Critically ill neonatal and pediatric patients often require central vascular access. Real-time ultrasound guidance for central venous catheterization is beneficial. Because the diameter of central veins is much smaller in neonates than in adults, extensive training is needed to master the visualization and catheterization of central veins in neonates” Wagner et al (2018).

Abstract:

OBJECTIVES: Critically ill neonatal and pediatric patients often require central vascular access. Real-time ultrasound guidance for central venous catheterization is beneficial. Because the diameter of central veins is much smaller in neonates than in adults, extensive training is needed to master the visualization and catheterization of central veins in neonates. This study assessed the learning effect of a standardized simulation-based teaching program on ultrasound-guided cannulation in a low-cost cadaver tissue model.

DESIGN: This simulation-based prospective study assessed physician competence in the ultrasound-guided central venous catheterization procedure. Analyses were conducted before and after the teaching course.

SETTING: Pediatric simulation center at a tertiary care center.
SUBJECTS: Staff physicians from the Neonatal ICU and PICUs at the Medical University of Vienna.

INTERVENTIONS: Two latex tubes, with internal diameters of 2 and 4 mm, were inserted in parallel into cadaver tissue to mimic vessels and create a model for central venous catheterization.

MEASUREMENTS AND MAIN RESULTS: Under ultrasound guidance, each participant attempted to puncture and insert a guide-wire into each of the latex tubes using in-plane and out-of-plane techniques, both before and after the teaching course. The training program was assessed using a questionnaire and a performance checklist. Thirty-nine physicians participated in this study. The rates of failure of guide-wire insertion into 2-mm tubes were significantly lower after than before the teaching course, using both in-plane ($p = 0.001$) and out-of-plane ($p = 0.004$) techniques. Teaching, however, did not significantly reduce the insertion failure rate into 4-mm tubes, either in-plane ($p = 0.148$) or out-of-plane ($p = 0.069$). The numbers of successful cannulations on the first attempt increased after the teaching in all methods ($p = 0.001$).

CONCLUSIONS: Implementation of a skills training program for ultrasound-guided central venous catheterization in a cadaver tissue model was feasible and cost- and time-effective. The number of attempts until successful cannulation of small vessels (2-mm tube) was significantly lower after than before the standardized teaching program.

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Reference:
Wagner, M., Hauser, K., Cardona, F., Schmölzer, G.M., Berger, A., Olischar, M. and Werther, T.

doi: 10.1097/PCC.0000000000001721.