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Abstract

3d printed venous access simulator for hemophilia patients

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Self-administration of clotting factor concentrates at home via peripheral venous access has become a standard of care in management of bleeding disorders [1]. The benefits include increased medication compliance, decreased bleeding complications and overall reduction of health care costs [2].

However, venipuncture techniques and skills are hard to learn when practicing on yourself or your child. In 2017, a nationwide survey of Hemophilia Treatment Center staff revealed that there was a lack of updated practice tools and technological aids to practice self-infusion [3].

The need for ultra-realistic and accurate model simulation and skills training is required for patients and families to safely and confidently gain venous access at home. The Orlando Health/Digital Anatomy Simulations for Healthcare, Inc. Team is developing a multi-use trainer to provide realistic, self-training, guidance practice tool for gaining peripheral venous access.

We are developing a 3D printed simulation/task trainer patch to simulate realistic basic anatomy. The tool requirements are to teach tissue palpation, vein location, tourniquet application, venipuncture with blood flashback, pressure release and saline flush. The patch is reusable with self-healing skin and vein. Ultra-realistic tissue properties and function for accurate training is accomplished on the Stratasys J750 polyjet printer with innovative 3D printed tissue property designs. This paper will review the design approach, tissue properties and function of the 3D printed device.

AUTHOR'S STATEMENT

K. Stubbs and S. Ortiz are employed by DASH, Inc. F. Lobo, J. Inziello, J. Stubbs, and R. Sims are shareholders in DASH, Inc., Stephanie Sharon, RN Shveta Gupta, MDare employed by Orlando Health. No Animal models have been used in conjunction with this work. Informed consent has been obtained from all individuals included in this study. Ethical approval: The research related to human use complies with all the relevant national regulations, institutional policies and was performed in accordance with the tenets of the Helsinki Declaration, and has been approved by the authors' institutional review board or equivalent committee. This work has been funded by Orlando Health.

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