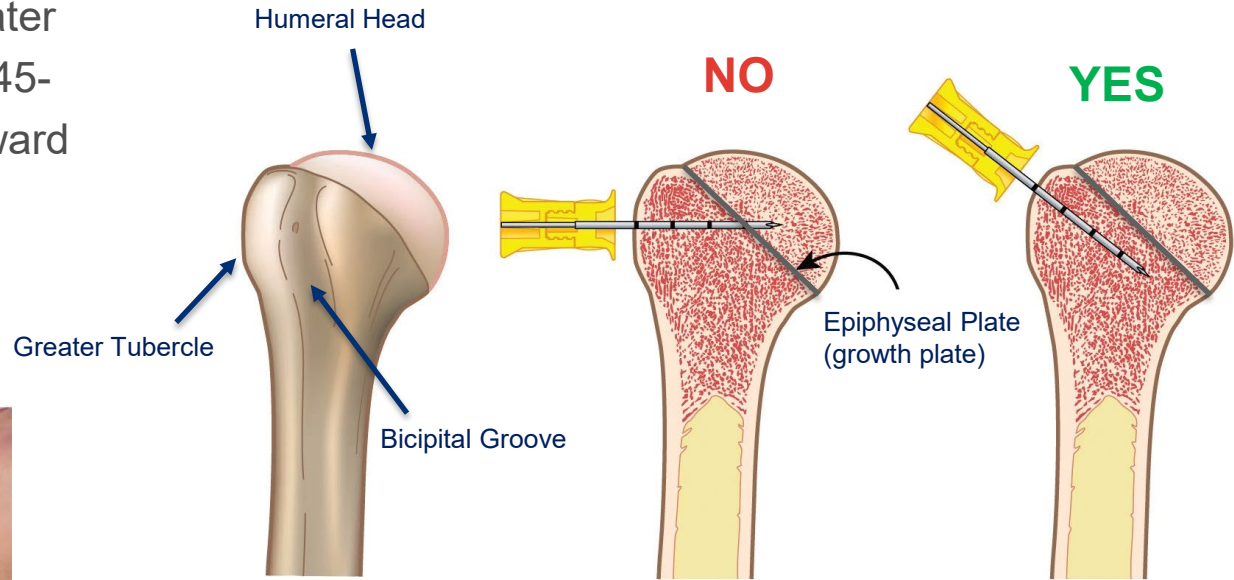
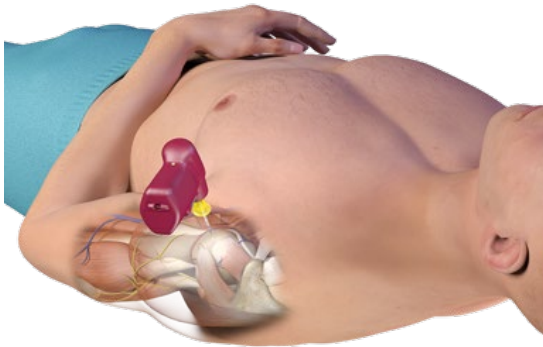


Proximal Humerus Site Identification



Proximal Humerus Insertion Angle

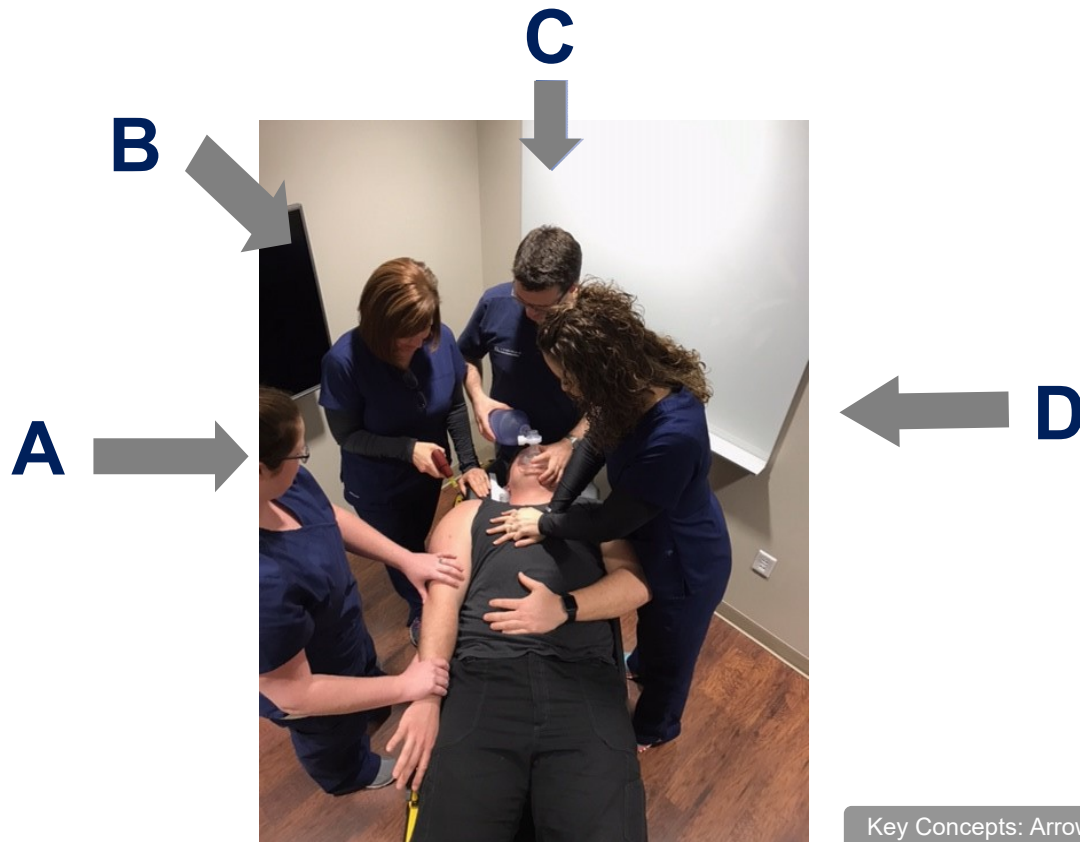
Insert needle set into the greater tubercle at an approximately 45-degree angle, as if aiming toward the opposite hip.



Proximal Humerus Insertion Angle



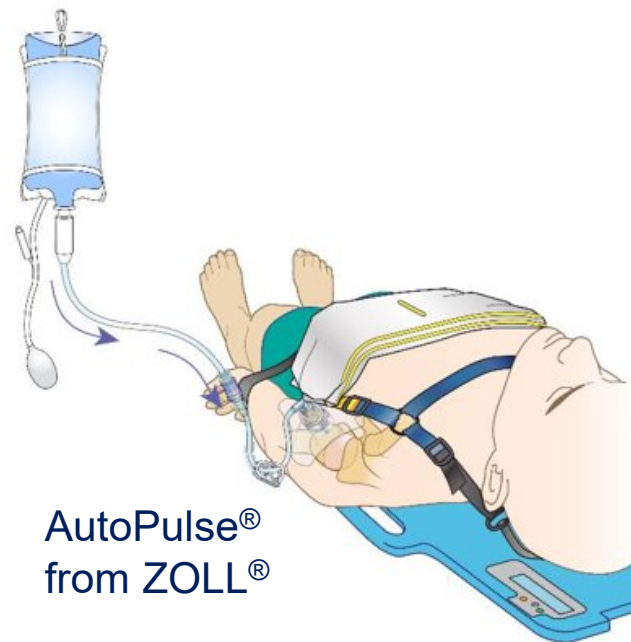
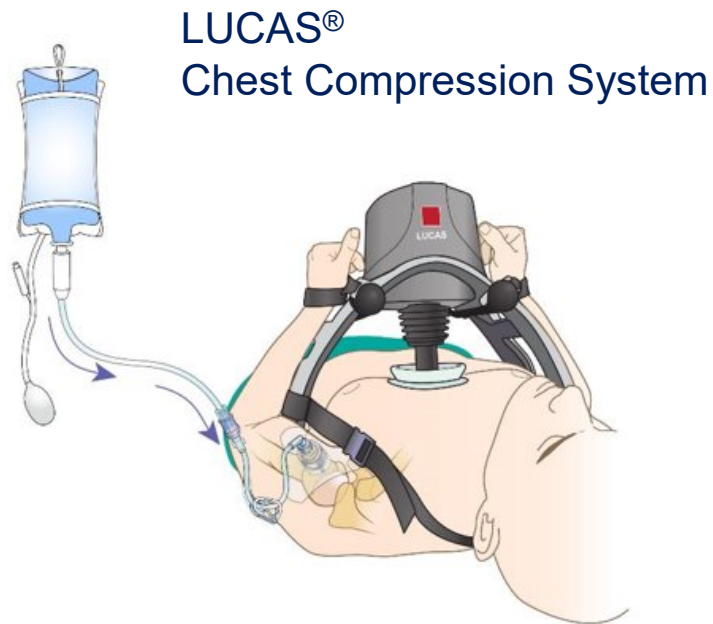
Myth: "There is not enough space at the head of the bed."



Key Concepts: Arrow® EZ-IO® System

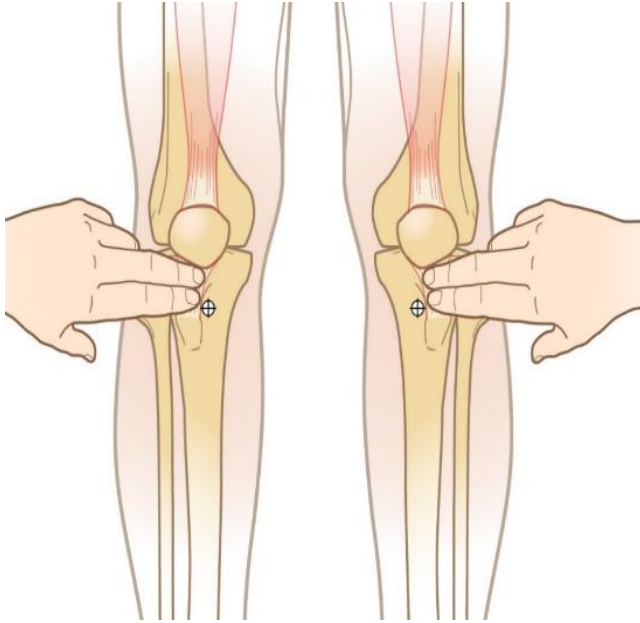
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Proximal Humerus IO Access and Mechanical CPR Devices

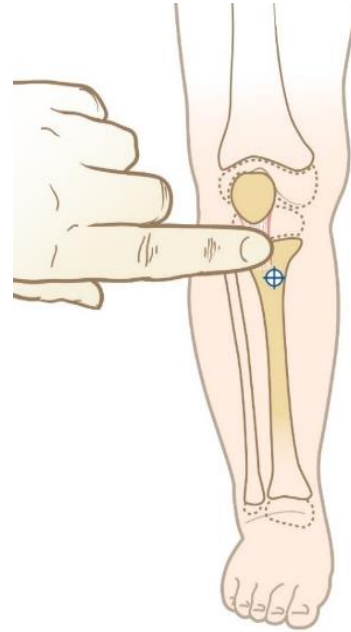


Proximal Tibia Site Identification

Adult/Older Child

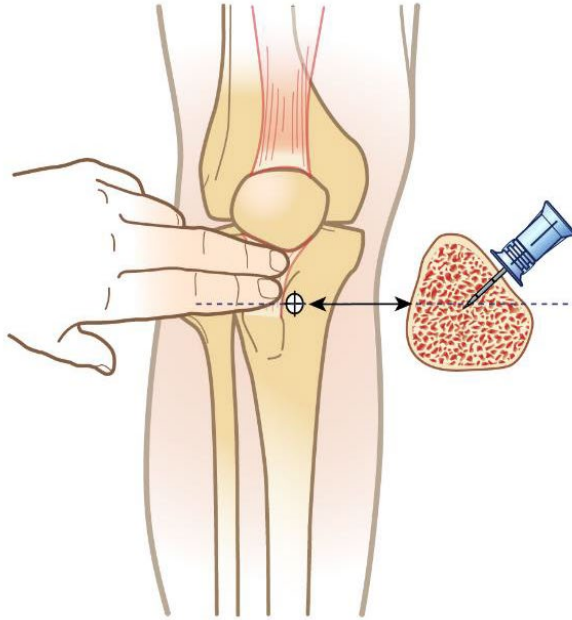


Neonate/Young Child

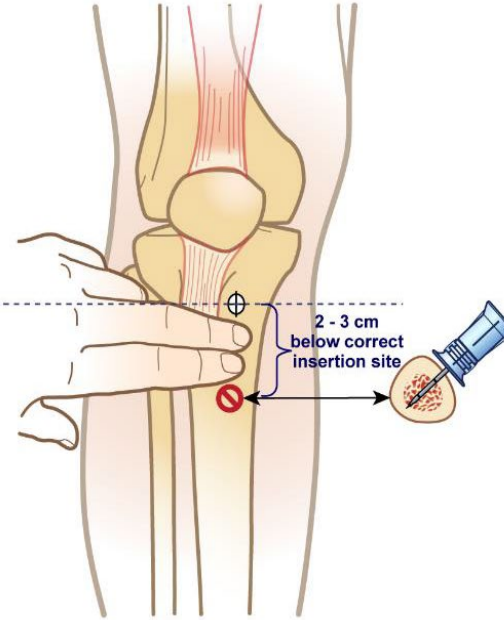


Proximal Tibia Site Identification

Correct



Incorrect

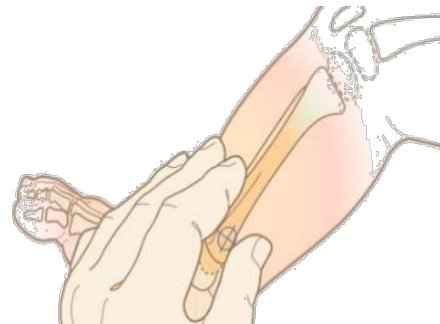
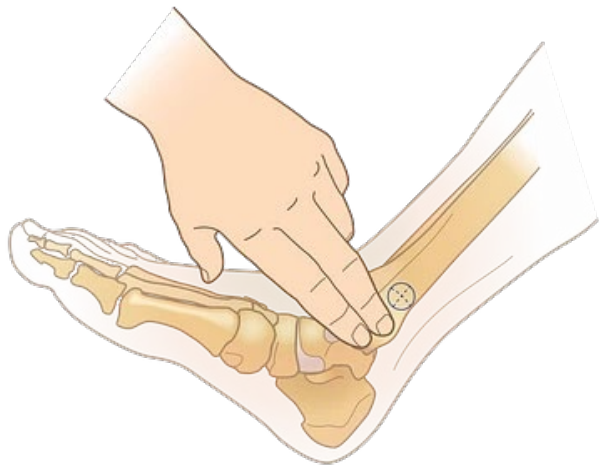


Proximal Tibia Site Identification

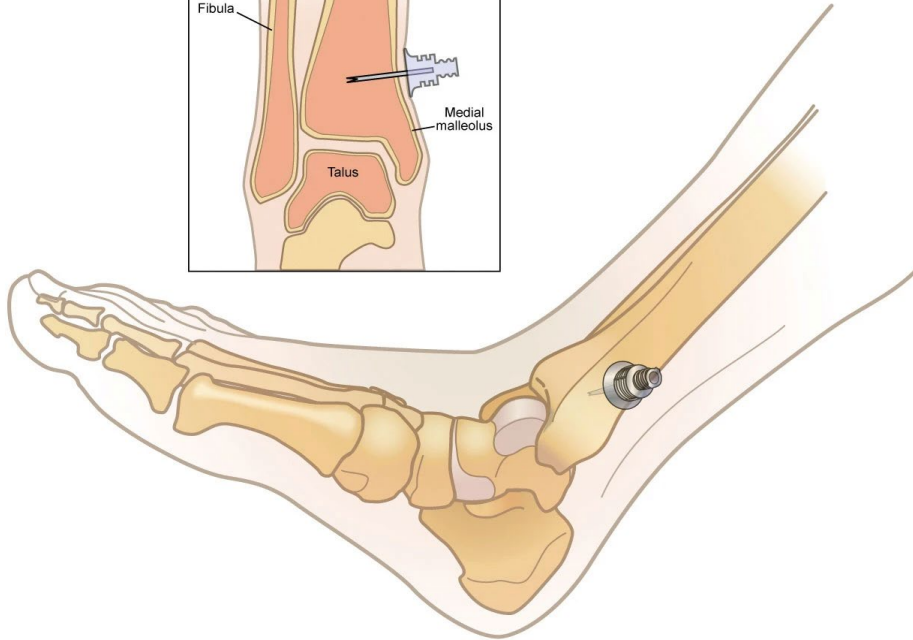
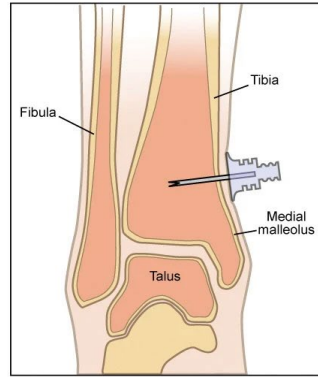


Distal Tibia Site Identification

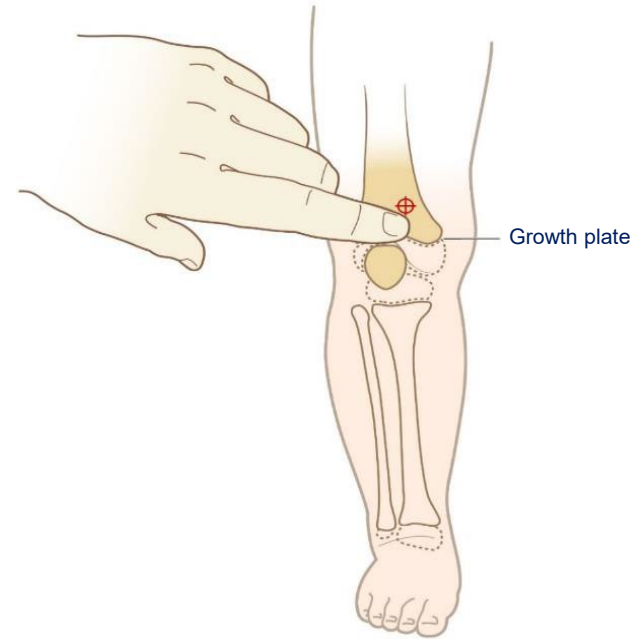
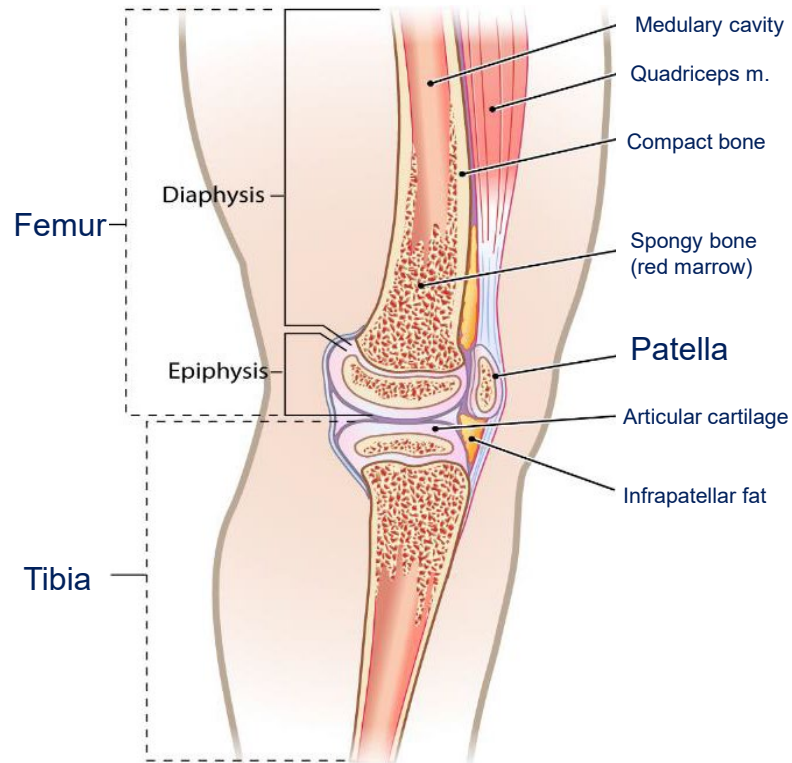
Insert medially on the flat, center aspect of the bone



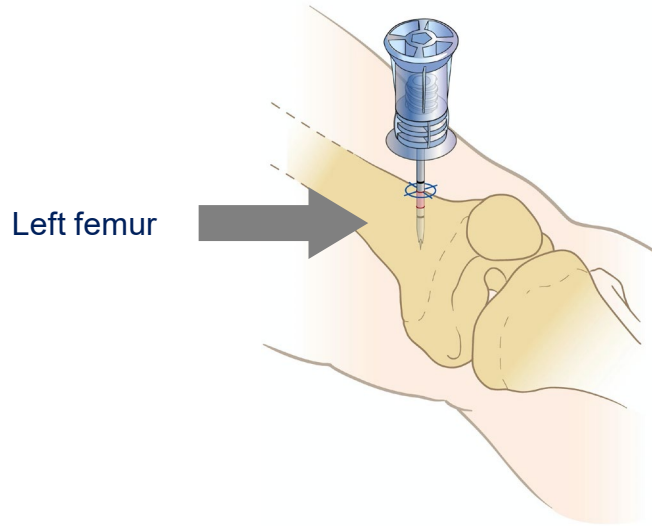
Distal Tibia Site Identification



Distal Femur Site Identification



Distal Femur Site Identification



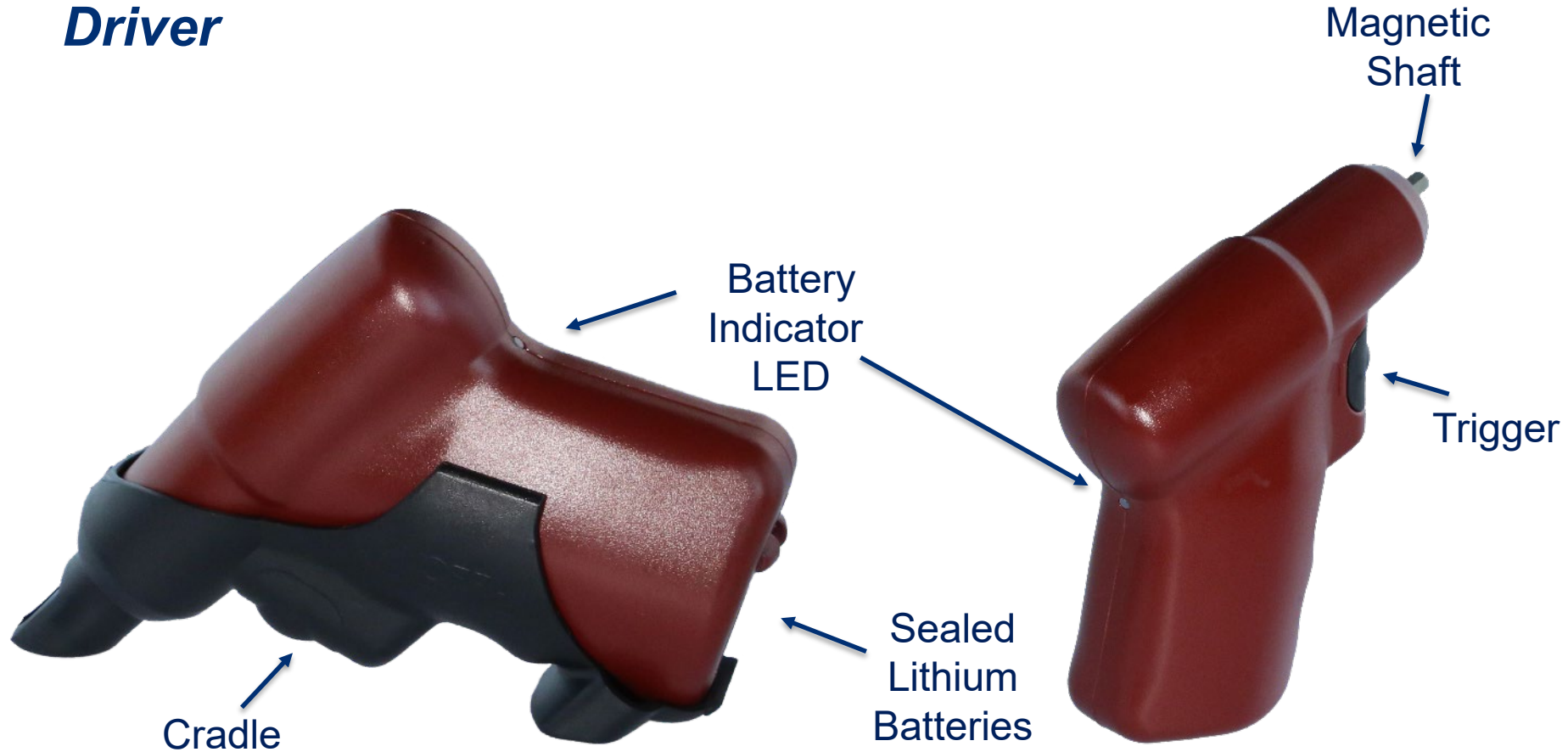
Ensure leg remains immobilized throughout dwell

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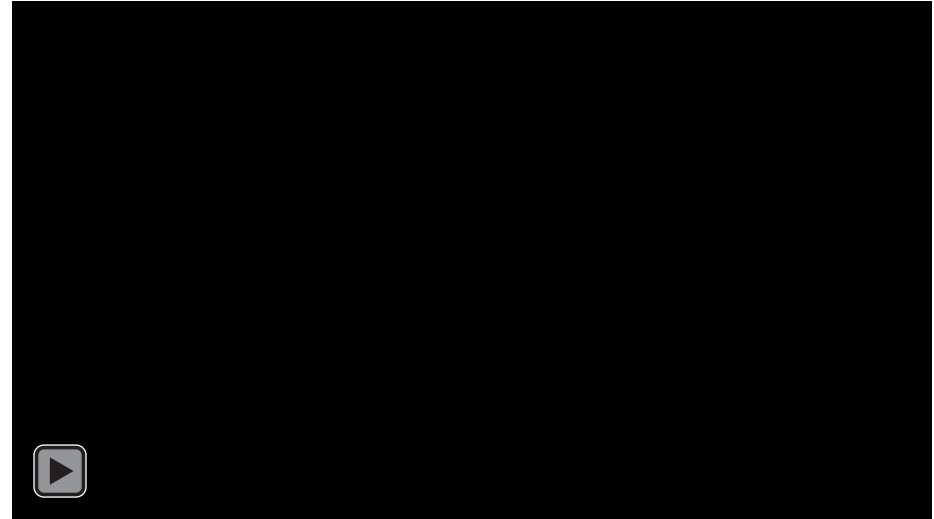
Insertion



Driver

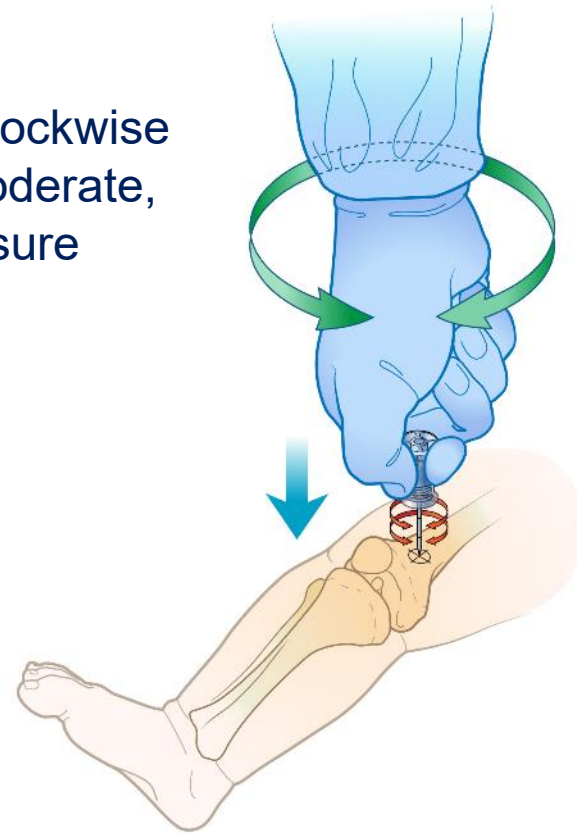


Insertion Preparation and Technique

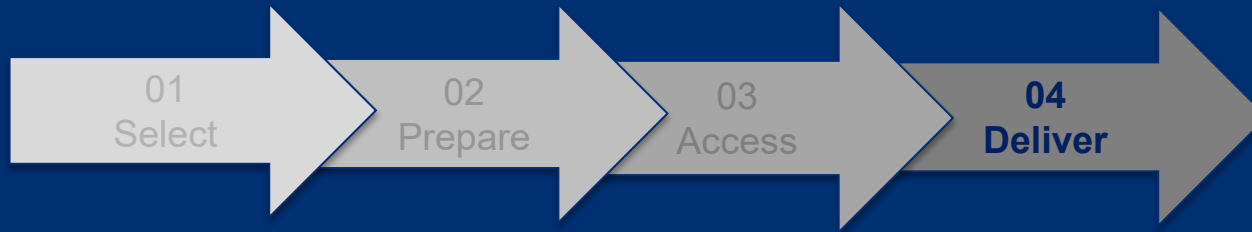


Manual Insertion

Rotate clockwise/counter-clockwise
while applying gentle to moderate,
steady downward pressure



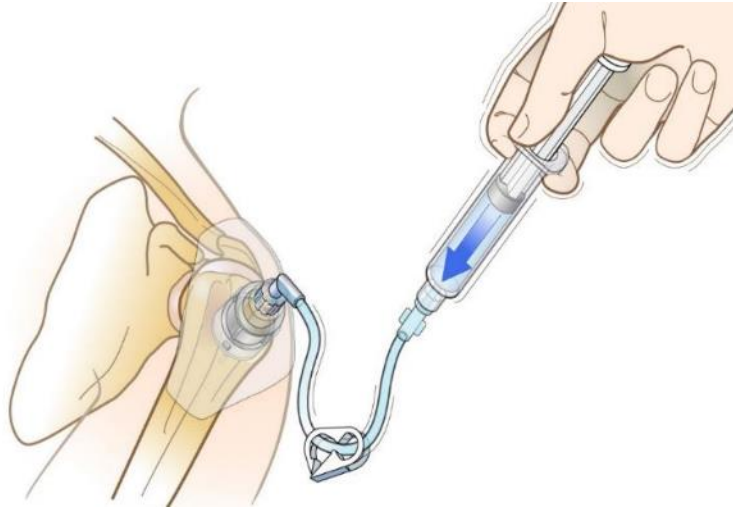
Care, Maintenance, and Removal



Flush

Adults: 5-10 mL

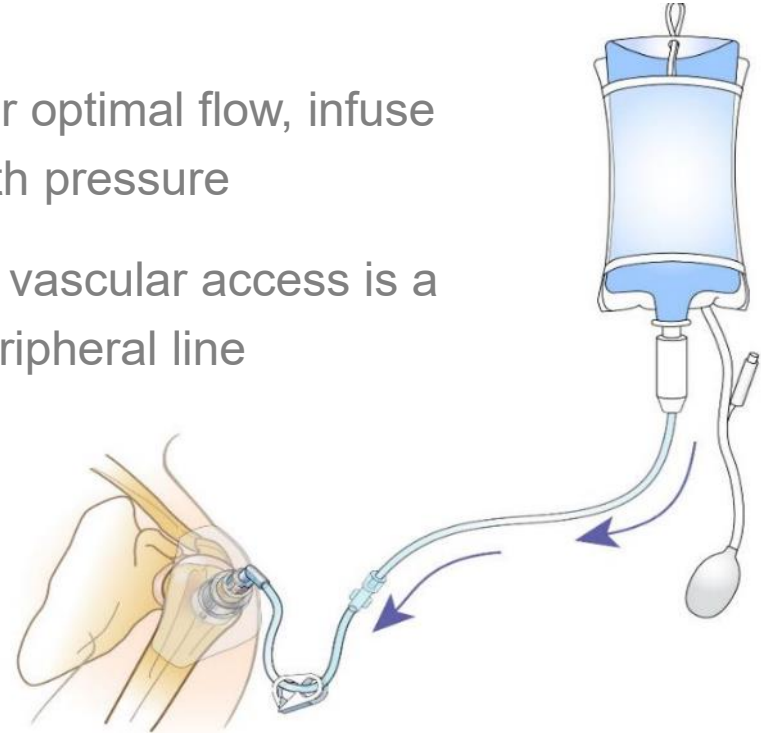
Infants and Small Children: 2-5 mL



Infusion and Medications

For optimal flow, infuse with pressure

IO vascular access is a peripheral line



IO Infusion Pain Management

IO Infusion Pain Management Using 2% Lidocaine (preservative-free and epinephrine-free)

Review lidocaine manufacturer's IFU prior to administration and observe recommended cautions/contraindications

With the stabilizer in place, carefully attach syringe **directly to IO catheter luer-lock hub**, without extension set in place

1

Slowly infuse initial dose of lidocaine over 120 seconds and allow to dwell for 60 seconds
ADULT: initial dose 40 mg • INFANT/CHILD: initial dose 0.5mg/kg (NOT to exceed 40 mg)

2

Flush IO catheter with normal saline
ADULT: flush: 5-10 mL • INFANT/CHILD: flush: 2-5 mL

3

Slowly infuse lidocaine (half of initial dose) over 60 seconds

4

Attach extension set primed with normal saline and flush

Repeat PRN. Consider systemic pain control for patients not responding to IO lidocaine
≥ 4 min total time

DISCLAIMER: Observe cautions/contraindications for lidocaine, confirm dose per institution. Selection and use of any medication, including lidocaine, given IV or IO is the responsibility of the treating physician, medical director, or qualified prescriber and is not an official recommendation of Teleflex Incorporated. The information provided is a summary of information found in the cited reference materials. This information is not intended to be a substitute for sound clinical judgment or your institution's treatment protocols.

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For additional information please visit www.eziocomfort.com.

Key Concepts: Arrow® EZ-IO® System

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Laboratory Analysis/Blood Sampling

Check with your laboratory for specimen processing capabilities.

1. Connect a syringe directly to the hub
2. The first 2 mL of IO blood aspirate may be discarded or considered for point of care testing
3. Samples must be identified as IO blood

Laboratory Analysis/Blood Sampling

- Volunteer study: IO samples vs. venous samples for complete blood count (CBC) and chemistry profile testing
- Significant correlation:
 - hemoglobin, hematocrit, RBCs
 - glucose, BUN, creatinine, total protein, albumin
 - sodium (5%), calcium (10%)
 - potassium (venous: 4.6 ± 0.5 IO: 5.4 ± 1.0 , 5.0 ± 1.0), chloride (venous: 9.9 ± 0.5 IO: 9.2 ± 0.3)
- No correlation: CO_2 levels, platelets, and WBC
- Red blood cell alloantibody screening in bone marrow samples correlate

Point-of-Care Analyzer Testing

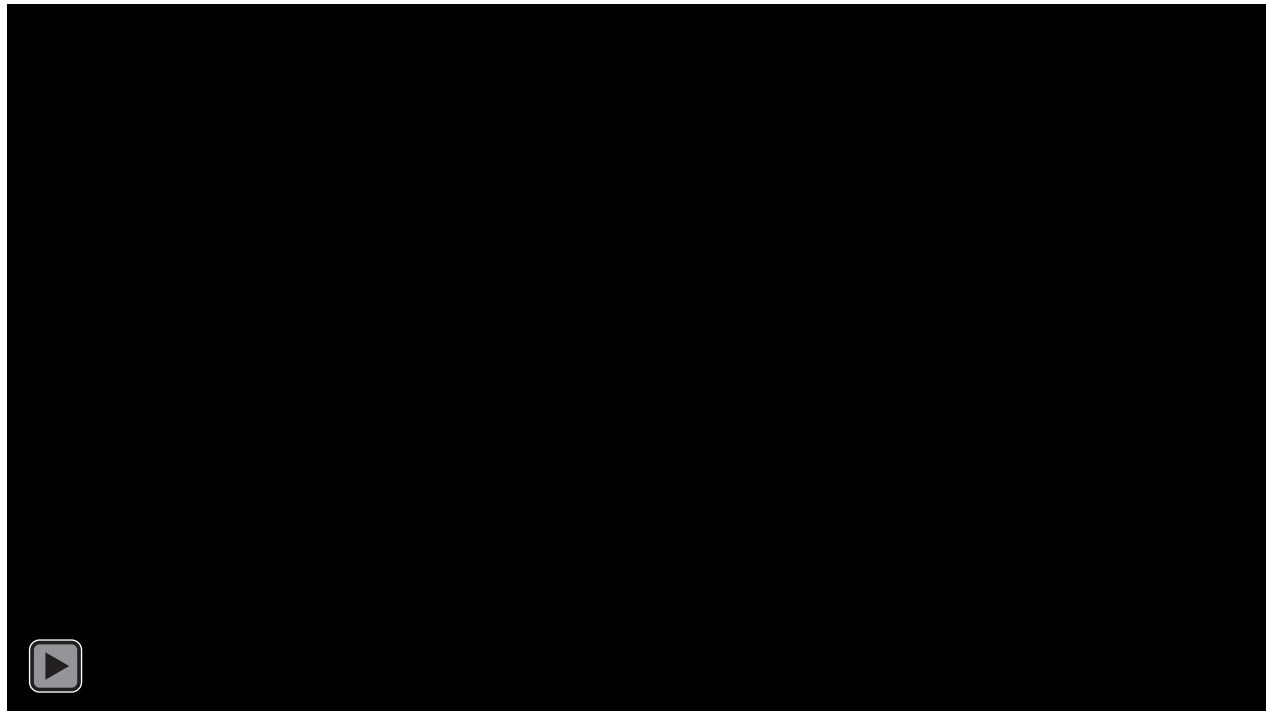
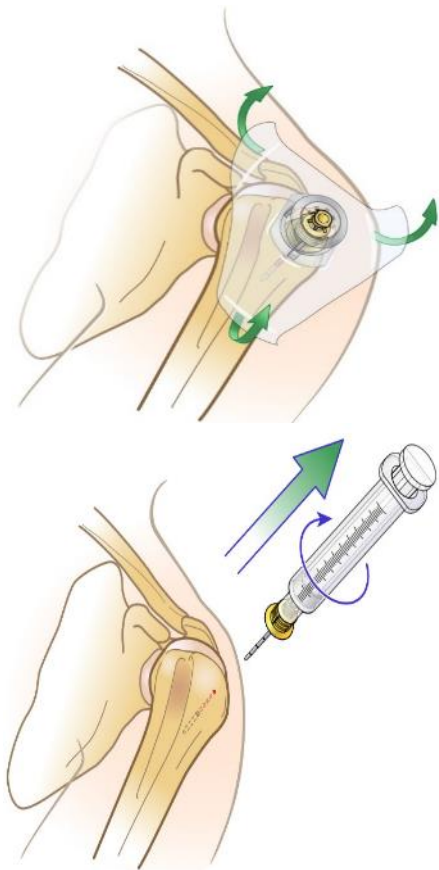
Study	Analysis of intraosseous blood samples using an EPOC point of care analyzer during resuscitation, Tallman 2017 ¹	Analysis of blood gas, electrolytes and glucose from intraosseous samples using an i-STAT point-of-care analyzer, Veldhoen 2014 ²
Objective	Investigate whether a correlation between IO and IV samples would remain consistent in critically ill patients	Investigate the feasibility and accuracy of analysis of intraosseous samples using an i-STAT® point-of-care analyzer
Methods	Evaluation of IO vs. IV samples using bedside point-of-care analysis	<ul style="list-style-type: none"> • 20 children enrolled during scheduled bone marrow biopsy aspiration • Evaluation of IO vs. IV samples using point-of-care analysis
Results	<ul style="list-style-type: none"> • Venous and IO samples: most comparable for pH, bicarbonate, sodium and base excess potentially for lactic acid • Intraclass correlation coefficients were excellent for sodium, reasonable for pH, pO₂, bicarbonate, glucose, lactic acid 	<ul style="list-style-type: none"> • Venous vs. IO samples clinically acceptable for pH, base excess, sodium, ionized calcium and glucose • Limitations: sample size/ stable patients/statistical methods
Conclusion	IO samples can be used with bedside point of care analyzers	Single-use cartridge analysis acceptable and avoids problem of bone marrow contents damaging conventional laboratory equipment

IO Access Care and Maintenance

- Assess frequently
 - IO access patency
 - Repeat flush as needed
 - Monitor site
 - Patient comfort



Removal



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Resources

Training Kit

- Training Driver
- Non-sterile Needle Sets
 - 15 mm, 25 mm, and 45 mm
- Arrow® EZ-Stabilizer® Dressings
- Yellow storage pack
- Simulated bone models





Education Resources

Clinical Education Webpage: www.teleflex.com/ezioeducation

- PowerPoint Download
- Bibliography

Teleflex Academy: www.teleflex-academy.com

- Online learning module with quiz and certificate

Cadaveric Lab Program: www.teleflex.com/en/procedural-lab-registration

Teleflex Emergency Medicine YouTube Channel: www.teleflex.link/IO-Access

- Testimonials: Patient and Clinician
- Proximal Humerus Fluoroscopy
- Site Identification and Insertion
 - Animated
 - Alert Patient
 - Cadaveric

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Rx only.

CAUTION: Federal (USA) law restricts this device to sale by or on the order of a physician.

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