

INS Position Paper

The Role of the Registered Nurse in the Insertion of Intraosseous (IO) Access Devices

As a leader in infusion therapy, the Infusion Nurses Society (INS) convened a national task force of experts to examine the practice of registered nurses placing intraosseous access devices. It is the position of the Infusion Nurses Society that a qualified registered nurse, who is proficient in infusion therapy and who has been appropriately trained for the procedure, may insert, maintain, and remove intraosseous access devices.

Background

Advances in the field of vascular access devices have resulted in an associated increase in the scope of practice of registered nurses, including the use of intraosseous (IO) access devices. The origin of IO vascular access dates back to 1922, with its first published use in a clinical setting having occurred during World War II.^{1,2,3} Since that time, IO access has primarily been used in the pediatric population as an alternative means of access when a vascular access device could not be placed.⁴ However, advances in IO devices have led to an expanded use of IO access that now regularly includes the adult population. In 2005 the American Heart Association stated in its *Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care* that IO cannulation was appropriate to provide access to the noncollapsible venous plexus found in the bone marrow space, thus enabling drug delivery similar to that achieved by central venous access. The Advanced CardiacLife Support Cardiac Arrest Algorithm from the American Heart Association now includes IO access along with intravenous (IV) access in the event of a cardiac arrest.⁵ IO access has now expanded into the nonemergent setting when IV access cannot be obtained and when the patient would be compromised without the medication or solution that has been prescribed for an emergent clinical condition. The National Association of EMS Physicians[®] (NAEMSP) position states: “Intraosseous access may provide a significant time saving which may benefit critically ill patients, both by decreasing time to achieve access and by decreasing the time to administration of indicated medications.”⁶

Discussion

Definitions

- *Intraosseous space:* The IO space refers to the spongy, cancellous bone of the epiphysis and the medullary cavity of the diaphysis, which are connected. The vessels of the IO space connect to the central circulation by a series of longitudinal canals that contain an artery and a vein. The Volkmann’s canals connect the IO vasculature with the major arteries and veins of the central circulation.
- *Intraosseous access device:* A device placed in the IO space.

Types of devices

- Manual: Hollow steel needles with removable trocars that prevent plugging of the needles with bone fragments during insertion. Manual devices are inserted using the hand-delivered force of the clinician performing the insertion.
- Impact-driven: Spring-loaded IO devices designed to penetrate through the bony cortex into the intraosseous space. These devices do not perform a drilling motion but instead use direct force to drive the sharpened IO needle into the IO space. One Food and Drug Administration (FDA)-approved device uses stabilizing probes and is intended for use on the sternum, while another FDA-cleared device that does not use stabilizing probes is cleared for use on the tibia.
- Powered drill: A handheld, battery-operated device drills the IO needle into the intraosseous space with a high-speed rotary motion.⁷ This device is FDA-cleared for use in both the proximal and distal tibia, as well as the humeral head.

Indication for use:

Emergent and nonemergent IO access when IV access cannot otherwise be obtained and when the patient might be at risk of increased morbidity or even mortality if access is not obtained.

Factors to consider:

- Dwell time for IO devices should be limited to no longer than 24 hours.
- Contraindications for using an IO device include:
 - fractures in the same extremity;
 - previous surgery involving the bone targeted for IO access;
 - infection at the insertion site;
 - local vascular compromise.
- Pain during insertion and infusion may be a concern in the conscious patient. The use of 2% preservative-free lidocaine initially injected into the IO space has proved effective in reducing the pain.^{5,6,7,8,9} The use of lidocaine for local anesthesia to the skin and periosteum of the insertion site may be considered.
- To insert and maintain an IO device on a patient, a registered nurse must have demonstrated competence and proficiency in infusion therapy, including specific training in IO vascular access using an anatomical model.
- Qualifications for inserting IO access devices must be consistent with applicable statutes.

- Maintenance of clinical competency in IO access must include:
 - validation of safe insertion knowledge and skills through demonstrated clinical experience;
 - demonstrated ability to provide appropriate care and maintenance of the IO access device;
 - ability to recognize complications of IO access.

- Formal organizational policies and procedures must be adopted providing the chain of responsibility for insertion, maintenance, and removal of IO access devices.

Statement of Position

It is the position of the Infusion Nurses Society that a qualified registered nurse may insert, maintain, and remove IO access devices. Intraosseous access should be considered if IV access cannot be obtained, and substantial concern exists for increased morbidity or even mortality in the patient from not obtaining treatment.

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