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A Comparison of Homemade Phantoms for Ultrasound Guided Peripheral Intravenous Catheter Insertion

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Purpose:

Ultrasound (U/S) guided peripheral intravenous catheter (PIV) placement is implemented in clinical settings across the medical field, with evidence supporting the use of point-of-care U/S as a procedural tool to improve patient outcomes. Non-commercial vascular access phantoms made of various materials have been described in published literature and online tutorials; however, there has been no comparison of the models. The primary objective of this study is to determine if non-commercial phantoms are useful for the education of U/S guided PIV placement.

Methods:

This prospective observational study trialed six unique phantom models: 1) the Amini ballistics gel model, 2) the Morrow ballistics gel model, 3) the University of California San Diego (UCSD) gelatin model, 4) the Rippey chicken model, 5) the Nolting spam model, 6) and the

Johnson tofu model. Selected phantoms were assembled through instructions from the source reference. Six U/S fellowship trained Emergency Medicine physicians performed U/S guided PIV placement on each model to evaluate their effectiveness pertaining to phantom haptics, echogenicity properties, and utility for PIV practice.

Results/ Conclusion:

The Rippey model outperformed other models in this study, doing so with a mid-level cost and minimal preparation time. The Rippey model scored highest on aggregate scores pertaining to haptics, echogenicity, and utility for U/S guided PIV placement and comparability to commercial products.

Non-commercial U/S phantoms may represent cost-effective and useful PIV insertion educational tools. Future studies should investigate the utility of these phantoms in teaching USIV to novice learners and direct comparison of non-commercial to commercial phantoms.