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Device for alternative IV and IO applications on patient simulators #449

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INTRODUCTION

Upkeep and cleaning of patient simulators is a daunting and ongoing task in every simulation lab. The necessity of Intravenous (IV) and intraosseous (IO) application to simulators creates a significant amount of wear and tear and a notable investment in time, resources and replacement parts in order to keep simulators adequately maintained. Residues from adhesives that remains on simulator exteriors due to these applications can be unsightly and difficult or time consuming to remove. In an effort of preservation and conservation a solution was sought to eliminate the wear on equipment, reduction of potential fluid damage, limiting the need for adhesives while providing sites for the management of IO and IV sites on patient simulators. We report a novel solution for an efficient and effective means of creating an IO or IV site as a conservative alternative to introducing catheters and adhesives to patient simulators.

METHODS AND MATERIALS

Appliances were created utilizing Smooth-on® Dragonskin FXPro® [1] and SilcPig® [2] in order to allow IV and IO management to occur without disrupting the simulator's exterior. Molds were made from venaguard kits using SmoothCast® 326 Resin[3]. SilcPig® pigments allowed silicone to be colored to appear as tape, venaguards and the sought skin tone. Measurements of the site were done to determine the size needed for the appliance. Once silicone sheet was poured and cured, a straight edge ruler and scalpel was used to cut appliance to size, folded across a length of shipping tape and welded with another small batch of silicone. Once weld cured, the catheter was placed through the skin, trimmed flush and plumbed into 3/16" silicone tubing[4] for a drain, silicone casts of venaguard and tape were then adhered over catheter and extension sets using another small batch of silicone. As a last step, the drain line was encapsulated on the interior of the sleeve to make the appliance watertight.

RESULTS

These appliances offer a great deal of flexibility and versatile use. Applying a small amount of baby powder allows sleeves to slide across simulator skin and results in a very realistic feel. The low shore hardness of the silicone used allows the appliance to stretch to 3 times its size to be placed over intended sites of the simulator such as arms, legs and torso. It was discovered that the appliances must be stretched and placed as opposed to being pulled on, attempting to pull appliance on could result in damage to the appliance. At the date this was authored, some appliances have endured over 2 years of use with minimal damage or wear and have eliminated an immeasurable amount of time of cleaning adhesive residue, and costs resulting from the needed replacement of simulator arms and injection sites.

CONCLUSION

The investment required to create these silicone appliances is quickly surpassed in time and money saved. The estimated cost of each appliance is roughly 8 USD, and the investment in time is 30 minutes, excluding curing time. A well constructed appliance is capable of lasting through hundreds of uses and can be easily repaired if small tears happen to occur. The use of these appliances has saved an immeasurable amount of time, resources and potential damage to hi-fidelity simulators and continue to serve as an effective and affordable alternative to managing and providing IV and IO sites on hi-fidelity simulators.

REFERENCES

[1] Smooth-On Dragonskin FX-Pro®. Available at https://shop.smooth-on.com/dragon-skin-fx-pro. Accessed May 25, 2017.

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[3] Smooth-On Smooth-Cast® Resin. Available at https://www.smooth-on.com/products/smooth-cast-326/. Accessed May 25, 2017.

[4] United States Plastic Corp®. Available at http://www.usplastic.com/catalog/item.aspx?itemid=36285. Accessed May 25, 2017.

Figure 1. Examples of IV / IO sleeves.

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