



Improving Outcomes from Pre-hospital and Emergency Care across the Asia-Pacific

STUDY PROPOSAL REQUEST FORM

Please complete the form and email to PAROS secretariat at patricia.tay@scri.edu.sg by the stipulated date. You will be notified in due time on whether your study has been accepted for presentation.

Reminder: Please check the list of existing proposals and publications from <https://www.scri.edu.sg/crn/pan-asian-resuscitation-outcomes-study-paros-clinical-research-network-crn/paros-publications/> to avoid duplications of proposals. Abstract and manuscript must be sent to PAROS chairs for approval before submission for presentation/publication.

1. BASIC INFORMATION

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Country: Singapore

2. TYPE OF REQUEST (Please select one)

New Study Proposal (initial)

Secondary Analyses

Explanatory Analyses

3. STUDY TITLE

Use Artificial Intelligence and Deep Learning to Predict Clinical Outcomes for Out-of-Hospital Cardiac Arrest Patients

4. ABSTRACT OF STUDY PROPOSAL

In **no more than 350 words**, describe the study under the given headings below.

Objectives/Hypotheses

Out-of-hospital cardiac arrest (OHCA) is a major healthcare burden and its prognosis is critical in decision-making for treatment and the withdrawal of life-sustaining therapy. Current tools are not predictive enough or yet widely validated. In this study, we aim to develop and validate artificial intelligence (AI) and deep learning models with prehospital data to predict several key clinical outcomes such as neurologic recovery and survival to discharge.

Methodology (To include sample size, settings, inclusion & exclusion criteria, etc. For secondary & explanatory analyses: include statistical plan, type of analyses, measurement, etc.)

We will conduct a secondary analysis using the PAROS-2 dataset. After excluding traumatic patients and cases without sustained ROSC after resuscitation, we will use routinely collected variables to derive predictive models using AI and deep learning algorithms. The primary outcome is neurological recovery (Cerebral Performance Category 1 or 2) after ROSC and the secondary outcome is survival to hospital discharge. Given that the rate of outcome is low, in building the prediction models we will specifically design algorithms to deal with data imbalance, i.e. skewed data distribution in outcomes.

Significance of the study (e.g. provide brief description on how the study can improve current

Accurate prediction of clinical outcomes in OHCA plays an important role in assisting clinical staffs to decide whether further aggressive life-sustaining therapy should be added. Although many clinical

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tools have been developed, they suffer from inaccurate prediction, and thus lack of real-world applicability. A recent study (Kwon, et al. Resuscitation 2020) demonstrates that deep learning could be valuable in designing powerful prognostic tools by using the Korean national OHCA dataset. However, this study is limited by two factors: 1) the dataset is comparably small and may not be representative; and 2) more importantly, the method used in the study does not have a mechanism to deal with data imbalance that could significantly impact on the predictive performance. In our proposal, we will be able to address the above issues with a much larger PAROS-2 dataset and novel AI algorithms to handle skewed data distribution in the outcomes. If validated, we believe that such a prognostic tool can aid paramedics and EMS fellows in making critical decisions. Furthermore, we aim to develop scalable methods, for making them easily be adopted by international societies.

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(A) Score (please highlight the appropriate score):

1	2	3	4	5	6	7	8	9	10
<i>Unfavourable</i>								<i>Favourable</i>	

(B) Comments (free text):

GUIDELINES FOR PREPARING NEW PROPOSAL PRESENTATION

If your study proposal has been accepted for presentation, you will be notified by the Secretariat. Please prepare your presentation slides in accordance to the following instructions. Each presenter is given 10 minutes to present (8min presentation + 2min Q&A).

General Instructions

1. Presentation must include the following sections:
 - a. Introduction
 - b. Objectives/Hypotheses
 - c. Methodology
 - d. Significance

2. Limit total number of slides to not more than 12. The following are the recommended number of slides for each section.
 - a. Introduction – maximum of 2 slides
 - b. Objectives/Hypotheses – maximum of 2 slides
 - c. Methodology – maximum of 6 slides
 - d. Significance – maximum of 2 slides

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3. Try to use big fonts and contrasting colours to increase readability e.g.
 - a. Black/dark blue font against white background
 - b. White/yellow font against black background
 - c. Black font against blue background

For any enquiries, please contact PAROS secretariat at patricia.tay@scri.edu.sg

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