Background

- Extracorporeal Membrane Oxygenation (ECMO):
  - Short-term respiratory and/or circulatory system
  - Rerouting blood to ECMO machine through cannulation
  - For ECMO to work, cannulation is required to reroute the blood flow to the machine
  - It requires highly trained healthcare professional
  - Training is conducted using mannequins

Methods

- Connected arterial loop and conducted cannulation training (Fig. 3a)
- Procedural internal bleeding was tested.
- Designed model of chest pad mold (b)
- Designed model of a femoral pad (c)
- A vibration motor base was designed and 3D printed (d)
- Inferior Vena Cava (IVC) connectors modeled and 3D printed (e)

Results

- Implemented:
  - An anatomically accurate system
  - Procedural emergencies
  - A realistic flow
- Tested the prototype at HMC with the presence of a multidisciplinary team

Significance

- Successful case study of integrating Engineering with medical simulation
- Future deployment in Local and international ECMO trainings
- Extracorporeal life organization (ELSO) expressed interest in the product

Objectives and Goals

- Develop, in collaboration with Hamad Medical Corporation a cannulation simulation mannequin that is:
  1) Cost effective
  2) Realistic and user friendly
  3) Multifunctional with high fidelity
- Use the mannequin at HMC to train ECMO clinicians locally

Post Project Recommendation

1) Improve realism and interactivity of the system
2) Introduce new procedural emergencies
3) Develop an instructor App to control and monitor procedural emergencies
4) Conduct a conclusive study
5) Create a custom made mannequin