

Faculty of Engineering

Summer Research Program 2023-2024

Project Title: Experimental Evaluation of an ECMO Cannula Securement Device

Supervisor(s): A/Prof Shaun Gregory, Dr Andrew Stephens
Department: Mechanical and Aerospace Engineering

Email: Shaun.Gregory@monash.edu, Andrew.Stephens@monash.edu

Website profile of project supervisor: <https://www.monash.edu/engineering/shaungregory>

Objective

This project aims to develop a device to secure ECMO cannulas preventing insertion-site infection and bleeding and providing safer mobility and rehabilitation.

Project Details

Extracorporeal membrane oxygenation (ECMO) supports patients with severe cardiac and/or respiratory failure. The use of ECMO has increased by 433% over the last ten years and the successful reports of ECMO treatment for the COVID-19 pandemic have resulted in a further increase in global ECMO utilization. ECMO set up consists of multiple components such as oxygenator, pump, heat exchanger, tubing and connections including the ECMO cannulas. ECMO cannulas are the patient-device interface that are inserted into large vessels to drain venous blood out of the body and return the oxygenated blood back to the circulation system. A common complication of this treatment is small cannula movements at insertion-site during the treatment that can result in life-threatening complications such as bleeding and infection. The student will be responsible for manufacturing the potential designs, building a test-rig, and testing the effectiveness of the designs to apply potential improvements. The students could continue this work as a part of their FYP in 2024.

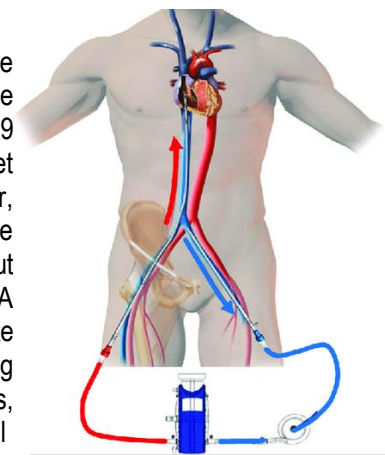


Figure 1: A simple schematic of ECMO circuit. Red and blue lines indicate oxygenated and de-oxygenated blood respectively

Prerequisites

The ideal candidate will have a background in Material or Mechanical Engineering with experience in hands-on experiments. The candidate should have a strong work ethic and integrate well into a team environment but be self-motivated to complete tasks.

Additional Information

We are a cardiovascular and respiratory engineering laboratory located at the brand-new Victorian Heart Hospital (on Clayton Campus). This project is being conducted in collaboration with the Alfred Hospital. End users feedback (Intensivists and ICU nurses) is obtained throughout the project to address a real-world problem with great potentials to be translated into a commercial product in near future.