

Paramedic – Evidence Based Medicine (P-EBP) Program

Paramedic CAT (Critically Appraised Topic) Worksheet

Title: *Effectiveness on Success Rates in Prehospital Intravenous Vascular Access Versus Intraosseous Infusions for Fluid Resuscitation in Children*

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Clinical Scenario:

Paramedics arrive on scene to a 5-year-old male patient who was struck by an oncoming vehicle while crossing the road on his bicycle. He appears to be unconscious and breathing. Patient has a right-sided open femur fracture and has lost a significant amount of blood. Intravenous vascular access must be obtained to administer patient fluids.

PICO (Population – Intervention – Comparison – Outcome) Question:

- *In ems patients less than 12 yoa requiring fluid resuscitation, does the use of IO or IV vascular access result in higher efficacy (obtained access)?*

Search Strategy:

(Children OR pediatrics) AND ("out of hospital" OR prehospital OR paramedics OR ambulance OR EMS OR EMT) AND (intraosseous OR "Illinois needle" OR "ez IO" OR IO)

Search Outcome:

86 results



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Relevant Papers:

AUTHOR, DATE	POPULATION: SAMPLE CHARACTERISTICS	DESIGN (LOE)	OUTCOMES	RESULTS	STRENGTHS/ WEAKNESSES
Lucas A. Myers 2013	4188 patients aged 18-years-old or younger.	Retrospective Chart Review Study - LOE 3	The success rates of Intravenous vascular access in pediatrics 18-years-old or younger.	The success rates were: 64.1% in those younger than 2 years. 67.1% in patients younger than 3 years. (p-value: $p < 0.001$). Each 1-year increase in age was consistent with an 11% increase in the odds of successful placement. The highest rate of attempts and highest rate of success occurred on the older patients within the group.	+ Well done data collection and analysis. + Good sample size used. -No randomization. -No comparison group.
Karin R. Rice 2015	143 pediatric patients in a Level 1 trauma tertiary care hospital.	Retrospective Review Study with a control group (day vs. night shift) - LOE 2	Intraosseous (IO) access in the absence of conventional Intravenous vascular access.	Reason for IO placement: 53.1% could not obtain IV access. 6.3% loss of IV access. 33.6% had no perfusion. 7% undeclared.	+ Comparison groups. -Small sample size. -Data taken from one institution. -Limited generalizability.
Kathryn Moore 2013	107 patients	Prospective Cross-	Test the use of a semi-	EZ-IO attempt: 100% within	+ Good data



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	Predominantly male and middle aged (range 3-94 years-old).	sectional Study	automatic IO infusion system (EZ-IO) as an alternative to vascular access in critical patients treated in a prehospital emergency setting.	30 seconds. IV attempt: 79% for second site of access on patients.	collection. + A lot of information to back up results. -Small sample size.
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Comments:

- All data was reported by paramedics.
- This study was approved by an institutional review board.
- Mean patient age was 14.1 years-old for the highest success rate for IV access.
- Male patients were significantly more likely to have IV success than female patients.
- Intraosseous infusions are more successful compared to intravenous vascular access.

Consider:

In reference to the initial question there was a fair amount of information both on the success rates of IV access and IO access in patients. All these prehospital studies used IV access as their first choice for fluid resuscitation. After several failed attempts at gaining IV access was IO access obtained. Since my research was based on the success rates of IV access there was not enough data on the success rates of IO access to consider changing practice in the prehospital setting during this time.



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Clinical Bottom Line:

Obtaining intraosseous (IO) access provides a fast, easy, and reliable way to obtain alternative venous access in patients whom require fluid resuscitation and/or medication.

References:

*Lucas A. Myers BAH, NREMT-P, Grace M. Arteaga MD, Logan J. Kolb BS,
Christine M. Lohse MS & Christopher S. Russi DO (2013) Prehospital Peripheral Intravenous
Vascular Access Success Rates in Children, Prehospital Emergency Care, 17:4, 425-428, DOI:
10.3109/10903127.2013.818180.*

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Institute for Brain Science, 307 Trent Dr, DUMC 3322, Durham, NC 27710 (karin.reuter-rice@duke.edu). DOI:
10.1097/TME.0000000000000077.*

*Francisco Torres, RD, Maria Dolores Galán, MD, RD, Maria del Mar Alonso, RD, Rosa Suárez, RD, Carmen
Camacho, MD, and Veronica Almagro, MD, Madrid, Spain (2013) INTRAOSSEOUS ACCESS EZ-IO IN A
PREHOSPITAL EMERGENCY SERVICE, Vol. 39, Issue 5.*

