Intraosseous Device Insertion

for Adults and Pediatrics

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POSITION PAPER

The purpose of this position paper is to encourage the reader to incorporate IO use in their vascular access algorithm and use this device to its full potential. **The position of the Association for Vascular Access is that IO cannulation should be employed by qualified clinicians in all critical situations (excluding neonates) when vascular access is not established.**

Protect Patients
Educate Clinicians
Save Lines

INTRODUCTION

Intraosseous (IO) access was introduced over 100 years ago, a direct insertion method offering immediate access to central circulation.[1] Despite these devices' long history, high first-attempt success rate, and extremely low complication profile, the use of IO's is still greatly underutilized.[2] Their low complication profile is even more impressive considering they are primarily utilized in high stress, emergent, critical, and life-threatening situations, where sterile (or even clean) technique is not prioritized.

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Benefits

• Insertion of an IO device takes 20 seconds or less.[2]

• IO success rates have been shown to be twice as high as intravenous (PIV) placement in patients without an obtained blood pressure.[2]

• Complication rates have been shown to be less than 1%.[3]

• Infusions through the humeral IO route reach central circulation as fast as central catheters and faster than peripheral catheters.[1]

• IO use is recommended by the American Heart Association (AHA), the International Committee on Resuscitation, the European Resuscitation Council, the Infusion Nurses Society, the National Association of EMS Physicians, with the Emergency Nurses Association and the American Association of Critical-Care Nurses (AACN).

• Education and training for competency can be completed in approximately one hour.

Barriers

- Perceived pain of insertion
- Concerns for complications
- Lack of training, confidence, or device availability

Contraindications

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

Manufacturing improvements have advanced IO cannulation as a viable alternative to IV access, decreasing morbidity and mortality by providing a fast and stable route for life-saving medications.[1] Despite multiple organizational recommendations and copious evidence of both efficacy and reliability of use, barriers continue to delay the appropriate inclusion of these devices in the healthcare algorithm. This trend must be reversed.

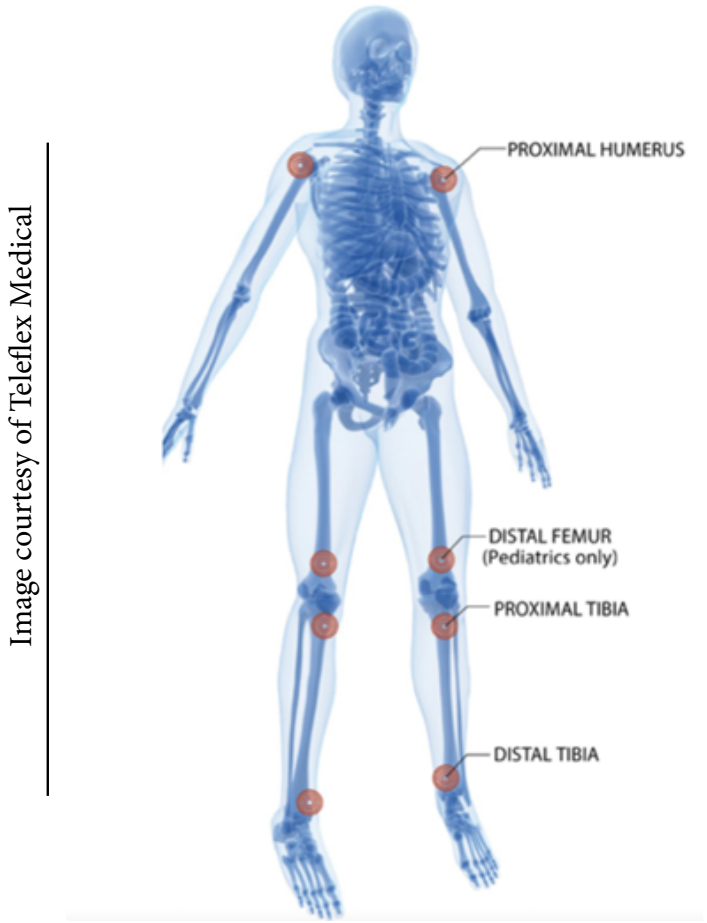
BACKGROUND & PROBLEM

In emergent/urgent situations where vascular access has not been established or has failed, gaining stable access is often challenging and time consuming. Often, a central venous access device (CVAD) or peripheral intravenous (PIV) insertion is used. These insertions have a high failure rate in code and pre-code situations, especially during resuscitation.[4,5] Furthermore, emergent situations do not allow for sterile (or even clean) technique, posing an increased risk for life-threatening infections and other complications.

Intraosseous (IO) access was introduced to circumvent such complications, using a steel needle to penetrate the non-collapsible bony cortex to the medullary cavity. This must be reiterated; this is a non-collapsible route to circulation. Such consistency is greatly preferable when cardiac arrest or shock may result in peripheral vasoconstriction, rendering peripheral access difficult or impossible to obtain.[6] The American Heart Association (AHA) and European Re-

suscitation Council (ERC) advocate the use of intraosseous access during CPR if peripheral vein access is not **immediately** possible to achieve.[6]

Improved insertion devices are more precise and efficient than ever before, now recommended for use in both adult and pediatric cases. Moreover, studies have shown that IO devices can be correctly sited in neonates and may be preferable to umbilical venous catheterization.[7] However, IO devices are **not recommended for neonates** at this time. Insertion has a very small margin of error, and severe complications may include compartment syndrome and limb loss.[8] While adult and pediatric cases have consistently proven their viability, further research and development of neonatal devices is required.



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PRACTICE RECOMMENDATIONS

1. The Association for Vascular Access recommends intraosseous access (IO) in urgent or emergent situations (excluding neonates) where venous access is not established.

2. Clinicians must be trained and deemed competent to insert and maintain IO devices.

3. In adult and larger pediatric patients, preferentially use the proximal humerus as the first choice.

4. In smaller pediatric patients, use an alternate site approved for pediatric use.

5. Please refer to the manufacturer's instructions for use (MIFU) for alternate insertion sites.

6. Use of a manufactured power device (driver, compression or spring loaded) is preferred over manual insertions.[6]

7. For conscious patients, employ a lidocaine protocol for infusions.[9]

8. Replace CVADs with IOs in code carts.

9. After stabilizing the patient, place appropriate vascular access in a sterile manner and remove IO within 24 hours or per MIFU.[2]

COMPLICATIONS

- Infiltrations and extravasation, can lead to compartment syndrome or soft tissue complications
- Cellulitis, osteomyelitis, fat embolism
- Epiphyseal plate necrosis in pediatrics
- Fracture, inability to remove bent IO needle[2]

SUMMARY

The position of the Association for Vascular Access is that IO cannulation should be employed by qualified clinicians in all critical situations, excluding neonates, when vascular access is not established.

The insertion of an intraosseous device is a necessary tool. CVAD or PIV insertion should not be attempted under such conditions. In conscious patients, use a lidocaine protocol for infusions. Education and training must be established to have qualified operators and to decrease the barriers to appropriate utilization.

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About AVA

The Association for Vascular Access (AVA) is an association of healthcare professionals founded in 1985 to promote the emerging vascular access specialty.

The mission of AVA is to lead healthcare by protecting patients and providers to improve lives.

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