Gateshead Health
NHS Foundation Trust

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Author(s) *(name and designation)*	Susan Lewis, Senior Resuscitation Officer
Sponsor	Hilary Lloyd, Director of Nursing, Midwifery and Quality
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This policy supersedes all previous issues

Version Control

Version	Release	Author/Reviewer	Ratified by/Authorised by	Date	Changes (Please identify page no.)
1.0	27/06/2017	Mike Bunn / Karen Wan	Resuscitation & Deteriorating Patient committee	18/05/2017	NA
2.0	01/10/2019	Susan Lewis	Resuscitation & Deteriorating Patient committee	22/08/2019	

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Procedure for Intraosseous Therapy using the EZ-IO® Intraosseous Infusion System

1 Introduction

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 utilizing a cutting IO needle and small power driver. IO is particularily recommended where 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.

Resuscitation Council (UK) Guidelines2015 recommend the IO route if no other access has been established within the first two minutes of cardiac arrest for adult patients in Advanced Life Support. In paediatrics where there is no vascular access, IO should be attempted.

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

2 Policy scope

This policy applies to all clinical staff trained in insertion of IO cannulas and/or who maintain intraosseous cannulas for any patient at Gateshead Health NHS Foundation Trust.

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

3 Aim of policy

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).

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

4 Duties (Roles and responsibilities)

The Chief Executive
Will ensure that this IO policy is in place, that staff are aware of its existence, and is accessible to those who need it, and that this policy is subject to appropriate audit and monitoring arrangements.

The Directorate Management Teams
Will ensure that the Directorate or Division, for which they are responsible, complies with this policy.

Ward Managers, Department Managers and Consultant Managers will:

- Ensure that all staff who insert IO cannulas receive training and where practicable complete competence in intraosseous cannulation.
- Maintain a record of all staff who have received training.
- Ensure that any staff who administers IO therapy have adequate cover for Hepatitis B. Hepatitis B status can be confirmed through the Trust Occupational Health Department..
- Ensure staff comply with Trust's Sharps Injury Prevention Procedures in their areas in the event of accidental/incident involving exposure to body fluids.

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

- Understand the Trust's Policy on IO Cannulation.
- Receive training before practicing and attend refresher training as required.
- Take responsibility for arranging further practice to maintain and increase competency within the work place.
- Practice in accordance with their professional duties.
- Practice standard precautions.
- Practice an aseptic technique.
- Follow the Trust's sharps injury procedure.
- Delegate to a more experienced practitioner if they are not competent to insert, use or remove intraosseous cannula.

5 Definitions

- **The Trust or Trust** - Gateshead Health NHS Foundation Trust.

- **Intravenous (IV)** – situated within, occurring within, or administered by entering a vein.

- **Intraosseous (IO)** – situated within, occurring within, or administered by entering a bone.

- **A Practitioner** – a person who is legally accountable or responsible for their practice e.g. Doctors, Nurses, Operating Department Practitioners, Radiographers, Midwives, Health Care Assistants.

- **ART** – Acute Response Team

6 Policy

6.1 Principles for practice

6.11 All staff that undertake intraosseous cannulation must:

- Have knowledge of local policies and procedures, specifically; Standard Precautions, Health and Safety and Infection Prevention & Control.
- Understand their legal and professional responsibilities.
- Have a working knowledge of anatomy and physiology of IO cannulation sites.
- If unsure of their competency in the procedure, hand over the responsibility to a more expert practitioner. The Practitioner must ensure that the person delegated to perform the task is competent to do so.
- Attempt IO insertion a maximum of two occasions on an individual patient, and if unsuccessful, ask for a more experienced practitioner to make further attempts.

6.2 Indications

6.2.1 Where there is inadequate or no IV access and an immediate need for IV fluids and/or IV medication to treat or prevent cardiac arrest.

6.2.2 Any situation where there are difficulties in achieving sufficient venous access resulting in inadequate or no IV access, and there is an immediate or urgent need for IV fluids and/or IV medication.

6.3 Contra indications

6.3.1 The following are contra indications:

- Fracture in the target bone.
- Previous orthopaedic surgery near the insertion site.
- Previous IO insertion within 48 hours in the target bone.
- Infection in the proximity of the insertion site.
- Inability to locate landmarks or excessive tissue over the insertion site.

6.4 Cautions

6.4.1 The stylet and catheter are not MRI compatible so must not go into an MRI scanner.

6.5 Complications

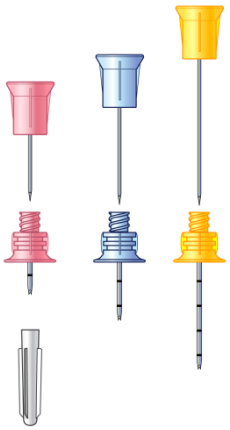
6.5.1 The following are potential complications and should be observed for:

- Dislodgement
- Extravasation
- Compartment syndrome
- Fracture of the targeted bone
- Infection
- Pain on use

6.6 Equipment required

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.

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

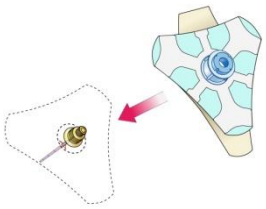


Each needle set pack contains the following items:
1 x EZ-Connect extension set
1 x NeedleVise sharps disposal device
1 x Patient wrist band

Notes:
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.

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



Other equipment required:
- 10mls 0.9% saline flush
- Sterile 10ml luer lock syringe for flushing
- Sterile syringe for blood sample if required
- Non-sterile non-latex gloves
- Skin preparation solution in accordance with local policy
- Cannulation tray
- Sharps container

6.7 Insertion Procedure

6.7.1 The following Procedure should be adhered to:
- An aseptic technique must be maintained throughout.
- Make a positive identification of patient and check name, address, date of birth and identification number.

- Ascertain the need for IO cannulation and if possible obtain consent as per the Trust consent to examination and treatment policy.
- Assess and landmark the chosen site (see appendix 1) rule out any contraindications to IO use at this site.
- Assess tissue thickness at site and select the appropriate sized needle set.
- Open equipment into the clean tray. Packaging must not be placed into the tray.
- Prime EZ-Connect with 0.9% saline and leave syringe attached.
- Apply non-sterile latex free gloves. Palpate site to locate appropriate anatomical landmarks for needle placement (see appendix 1).
- Cleanse site for 30 seconds with chloraprep and allow to air dry thoroughly.
- Connect appropriate EZ-IO® needle to driver.
- Remove needle cap. Stabilise insertion site.
- Gently pierce the skin with the EZ-IO® needle at a 90-degree angle to the bone surface until the needle tip touches the bone.
- Before driving needle into the bone check that at least one black line is visible on the needle. If no black line is visible, the patient may have excessive tissue over the selected insertion site and the needle may not reach the medullary space. Consider an alternative site or a longer needle set.
- If there is at least one black line visible, start driving the needle into the bone by squeezing the trigger and applying gentle, consistent, downward pressure.
- CAUTION: Keep hand and fingers away from the needle set.
- CAUTION: Excessive force may cause the driver to slow down and stop. If this happens ease off and let the speed and sharpness of the needle do the work.
- Release the trigger to stop drilling when there is decreased resistance (a sudden “give” or “pop”).
- Stabilise the needle hub and remove the EZ-IO® driver. Continue to stabilise the needle hub and remove the stylet by turning counter-clockwise and immediately dispose of in an appropriate sharps container or “needleVISE”.

6.7.2 A NeedleVISE is included in all needle sets:

- When stylet/needle are no longer required, they should be placed in the NeedleVISE by holding the needle hub.
- The NeedleVISE must be on a hard, flat surface
- The stylet/needle should be placed in the NeedleVISE using one hand *(do not hold the NeedleVISE with your other hand)*
- Once activated, the needle cannot be removed from the NeedleVISE
- Dispose in a sharps container immediately after the clinical procedure is completed
- Secure site with EZ Stabilizer. Connect primed EZ-Connect to the luer lock port on the EZ-IO® needle hub.

6.7.3 Confirm placement by one or more of the following:

- Flash back of blood in the catheter hub or blood on aspiration. *Note:* In the situation where the patient has severely compromised circulation a flash back may not be visible.
- Pressurised fluids flow without difficulty and without any signs of extravasation.
- Pharmacological effects.
- Flush the catheter with 10 mls of 0.9% saline over about 5 seconds and assess for extravasation. *Important:* No flush = No flow and repeated flushes may be necessary.
- If the patient experiences pain, the practitioner may need to use lignocaine for anaesthetic effect prior to the 10ml 0.9% saline flush (see appendix 2) and it may be necessary to administer additional lignocaine following the flush. *Note:* this lignocaine must be prescribed.
- Disconnect the 10 ml syringe from the EZ-Connect extension set and administer medications and fluids as prescribed using a pressure delivery system (e.g. syringe boluses, pressure bag, volumetric pump, rapid infuser, etc). *Note:* To achieve optimal flow rates in adults 300mmHg of pressure is recommended.
- If used, secure the IV giving set tubing to the patients' limb to reduce the risk of displacing the IO needle and continue to monitor the extremity for extravasation and signs of compartment syndrome.
- Write the date and time of insertion on the EZ-IO® wristband and attach it to the patient to highlight that the patient has an IO in situ.
- Use the IO Care Pathway form (see appendix 3) to document the insertion in the patient's notes.

6.8 Laboratory Analysis / Blood Sampling from IO Access

6.8.1 Clinical evidence suggests that early in the resuscitation process, blood gas values derived from IO blood may be used to assess central venous acid-base status, and theat a number of blood count and chemistry values will equal venous samples. Other values will approximate venous values; few will not correlate.

6.8.2 IO samples should be used with caution after resuscitation efforts beyond the immediate phase.

6.8.3 Blood samples for laboratory analysis can be drawn from the EZ-IO by connecting a syringe directly to the EX-IO hub.

6.8.4 For most laboratory studies, the first 2 ml should be aspirated and discarded prior to the withdrawl of the laboratory sample.

6.8.5 If necessary (e.g. Paediatrics), the first 2ml may be saved for certain tests, such as cultures or blood typing.

6.8.6 Aspiration of adequate volumes for laboratory samples may vary greatly between patients; therefore samples should be prioritised in order of importance.

6.8.7 Samples must be identified as Intraosseous blood so laboratory personnel can accurately interpret results and identify origin of stem cells.

6.9 Ongoing use of IO

6.9.1 If you have not been trained to access and use an IO cannula you must seek the assistance of someone who has. If there is no one in the local clinical area with the appropriate knowledge and skills, contact the ART team for assistance and advice.

6.9.2 Following insertion of the EZ-IO, check site for signs of complications (see 5.4) every 15 minutes for the first 2 hours. Check site every 1 hour thereafter until device is removed.

6.9.3 If any signs of complications are seen, discuss with the patients team and remove the device

6.9.4 Before accessing IO the practitioner must establish that IO access is still necessary (e.g. no IV access and the patient continues to need IV fluids and/or IV medication).

6.9.5 Removal must be discussed with the patient's team prior to removal. EZ-IO® can remain in situ for an absolute maximum of 72 hours, however removal within 24 hours is strongly recommended, providing opportunity to gain alternative venous access.

6.9.6 When accessing IO an aseptic technique must be maintained.

6.9.7 Most medication / fluids that can be safely given through a peripheral vein may be given IO. IO doses, rates and compatibility precautions are the same as the IV route.

6.9.8 The patient may experience extreme discomfort when having anything via the IO route. In this circumstance Lignocaine can be prescribed and instilled into the IO before use (see appendix 2).

6.9.9 In a situation where there is a clinical decision to continue using IO beyond the emergency that it was inserted for, this decision must be documented in the notes and the IO must be:

- Inspected and flushed prior to every use to confirm patency.
- Removed within 24 hours wherever possible, however an absolute maximum of 72 hours.
- Documented on the "IO Care Pathway" (see appendix 3).

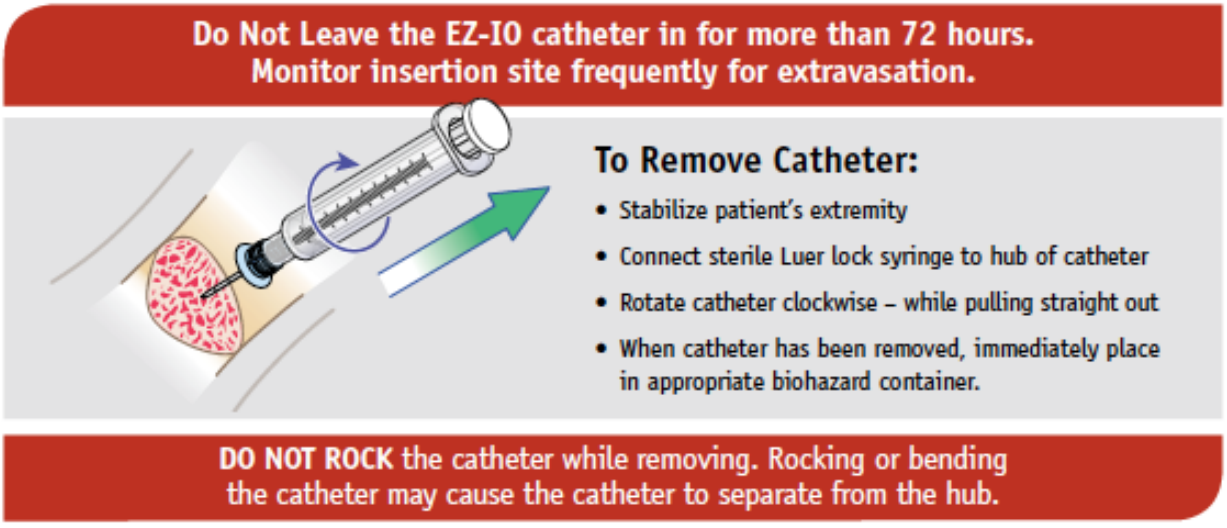
6.10 Removal procedure

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

6.10.2 An aseptic technique must be maintained throughout.

6.10.3 To remove the EZ-IO® needle:

- 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 after removal for signs of infection.
- Document removal on the "IO care Pathway" and ensure the IO wristband stays on the patient for 48 hours following removal of the catheter.



7 Training

7.1 Intraosseous cannulation, use and removal require training prior to practice.

7.2 Training on the insertion, use and removal of IO cannula will be provided under the auspices of the Resuscitation Services Department but will be delivered by Teleflex at one of the cadaveric workshops held at Newcastle hospitals and other locations throughtout the UK.. This training will be recorded on ESR . It is reposnibility of the course attendee to email their certificate to the resus team who will facilitate addition of their qualification to the ESR system.

7.3 Training will be targeted at registered healthcare staff that may need to use intraosseous cannula in their clinical duties. These primarily include Cardiac arrest team members, Acute Response Team, Emergency department practitioners and Paediatric practitioners.

7.4 Non-medical staff that have been trained in intraosseous cannulation outside of the Trust should be assessed locally either by an appropriately experienced practitioner or by the Resuscitation Services Department (see Competency based assessment for a registered practitioner to undertake emergency Intraosseous vascular access).

7.5 Refresher training is not mandatory but practitioners must be satisfied that they are meeting their professional requirements and seek training if there is any doubt about their competency. Competency should be assessed as part of an individuals annual appraisal.

7.6 Use of IO cannula is similar to use of an IV cannula and staff that use intraosseous cannula must also undertake an IV cannulation course (arranged througthe SCIL team.).

8 Diversity and inclusion

The Trust is committed to ensuring that, as far as reasonably practicable, the way we provide services to the public and the way we treat our staff reflects their individual needs and does not discriminate against individuals or groups on any grounds. This policy as been appropriately assessed.

9 Monitoring compliance with the policy

Standard/process/issue	Monitoring and audit			
	Method	**By**	**Committee**	**Frequency**
Staff will be trained in the use of EZ-IO access	ESR training records Individual staff annual appraisal	Resuscitation officers Ward / department managers	Resuscitation & deteriorating patient committee	Annual Annual at individual appraisals
Duration of insertion must be under 72 hours	Resuscitation 2222 call audit	Resuscitation officers	Resuscitation & deteriorating patient committee	Annual

10 Consultation and review

This policy has been reviewed by the Resuscitation and Patient Deterioration Committee in consultation with other interested stakeholders.

11 Implementation of policy (including raising awareness)

The policy has been implemented following the OP27 policy for development, management and authorisation of policies will be made available to staff via the ytrust intranet and circulated by the Trust secretary

12 References

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- Ong MEH, Chan YH, Oh JJ, Ngo AS-Y. An observational, prospective study comparing tibial and humeral intraosseous access using the EZ-IO®. *American Journal of Emergency Medicine* 2009;27:8-15.
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- Fowler R, Gallagher JV, Isaacs SM, et al. The role of intraosseous vascular access in the out-of-hospital environment (resource document to NAEMSP position statement). *Prehospital Emergency Care* 2007;11(1):63-6.
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- Gillum L, Kovar J. Powered intraosseous access in the prehospital setting: MCHD EMS puts the EZ-IO® to the test. *JEMS* 2005;30:s24-6.
- Hixson R, Intraosseous Vascular Access and Lidocaine, http://www.pawz.net/index_htm_files/IO%20Lidocaine.pdf, May 2011
- Resuscitation Guidelines 2015, 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)
- NMC 2018, The Code
- 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®).
- NPSA guidelines 2007. Administration of injectable medicines.

13 Associated documentation

- RM22 Consent to examination and treatement policy
- IC07 Sharps Policy
- IC04 Hand Hygiene policy
- IC03 Standard precautions for the prevention and control of injection
- MM03 Administration of Medicines Policy
- IC01 Control of Infection policy
- Competency based assessment for a registered practitioner to undertake emergency Intraosseous vascular access.
- Competency based assessment booklet for Peripheral cannulation

Appendix 1 **IO instertion sites**

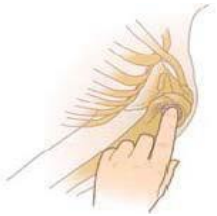
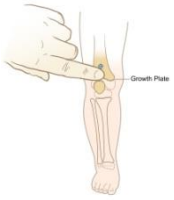
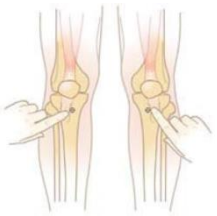
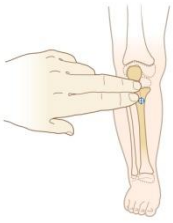
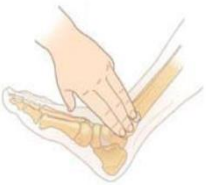
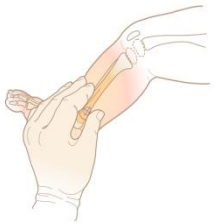
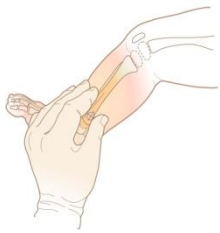
Appendix 2 **Local Anaesthesia**

Appendix 3 **Intraosseous Care Pathway**

Appendix 4 **Vascular Access Algorithm**

Appendix 1 – IO Insertion Sites

Ensure thorough training in the correct land marking 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 2cm 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 1cm medial to the upper portion of the tibial tuberosity. If tibial tuberosity cannot be identified site is approximately 3cm below the patella.	
Proximal Tibia - Paediatric Insertion site is located 1cm below the tibial tuberosity or 2cm 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.	
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 2 – Local Anaesthesia

IO is most commonly used in cardiac arrest and peri-arrest and anaesthesia is not normally required. However, in the situation where the IO route is used and the patient is conscious and sensitive to pain, the clinician may consider analgesia after insertion and prior to medication/fluid administration.

This may also apply following successful resuscitation and subsequent improvement in the patient's conscious level, if the IO catheter is still being utilised then analgesia may be required to maintain patient comfort.

Whilst Vidacare cannot provide specific guidance on choose of anesthesia and dosage, we can direct Practitioners to the work of Dr Hixson in developing their Trust IO Anaesthesia protocol.
Hixson R, Intraosseous Vascular Access and Lidocaine, May 2011

Dr Hixon IO Anaesthesia Protocol (reproduced with permission)

Anaesthesia: For the patient responsive to pain consider giving initial and subsequent doses of prescribed 1% or 2% preservative and adrenaline free lignocaine (cardiac lignocaine) via the IO prior to flushing and in the absence of published conta-indications.

Contra-indications: Sino-atrial disorders, all grades of AV block, severe myocardial depression, acute porphyria.

Dose: 0.5mg/kg given slowly over 1-2 minutes via the IO.
Usual adult dose range: 20mg – 40mg
Dose calculation: Volume in ml of 2% Lignocaine = $\frac{0.5 \times \text{Weight}}{20}$

Volume in ml of 1% Lignocaine = $\frac{0.5 \times \text{Weight}}{10}$

Note: The EZ-Connect has an internal volume of 1ml which needs to be completely primed to remove any air in the set.
Process

- Exclude contra-indications to lignocaine
- Monitor patient clinically. Consider additional monitoring as indicated e.g. 3 lead E.C.G.
- Administer initial dose (0.5mg/kg) slowly (over 1-2 minutes).
- Flush with 10mls 0.9% saline for adults and 5mls for children, over 5 seconds.
- Administer subsequent dose over 30 seconds
- Inject or infuse fluids/medications under pressure as required.

Note: If discomfort re-occurs, consider repeating the subsequent dose at a maximum frequency of once every 45 minutes.

Age	Weight (kg)	Volume of 2% (ml) 1ml of 2% = 20 mg/ml		Volume of 1% (ml) 1ml of 1% = 10 mg/ml	
		Initial dose	Subsequent dose	Initial dose	Subsequent dose
Neonate	3	0.07	0.03	0.15	0.07
Neonate	4	0.10	0.05	0.20	0.10
7 weeks	5	0.12	0.06	0.25	0.12
3 months	6	0.15	0.07	0.30	0.15
5 months	7	0.17	0.08	0.35	0.17
7 months	8	0.20	0.10	0.40	0.20
1 year	9	0.22	0.11	0.45	0.22
15 months	10	0.25	0.12	0.50	0.25
2 years	12	0.30	0.15	0.60	0.30
3 years	14	0.35	0.17	0.70	0.35
4 years	16	0.40	0.20	0.80	0.40
5 years	18	0.45	0.22	0.90	0.45
6 years	20	0.50	0.25	1.00	0.50
7 years	23	0.57	0.28	1.10	0.57
8 years	26	0.65	0.32	1.30	0.65
9 years	29	0.72	0.36	1.40	0.72
10 years	32	0.8	0.40	1.60	0.80
11 years	35	0.87	0.43	1.70	0.87
12 years	39	0.97	0.48	1.90	0.97
13 years	44	1.10	0.55	2.20	1.10
14 years	50	1.20	0.62	2.50	1.20
15 years	54	1.30	0.67	2.60	1.30
16 years	58	1.40	0.72	2.80	1.40
Adult	60	1.50	0.75	3.00	1.50
	70	1.70	0.87	3.40	1.70
	80+	2.00	1.00	4.00	2.00

Monitoring

Observe for extravasation and hypersensitivity reaction with every IO lignocaine injection. If these occur immediately stop administration and treat as appropriate.

If extravasation occurs remove IO and place another IO needle in a different bone.

See summary of product characteristics (SPC) for other known side effects of Lignocaine.

Appendix 3 – Intraosseous Care Pathway

IO Care Pathway

Date of Insertion:	dd/mm/yyyy
Time of Insertion:	00:00
Insertion Site:	
Inserted by:	PRINT

Affix patient sticker here

Handover to Ward / Unit:	24hrs post insertion:	48hrs post insertion
IO secured ☐	IO secured ☐	IO secured ☐
IO Patent ☐	IO Patent ☐	IO Patent ☐
Site free of complications ☐	Site free of complications ☐	Site free of complications ☐
Signature of Nurse:	Signature of Nurse:	Signature of Nurse:
Comments:	Comments:	Comments:

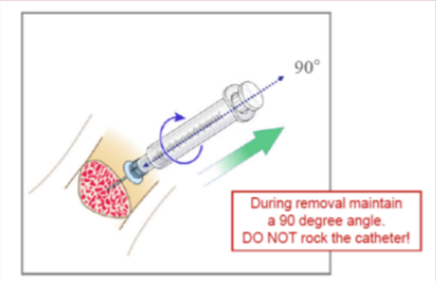
IO must be removed when no longer clinically necessary OR within 72 hours

Time and date needle site on patients skin prior to removal

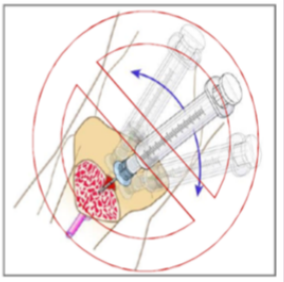
Wrist band must remain on patient for 48hrs post removal

Flush with 0.9% Saline prior to use

To remove IO needle



Avoid rocking



Time and date of removal	dd/mm/yyyy
Removed by (print)	PRINT

ORIGINAL FORM MUST STAY WITH PATIENT

Appendix 4 – Vascular Access Algorithm