Arrow

EZ-IO

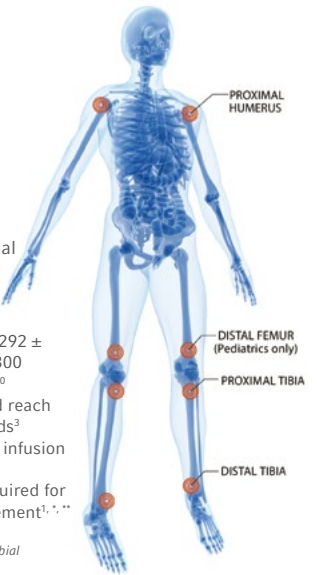
Intraosseous Vascular Access System

Pocket Guide

Teleflex

Insertion Sites

The Arrow EZ-IO Intraosseous Vascular Access System from Teleflex provides intraosseous access when intravenous access is difficult or impossible to obtain in emergent, urgent or medically necessary cases.



Advantages of proximal humerus site include:

- Mean flow rate of 6,292 ± 3,277 mL/hr under 300 mmHG of pressure [10]
- Medication and fluid reach the heart in 3 seconds[3]
- Lower insertion and infusion pain[1,*,**]
- Less medication required for patient pain management[1, *, **]

** Compared to EZ-IO System tibial insertions*
*** Based on EZ-IO System Adult Proximal Humerus insertion data*

Do not use the Arrow EZ-IO System in the sternum!

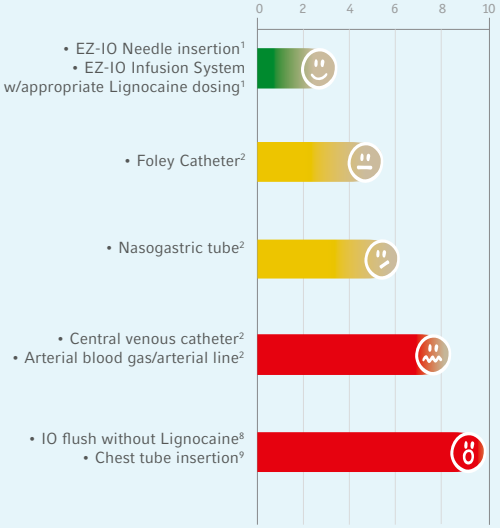
Contraindications for the use of the EZ-IO Vascular Access System:

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

Pain Management Guide

Pain Comparisons on Conscious & Alert Patients

Many medically necessary procedures involve pain and may cause anxiety.



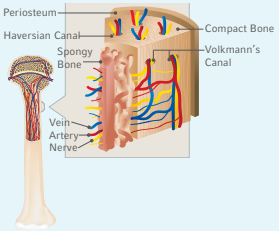
Data in chart for illustrative purposes only

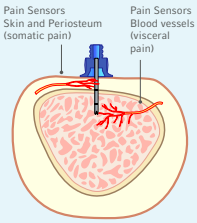
Insertion

Arrow EZ-IO Needle Set insertion pain is quick. Insertion pain rates as a 3 on a 0-10 pain scale.[1,**]

Infusion

The pain associated with IO infusion can be manageable with correct dosing and application of 2% preservative-free and epinephrine-free Lignocaine IO (per institutional protocol). Arrow EZ-IO infusion pain can rate up to a 3 on a 0-10 pain scale with Lignocaine use.[1]





The intraosseous (IO) space contains a matrix of blood vessels and nerves. This structure provides rapid distribution of fluids and medications, and also contains numerous sensory receptors that register pressure variations. This pressure can be very uncomfortable or painful for a responsive patient.

Consider Using Anaesthetic for Patients Responsive to Pain:

Review manufacturer's Lignocaine instructions for use prior to administration and observe recommended cautions/ contraindications to using 2% preservative free and epinephrine free Lignocaine (intravenous Lignocaine).

The following recommendations are based on published IO clinical literature:

1. Confirm Lignocaine dose per institutional protocol.
2. Prime extension set with Lignocaine.
   Note that the priming volume of the EZ-Connect Extension Set is approximately 1.0 ml.
3. Slowly infuse Lignocaine over 120 seconds.
   - Adults: Typical initial dose is 40 mg
   - Infant/Child: Typical initial dose is 0.5 mg/kg, NOT to exceed 40 mg
4. Allow the Lignocaine to dwell in IO space 60 seconds.
5. Flush with normal saline.
   - Adults: 5 to 10 ml
   - Infant/Child: 2 to 5 ml

6. Slowly administer an additional Lignocaine IO over 60 seconds. Repeat additional PRN.
   - Adults: Typical dose of 20 mg
   - Infant/Child: Typical additional dose is half the initial dose

Consider systemic pain control for patients not responding to IO Lignocaine.

For more information visit EZIOComfort.com.

Laboratory Analysis/Blood Sampling

Based on preclinical and clinical evidence comparing IO and venous or arterial blood specimens a number of common laboratory values correlate well, a few do not, and other values show clinical similarity without statistically significant correlation, therefore caution should be exercised with their interpretation.

Certain point of care analysers have been studied with acceptable results. Check with your laboratory for IO blood specimen processing capabilities.

For more information regarding IO lab analysis, refer to the publication Science and Fundamentals of Intraosseous Vascular Access, available at: teleflex.com/ezioeducation.

The following recommendations have been developed based on research done by Teleflex; study data was based on IO blood specimens obtained prior to any infusions or flush:

- Connect a syringe directly to the EZ-IO Catheter Hub
- The first 2 ml of IO blood aspirate may either be discarded or considered for point of care testing
- For other than point of care testing, consult with the laboratory to determine acceptability of IO blood specimens for analysis
- Specimens must be identified as IO blood

Fluids and Medications

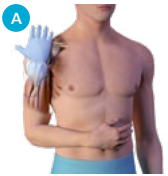
Many fluids and medications that can be given via a peripheral IV can be given via the intraosseous (IO) route using the same dose, rate, and concentration.[4,5,6,7] Deliver medication and fluids as ordered. Administer medications in the same dose, rate, and concentration as given via peripheral IV. For optimal flow infuse with pressure.

The following fluids and medications were delivered via the intraosseous (IO) route as referenced in clinical literature. The clinical literature is available on request through Teleflex Incorporated.

- Adenosine
- Albumin
- Alfentanil
- Alteplase
- Aminophylline
- Amiodarone
- Ampicillin
- Anascorp
- Anesthetic agents
- Antibiotics
- Antitoxins
- Anti-menigococcal antitoxin
- Anti-pneumococcus serum
- Atracurium besylate
- Atropine
- Astreonam
- Blood and blood products
- Bretylium
- Calcium chloride
- Calcium gluconate
- Cefazolin
- Ceftriaxone
- Contrast media
- Dexamethasone
- Dextran-40
- D5W
- D5 ½NS
- Dextrose 10%
- Dextrose 25%
- Dextrose 50%
- Diazepam
- Diazoxide
- Digoxin
- Diltiazem
- Diphenhydramine
- Dobutamine hydrochloride
- Dopamine
- Ephedrine
- Epinephrine
- Etomidate
- Fentanyl
- Fluconazole
- Flumazenil
- Fosphenytoin
- Furosemide
- Gentamicin
- Haloperidol
- Hartmann's Solution (Compound Sodium Lactate Solution)
- Heparin
- Hydroxocobalamin
- Hydrocortisone
- Hydromorphone
- Hypertonic saline/dextran (7.5% NaCl/6% dextran)
- Insulin
- Isoprenaline
- Ketamine
- Labetalol
- Levetiracetam
- Lignocaine
- Linezolid
- Lorazepam

- Magnesium sulfate
- Mannitol
- Methylprednisolone
- Midazolam
- Mivacurium
- Morphine sulfate
- Nalbuphine
- Naloxone
- Neostigmine
- Nitroglycerin
- Norepinephrine
- Normal saline
- Ondansetron
- Pancuronium
- Paracetamol
- Penicillin
- Phenobarbital
- Phenylephrine
- Phenytoin
- Piperacillin
- Potassium chloride
- Promethazine
- Propofol
- Remifentanil
- Rocuronium
- Sodium bicarbonate
- Standard IV solutions
- Succinylated gelatin solution 4%
- Succinylcholine
- Sufentanyl
- Tenecteplase
- Thiamine
- Thiopental
- Tobramycin sulfate
- Tranexamic acid
- Vancomycin
- Vasopressin
- Vecuronium
- Vitamin K

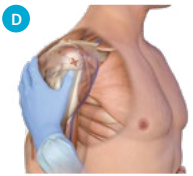
Proximal Humerus Insertion Site Identification



A: Place the patient's hand over the abdomen (elbow adducted and humerus internally rotated). Place your palm on the patient's shoulder anteriorly. The area that feels like a "ball" under your palm is the general target area. You should be able to feel this ball, even on obese patients, by pushing deeply.

B: Place the ulnar aspect of your hand vertically over the axilla. Place the ulnar aspect of your other hand along the midline of the upper arm laterally.

C: Place your thumbs together over the arm. This identifies the vertical line of insertion on the proximal humerus.

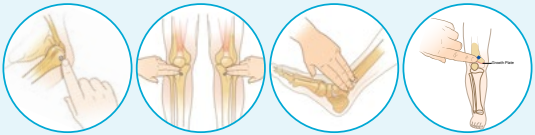


D: Palpate deeply up the humerus to the surgical neck. This may feel like a golf ball on a tee – the spot where the "ball" meets the "tee" is the surgical neck. The insertion site is 1 to 2 cm above the surgical neck, on the most prominent aspect of the greater tubercle.

E: Point the needle set tip at a 45-degree angle to the anterior plane and posteromedial.

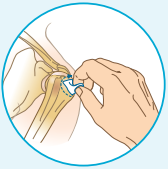
Insertion Technique and Removal

Step 1: Locate the insertion site.



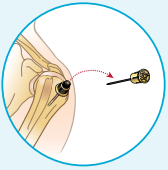
Paediatrics only

Step 2: Clean insertion site per institutional protocol. Stabilise extremity.

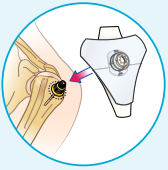


Step 3: Gently press needle through the skin until the tip touches the bone. The 5 mm black mark on the needle set must be visible above the skin prior to insertion. Squeeze the trigger, apply gentle steady pressure. In the event of driver failure, disconnect the power driver, grasp the needle set hub by hand and advance into the medullary space while twisting back and forth.

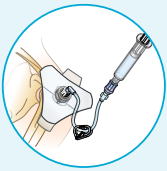
Step 4: Stabilise hub and disconnect driver and remove stylet. Place stylet into NeedleVISE for sharps containment.



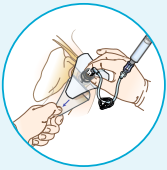
Step 5: Place the EZ-Stabilizer Dressing over the catheter hub.



Step 6: Attach primed EZ-Connect extension set to the Hub, firmly secure by twisting clockwise.

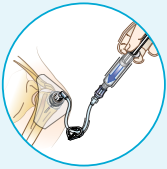


Step 7: Attach EZ-Stabilizer dressing by pulling the tabs to expose the adhesive and adhere to the skin.

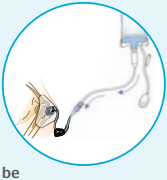


Step 8: Flush the EZ-IO Catheter with normal saline (0.9% Sodium Chloride) (5-10 ml for adults; 2-5 ml for infant/child).

Prior to flush, consider 2% preservative-free and epinephrine-free Lignocaine (intravenous Lignocaine), follow institutional protocols/policy.



Step 9: Deliver medication and fluids as indicated. Administer medications in same dose, rate and concentration as given via peripheral IV. For optimal flow infuse with pressure.



Note: The EZ-Connect Extension Set should NOT be used for high pressure infusion/power injection.

Removal

Remove EZ-Connect. Lift and remove EZ-Stabilizer adhesive dressing. Attach luer-lock syringe to hub of catheter. Withdraw the catheter by applying traction while rotating the syringe and catheter clockwise. Maintain axial alignment during removal, do NOT rock or bend the catheter. Once removed, immediately place syringe/catheter in appropriate sharps container. Dress site per institutional protocol/policy.

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EZ-IO System Components

EZ-IO Power Driver

REF.	DESCRIPTION	QTY
9058	EZ-IO Power Driver	1

EZ-IO Needle+Stabilizer Kits

REF.	DESCRIPTION	QTY
9079P-EU-005	45 mm Needle	5
9001P-EU-005	25 mm Needle	5
9018P-EU-005	15 mm Needle	5

Each set includes a 15 G. sterile EZ-IO Needle Set, EZ-Stabilizer Dressing, EZ-Connect Extension Set, EZ-IO Patient Wrist Band and NeedleVISE 1-Port Sharps Block.

Additional considerations regarding the EZ-IO Power Driver:

- As with any emergency medical device carrying a backup is a strongly advised protocol
- The life expectancy and approximate number of insertions will depend on multiple factors: actual usage, bone density, insertion time, storage conditions, and frequency of driver testing
- Do not use excessive force during insertion. Let the EZ-IO Power Driver do the work.
- The EZ-IO Power Driver LED appears solid green when trigger is activated and the driver has sufficient power
- The EZ-IO Power Driver LED blinks red when the trigger is activated and the driver has only 10% of battery life remaining
- Replace the EZ-IO Power Driver when the LED begins blinking red
- In the event of a driver failure, disconnect the EZ-IO Power Driver, grasp the EZ-IO Needle Set Hub by hand and advance into the medullary space while twisting back and forth

References:

1. Philbeck TE, Miller LJ, Montez D, Puga T. Hurts so good; easing IO pain and pressure. JEMS 2010;35(9):58-69. Research sponsored by Teleflex Incorporated.
2. Morrison RS, Ahronheim, JC, Morrison, GR. Pain and Discomfort Associated with Common Hospital Procedures and Experiences. Journal of Pain and Symptom Management; Vol. 15 No. 2 February 1998.
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9. Luketich JD, Kiss M, Hershey J, et al. chest tube insertion: a prospective evaluation of pain management. Clin J Pain 1998;14(2):152-4.
10. Puga T, Montez D, Philbeck T, Davlantes C. Adequacy of intraosseous vascular access insertion sites for high-volume fluid infusion. Crit Care Med 2016; 44(12):143 Research sponsored by Teleflex Incorporated. Based on healthy volunteer study.

Information in this document is not a substitute for the product Instructions for Use. Readers should consult product labeling for proper indications, contraindications, warnings and precautions prior to use.

Potential complications may include local or systemic infection, haematoma, extravasations, or other complications associated with percutaneous insertion of sterile devices.

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