Procedure for the insertion and care of an EZ-IO®

V2.0

January 2018
Summary.

Stage 1

Step 1
Locate the insertion site

Step 2
Clean site with 2% Chlorhexidine in 70% Alcohol

Step 3
Stabilise site

Stage 2

Step 1
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)

Step 2
Squeeze the trigger, apply gentle steady pressure until you feel a decrease in resistance indicating the Needle Set has entered the medullary space.

Step 3
Stabilise hub and remove driver and stylet. Place stylet in an appropriate sharps container.

Stage 3

Step 1
Place the EZ-Stabilizer® Dressing over the catheter hub.

Step 2
Confirm placement. Aspirate blood.

Step 3
Attach primed extension set, firmly secure to catheter hub with clamp open. Flush the EZ-IO Catheter with normal saline (5-10 mL for adults; 2-5 mL for infants/children).
<table>
<thead>
<tr>
<th>Stage 4</th>
</tr>
</thead>
</table>
| **Step 1**  
Deliver medication and fluids as ordered. Administer medications in same dose, rate and concentration as given via peripheral IV. For optimal flow infuse with pressure.  
**Step 2**  
Apply EZ-IO wrist band to patient and document in the notes. |
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1. **Introduction**

1.1. Intraosseous (IO) cannulation is inserting a needle into a bone to allow the delivery of intravenous therapy. If intravenous access has failed, is inadequate, unlikely to be achieved or would significantly delay time critical treatment in the peri-arrest situation the intraosseous route should be considered.

1.2. Resuscitation Council (UK) Guidelines 2015 recommend the IO route if no other access has been established in the first two minutes of cardiac arrest for adult advanced life support. In paediatrics where there is no vascular access, IO should be attempted.

1.3. The EZ-IO® intraosseous infusion system allows for immediate vascular access within seconds, to enable the delivery of medications and intravenous fluids. The EZ-IO® provides rapid, smooth entry into the bone’s medullary cavity, creating an immediate conduit to the central circulation utilising a cutting IO needle and small power driver.

1.4. This procedure was developed from policy, procedure and protocol guidance provided by Vidacare, the manufacturers of EZ-IO®.

1.5. This version supersedes any previous versions of this document.

2. **Purpose of this Policy/Procedure**

2.1. To ensure that the Trust maintains standards for administration of IO therapy and in accordance with national and professional guidelines, and in accordance Vidacare’s EZ-IO® Directions For Use (DFU).

2.2. To ensure that the Practitioner is able to carry out IO cannulation in order to meet patient needs. The practitioner must relate theory to practice knowledgeably, skilfully and safely, demonstrating a caring attitude, and achieve competence by the Royal Cornwall Hospitals NHS Trust standards.

3. **Scope**

3.1. This procedure applies to all clinical staff who insert IO cannulas and/or who care for and maintain intraosseous cannulas for any patient at the Royal Cornwall Hospitals NHS Trust.

3.2. It includes the responsibilities of staff involved in IO cannulation and care and maintenance of intraosseous cannulas and the standards that should be adopted for each step in the process.

4. **Definitions / Glossary**

**Intraosseous** - Situated within, occurring within, or administered by entering a bone.

**Infusion** - The introduction of a substance, such as a fluid, electrolyte, nutrient, or drug, directly into the body.
Vascular access - The ability to enter the vascular system via indwelling catheter, cannula, or other instrument used to obtain venous or arterial access for administering therapy or obtaining blood for testing.

A Practitioner - A person who is legally accountable or responsible for their practice; Doctors, Nurses, Operating Department Practitioners, Radiographers, Midwives etc.

Resuscitation - The attempt which is made to revive a person who is in cardiac or respiratory arrest.

Cardiac Arrest - The cessation of cardiac output. There is abrupt loss of consciousness, absence of a central pulse and spontaneous breathing stops.

5. Ownership and Responsibilities

5.1. Role of the Managers

Ward, department and line managers have a responsibility to ensure that all staff members have access to this procedure and adhere to it. Managers must also recognise the training needs of their staff to ensure sufficient and appropriate training is undertaken before carrying out this procedure.

5.2. Role of the Resuscitation Committee

The Resuscitation Committee/ Resuscitation Officers are responsible for procedure distribution, providing training, and monitoring the use of the EZ-IO® during arrests.

5.3. Role of Individual Staff

All clinical staff that undertake IO cannulation, use IO cannula or remove IO cannula must:

- Understand the Trust’s procedure on IO cannulation.
- Receive training before practicing and attend refresher training as required (Contact Resuscitation Officers).
- Take responsibility for arranging further practice to maintain and increase competency within the work place.
- Practice in accordance with their professional duties.
- Follow the Trusts Standard infection prevention and control precautions policy including Hand Hygiene and Safe Handling and Disposal of Sharps
- Practice an aseptic technique.
- Delegate to a more experienced practitioner if they are not competent to insert, use or remove intraosseous cannula.
6. Standards and Practice

6.1. Equipment

EZ-IO® Power Driver
The EZ-IO® Power driver can achieve approximately 500 needle set insertions under ideal conditions and contains a non-rechargeable manganese dioxide lithium battery.

6.2. EZ-IO® Needle Sets
Needle sets come in three lengths and are all 15g
- Pink 15mm
- Blue 25mm
- Yellow 45mm

Each needle set pack contains the following items:
1 x EZ-Connect extension set
1 x NeedleVise sharps disposal device
1 x Patient wrist band

Notes:
Appropriate size intraosseous Needle Set based on patient size and weight
EZ-IO 15mm 3-39 kg
EZ-IO 25mm 40 kg and greater
EZ-IO 45mm excessive tissue or using the humeral site

The weight range on EZ-IO® needle set packaging is a guide only and not an absolute indication that the needle is appropriate for a particular weight. The most important check of correct needle length is tissue thickness above the bone. Once the needle is inserted through skin and soft tissue and makes contact with the target bone, there must be at least one black mark on the needle still visible.

Red needles are non-sterile and for training only.

6.3. EZ-IO® Stabilizer dressing
The EZ-IO® stabilizer dressing is used to secure and protect the needle once inserted.

6.4. Other equipment required:
Sharps container
Cannulation tray
3x10 ml syringes
Alcohol based hand rub
2x pairs non-sterile non-latex gloves
Plastic apron
Chloraprep (2% Chlorhexidine in 70% Alcohol)
1x EZ-IO Stabiliser dressing
1x sterile 2x2 or 4x4 gauze pad
0.9% saline flush
Intravenous solution (appropriate volume and type)
1x fluid administration set
1x fluid administration pump or pressure bag (If pump or pressure bag unavailable fluid will need to be bolused manually using a 50ml syringe)

6.5. Indications for Use

For adults and paediatrics anytime in which vascular access is difficult to obtain in emergent, urgent or medically necessary cases.

6.6. Contraindications

- Fracture of the targeted bone
- Previous orthopaedic procedures near insertion site (prosthetic limb or joint)
- IO within the past 24 - 48 hours in the targeted bone
- Infection at the insertion site
- Inability to locate landmarks or excessive tissue over the insertion site
- The stylet and catheter are not MRI compatible so must not go into an MRI scanner

6.7. Complications

The following are potential complications and should be observed for:

Dislodgement
Extravasation
Compartment syndrome
Fracture of the targeted bone
Infection
Pain on use
6.8. Location of appropriate site

Please refer to appendix 3 for guidance.

6.9. Procedure

6.9.1. Explain procedure to patient/family
6.9.2. Obtain assistance as needed
6.9.3. Wash hands
6.9.4. Choose appropriate intraosseous needle set (ensure sterile pack intact) and assemble equipment
6.9.5. Clean tray using 2% Chlorhexidine in 70% alcohol swabs and allow to dry
6.9.6. Drop the following onto tray:
Chloraprep (2% Chlorhexidine in 70% Alcohol)
2x2 gauze or 4x4 gauze
1x EZ-IO Stabiliser dressing
Needle Set, in cartridge, and EZ-Connect (with attached syringe)
6.9.7. Connect 10 ml syringe to EZ-Connect, primed with sterile saline or lidnocaine as appropriate, using a non-touch technique.

6.9.8. Leave syringe attached to EZ-Connect

6.9.9. Locate appropriate insertion site

6.9.10. Palpate site to locate appropriate anatomical landmarks for Needle Set placement

6.9.11. Wash hands

6.9.12. Apply non-sterile latex free gloves

6.9.13. Cleanse site using Chloraprep (2% Chlorhexidine in 70% Alcohol). Allow to air dry thoroughly

6.9.14. Using a non-touch technique:

6.9.15. Connect appropriate Needle Set to driver

6.9.16. Stabilise site

6.9.17. Remove needle cap

6.9.18. Insert EZ-IO needle into the selected site. Position the driver at the insertion site with the needle set at a 90-degree angle to the bone surface. Gently pierce the skin with the Needle Set until the needle set tip touches the bone. Check to ensure that at least one black line is visible. If no black line is visible, patient may have excessive soft tissue over selected insertion site and needle set may not reach the medullary space. Consider an alternative site for insertion or a longer needle set.

6.9.19. Penetrate the bone cortex by squeezing driver’s trigger and applying gentle, consistent, steady, downward pressure (allow the driver to do the work)

6.9.20. Release the driver’s trigger and stop the insertion process when:

- On adult patients when accessing the tibia using the 25mm Needle Set or the proximal humerus using the 45mm Needle Set, you may stop by releasing the trigger when the hub is almost flush with the skin.

- On paediatric patients when you feel a decrease in resistance indicating the Needle Set has entered the medullary space, release the trigger.

6.9.21. Remove EZ-IO Power Driver from Needle Set while stabilising the catheter hub

6.9.22. Remove stylet from catheter by turning counter-clockwise and immediately dispose of stylet in appropriate biohazard sharps container *NEVER return used stylet or cartridge to the EZ-IO kit or crash trolley
6.9.23. Apply stabiliser dressing

6.9.24. Confirm placement by aspiration of blood. Intraosseous blood must only be sent for analysis in a critical emergency, when arterial or venous blood sampling is not a possibility. This must be discussed with the relevant laboratory.

6.9.25. Connect primed EZ-Connect to exposed Luer-lock hub

6.9.26. Syringe bolus: flush the catheter with 10 ml of normal saline

6.9.27. Clean the Driver using 2% Chlorhexidine in 70% Alcohol swabs. Allow to dry.

6.9.28. If the patient is responsive to pain the clinician may consider use of 2% lidocaine without preservatives or epinephrine (cardiac lidocaine) for anaesthetic effect prior to the 10ml normal saline flush and it may be necessary to administer additional lidocaine following the saline flush. (see appendix 4)

6.9.29. Assess for potential IO complications (See section 6.8)

6.9.30. Disconnect 10 ml syringe from EZ-Connect extension set

6.9.31. Connect primed EZ-Connect extension set to primed IV tubing

6.9.32. Begin infusion utilising a pressure delivery system

6.9.33. Monitor extremity continuously for any complications

6.9.34. Place EZ-IO armband on patient, document time and date

6.9.35. Dispose of all items in accordance with the Trusts waste policy

6.9.36. Wash hands with soap and water

6.9.37. Clearly document in the patients medical notes:

- Site of EZ-IO insertion
- Size of needle used
- Reason for insertion
- Signature, Date and Time

6.10. **Catheter Removal**

If you have not been trained to remove an IO cannula you must seek the assistance of someone who has.

An aseptic technique must be maintained throughout.

**To remove the EZ-IO® needle:**
Wash hands and apply non-sterile disposable gloves.
Remove the extension set from the needle hub.

Attach a 10 ml sterile luer lock syringe to the open IO port.
Grasp syringe and continuously rotate clockwise while gently pulling the catheter but maintain a 90-degree angle to the bone.
Caution: Do not rock or bend the catheter during removal.
Dispose of the catheter into a sharps container.
Apply pressure to the site as needed and apply a simple dressing.
Insertion site should be assessed hourly after removal for signs of infection for 48 hours.
Document removal in the patient’s medical notes and ensure the IO wristband stays on the patient for 48 hours following removal of the catheter.

6.11. Location of Devices within the Trust

   - Emergency Department
   - Critical Care Unit (previously ITU)
   - Theatre recovery (Trelawney)
   - Theatre recovery (Tower block)
   - Theatres (obstetric) PAMW
   - Tolgus ward
   - Paediatric HDU
   - Urgent treatment centre West Cornwall Hospital
   - Theatre St Michael's Hospital
7. **Dissemination and Implementation**

7.1. This procedure will be available on the Trusts Documents Library.

7.2. Targeted staff members will be alerted by:

- Series of training workshops
- Inclusion in the RCHT Staff daily bulletin
- Cascading by the Divisional Management Teams to the relevant clinical areas involved in the use of Intraosseous access.

8. **Monitoring compliance and effectiveness**

<table>
<thead>
<tr>
<th>Element to be monitored</th>
<th>1. Equipment availability in the relevant clinical areas.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. The use of EZIO during cardiac arrest calls.</td>
</tr>
<tr>
<td></td>
<td>3. All incidents involving the use of EZIO.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lead</th>
<th>1. Ward/Department managers/Resuscitation Officers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. Resuscitation Officers</td>
</tr>
<tr>
<td></td>
<td>3. Resuscitation Officers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tool</th>
<th>1. Annual Equipment Audit and Arrest Audit form.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. Arrest audit form.</td>
</tr>
<tr>
<td></td>
<td>3. Datix (staff able to select tick box for resuscitation). Electronic system used for reporting incidents/non-compliance.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Frequency</th>
<th>1. Annual audit and daily follow-up of arrest incidents.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. Ongoing monitoring.</td>
</tr>
<tr>
<td></td>
<td>3. Whenever an alert occurs.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reporting arrangements</th>
<th>All elements will be reported back to the Resuscitation Committee. All reports presented and discussed by the Resuscitation committee are minuted. These minutes feed in to the Governance Committee reporting structure which in turn reports to the Board. Any specific learning outcomes and issues will be shared with the Governance Lead(s) for the appropriate division(s) via the Divisional Quality &amp; Learning Group.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Acting on recommendations and Lead(s)</th>
<th>The Divisional Quality &amp; Learning Group is responsible for interrogating required actions and to designate a named lead where appropriate. This is documented in meeting minutes.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Change in practice and lessons to be shared</th>
<th>The Resuscitation Officers will to take any necessary changes to practice forward where appropriate. Lessons will be shared with all the relevant stakeholders.</th>
</tr>
</thead>
</table>

9. **Updating and Review**

9.1. This procedure will be due to have a review by January 2021.
9.2. This procedure will be reviewed by the Resuscitation Committee prior to the next review date. New Resuscitation Council UK Guidelines are due to be published in 2020 which may result in changes being made to this policy.

10. Equality and Diversity

10.1. This document complies with the Royal Cornwall Hospitals NHS Trust service Equality and Diversity statement which can be found in the 'Equality, Diversity & Human Rights Policy' or the Equality and Diversity website.

10.2. Royal Cornwall Hospitals NHS Trust is committed to a Policy of Equal Opportunities in employment. The aim of this policy is to ensure that no job applicant or employee receives less favourable treatment because of their race, colour, nationality, ethnic or national origin, or on the grounds of their age, gender, gender reassignment, marital status, domestic circumstances, disability, HIV status, sexual orientation, religion, belief, political affiliation or trade union membership, social or employment status or is disadvantaged by conditions or requirements which are not justified by the job to be done. This policy concerns all aspects of employment for existing staff and potential employees.

10.3. Equality Impact Assessment

10.4. The Initial Equality Impact Assessment Screening Form is at Appendix 2.
## Appendix 1. Governance Information

<table>
<thead>
<tr>
<th>Document Title</th>
<th>Procedure for the Insertion and care of an EZ-IO®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date Issued/Approved:</td>
<td>January 2015</td>
</tr>
<tr>
<td>Date Valid From:</td>
<td>January 2018</td>
</tr>
<tr>
<td>Date Valid To:</td>
<td>January 2021</td>
</tr>
</tbody>
</table>
| Directorate / Department responsible (author/owner): | Resuscitation officers  
Department of Postgraduate Education |
| Contact details: | 01872 252124 |
| Brief summary of contents | Procedural guidance for staff regarding all aspects of insertion and care of an EZ-IO® including roles and responsibilities, training and equipment. |
| Suggested Keywords: | EZ-IO®, Intraosseous, Infusion, access |
| Target Audience | RCHT | PCH | CFT | KCCG |
| Executive Director responsible for Policy: | Medical Director |
| Date revised: | January 2018 |
| This document replaces (exact title of previous version): | Procedure for the Insertion and care of an EZ-IO® V1 |
| Approval route (names of committees)/consultation: | Resuscitation Committee, Teleflex |
| Divisional Manager confirming approval processes | n/a |
| Name and Post Title of additional signatories | n/a |
| Name and Signature of Divisional/Directorate Governance Lead confirming approval by specialty and divisional management meetings | {Original Copy Signed} |
| Signature of Executive Director giving approval | {Original Copy Signed} |
| Publication Location (refer to Policy on Policies – Approvals and Ratification): | Internet & Intranet | ✓ | Intranet Only |
## Instructions

**Procedure for the Insertion and care of an EZ-IO®**

**Related Documents:**

- RCHT (2015) Standard infection prevention and control precautions policy including Hand Hygiene and Safe Handling and Disposal of Sharps
- RCHT (2016) Cardiopulmonary Resuscitation Policy
Procedure for the Insertion and care of an EZ-IO®

Resuscitation Guidelines 2010, Resuscitation Council (UK)
- DOH 2007, Saving Lives: High Impact Intervention 2 (NB whilst this document is aimed at IV access the principals apply to IO)
- RCN 2010. Standards for Infusion Therapy (NB there is general guidance on IO that is very useful. However, this policy (TCPnnn) takes precedence and it should be noted that the RCN guidance on insertion sites DOES NOT APPLY TO EZ-IO®).


Training Need Identified?
Yes – staff will need to carry out training to achieve successful implementation of this procedure. The Learning and Development department have been informed.

Version Control Table

<table>
<thead>
<tr>
<th>Date</th>
<th>Version No</th>
<th>Summary of Changes</th>
<th>Changes Made by (Name and Job Title)</th>
</tr>
</thead>
</table>

All or part of this document can be released under the Freedom of Information Act 2000

This document is to be retained for 10 years from the date of expiry.
This document is only valid on the day of printing

Controlled Document
This document has been created following the Royal Cornwall Hospitals NHS Trust Policy on Document Production. It should not be altered in any way without the express permission of the author or their Line Manager.
Appendix 2. Initial Equality Impact Assessment Form

*This assessment will need to be completed in stages to allow for adequate consultation with the relevant groups.*

Are there concerns that the policy could have differential impact on:

<table>
<thead>
<tr>
<th>Equality Strands:</th>
<th>Yes</th>
<th>No</th>
<th>Unsure</th>
<th>Rationale for Assessment / Existing Evidence</th>
</tr>
</thead>
</table>

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Name of the strategy / policy / proposal / service function to be assessed

<table>
<thead>
<tr>
<th>Directorate and service area:</th>
<th>Is this a new or existing Policy?</th>
</tr>
</thead>
<tbody>
<tr>
<td>All clinical</td>
<td>Existing</td>
</tr>
</tbody>
</table>

Name of individual completing assessment: Gemma Ashton-Cleary

| Telephone: | (01872) 252124 |

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1. **Policy Aim**
   - **Who is the strategy / policy / proposal / service function aimed at?**
   - To provide procedural guidance for the insertion of an EZ-IO®

2. **Policy Objectives**
   - To ensure that all relevant clinical staff are fully competent in the insertion and care of an EZ-IO®

3. **Policy – intended Outcomes**
   - Effective management of all critically ill/arrested patients requiring urgent drug or fluid therapy where vascular access is difficult to obtain.

4. **How will you measure the outcome?**
   - Audit of every arrest call.

5. **Who is intended to benefit from the policy?**
   - Critically ill patients where vascular access is difficult to obtain. Clinical Staff trained in the use of EZ-IO®

6a. Who did you consult with:

   b). Please identify the groups who have been consulted about this procedure.

   | Workforce | Patients | Local groups | External organisations | Other |

   Please record specific names of groups

   N/A

What was the outcome of the consultation?

N/A

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7. **The Impact**

Please complete the following table. If you are unsure/don’t know if there is a negative impact you need to repeat the consultation step.

### Equality Strands:

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Unsure</th>
<th>Rationale for Assessment / Existing Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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If you are unsure/don’t know if there is a negative impact you need to repeat the consultation step.
<table>
<thead>
<tr>
<th>Age</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex (male, female, trans-gender / gender reassignment)</td>
<td>No</td>
</tr>
<tr>
<td>Race / Ethnic communities /groups</td>
<td>No</td>
</tr>
<tr>
<td>Disability - Learning disability, physical impairment, sensory impairment, mental health conditions and some long term health conditions.</td>
<td>No</td>
</tr>
<tr>
<td>Religion / other beliefs</td>
<td>No</td>
</tr>
<tr>
<td>Marriage and Civil partnership</td>
<td>No</td>
</tr>
<tr>
<td>Pregnancy and maternity</td>
<td>No</td>
</tr>
<tr>
<td>Sexual Orientation, Bisexual, Gay, heterosexual, Lesbian</td>
<td>No</td>
</tr>
</tbody>
</table>

You will need to continue to a full Equality Impact Assessment if the following have been highlighted:
- You have ticked “Yes” in any column above and
- No consultation or evidence of there being consultation- this excludes any policies which have been identified as not requiring consultation. or
- Major this relates to service redesign or development

8. Please indicate if a full equality analysis is recommended. | Yes | No |
9. If you are not recommending a Full Impact assessment please explain why.

Signature of policy developer / lead manager / director | Date of completion and submission

Names and signatures of members carrying out the Screening Assessment
1. 2. Human Rights, Equality & Inclusion Lead
Keep one copy and send a copy to the Human Rights, Equality and Inclusion Lead
c/o Royal Cornwall Hospitals NHS Trust, Human Resources Department, Knowledge Spa, Truro, Cornwall, TR1 3HD

This EIA will not be uploaded to the Trust website without the signature of the Human Rights, Equality & Inclusion Lead.

A summary of the results will be published on the Trust’s web site.

Signed __ ____________________
Date ____________________
Appendix 4. IO Insertion Sites

Ensure thorough training in the correct landmarking techniques for the above sites is undertaken prior to practitioner’s first use of EZ-IO®.

**Proximal Humerus**

Insertion site is located directly on the most prominent aspect of the greater tubercle. Ensure that the patient’s hand is resting on the abdomen (over the umbilicus) and that the elbow is adducted (close to the body). Slide thumb up the anterior shaft of the humerus until you feel the greater tubercle, this is the surgical neck. Approximately 1-2 cm (depending on patient anatomy) above the surgical neck is the insertion site.

**Distal Femur - Paediatric** (below the age of 6)

Insertion site is located approximately 2 cm above the patella (depending on patient anatomy) on the anterior femur and 1 cm medial to avoid the patella tendon.

**Proximal Tibia - Adult**

Insertion site is approximately 1 cm medial to the upper portion of the tibial tuberosity. If tibial tuberosity cannot be identified site is approximately 3 cm below the patella.

**Proximal Tibia - Paediatric**

Insertion site is located 1 cm below the tibial tuberosity or 2 cm below the patella midway between the edges of the bone, which will be dependent on the size, and age of the child.

**Distal Tibia - Adult**

Insertion site is located approximately 3 cm proximal to the most prominent aspect of the medial malleolus. Place one finger directly over the medial malleolus; move approximately 2 cm (depending on patient anatomy) proximal and palpate the anterior and posterior borders of the tibia to assure that your insertion site is on the flat center aspect of the bone.

**Distal Tibia - Paediatric**

Insertion site is located approximately 3 cm proximal to the most prominent aspect of the medial malleolus. Place one finger directly over the medial malleolus; move approximately 2 cm (depending on patient anatomy) proximal and palpate the anterior and posterior borders of the tibia to assure that your insertion site is on the flat center aspect of the bone. Please note that in paediatrics this distance may be slightly less.
Appendix 4. Local Anaesthetic

For patients able to perceive pain, there can be significant discomfort associated with the initial flush as well as infusion. Pressure changes occur within the bone as a result of infusion of medications and fluids, and if not properly anesthetized, pain associated with IO infusion under pressure is often severe. Anesthetizing the IO space prior to the initial flush should be considered for any patient who is conscious/alert to pain. If time constraints do not permit anesthetization prior to the initial flush, pain management should be considered as soon as time permits, and as needed throughout the course of IO infusion.

Consider using anesthetic for patients responsive to pain:
Review manufacturer’s lidocaine instructions for use prior to administration and observe recommended cautions/contraindications to using 2% lidocaine preservative –free and epinephrine-free (intravenous lidocaine). The following recommendations are based on published intraosseous clinical literature.
1. Confirm lidocaine dose per institutional protocol
2. Prime extension set with lidocaine

*Note that the priming volume of the EZ-Connect® extension set is approximately 1.0 mL*
1. Slowly infuse lidocaine IO 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
2. Allow lidocaine to dwell in IO space 60 seconds
3. Flush with normal saline
   • Adults: 5 to 10 mL
   • Infant/Child: 2 to 5 mL
4. Slowly administer an additional dose of lidocaine IO over 60 seconds. Repeat PRN.
   • Adults: Typical additional dose is 20 mg
   • Infant/Child: Typical additional dose is half the initial dose
5. Consider systemic pain control for patients not responding to IO lidocaine

Disclaimer: 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. Teleflex Incorporated is not the manufacturer of lidocaine. Users should review the manufacturer’s instructions or directions for use and be familiar with all indications, side effects, contraindications, precautions and warnings prior to administration of lidocaine or any other medication. Teleflex Incorporated disclaims all liability for the application or interpretation of this information in the medical treatment of any patient. For additional information please visit www.eziocomfort.com.

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