

# **Intraosseous Infusion Devices: A Comparison For Potential Use In Special Operations.**

J Trauma 2000 Jun;48(6):1068-74

Calkins MD. Fitzgerald G. Bentley TB. Burris D. Dubick MA. Holcomb JB.

**OBJECTIVE:** To determine which intraosseous (IO) devices were easy to learn to use, easy to use once the skill was obtained, and appropriate for the Special Operations environment.

**METHODS:** Thirty-one Navy SEAL corpsmen, Air Force pararescuemen, Army Special Forces, and Ranger medics, in a prospective, randomly assigned, cross-over study, tested four commercially available, Food and Drug Administration-cleared IO devices. The systems included the injection models First Access for Shock and Trauma (FAST, Pyng Medical) and Bone Injection Gun (Wais Medical, Kress USA Corporation) and the hand-driven threaded-needle SurFast (Cook Critical Care) and straight-needle Jamshidi needle (Baxter) models. The Special Operations medical care providers received a lecture regarding IO use, viewed videotapes of the injection models, and practiced with demonstration units in the classroom. Each participant then entered the cadaver lab where all four of the IO devices were placed in randomly assigned order. A poststudy questionnaire was then completed. The FAST was placed in the sternum, whereas the other units were placed in either medial proximal or distal medial tibia. Each participant was assessed for time, number of attempts, and success. The presence of marrow, extravasation, quality of flow, and security of needle were evaluated in combination to help determine success. **RESULTS:** All four devices were believed to be easy to learn as well as easy to place.

FAST was successful in 29 of 30 insertions (94%) with a placement time of 114 +/- 36 (mean +/- SD) seconds. The Bone Injection Gun was similarly successful (29 of 31 insertions, 94%) with a mean placement time of 70 +/- 33 seconds. This time was statistically significantly faster ( $p < 0.05$ ) than that with FAST, but not with the other devices. Thirty of 31 SurFast placements (97%) were successful, on average taking 88 +/- 33 seconds to place. The Jamshidi needle also had 30 of 31 successful placements (97%) at an average 90 +/- 59 seconds. No one device was rated by the participants as significantly better than the others; however, the Bone Injection Gun did have 65% of participants rate it as first or second (closest was Jamshidi needle at 52%).

**CONCLUSION:** These IO devices were easy to teach and learn as well as easy to use. Insertion times compared favorably with peripheral intravenous catheter placement in the face of hemorrhage. All four devices can be appropriately used in the Special Operations environment and are reasonable alternatives when intravenous access cannot be gained. Although no device was rated higher than the others, particular features are desirable (low weight/size, simplicity, reusability, secure, clean, well protected).