Critical Care Honours Program 2026

Department of Critical Care

Faculty of Medicine, Dentistry and Health Sciences

THE UNIVERSITY OF MELBOURNE

"I have nothing but incredible things to say about my honours experience this year, and how it has impacted, motivated and inspired me in so many ways"

Critical Care Honours student, Lier Deng

go.unimelb.edu.au/7ghs

Welcome

Welcome to the Department of Critical Care (DoCC) within the Melbourne Medical School. DoCC is one of the few University departments anywhere in the world that embraces all three critical care specialties: anaesthesia, emergency medicine, and intensive care medicine. DoCC covers over 20 hospitals affiliated with the University.

The need for DoCC stems from the unfortunate fact that many high-risk, deteriorating, and critically ill patients have poor outcomes. Collectively these patients have a broad range of problems from trauma to children with sepsis to mental health to severe co-morbidity before surgery to complex pain syndromes; to name a few. Both preventing and managing health care crises is a key common feature of the three critical care specialties.

The DoCC Honours Program is designed to provide research projects directly relevant to acute human disease and treatment and recovery of the high-risk, deteriorating, and critically ill patient.

We hope to see you at our information session in the coming weeks, where you will have the opportunity to hear from potential supervisors, current students, and ask questions about the projects on offer. More information about this information session will be posted on our website soon.

We believe critical care is the future of hospital medicine and regardless of the project you choose, you will be pursuing an important and challenging area of research with direct, patient-focused outcomes, alongside a world-renowned community of researchers.

I look forward to meeting you in the Department next year.

Professor David Story
Head, Department of Critical Care
Professor and Foundation Chair of Anaesthesia at the University of Melbourne
ANZCA President

The Critical Care Honours Program

Overview

The Department of Critical Care Honours Program is designed to offer research projects directly relevant to acute human disease and treatment of the high-risk, deteriorating and critically ill patient.

Projects offered are from leading clinician scientists in the areas of anaesthesia, emergency medicine and intensive care medicine, across a range of University-affiliated hospital sites.

Our supervisors have prominent national or international profiles with outstanding track records of exceptional mentorship and supervision.

Research Projects & Supervision

Research projects are offered by individual research groups within the department and have been overseen by the Research Committee.

All projects address fundamental scientific questions or key questions in improving care for high-risk, deteriorating or critically ill patients.

Supervisors have extensive experience in research and graduate supervision and student assessment.

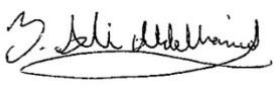
At least two supervisors are assigned to every student to ensure the best quality student experience.

Seminar Program

A comprehensive seminar program complements the research project, comprising weekly presentations from world leading critical care researchers.

Each seminar focusses on a key area of critical care research. The aim is to provide students with a comprehensive knowledge base, using a pragmatic approach, that can be applied to both research and clinical care.

Lectures cover research methodology and the latest translational research across the three key critical care disciplines of anaesthesia, emergency medicine and intensive care medicine, with topics ranging from clinical trial design, meta-analysis, sepsis, recovery after critical illness, delirium and perioperative risk through to toxicology, substance abuse and recreational drug related behaviour.



Dr Yasmine Ali Abdelhamid
Honours Coordinator, Department of Critical Care
Specialist Intensivist at The Royal Melbourne Hospital,
Honorary Senior Clinical Fellow, Department of Critical Care, University of Melbourne

Meet some of our supervisors...

Dr Meg Allen

Dr Meg Allen is a staff specialist anaesthetist at the Royal Melbourne Hospital and Honorary Senior Fellow of the Department of Critical Care at the University of Melbourne. Her clinical interests include Neuro-anaesthesia, complex orthopaedics and care for trauma patients. Meg's research interests are aligned with improving perioperative patient care and clinician welfare. She has recently completed her PhD through the Department of Critical Care at The University of Melbourne, investigating perioperative opioid stewardship and was the 2023 MACH Health Services Research fellow for the Royal Melbourne Hospital.

Dr Elyssia Bourke

Dr Bourke is an Emergency Physician and Director of Emergency Medical Research at the Royal Melbourne Hospital, Executive Committee member of the Department of Critical Care at the University of Melbourne, Chair of the Australasian College of Emergency Medicine (ACEMI) Clinical Trials Network and an executive member of the ACEM research committee and the Paediatric Research in Emergency Departments International Collaborative (PREDICT) network. She has completed a PhD examining the optimal management of paediatric acute behavioural disturbance in the emergency department setting.

A/Prof Lachlan Miles

A/Prof Miles is a Staff Specialist and Head of Research in the Department of Anaesthesia at Austin Health, Honorary Principal Fellow of the Department of Critical Care at the University of Melbourne and an Honorary Principal Research Fellow and Perioperative Clinical Lead in the Preclinical Critical Care Unit of The Florey Institute of Neuroscience and Mental Health. His subspecialty clinical practice involves cardiothoracic and major hepatobiliary anaesthesia (including liver transplant) and peri-operative medicine.

Our 2025 Honours projects

Perioperative opioid practice at the Royal Melbourne Hospital

Contact: **Dr Megan Allen**

Email: **megan.allen@mh.org.au**

Co-supervisors: **Dr Paul Emery and Professor Kate Leslie**

Location: **Department of Anaesthesia and Pain Management, The Royal Melbourne Hospital**

Opioids are a cornerstone of analgesia for surgery, yet present therapeutic risk to patients. Perioperative opioid stewardship aims to harness the therapeutic benefits and mitigate risk. Stewardship measures can include standardised care pathways with clinical guidance endorsed by expert pain medicine clinicians. Such analgesia guidance, encompassed within enhanced recovery after surgery (ERAS) pathways, is in place at RMH for patients undergoing spine and major joint arthroplasty surgery.

This project will assess the pain experiences, perioperative opioid use, and discharge opioid prescribing for patients cared for at RMH under existing ERAS pathways. The core of this project will be a retrospective cohort study with data collection from the electronic medical record. Opportunities to observe the acute pain round and in the operating theatre may be available.

Patient experience of presenting to emergency department with a primary headache

Contact: **Dr Elyssia Bourke**

Email: **Elyssia.Bourke3@mh.org.au**

Co-supervisor: **Dr Amy Robotham**

Location: **Emergency Department, The Royal Melbourne Hospital**

Primary headache - which includes migraine headache, cluster headache and tension headache - is one of the most common emergency department presentations. Currently when patients present to the ED with primary headache, clinicians report using a range of investigation and management strategies. It is not known what the patient experience is when presenting to the emergency department with primary headache. Importantly, we do not know what these individual's highest priorities for treatment are.

This qualitative study will involve one-to-one interviews with patients who have presented to the ED with primary headache. Through these interviews, we aim to develop a lived experience understanding of the patient experience and priorities. This work will influence future research including clinical trials to improve the treatment of ED patients with primary headache.

Quantifying the epidemiology and costs of cardiac arrest after trauma. A clinical audit to help inform and enhance guidelines

Contact: **Dr Elyssia Bourke**

Email: **Elyssia.Bourke3@mh.org.au**

Co-supervisor: **Dr David Camilleri**

Location: **Emergency Department, The Royal Melbourne Hospital**

Traumatic injuries are one of the leading causes of death in Australia. A number of heroic measures are undertaken for patients who present critically injured from trauma to the emergency department in an attempt to improve their survival. This includes resuscitative thoracotomy (incision made to the person's chest to access the heart and lungs to treat injuries, control bleeding and improve circulation).

For patients who experience cardiac arrest in the setting of trauma, the resources utilised in an effort to resuscitate these patients are extensive. Despite this, patient outcomes are often poor. Through this project we hope to review and quantify the epidemiology of these cases, their outcomes and costs associated with this care. This information will be used to optimise current guidelines to enhance outcomes for these patients whilst considering the impacts on the health system more broadly.

Understanding the range and commonality of outcomes used in trauma research in critical care: a scoping review

Contact: **Dr Elyssia Bourke**

Email: **Elyssia.Bourke3@mh.org.au**

Co-supervisor: **Dr Ned Douglas and Mr Chris Selman**

Location: **Emergency Department, The Royal Melbourne Hospital**

Patients with traumatic injuries are cared for in the pre-hospital environment, the emergency department, theatre and intensive care. In short, trauma care is core business across all the critical care specialties. To ensure the highest level of evidence is available to guide the care provided to these patients, understanding the most meaningful clinician and patient centred outcomes in trauma is essential.

This study therefore proposes to undertake a scoping review to summarise the clinician determined and patient reported outcomes used in randomised controlled trials and trauma registry studies from 2020-2025 for patients injured by trauma. The data for patients with a single-system injury (e.g. neurotrauma and chest trauma) as well as polytrauma patients will be examined. The results of this scoping review will be used to guide the determination of a novel ordinal outcome for trauma research co-designed by clinicians and consumers which could be used for future conventional randomised controlled trials or platform trials.

Using Immune Function to Guide Treatment in Critically Ill Patients

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Contact: **Dr Laura Cook**

Email: **l.cook@unimelb.edu.au**

Co-supervisors: **Professor Yugeesh Lankadeva, Professor Adam Deane**

Location: **Doherty Institute/Royal Melbourne Hospital**

When patients are admitted to intensive care, they often receive broad treatments such as antibiotics, steroids, or immune-modulating drugs - especially during infections like COVID-19. However, these treatments are not tailored to individual patients, and there is currently no standard way to guide their use based on a patient's immune function.

Your project aim is to validate a set of rapid immune tests that can be done when a patient arrives in intensive care. These tests will help doctors to decide if a patient needs drugs that either boost or suppress the immune system. This personalised approach could improve survival and recovery by matching treatments to the patient's immune profile. It also prepares us for future pandemics, helping hospitals deliver faster, smarter care. This project has the potential for immediate real-world impact, improving outcomes for critically ill patients through more targeted and effective treatment decisions.

Critically ill patients with liver failure and the response to dietary protein in the ICU

Contact: **Professor Adam Deane**

Email: **adam.deane@mh.org.au**

Co-supervisors: **Dr Kym Wittholz and A/Prof Amalia Karahalios**

Location: **Intensive Care Unit, The Royal Melbourne Hospital**

We recently published a cluster randomized, crossover, open-label trial of 3397 critically ill patients from 8 ICUs across a 12-month period (Summers, et al. JAMA. 2025. doi: 10.1001/jama.2025.9110). This trial was named TARGET Protein.

In TARGET Protein, patients were randomized to receive augmented dietary protein or usual amounts of dietary protein. The intervention of augmented dietary protein did not improve patient outcomes with signals of harm.

It is biologically plausible that certain patient groups responded differently to the intervention. Patients with liver failure may have issues processing the amino acids, which can affect brain function.

In this Honours project you will use the existing TARGET Protein database and extract all data related to patients with liver failure. By obtaining some further blood tests in these patients you will determine whether more protein is harmful or beneficial to these patients.

Phenobarbital as an Adjuvant to benzodiazepine administration when compared to Single-agent benzodiazepine Treatment (usual care) for Alcohol Withdrawal Syndrome in the Intensive Care Unit (PASTA)

Contact: **Professor Adam Deane**

Email: **adam.deane@mh.org.au**

Co-supervisor: **Dr Tess Evans**

Location: **Intensive Care Unit, The Royal Melbourne Hospital**

In Australia, approximately 30% of the population aged 14 and above consume alcohol in a way that puts their health at risk. Alcohol-use disorders are a spectrum of disorders, which includes excessive use, abuse, dependence, and addiction. In the intensive care unit (ICU), approximately one in four patients have a history of alcohol abuse or alcohol-related issues.

Managing patients with alcohol-use disorders who present to the hospital or ICU can be extremely complicated, as hospital admission usually results in immediate abstinence from drinking alcohol and can trigger alcohol withdrawal syndrome. While the symptoms vary in intensity, approximately one in five patients can develop seizures, and patients in the ICU who are reliant on life support and who develop delirium due to alcohol withdrawal syndrome may risk harming themselves by accidental removal of catheters or tubes that are providing this life support

The current mainstay of treatment for alcohol withdrawal syndrome are benzodiazepines. This class of drug is known to ameliorate patient agitation, reduce the incidence of alcohol withdrawal seizures, and prevent alcohol withdrawal delirium. Phenobarbital belongs to a drug type called barbiturates

that can be used to treat epilepsy. In North America, many centres use phenobarbital for the treatment for alcohol withdrawal syndrome, but it is not used in Australia.

In 2025 we commenced a single centre, three-arm, parallel group, electronic medical records embedded and randomized, feasibility trial. Our objective is to determine whether it is feasible within an electronic medical record platform to screen, randomise, and direct the administration of intravenous phenobarbital, as an alternative to usual care, in critically ill patients who are withdrawing from alcohol and are admitted to the Intensive Care Unit.

In this Honours project you will participate as an investigator in this ongoing trial.

Ketones In Critical Care: a feasibility randomised controlled trial (KICC trial)

Contact: **Professor Adam Deane**

Email: **adam.deane@mh.org.au**

Co-supervisors: **Dr Kym Wittholz and Dr Yasmine Ali Abdelhamid**

Location: **Intensive Care Unit, The Royal Melbourne Hospital**

Ketones are a natural source of energy for our cells. They are produced by the liver and rise in times when levels of glucose are low. We can induce this rise in blood ketone level by fasting, adhering to a ketogenic diet, or drinking a special ketone formula.

Some studies have shown that raising blood ketone level is beneficial but there is a sparsity of research in the role of ketones in critically ill patients. A major issue limiting research in the field is that it can be extremely challenging to raise the ketone levels by fasting or dietary means during critical illness. Nutritional supplements are now available that contain ketones and can increase blood ketone levels without the adverse effects observed with fasting or diet changes.

We will commence this trial in late 2025. The aim of this study is to determine if it is feasible to conduct a randomised control trial using an exogenous ketone ester in addition to standard of care enteral feeding regimen in patients who are mechanically ventilated.

In this Honours project you will participate as an investigator in this ongoing trial.

Thiamine use in the ICU and Beyond: increasing use, increasing need

Contact: **Professor Craig French**

Email: **craig.french@wh.org.au**

Co-supervisors: **A/Prof Forbes McGain**

Location: **Intensive Care Unit, Western Health**

Thiamine is currently the third highest cost drug in Western Health Intensive Care Units. The evidence to support its routine is uncertain. This project is a systematic review of the literature and meta-analysis of relevant extracted data relayed to thiamine use in the critically ill. You will also conduct a survey of Australian and New Zealand ICU practice regarding thiamine prescribing practice and use.

A Life Cycle Inventory (library) of Operating Theatre and ICU Equipment and Energy Use

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Contact: **A/Prof Forbes McGain**

Email: **forbes.mcgain@wh.org.au**

Co-supervisors: **Dr Scott McAllister and Catherine O'Shea**

Location: **The University of Melbourne and Western Health**

Aims:

1. To build a Life Cycle Inventory (LCI= a library) of materials commonly used in the operating room and intensive care; and
2. To assist in measuring energy use in the ICU/operating theatres. With such data thereafter will be systematic series of healthcare life cycle analyses.

Methods:

We will examine the operating room and ICU equipment procurement lists of Western Health. We will then locate relevant equipment (e.g. syringes, fluid bags, arterial lines, etc.), and then discover the composition, mass, and place of manufacture. Composition will be sought from product representatives. You will also undertake spectrographic analyses of such materials at the UniMelb Chemistry Lab (training will occur). Pharmaceutical data will not be examined.

Reducing Single Use PPE in ICU: An environmental sustainability project

Contact: **A/Prof Forbes McGain**

Email: **forbes.mcgain@wh.org.au**

Co-supervisors: **Dr Scott McAllister and Catherine O'Shea**

Location: **The University of Melbourne and Western Health**

There are 3 qualitative studies within this overall study. Ethics has been granted for the project proposal, and it is intended that the Honours Student will be involved in all aspects of the project.

1. Focus groups questionnaire at initiation (time= 0)
2. Staff survey (at t= 0, 12, 24 months)
3. Bedside PPE use (t= 0,3,12, 24 months).

Objectives:

The primary objective will be to reduce single use PPE consumption by 25% in 3 ICUs without significantly affecting (<5% variance before-after) the incidence of multi-resistant bacteria colonisation and 'central line-associated bloodstream infections (CLABSI).

A secondary objective will be to study the barriers and enablers of reducing barrier gown use, to study the scalability, sustainability and carbon impact of safely reducing barrier gown use and explore replacement with reusable gowns and to conduct staff surveys regarding usage before and after intervention.

Participants:

Participants in the study will be all staff who provide clinical care in the ICU. That is, consenting ICU nursing, medical, allied health and support staff at the study ICUs will

Methods:

This is a prospective interventional before and after study to discover whether single use PPE consumption (the use of long-sleeved gowns, aprons and gloves) can be reduced by 25% using an educational intervention, without affecting the incidence of multi-resistant organisms (MROs). McNemer test will be employed to investigate whether the proportion of PPE usage is statistically different before and after the intervention. All tests will be performed at a 5% level of significance.

Effects of cardiopulmonary bypass on cellular immune function: a prospective, observational study

Contact: **A/Prof Lachlan Miles**

Email: **lachlan.miles@unimelb.edu.au**

Co-supervisors: **Dr Rachel Peiris and Prof Yugeesh Lankadeva**

Location: **Austin Health and The Florey Institute of Neuroscience and Mental Health**

Infections acquired in hospital after surgery are major complications which slow recovery and increase the risk of death. This risk is particularly pronounced after surgery on the heart: hospital-acquired infections cause one in five deaths after these procedures and increase the risk of being readmitted to hospital after surgery 6-fold. It is not surprising, therefore, that patients who have had heart surgery and the doctors who care for them believe that preventing infections after these procedures is a top research priority. Paradoxically, it is suspected, but not proven, that the inflammatory response to these lifesaving procedures impairs immune function, predisposing patients to postoperative infection.

In this project, you will work with cardiac anaesthetists at Austin Health and scientists at The Florey Institute of Neuroscience and Mental Health to determine how cardiac surgery affects the function of white blood cells. The project will be quite intensive, requiring both presence in the cardiac operating theatres at the Austin Hospital, and benchtop analyses at The Florey Institute. The project is a component of the MRFF-funded MEGA-HEART program, which aims to test novel treatments for brain, kidney and immune dysfunction after cardiac surgery.

Falls within the Emergency Department: A systematic Review and Meta-Analysis

Contact: **Dr Abdi Osman**

Email: **Abdi.osman@austin.org.au**

Co-supervisors: **Prof George Braitberg**

Location: **Emergency Department**, **Austin Hospital**

You will conduct a systematic review and meta-analysis on Incidence, Risk Factors, and Outcomes of Patient Falls occurring within the Emergency Departments to estimate incidence rate of patient falls, identify and quantify patient-related, environmental, and organizational risk factors associated with the fall and assess the clinical outcomes associated with falls (e.g., injury rates, length of stay, mortality).

Safewards evaluation in the Emergency Department. A cross-sectional study

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Contact: **Dr Abdi Osman**

Email: **Abdi.osman@austin.org.au**

Co-supervisors: **Prof George Braitberg**

Location: **Emergency Department**, **Austin Hospital**

To investigate the attitudes and perspectives of the staff in the Emergency Department on the Safewards intervention. The study will explore the staff's utilisation of Safewards in the ED and if they feel it has provided them with the appropriate tools and techniques to de-escalate patients and visitors that show behaviours of concern.

You will be listed as an investigator on the project and will participate in data collection (qualitative) and analysis.

Mapping Clinical Outcome Data onto Health Utilities for Economic Evaluations

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Contact: **Karen Trapani**

Email: **Karen.Trapani@petermac.org**

Co-supervisor: **Professor Gang Chen**

Location: **Centre for Health Policy's Cancer Health Services Research Unit, Peter MacCallum Cancer Centre**

The study will be hosted by the Centre for Health Policy's Cancer Health Services Research Unit in partnership with Peter MacCallum Cancer Centre. You will be embedded at the Victorian Comprehensive Cancer Centre, working alongside health economists, and peri-operative clinicians, and gaining clinical insight into recovery assessment. We anticipate that this would be a project completed over a 6-month period but can discuss with candidates according to their course requirements.

Abstract:

Health-related quality-of-life (HRQoL) tools such as the EQ-5D translate patients' self-reported health into utility index (anchored on a 0-1 death-full health quality-adjusted life year (QALY) scale). Real-world datasets rarely contain such measures, making economic evaluation harder.

This project will test whether the routinely collected Post-operative Quality of Recovery Scale (PostopQRS) can be mapped to EQ-5D utilities. PostopQRS captures multi-domain recovery after surgery from patient and clinician perspectives, yet its composite scores cannot directly produce QALYs. A reliable mapping would let analysts value outcomes whenever only PostopQRS is available.

Additional information:

Work will proceed in two phases:

1. Phase 1: protocol development for mapping analysis will be drafted, detailing candidate statistical models, covariates/predictors, goodness-of-fit criteria, and validation analyses to assist the selection of optimal mapping functions.
2. Phase 2: develop mapping functions from PostopQRS onto EQ-5D using existing datasets. In this phase, both direct and indirect mapping approaches will be considered. The indirect mapping approach involves first predict the responses to each of the EQ-5D dimension before applying a country-specific value set to estimate the overall health utilities. The direct mapping approach focuses on predicting health utilities directly. The preliminary analyses will inform the feasibility to conduct direct and/or indirect mapping in this study sample.

Applicants should have demonstrated skills in statistical programming and data analysis and an interest in applied health economics.

Impact of e-cigarette legislation on poisonings reported to the Victorian Poisons Centre

Contact: **Prof Anselm Wong**

Email: **anselm.wong@austin.org.au**

Co-supervisor: **A/Prof Shaun Greene**

Location: **Austin Hospital, Victorian Poisons Centre, Toxicology Unit and Department of Emergency Medicine**

Recent legislation in 2024 has aimed to restrict sales of e-cigarettes to pharmacy, including pharmacy only sales and age restrictions. Previous legislation had minimal effect on the number of poisonings reported to the Victorian Poisons Centre. This project aims to evaluate whether the new legislation has managed to curb the number of poisonings.

This will be a retrospective review undertaken in conjunction with the Victorian Poisons Centre. You will learn everything from the start to finish -performing the research with specialists in the field. Our research team has successfully mentored previous students through to obtaining their own first authored publications. Ethics approval has already been obtained for the project.

Interventions in Cancer Pain: Retrospective study

Contact: **Dr Jamie Young**

Email: **jamie.young@petermac.org**

Co-supervisor: **Ms Ciara Power**

Location: **Peter MacCallum Cancer Hospital**

Interventions in cancer pain are commonly performed but there are unknows regarding repeat procedures and the type of procedure that is helpful. This project will be a retrospective study looking at a database that focuses on pain interventions done for cancer pain. The hypothesis is that cancer pain interventions are helpful, improve function and reduce polypharmacy.