Comprehensive Research Experience for Medical Students (CREMS)  
2022 Supervisor and Project Information Form

Please complete and return via email ONLY to crems.programs@utoronto.ca by February 18, 2022.

Supervisor Information

NOTE: CREMS will not support pre-determined pairings of students and supervisors. Supervisors must agree to open their projects to all students and interview all that are interested.

Name: James Jung
Email: James.Jung@mail.utoronto.ca

Department: Surgery
Hospital/Research Institution: St. Michael’s Hospital/Li Ka Shing Knowledge Institute

SGS Department(s) (if applicable):
Click or tap here to enter text.

ORCID ID (see https://orcid.org/ - If you do not have an ORCID ID we encourage you to sign up for one):
Click or tap here to enter text.

Location of Work:
Remote. Physical space at St. Michael’s Hospital is also available if requested

Field of Research (up to 4 keywords):
Machine learning, Data science, Surgical outcomes, Clinical prediction

Student contact time (number of hours per week YOU are available to the student for any concerns or to review progress):
16 hours / week
Project Information

NOTE: If this project is selected, this information will be posted on CREMS website for interested student applicants to view research opportunities.

PROJECT TITLE:
Determination of Clinicians’ Perceived Beliefs, Barriers, and Facilitators to Implementation of Artificial Intelligence Early Warning Sign Platform to the Surgical Wards.

PROJECT DESCRIPTION:
Including background, aim(s), methodS and significance of the project. Maximum 300 words.

Background/Rationale

Patients admitted to surgical specialties are prone to clinical decline due to the acuity of presentations and the invasive nature of interventions and take up 47% of ICU admissions in Canada. The leading cause of unplanned transfer to the ICU is a failure to timely recognize changes in patient’s clinical status. Despite the extraordinary amount of data generated and stored in the electronic health records, clinicians are often faced with time constraints, emotional and cognitive fatigue, and inherent bias to fully process all the relevant data to consistently arrive at the correct clinical judgment. At St. Michael’s Hospital, we developed a state-of-the-art Artificial Intelligence Early Warning System (AI-EWS) that in advance of 48 hours identifies patients who are at high risk of clinical deterioration. The AI-EWS uses a recurrent neural network that analyzes electronic medical records to make real-time predictions.

Statement of Study Aim and Study Methods

The AI-EWS is one of the first known artificial intelligence platforms to detect clinical deterioration in surgical patients. Thus, it is not known how clinicians will perceive implementation of such artificial intelligence platform in their workflow. Reimagining a clinical workflow with the AI-EWS platform involves more than just implementation; it also requires commitment to enable synergistic partnership at the human-machine interface. Yet, there is a paucity of data on how clinicians feel about and prepare for the changes in their workplaces imposed by the introduction of AI platforms in healthcare. To address this unmet need, the specific aim of our research is to determine the perceived beliefs, barriers, and facilitators to wide implementation of the AI-EWS at St. Michael’s Hospital.

We will perform semi-structured individual interviews with a variety of occupational groups to ensure there is broad representation, including senior administrators, computer scientists, ethicists, and front-line care providers like surgeons, nurses, and trainees. Interviews will be conducted until thematic saturation has occurred, that is when the investigators agree that most viewpoints are fully accounted for, and additional interviews will provide no new insight into relevant themes. In-person or video conference interviews will be recorded and transcribed verbatim. The interview transcripts will be reviewed and coded by qualitative research experts, then analyzed according to the standard thematic analysis techniques. The results generated by this qualitative methodology will help guide implementation of AI-EWS at St. Michael’s Hospital.
Significance of Research

To our knowledge, this will be the first large-scale implementation of an Artificial Intelligence-enabled platform for prediction of clinical deterioration in a surgical setting. This research has important implications for understanding how artificial intelligence can be used to better assist clinicians in their workflow. The evidence gathered from the qualitative study will help guide implementation strategy of a novel artificial intelligence platform to clinical workflow. When validated and fully implemented, the potential clinical benefit to the surgical patients in terms of reducing mortality and morbidity is tremendous.

Is this project remote-capable (in case of new restrictions) or have an alternative remote option?
☒ Yes, remote capable ☐ No
☐ Yes, alternate remote option. Please specify (100 words max): Click or tap here to enter text.

If human subjects are involved, have the appropriate Research Ethics Board approvals been obtained?
☐ Yes ☐ No ☐ Not Applicable

If yes, please list the application submission date:

Do you expect this work will be published?
☒ Yes ☐ No ☐ Uncertain / Other
Research Environment and Student Roles and Responsibilities

Please be specific as possible. Please describe the research environment, including availability of required facilities/equipment/expertise, supervisor’s experience and mentorship plans. Please clearly outline the student role(s) and responsibilities related to the project, potential educational value, and indicate who will serve as the student’s direct report for daily oversight (PI, PHD student, technician, etc.). **Maximum 300 words.**

Research Environment

The Li Ka Shing Knowledge Institute at St. Michael’s Hospital specializes in health services and policy, population health, global health, and knowledge translation research. Dr. Jung’s lab has a physical lab space in 2 Queen Street East building, if the accepted student prefers to work on-site. The accepted student will be able to complete work remotely as well. Dr. Jung’s lab works closely with Data Science & Advanced Analytics team at St. Michael’s Hospital on the development and implementation of the Artificial Intelligence Early Warning Sign platform.

Supervisor

Dr. James Jung is an Assistant Professor at the Department of Surgery, University of Toronto, and a Surgeon-Scientist at St. Michael’s Hospital. He completed medical school and General Surgery residency at the University of Toronto, followed by clinical fellowship at Massachusetts General Hospital, Harvard Medical School. During residency, he completed a PhD degree in Clinical Epidemiology and Health Services Research at the Institute of Health Policy, Management and Evaluation, University of Toronto. His primary research interests are in utilizing machine learning and data science principles to perform real-time clinical predictions in surgical populations. He has vast experience in mentoring medical students and residents in clinical research. Most students have presented their works at local, regional, or national meetings and published manuscripts in high-impact journals.

Student Roles and Responsibilities

The accepted student is expected to be involved in the development, implementation, data gathering, and data synthesis of the qualitative study on determining the clinicians’ perceived beliefs, barriers, and facilitators of implementation of an AI platform at an academic hospital. They are expected to present the findings of this study in local, regional, or national academic meetings. The accepted student is expected to report to the Principal Investigator, Dr. Jung in weekly meetings to check progress.