Randomized simulated comparison of two intraosseous access devices in Georgetown, Guyana

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Background

Intraosseus (IO) devices are used for emergency vascular access in the resuscitation of patients in shock when intravenous attempts have failed.

Several expensive single-use commercial manual and automatic cannulation devices are available for use in the pre-hospital and hospital settings.

Purpose

To compare the technique and insertion success of the Near Needle Holder (Near Manufacturing, Alberta www.nearperfection.com), a low-cost and reusable device, to the Cook® Pediatric Intraosseous device.

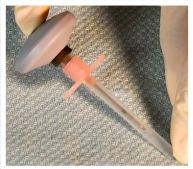

Fig 1. Cook® Pediatric IO device

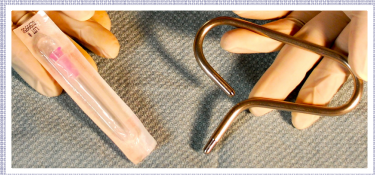

Fig 2. Near Needle Holder used to introduce 18g hollow-bore needle

Participants were asked to demonstrate needle insertion using correct technique as demonstrated in the training video and confirm correct placement of the needle by aspirating bone marrow:

Fig 3 & 4. Technique for grasping the Cook® IO and Near Needle Holder.

Fig 6. Confirming correct needle placement by aspirating bone marrow.

Results

Time for insertion and insertion success was identical for both devices (32 sec, 100% respectively). The rate of technical complications was similar for both devices (Cook® 34%, Near 38%; Fig 6).

Participants found the Cook® IO easier to use and insertion posed less of a safety risk to the inserter than the Near Needle Holder (Fig 7).

All participants felt that a device for IO insertion should be introduced at their facility, as most participants did not have access to a device to facilitate insertion of a hollow-bore needle. Although the Near Needle Holder was felt to be slightly less user-friendly than the Cook® IO, it was thought to be a significant improvement over the current situation.

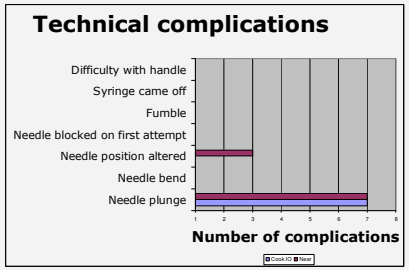

Fig 7. Technical complications encountered with the Near Needle Holder vs the Cook® IO device.

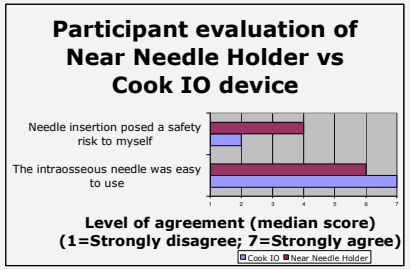

Fig 8. Participant evaluation of the Near Needle Holder vs Cook® IO device.

Methods

Local ethics approval was obtained. Participants and faculty (n=32) at a CNIS Trauma Team Training (TTT) update course in Georgetown, Guyana took part in this randomized crossover study. Fifty percent of participants had no prior experience with IO insertion.

After watching a short instructional video and practicing insertion of both devices on a plastic pediatric model, participants inserted and evaluated each device. An independent observer recorded the time for successful insertion, insertion success, and noted any technical complications.

Outcome measures included time for insertion, success of insertion as determined by ability to aspirate simulated bone marrow, technical complications, and the learner's subjective evaluation of the ease of use and safety of the device using a 7-point Likert scale.

Conclusions

Results for all outcome measures comparing the two intraosseous devices approach equivalence, suggesting that the Near Needle Holder is a safe and effective resuscitation tool for pediatric patients in shock.

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