Intraosseous access: A Review of Current Practices and Its Use in Patients with Difficult Access

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Purpose/Problem & Practice Question

Purpose: To decrease delay in patients receiving critical medications due to lack of vascular access.

Population: Critical adult patients in ER

Intervention: IO access for life saving medications

Comparison: Various other access

Outcomes: Earliest administration of life-saving medications.

In critical patients, will the initiation of intraosseous access compared to venous access decrease delay in administration of life-saving medications?

Background

According to the CDC (2014), heart disease (n = 614,348), chronic respiratory disease (n = 147,101), and cerebrovascular incidence (n = 135,103) were three of the top leading causes of death in the United States (CDC, 2014). Many of these types of emergencies require cannulation of a patient’s vascular system for treatment.

Failure rates using intravenous (IV) access within emergency situations have been found to be 10-40% (Lapostolle, F., et al, 2007). This can result in repeated attempts at IV insertion, which can cost valuable time in patients that require life-saving medications or rapid fluid resuscitation.

Central venous catheterization (CVC) is an alternative form of access that can be used to establish hemodynamic stability and monitoring in emergency situations (AHA, 2005). However, CVC access is relatively time consuming and requires experience for accurate placement. The risks of a complication with CVC placement are also greater and include venous thrombosis, pneumothorax, and catheter related infections (Leung J, Duffy M, Finckh A [2009], Miller AH, Roth BA, Mills TJ, Woody JR, Longmoor CE, Foster B [2002]).

Methods

Database Used: Ovid, Google Scholar, Anne Arundel Community College Library
Search Strategies and Search Terms Utilized: Intraosseous access, critical care, resuscitation, emergency, venous access, peripheral access, central venous

Six studies were reviewed.

Two studies were level 1 (RCT/experimental), two were level 3 (meta-analysis, literature review) and two were level 5 (informational, opinion) sources of evidence.

Studies appraised using the Johns Hopkins Evidence-Based Practice Research Evidence Appraisal Tool.

Literature Review & Summary of Evidence

Success Rates

Tibial IO access has the highest first attempt success rate (4.6 minutes), followed by humeral and peripheral (Reades, R., Studnevich, J. R., Vandeventer, S., & Garrett, J., 2011). IO access attained in under 5 minutes, with a 91% first time success rate compared to 43% first time success rate with peripheral IV’s (Anson, J. A., 2014).

1/10 patients failed IO placement, where CVC placement required 2 or more attempts (4/10 patients) (Leidel, B. A., 2009).

Drug Delivery

Bone anatomy provides direct access to patient’s circulatory system (Day, M. W., 2011). Resuscitation medications can be given IO with the same serum concentration as central venous access (Day, M. W., 2011).

There is no pharmacokinetic difference IO vs. IV access (Burgert, J. M., 2009).

Limitations

Serum concentrations of some antibiotics are lower using IO access compared to peripheral IV use (Day, M. W., 2011).

Lack of familiarity with IO use compared to IV use (Burgert, J. M., 2009).

Impact and Conclusion

Impact

Utilizing clinical judgment to determine “critical patients.” Implementing IO access in patients where IV access cannot be obtained in a timely manner (90 seconds per ED policy).

Conclusions

More studies need to be conducted on the use of vasopressors for use through an IO device.

IO use is still underutilized in emergency situations, even with support though EBP indicating increased efficacy with delivery of medications and fluids.

Practice Recommendations

- Review policy for IO administration with ED RN’s
- IO to be presented during ED skills day
- Review new/experienced staff to IO kit supplies and how each item is implemented.
- Review IV placement timing as supported by EBP.
- Educate staff about ARROW EZ-IO® by Teleflex application.
- Identify an ED educator/staff member to track IO use by counting supplies/ chart audits.


All additional references available upon request.