Novel Femoral Arterial Access Simulator and Simulation-Based Mastery Level Aid Trainees in Improving Confidence and Skillset

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Background

Safest femoral arterial access utilizes Ultrasound-guidance, fluoroscopy, and a micropuncture kit. However, trainees often have limited exposure to using these techniques prior to clinical application and there is no standardization to teach and evaluate them on percutaneous femoral arterial access. The Simulation-based Mastery Learning Curriculum, or SBML, has been demonstrated in other medical and surgical procedures to effectively teach trainees and assess their competency prior to clinical application

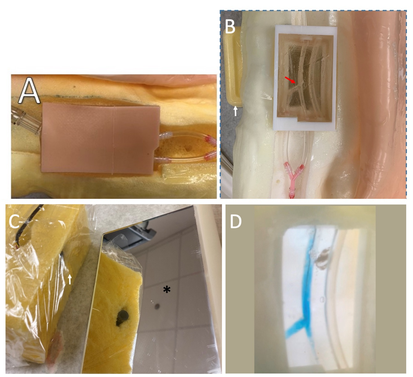
Objectives

Understand the trainees' perception of utilizing FAA SBML Curriculum using the novel simulator compared to the commercially available simulator

Methods

- Prospective, single institution study in 2022
- All cardiology fellows (CF) and vascular trainees (VT) who previously had not done USG-FAA SBML Curriculum
- Pretest used the commercially available simulator
- Posttest used the novel simulator
- All trainees received a confidential survey after completing SBML curriculum

Figure 1



A) Flesh-like silicone on top of the 3 D printed ultrasound compatible cassette that can be used with a micropuncture kit B) Cassette with anatomically correct common femoral artery and its bifurcation and vein C) Mirror and camera inside a yellow foam block. The camera is able to record and project the simulated contrast injection D) where blue dye is seen going through the common femoral artery

Results

Table 1. Participant Demographics

	N=9
Male	7 (77.8%)
Cardiology Fellow	7 (77.8%)
PGY-level	4 (1-6)
Any FAA Experience	3 (33.3%)
Prior FAA Simulations	3 (33.3%)
Number of FAA lines placed prior to simulator	0 (IQR 0,20)

Table 2. Results from SBML Curriculum

	Pre-Test (N=9)	Posttest (N=9)	P-value
Needle Passes	2 (IQR 1,3)	1 (IQR 1,1)	0.13
Sheath Passes	0 (IQR 0,0)	1 (IQR 1,1)	0.01
Checklist Score	6/17 (IQR 3,8)	17/17 (IQR 17,17)	0.01

Abbreviations: IQR= interquartile range

Table 3. Survey Responses from Participants

	Median/N =9	IQR/%
How would you rate the skills lab experience (1 Poor, 5 Excellent)?	4	(4,5)
The teaching in the skills lab improved my ability to perform femoral artery access (1 Strongly Disagree, 5 Strongly Agree):	5	(5,5)
The teaching in the skills lab improved my overall skill set (1 Strongly Disagree, 5 Strongly Agree):	5	(4,5)
Do you feel more confident with femoral arterial access after this simulation (1 Strongly Disagree, 5 Strongly Agree)?	5	(4,5)
Prefers Novel Simulator	7	77.80%

Table 4. Novel Simulator Responses

	Median/ N=9	IQR/%
Preferred Novel Simulator's Pulsatile Flow	9	100.0
Preferred Novel Simulator's Fluoroscopy	8	88.9
Did the pulsatile flow help during the simulation?	8	88.9
Did the angiogram help during the simulation?	8	88.9
Would you want future arterial access simulations with the novel simulator?	8	88.9
Preferred Novel Simulator's Tactile Feedback	3	33.3*

*Prior FAA experience preferred the tactile feedback compared to those with no prior FAA (n=3 (100%) vs n=6 (0%), p=0.012).

Conclusions

- Using a standardized simulation-based mastery learning curriculum trainees from a diverse clinical background can achieve mastery for procedural femoral artery access
- All trainees reported a positive experience with the simulation for confidence in FAA
- Most trainees preferred the novel FAA simulator

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