



# INTRASOSSEOUS NEEDLE INFUSION (EZ-IO)



## Escambia County, Florida - ALS/BLS Medical Protocol

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The technique of intraosseous infusion (IO) was first described over 70 years ago.

It has been used extensively since that time for the administration of fluids, medications and blood. Due to anatomy of the IO space flow rates may be slower than those achieved with IV catheters.

The major advantage of IO infusion is that the bone marrow acts as a non-collapsible vein, which can be easily accessed even in cases such as shock where peripheral veins cannot be found.

Any medication or fluid, which can be administered IV can be administered IO in the same dose and concentration.

Complications are infrequent and consist mostly of pain and extravasations.

Insertion of the EZ-IO in conscious patients causes mild to moderate discomfort and is usually no more painful than a large bore IV.

### Training Requirements:

**The EZ-IO AD and EZ-IOPD infusion systems require specific training prior to use.**



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## *Adult (EZ-IO AD)*

### INDICATIONS:

#### Adult patients (Greater than 12 years of age or > 40 Kg)

1. **Emergent** need for intravenous fluids or medications needed and a peripheral IV cannot be established with 2 attempts or within 90 seconds **AND** exhibit 1 or more of the following:
  - a. An altered mental status (GCS of 8 or less).
  - b. Respiratory compromise (Such as patients with a SaO<sub>2</sub> 90% after appropriate oxygen therapy or a respiratory rate < 10 or > 40 / min).
  - c. Hemodynamic instability or shock (As noted by a systolic BP less than 90, decreased skin perfusion, or weak or absent radial pulses).
  - d. As directed by on-line medical control

### CONTRAINDICATIONS:

1. Fracture of the tibia or femur or humerus (consider alternate site).
2. Previous orthopedic procedure (knee or shoulder replacement) or IO within 24 hours (consider alternate site).
3. Pre-existing medical condition (tumor near site or peripheral vascular disease).
4. Infection at insertion site (consider alternate site).
5. Inability to locate landmarks



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- Significant edema
- Excessive tissue at insertion site.

### CONSIDERATIONS:

#### Flow rates:

Due to anatomy of the IO space flow rates may be slower than those achieved with IV catheters.

- 1. Rapidly flush (bolus) 10 ml saline with a syringe through the EZ-IO. This will greatly improve the flow rate of the IO infusion. **No Flush = NO Flow**
- 2. Use a pressure bag or pump for continuous infusions.

#### Pain:

Insertion of the EZ-IO in conscious patients causes mild to moderate discomfort and is usually no more painful than a large bore IV.

#### **Infusion through the EZ-IO may cause severe discomfort for conscious, alert patients.**

Prior to the IO syringe bolus (flush) or continuous infusion in the alert patients, **slowly** administer Lidocaine 2 % (Preservative Free) through the EZ-IO hub. (Ensure patient has no allergies or sensitivity to Lidocaine.)

EZ-IO AD: Slowly administer 20 to 40 mg. of Lidocaine 2 % (Preservative Free)



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## PRECAUTIONS:

**The EZ-IO is not intended prophylactic use.**

## EQUIPMENT:

Adult IO Kit including:

1. EZ-IO **AD** Driver and Needle Set
2. Alcohol and Betadine Swabs
3. Lidocaine 2% Preservative Free
4. EZ-Connect
5. 10 ml of Normal Saline
6. 10 cc syringe
7. 1000cc Normal Saline (or suitable sterile fluid)
8. Tape and Gauze
9. Pressure Bag
10. EZ-IO yellow wrist band



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### PROCEDURE:

*If the patient is conscious, advise them of the **EMERGENT NEED** for this procedure and obtain informed consent.*

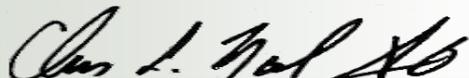
1. Wear approved Body Substance Isolation Equipment.
2. Determine EZ-IO Indications.
3. Rule out Contraindications.
4. Locate insertion site (tibia).
5. Cleanse insertion site using aseptic technique with betadine followed with alcohol.
6. Prepare the EZ-IO driver and needle set.
7. Stabilize leg and insert EZ-IO needle set.
8. Remove Driver from needle set while stabilizing catheter hub.
9. Remove stylet from needle set, place stylet in shuttle or sharps container.
10. Connect primed EZ-Connect – extension set.
11. Confirm placement
12. Slowly administer Lidocaine 2% (20 to 40 mg) (Preservative Free) IO to conscious adult patients.
13. Flush or rapidly bolus the EZ-IO catheter with 10 ml of normal saline.
14. Place a pressure bag on solution being infused.
15. Begin infusion.



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16. Dress site, secure tubing and apply wristband.

Frequently monitor IO catheter site and patient condition. Advise caregivers to Remove IO catheter within 24 hours.



### *Pediatric (EZ-IO PD)*

#### INDICATIONS:

**Patients between 3 -39 kg** – (FOR PATIENTS  $\geq$  40 kg USE THE EZ-IO AD)

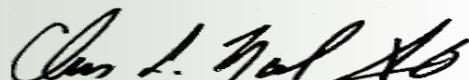
1. **Emergent** need for intravenous fluids or medications needed and a peripheral IV cannot be established with 2 attempts or within 90 seconds **AND** exhibit 1 or more of the following:
  - a. An altered mental status (GCS of 8 or less).
  - b. Respiratory compromise (Such as patients with a SaO<sub>2</sub> 90% after appropriate oxygen therapy or a respiratory rate < 10 or > 40 / min).
  - c. Hemodynamic instability or shock (As noted by a decreased BP, decreased skin perfusion, delayed capillary refill or weak or absent radial pulses).



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d. As directed by on line medical control.

### CONTRAINDICATIONS:

1. Fracture of the tibia or femur (consider alternate site).
2. Previous orthopedic procedure (knee replacement) or IO within 24 hours (consider alternate site).
3. Pre-Existing Medical Condition (tumor near site or peripheral vascular disease).
4. Infection at insertion site (consider alternate site).
5. Inability to locate landmarks
  - Significant edema
  - Excessive tissue at insertion site.

### CONSIDERATIONS:

#### Flow rates:

Due to anatomy of the IO space flow rates may be slower than those achieved with IV catheters.

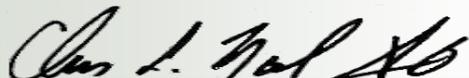
- Rapidly flush (bolus) 5 ml saline with a syringe through the EZ-IO. This will greatly improve the flow rate of the IO infusion. **No Flush = NO Flow**
- Use a pressure bag or pump for continuous infusions (**Exercise extreme caution with continuous fluid administration in children.**) **Burritrol devise is recommend to control fluid administration**



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**amounts. Never hang a 1000cc IV bag in pressure infuser directly to patient. A 250cc bag is provided for pediatric patients.**

## Pain:

Insertion of the EZ-IO PD in conscious patients may cause mild to moderate discomfort but is usually no more painful than a large bore IV.

## **Infusion through the EZ-IO may cause severe discomfort for conscious patients.**

Prior to the IO syringe bolus (flush) or continuous infusion in the alert patients, **slowly** administer Lidocaine 2 % (Preservative Free) through the EZ-IO hub. (Ensure patient has no allergies or sensitivity to Lidocaine.)

EZ-IO PD: Slowly administer 0.5mg/kg. of Lidocaine 2 % (Preservative Free) to conscious pediatric patients.

## **PRECAUTIONS:**

**The EZ-IO PD is not intended prophylactic use.**

## **EQUIPMENT:**

Pediatric IO Kit including:

1. EZ-IO Driver
2. EZ-IO PD Needle Set
3. Alcohol and Betadine Swabs
4. Lidocaine 2% (Preservative Free)



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5. EZ-Connect
6. 10 ml of Normal Saline in Syringe
7. 1000cc Normal Saline (or suitable sterile fluid)
8. Tape or Gauze
9. Pressure Bag

### PROCEDURE:

*If the patient is conscious, advise them of the **EMERGENT NEED** for this procedure and obtain informed consent.*

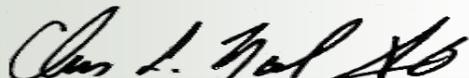
1. Wear approved Body Substance Isolation Equipment
2. Determine EZ-IO PD Indications
3. Rule out Contraindications
4. Locate insertion site (**Tibia ONLY**)
5. Cleanse insertion site using aseptic technique using betadine then alcohol swabs.
6. Prepare the EZ-IO PD driver and needle set
7. Stabilize leg and insert EZ-IO PD needle set
8. Remove Driver from needle set while stabilizing catheter hub
9. Remove stylet from needle set, place stylet in shuttle or sharps container



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10. Connect primed EZ-Connect
11. Confirm placement by aspiration.
12. Slowly administer Lidocaine 2% (Preservative Free) (0.5mg/kg dose) IO to conscious patients
13. Flush or rapidly bolus the EZ-IO PD catheter with 5 ml of normal saline.
14. Place a pressure bag on solution being infused
15. Begin infusion
16. Dress site, secure tubing and apply wristband

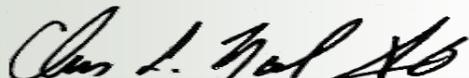
Frequently monitor IO catheter site and patient condition. Advise caregivers to Remove IO catheter within 24 hours.



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**EZ-IO**

## 1. EZ-IO® AD (40 KG AND GREATER) AND EZ-IO® PD (3-39 KG)

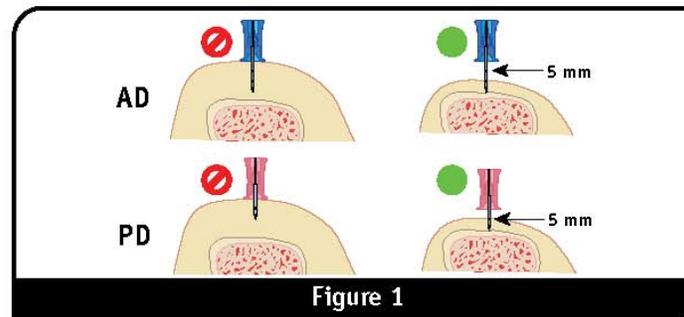
**DEVICE DESCRIPTION:** EZ-IO needle sets contain a stylet and catheter. When stylet is removed a standard luer lock is exposed. The catheter of the EZ-IO AD is 15 gauge 25 mm. The EZ-IO PD is 15 gauge 15 mm. Both catheters are made of 304 stainless steel, provided sterile, non-pyrogenic and in a protective canister.

### INDICATIONS FOR USE:

The EZ-IO Product System is indicated for immediate vascular access in emergencies.

### CONTRAINDICATIONS FOR USE:

- Fracture
- Excessive tissue and/or absence of adequate anatomical landmarks
- Infection at the area of insertion
- Previous, significant orthopedic procedure at the site (IO in past 24 hours, prosthetic limb or joint)



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## EZ-IO

### WARNINGS AND PRECAUTIONS:

**CAUTION:** Use aseptic technique.

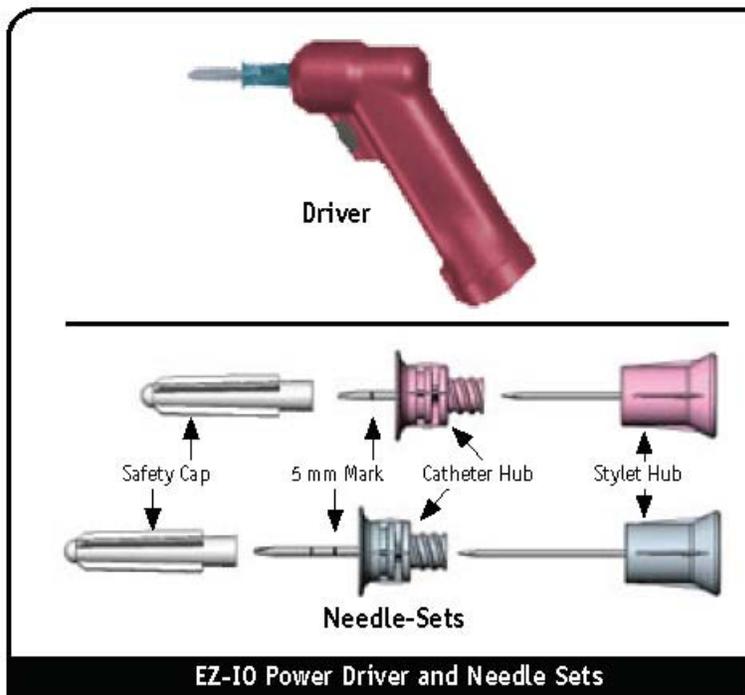
**CAUTION:** Check skin thickness before insertion (See Figure 1).

**CAUTION:** 24 hour use only.

**CAUTION:** Single use only.

**CAUTION:** Do not recap needle sets or separated components. Use biohazard and sharps disposal precautions.

**STORAGE:** -20°C to 50°C (-4°F to 122°F).



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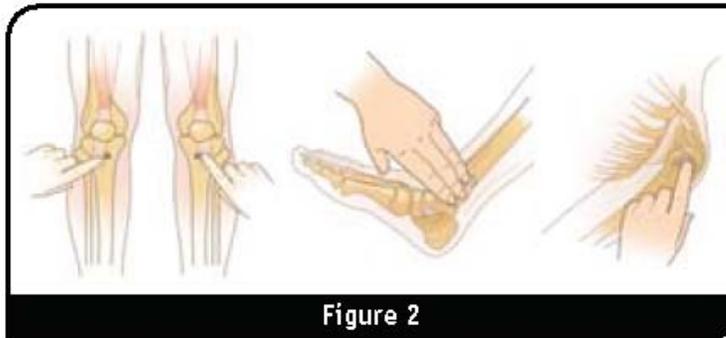


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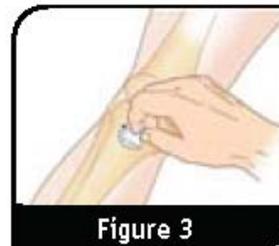
**EZ-IO**

## INSERTION STEPS:

1. BSI.
2. Aseptic technique.
3. Locate insertion site. (See Figure 2)

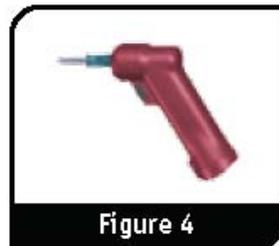


4. Prepare insertion site. (See Figure 3 – Tibial site shown for clarity).



5. Prepare infusion system.

6. Ensure that the driver and needle set are securely seated. (See Figure 4)



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## EZ-IO

7. Remove and discard the needle set safety cap from the IO needle set installed on the EZ-IO power driver. (See Figure 5)

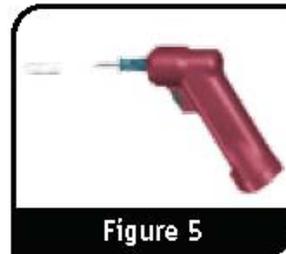


Figure 5

8. Insert.

**IMPORTANT:** Do not touch the needle set with your hand or fingers.

**IMPORTANT:** Control the patient's movement prior to and during needle set insertion.

- a. Position driver at insertion site with needle set at a 90-degree angle to the bone. (See Figure 6) **Gently** power or press needle set until needle set tip touches bone.
- b. Ensure at least 5 mm of the catheter is visible. (See Figure 1)
- c. Penetrate bone cortex by squeezing the driver's trigger and applying **gentle, steady downward pressure**. (See Figure 6)
- d. Release driver's trigger and stop insertion process when:
  1. A sudden "give" or "pop" is felt upon entry into the medullary space.
  2. A desired depth is obtained.

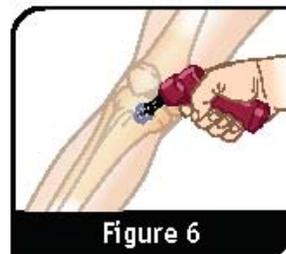


Figure 6

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