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Extremely Premature Infant Intravenous Catheter Insertion Trainer: Development and Benchtop Testing

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Abstract

Context: Intravenous (IV) catheter insertion is one of the most common procedures in pediatric medicine. The procedure is a core skill for pediatric nurses, and is also a required skill for pediatric residents according to the Accreditation Council for Graduate Medical Education (ACGME). In the neonatal intensive care unit (NICU) it is critical that healthcare providers are competent in IV insertion because extremely premature infants are dependent on IV fluids or parenteral nutrition until feeds are established. Therefore, training healthcare providers to place IVs in extremely premature infants is essential. Currently, however, very few extremely premature infant IV trainers are available on the market, and the available models are very expensive, costing several hundred US dollars. We developed a low cost IV trainer in order to allow providers in our NICU the ability to practice IV placement in extremely premature infants.

Description: We used a Premature Anne[™] (Laerdal Medical, Inc.) as a base model to create an anatomically correct premature infant arm and hand. A cast was made of the Premature Anne's[™] arm and hand. The cast was then used to create a mold which allowed us to make a silicone-based replica of the Premature Anne[™] arm and hand. Simulated veins were created by placing thin wires into the silicone mold. The wires were removed after the silicone dried, which left an open lumen in the silicone simulating a vein. Microbore IV tubing was inserted into the distal ends of the simulated veins in order to allow infusion of simulated blood and drainage of infused fluids and medications.

Observation/Evaluation: The IV trainer was tested in our simulation laboratory by a cohort of nurses. The trainer had a realistic size and shape of an extremely premature infant's arm and hand (Figure 1). The veins were palpable under the silicone skin, which mimicked real life. The veins were easily accessed with a 24 gauge angiocatheter IV needle. A realistic flash of blood was noted when the IV catheter was correctly placed into the simulated vein. IV fluids were easily infused into the trainer and were drained through a drainage port. No leakage of simulated blood through the silicone skin of the task trainer was noted after several punctures.

Discussion: We developed an extremely premature infant IV catheter insertion trainer so providers in our NICU could practice IV placement in this vulnerable population. The IV trainer worked well during bench-top testing in the simulation lab. The next step is to conduct validity studies using the task trainer during in situ simulation exercises. After validation, we will

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determine if the new trainer should be incorporated into standard hospital IV training, and/or competency assessment of our neonatal healthcare providers.

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