

Helm M, Haunstein B, Schlechtriemen T, Ruppert M, Lampl L, Gäßler M.
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EZ-IO Intraosseous Device Implementation in German Helicopter Emergency Medical Service

Use of the Arrow EZ-IO Intraosseous Vascular Access System by emergency medical services personnel was associated with a high rate of successful insertion

The Arrow EZ-IO Intraosseous Vascular Access System was associated with a high rate of user satisfaction

Objective

To evaluate the use of the Arrow EZ-IO Intraosseous Vascular Access System by the German Helicopter Emergency Medical Service (HEMS).

Methods

This study comprised a retrospective chart review of intraosseous (IO) needle insertions performed by HEMS personnel between January 2009 and December 2011 (i.e., the 3 year period following introduction of the EZ-IO at all HEMS bases).

The primary outcome variable was the rate of successful insertions.

Secondary outcome variables were the IO access site, the size of needle used, the line of vascular access, handling problems, and user satisfaction.

Results

Over the course of the study, 120,923 patients were treated by HEMS; in 348 of these patients (0.3%), an attempt at IO vascular access was made.

Significant differences in certain demographics/clinical characteristics were noted in patients in the IO vascular access group versus the non-IO vascular access group.

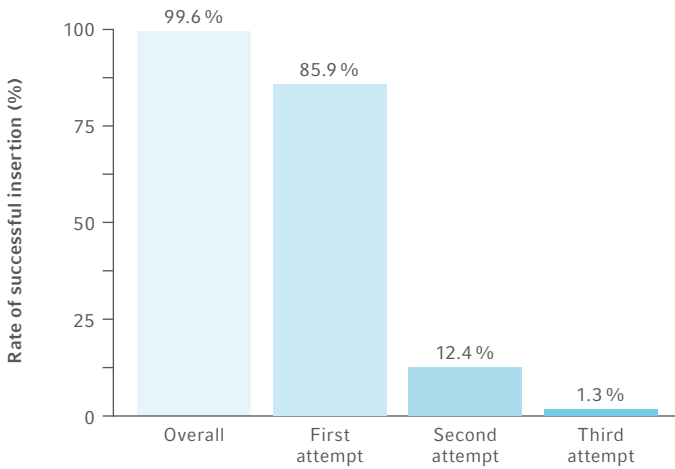
- Patients in the IO group were younger (41.7 vs 56.5 years; $p < 0.001$), were more often male (63.2% vs 57.7%; $p = 0.037$), were more often trauma cases (37.3% vs 30.0%; $p = 0.003$), and more often had a National Advisory Committee for Aeronautics score of ≥ 5 (77.0% vs 18.6%; $p < 0.001$)
- Patients in the IO group also had more seriously compromised vital signs and more often required invasive procedures such as endotracheal intubation and chest compressions

The most common site of IO vascular access was the proximal tibia (87.2% of cases), followed by the distal tibia (7.5%) and the proximal humerus (5.3%); the most frequently used needle size was 25 mm (56.8%), followed by 15 mm (30.4%) and 45 mm (12.8%).

The overall rate of successful insertion was 99.6%, with most insertions occurring on the first attempt (Figure 1); insertion was unsuccessful in a single adult patient, which was the result of the needle bending during insertion.

- Insertion success rates were comparable in patients aged < 7 versus ≥ 7 years, in trauma vs non trauma cases, and in patients in cardiac arrest vs patients with spontaneous circulation.

Figure 1. Rate of successful insertion with the Arrow EZ-IO Intraosseous Vascular Access System during use by the German Helicopter Emergency Medical Service (HEMS) (N=227)

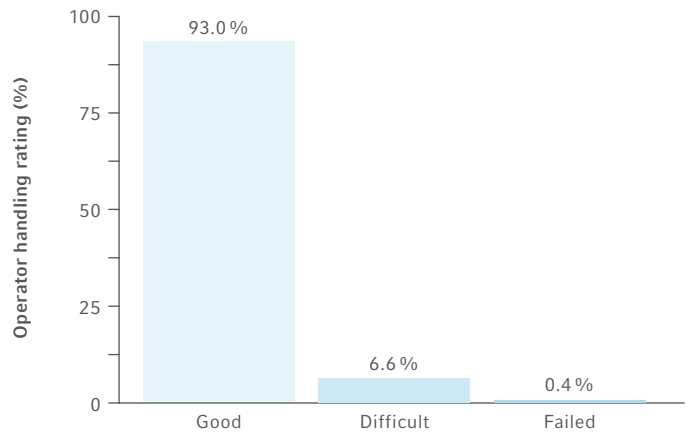


Across the overall analysis population, there was a predominance (60.8% of patients) for IO access as a second-line vascular access strategy (i.e., use of the IO route after attempts at intravenous access had failed).

- This was true for all patient subgroups with the exception of those aged <7 years in whom there was a predominance (63.9%) for IO access as a first line strategy (i.e., use of the IO route in the first instance because of an assumed delay in achieving intravenous access).

Handling of the EZ-IO system was considered “good” by almost all operators (Figure 2); handling problems were reported in four patients and included needle dislocation (n=2; 0.8%), needle bending (n=1; 0.4%), and extravasation/parafusion (n=1; 0.4%).

Figure 2. Handling rating for the Arrow EZ-IO Intraosseous Vascular Access System during use by the German Helicopter Emergency Medical Service (HEMS) (N=227)



Conclusions

The rate of usage of the Arrow EZ-IO Intraosseous Vascular Access System by HEMS is compatible with established guidelines/recommendations, with uptake generally reserved for the most critically ill patients.

Rates of successful insertion overall and on the first attempt were high and were consistent across various patient subgroups; the rate of user satisfaction was also high.

The authors concluded that “*[t]he EZ-IO intraosseous device proved feasible with a high success rate in adult and pediatric emergency patients in HEMS*”.

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