

S RTP - Project Description Form #244

PART I:

Name of Schulich faculty member who will supervise the project Robert Arntfield

Supervisor's Schulich, Western, Hospital or Lawson Email robert.artnfield@lhsc.on.ca

Schulich Department Medicine

PART II - Project Description

Title of Project Multi-reader multi-case study assessing the diagnostic accuracy of clinician interpreted vs. AI interpreted lung sliding

Background

Artificial intelligence assisted lung ultrasound is a promising diagnostic technology. One application is its use to diagnose pneumothorax at the bedside. We have developed and retrospectively and prospectively validated an AI lung ultrasound model to diagnose the absence of lung sliding (a feature of pneumothorax) but have not yet studied this with multi-readers on standardized cases to see whether its application improves diagnostic accuracy or comfort.

Hypothesis

We hypothesize that readers using AI-LUS to diagnose absence lung sliding will have higher diagnostic accuracy and confidence than readers without.

Proposed Methodology

We will conduct a multi-reader, multi-case study where two groups of clinicians interpret a series of lung ultrasound images to detect lung sliding with and without the AI technology. These groups (16 readers, two groups of 8) will do two separate reading sessions 1 month apart, one with AI imaging, and one without. These two groups will be divided at random, and one will complete the AI-assisted read first and the other the human read. We will then compare the diagnostic accuracy to look for incremental diagnostic yield from implementing the AI tool. We will also look to see whether confidence impacts the diagnostic performance.

Expected Outcomes

We will determine the diagnostic accuracy of human interpretation and AI interpretation of LUS for the diagnosis of absence lung sliding. We will perform subgroup analyses to compare diagnostic accuracy based on provider experience, confidence, and specialty.

Research Environment - Description of the number of research personnel, primary location of research, size of lab, etc

The student will be part of a rich research team with multiple residents, fellows, and attendings collaborating on this research. The primary location is at London Health Sciences Centre, Victoria Hospital, and the medical student will work out of the 'Ultra-lounge', a comfortable multi-use office space for ultrasound researchers and clinicians. Currently, our research team has 8 individuals (engineers and clinicians) and we work hard to ensure the S RTP students have access to mentorship from multiple clinicians.

Names and titles of other individuals who will be involved with the research project?

Dr. Ross Prager - Adjunct Professor, Clinical Researcher

Dr. John Basmaji - Assistant Professor, Clinical Researcher

Delaney Smith - Machine Learning Specialist

Ben Wu - Software engineer
Carter Winberg - ICU fellow
Kiran Rikrhaj - POCUS fellow

Can this project be done remotely? No

Duration of Project Two Summers

Expected Objectives/Accomplishments for Student for Year 1?

Assist in study procedures related to the MRMC study including 1) data labeling 2) study organization 3) introduction to data analysis (we have a data scientist to lead this)

Expected Objectives/Accomplishments for Student for Year 2?

Assist in the knowledge translation surrounding the project including 1) manuscript presentation 2) presentation of research 3) generation of blog posts 4) any residual data analysis that isn't complete or secondary projects.

PART III - Certifications

If the project will require any certification - Human Ethics approvals from one or more of the following offices, please check the appropriate box below.

Human Ethics: If you have the protocol information, please enter it below (or enter the status of the approval). WREM:13872 - status, under review - anticipated approval January 2024.

Note: certification approval should be obtained prior to the start of the summer. Projects without this approval will not be a priority for funding.