

## VIRTUAL COACH CAN BE EQUIVALENT TO A HUMAN INSTRUCTOR IN REBOA TRAINING: A PROSPECTIVE RANDOMIZED STUDY

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We developed a **mixed-reality, semi-autonomous** resuscitative endovascular balloon occlusion of the aorta (**REBOA**) **simulator** allowing real-time tracking of ultrasound-guided femoral arterial access and REBOA catheter insertion steps. We integrated a **virtual coach** (VC) to teach and assess learners autonomously and conducted a mastery-based validation study comparing the virtual coach against one emergency physician human instructor (HI). **Mastery standards** were to complete consecutive successful REBOA insertions in Zone 1 then Zone 3 within 2 minutes. Fourteen participants completed all study-related interventions and achieved mastery. The VC and HI groups showed similar results (Table 1). 97% of participants commented positively about the training in post-study surveys. Our results showed no significant difference between **virtual coach and one human instructor** in teaching participants in placing a REBOA catheter on the simulator.

Table 1. Human Instructor vs. Virtual Coach Group Comparisons

Parameter	Human Instructor (n=7)	Virtual Coaching (n=7)	Total (n=14)	p
Age - Median (min-max)	31 (28-33)	33 (29-36)	31 (28-36)	0.157*
Sex - (Female/Male)	5/2	3/4	8/6	0.280**
Number of attempts to reach mastery during mastery assessment Median - (min-max)	4 (2-9)	2 (2-6)	4 (2-9)	0.128*
Free practice attempts - Median (min-max)	1 (0-3)	1 (0-6)	1 (0-6)	0.425*
Baseline time (seconds) - (Mean±SD)	268.4±193.8	243.4±144.0	255.9±168.0	0.613*
Mastery times (seconds) - (Mean±SD)	99.6±10.7	104.6±9.9	102.1±10.4	0.223*
Total scores - (Mean±SD)	10.1±4.3	9.72±4.8	9.91±4.5	0.702*
*: Mann-Whitney U test, **: $\chi^2$ test, SD: Standard deviation				