

Efficacy of a One-Day, Mannequin-Based Extracorporeal Membrane Oxygenation (ECMO) Training Course in Swine (*Sus scrofa*)



Joseph K. Maddry, MD^{1,2,3,4}; R. Madelaine Paredes, PhD²; Timur Abdurashidov, DO CPT, MC, USA³; Joni A. Paciocco, ADN, RN¹; Maria Castaneda MS^{1,2}; Allyson A. Araña, PhD^{1,2}; Crystal A. Perez, BSN, RN^{1,2}

¹United States Air Force En route Care Research Center; ²59th Medical Wing, Science & Technology; ³Department of Emergency Medicine, San Antonio Military Medical Center;

⁴Department of Military and Emergency Medicine, Uniformed Services University



Background

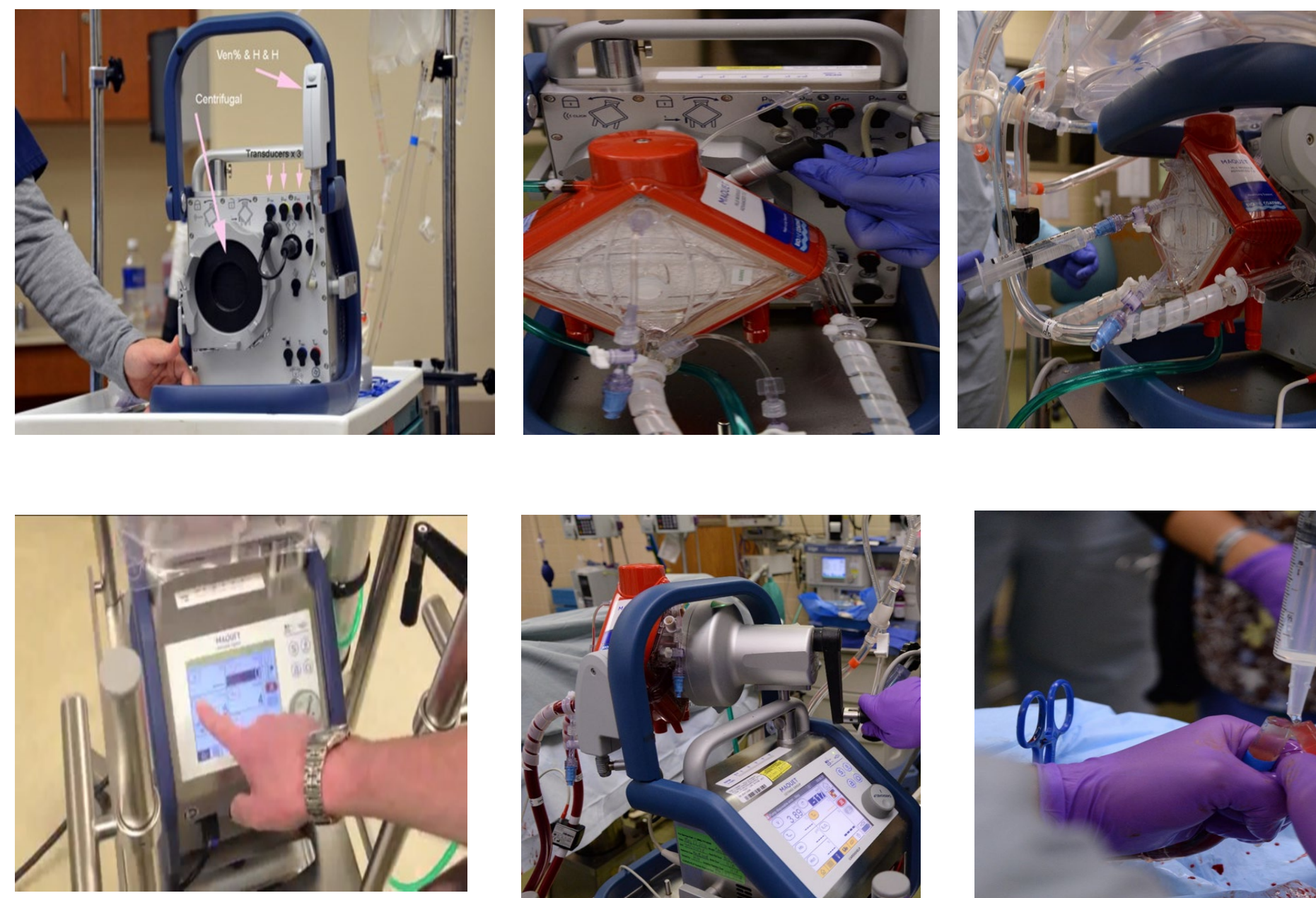
- Extracorporeal membrane oxygenation (ECMO) is an advanced medical technology used to treat refractory respiratory failure, heart failure, or both.
- The coronavirus pandemic has resulted in a significant increase in patients treated with ECMO.
- The number of hospitals with ECMO capabilities and the number of ECMO trained physicians and nurses are limited.
- Further training of personnel in the initiation of ECMO therapy could expand this critical therapy.

Objective

To evaluate the efficacy of our previously developed ECMO course using mannequin-based training in place of the currently existing live-tissue training model to determine if such a program was adequate and could be expanded to other facilities.

Methods

- Seventeen teams, each consisting of one physician and one nurse, were independently trained using prerecorded ECMO training lectures followed by hands-on practice of ECMO cannulation on two separate mannequin types.
- Each training session was approximately five hours in duration.
- The success of the training was evaluated via pre- and post-training knowledge and confidence assessments
- Research technicians observed and recorded each team independently attempting to initiate ECMO and trouble shoot common ECMO complications on a Yorkshire swine.



Results

- Seventeen teams completed the ECMO course.
- All teams were successful in priming and preparing the ECMO circuit.
- Sixteen of the 17 teams (94%, 95% CI = 71% - 100%) were able to successfully place the swine on veno-arterial ECMO. Of those 16 teams, 15 successfully transitioned to veno-arterial-venous ECMO.
- These results are similar to the success in our previous live-tissue training model.

Conclusion/Discussion

An abbreviated one-day lecture and hands-on, mannequin-based, ECMO course resulted in a high rate of successful skill demonstration and improvement in physicians' and nurses' knowledge assessments and confidence levels, similar to a previous live-tissue based training protocol.

Acknowledgements

This project was funded by the Department of Defense Joint Program Committee 6 (JPC-6) Combat Casualty Care Research Program and the Congressionally Directed Medical Research Programs (CDMRP) – FY2016 Defense Medical Research and Development Program Joint En Route Care Award.

Corresponding author:
Joseph.K.Maddry.mil@mail.mil