



THE UNIVERSITY OF
MELBOURNE

Critical Care Honours Program 2024

Department of Critical Care

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.

DoCC was established in January 2021 and in 2023 we are very excited to be offering a dedicated critical care honours specialisation for the second time. The DoCC Honours Program is designed to provide research projects directly relevant to acute human disease and treatment 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-focussed 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
Chair of Anaesthesia
Melbourne Medical School,
The University of Melbourne

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.



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

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, delirium and perioperative risk through to toxicology, substance abuse and recreational drug related behaviour.

Meet some of our supervisors



Associate Professor Kimberley Haines (PhD, BHSc (Physiotherapy)) is the Physiotherapy Research Lead and Critical Care Physiotherapist at Western Health and Clinical Associate Professor, Department of Critical Care.

Her research has largely focused on recovery following critical illness – to measure, predict, and improve patient and caregiver outcomes. More recently Associate Professor Haines has led some of the first co-designed studies in critical care - a co-designed critical care recovery program that is currently being testing via a virtual platform.

She has also led large, international qualitative studies for the Society of Critical Care Medicine evaluating the implementation of ICU recovery programs, and describing patient and caregiver experiences of ICU survivorship.

Associate Professor Haines has supervisory experience (including in medicine), and currently supervises 2 PhD and 2 Masters students, and several clinician-researchers.



Dr Julia Dubowitz (PhD, FANZCA, MBBS) is a clinical and research anaesthetist with an interest in perioperative medicine and oncologic anaesthesia. Julia completed her fellowship training at the Peter MacCallum Cancer Centre, where she currently works as a specialist anaesthetist and Clinical Lead for Research within the Department of Anaesthesia, Perioperative and Pain Medicine.

She is a principal and national investigator on several clinical trials, and has published over ten peer-review publications. Dr Dubowitz have received numerous research grants, and supervises junior doctors undertaking research projects in clinical anaesthesia.

Julia's primary focus is providing high-quality, evidence-based care to her patients, and supporting patients through their cancer surgery journey. Julia regularly participates in continuing professional development activities through the Australia and New Zealand College of Anaesthetists.



Dr Yasmine Ali Abdelhamid (PhD, FRACP, FCICM, MBBS) is the Academic Coordinator of the Honours program, a Specialist Intensivist at The Royal Melbourne Hospital and Honorary Senior Clinical Fellow at the Department of Critical Care, University of Melbourne.

Dr Ali Abdelhamid's research interests include glycaemia, nutrition and metabolism in critical illness; muscle physiology and critical illness weakness; reducing morbidity after traumatic brain injury and multitrauma; and optimising follow-up care and long-term outcomes in patients following critical illness. She has specific expertise in complex physiological studies of critical illness, clinical trial design, and long-term functional outcome assessment in survivors of critical illness. She has experience in supervising Honours students, as well as medical students undertaking research projects.

Dr Ali Abdelhamid's research program receives support from research nurses, a research scientist and study manager with expertise in electronic medical records – who will all be able to assist the successful applicant/s.

Projects



Phoxyllium as a phosphate sparing solution in high volume haemofiltration in fulminant hepatic failure

CONTACT: Dr Neil Glassford

EMAIL: neil.glassford3@austin.org.au

CO-SUPERVISORS: Dr Caleb Fisher, Professor Rinaldo Bellomo, Professor Anne-Louise Ponsonby

LOCATION: Department of Intensive Care, Austin Hospital

The safety and efficacy of using phosphate-containing solutions during high volume renal replacement therapy in critically ill patients with fulminant hepatic failure has not yet been established. Our project will compare the demographic and biochemical characteristics of patients receiving phosphate-containing renal replacement solutions with those from a historical control cohort who did not and explore differences in their outcomes. We will also perform a scoping literature review on the incidence and management of hypophosphataemia in patients with fulminant hepatic failure. Ethics approval will be in place prior to commencement.

Based in the Austin Hospital Department of Intensive Care with weekly supervisor contact, potential for multiple publications, potential for clinical exposure, potential to be involved in data collection for other unit projects.

The immune signature of sepsis

CONTACT: **Dr Laura Cook**

EMAIL: l.cook@unimelb.edu.au

CO-SUPERVISORS: **Associate Professor Yugeesh Lankadeva, Dr Mark Plummer**

LOCATION: **Department of Critical Care, Peter Doherty Institute for Infection and Immunity**

There is an urgent need for treatments of sepsis, which is a dysregulated immune response to infection causing one in five deaths globally. Although this burden is highest in low-income countries, over 10% of Australian Intensive Care Unit (ICU) admissions are due to sepsis, with ~25% of these patients dying in hospital. Currently, there are no therapies to reverse sepsis-induced organ failure. Phase 1 clinical trials are now testing the use of mega dose sodium ascorbate (a formulation of Vitamin C) to treat sepsis.

This project will use blood samples from Phase 1 human clinical trials and blood and tissue samples from large animal studies of sepsis. We will perform detailed immune phenotype analysis and functional cellular assays using flow cytometry as our main research tool to investigate how the immune signature of sepsis changes over time in ICU and with treatment. This will help us understand the immunological signature of sepsis and identify patients most likely to benefit from treatment.

The lived experience of socially isolated ICU survivors

CONTACT: Associate Professor Kimberly Haines

EMAIL: kimberley.haines@wh.org.au

CO-SUPERVISORS: Dr Yasmine Ali Abdelhamid, Ms Nina Leggett

LOCATION: Department of Critical Care, Parkville and Western Health

Intensive Care Unit (ICU) survivors can be at risk for social isolation and loneliness as they transition back to the community due to changed social supports, and a lack of understanding from friends and family. We will complete a study of 20 ICU survivors with known risk factors for social isolation and loneliness such as older age (>65 years), living alone and lower socioeconomic health status. Participants will be recruited from two hospitals with diverse catchment areas (Western Health and Melbourne Health). The patients will participate in a semi-structured interview. A semi-structured interview guide will be developed to explore the participants' experiences of social isolation and loneliness across their critical illness recovery, how this has impacted on their ability to access healthcare post-hospital discharge, and to specifically elicit their ideas and solutions for how health systems could detect and mitigate social isolation and loneliness.

The Honours student will have a role in recruiting the patients, designing the interview, interviewing the patients and analysing the data. The student will work with a supportive multidisciplinary team of researchers who will support the student to gain skills in study design, data analysis and working with patients.

Patients' preferred mode of follow-up after critical illness: a prospective study

CONTACT: Dr Matthew Maiden

EMAIL: mmaiden@unimelb.edu.au

CO-SUPERVISORS: Associate Professor Kimberley Haines, Dr Yasmine Ali Abdelhamid

LOCATION: Royal Melbourne Hospital

The purpose of this study is to investigate the current experience of critical care survivors and their caregivers, as they move through the transitions of care, from ICU to reintegrating with their primary care provider.

This highly novel sub-study will investigate survivors access to, and satisfaction with primary care providers using a validated outcome measure - the General Practice Assessment Question.

Thirty-five participants will be recruited from three health services, and from varied areas of socioeconomic advantage and disadvantage as defined by the Australian Bureau of Statistics. Data will be collected via telephone interview. The student will assist with recruitment, data collection, data management and analysis, and manuscript preparation. Ethics approval is in place for this larger project of work and an ethics amendment for this sub-study will be sought imminently.

Does sampling blood through antimicrobial coated cannulas reduce the diagnosis of bacteraemia?

CONTACT: Dr Matthew Maiden

EMAIL: mmaiden@unimelb.edu.au

CO-SUPERVISOR: TBC

LOCATION: Microbiology Lab, Royal Melbourne Hospital

Blood is taken for microbial culture in patients with clinical features of sepsis. In patients managed in an intensive care unit (ICU), blood is often sampled via arterial or venous cannula. Some of these cannula are impregnated with antimicrobial agents to reduce line-related infections. It is not known if taking blood through these cannula reduce the detection of bacteraemia.

This clinical and laboratory-based project will determine i) the current practice of blood sampling for cultures, and ii) whether there is an in-vitro difference in cultures when blood is sampled through an antimicrobial impregnated cannula.

The student will be involved with mixed mode study design, will conduct a retrospective clinical audit, and undertake a laboratory-based microbiological study.

Implementing routine conversation with a critically ill patient's general practitioner: a before and after study

CONTACT: Dr Matthew Maiden

EMAIL: mmaiden@unimelb.edu.au

CO-SUPERVISORS: Associate Professor Kimberley Haines, Dr Yasmine Ali Abdelhamid

LOCATION: Royal Melbourne Hospital

Integration between hospitals and community-based health care is known to be a problem. For patients managed in the intensive care unit, it is rare for the general practitioner (GP) to be contacted. This may be a missed opportunity to incorporate insights and advice of the medical practitioner who is likely to know the patient best. A conversation with the patient's GP may help with goal of care conversations, treatment planning, support for the patient's family, and healthcare after hospital discharge. This project seeks to determine the effect of routinely contacting the GP of a critically ill patient. We hypothesise that this relatively simple intervention will improve healthcare integration, efficiency, and provide important benefits to patients.

The Honours student will co-design this health system improvement project, be involved in data collection, and will lead project reporting.

Realtime prediction of postoperative complications after major cancer surgery

CONTACT: Dr Julia Dubowitz

EMAIL: julia.dubowitz@unimelb.edu.au

CO-SUPERVISORS: Professor Bernhard Riedel, Dr Hilmy Ismail

**LOCATION: Department of Anaesthesia, Perioperative and Pain Medicine,
Peter MacCallum Cancer Centre**

Postoperative complications occur in up to 25% of surgeries. In cancer patients, postoperative complications can delay or even prevent their access to adjuvant oncologic therapy, a key driver of long-term cancer survival. Certain patients are more prone to postoperative complications and identifying the “phenotype” of this vulnerable cohort will enable early intervention with the objective of reducing postoperative complications. Using patient clinical data, this project aims to validate a machine learning algorithm to predict postoperative complications in real time, throughout the patient’s early postoperative period.

In a cohort of patients presenting for major intra-abdominal cancer surgery, we will examine the association between clinical biomarkers (FBE, Cr, CRP, Albumin etc.) and postoperative complications to test and validate a real time risk prediction algorithm.

Multicentre delirium period prevalence study in ICU

CONTACT: Ms Melissa Ankravs

EMAIL: Melissa.Ankravs@mh.org.au

CO-SUPERVISOR: Associate Professor Adam Deane

LOCATION: Royal Melbourne Hospital

We previously published a multicentre point prevalence study of delirium assessment and management in patients admitted to Australian and New Zealand intensive care units (44 sites/627 patients on a single day). The breadth of this point prevalence data will now be complemented by granular epidemiological data obtained over 90 days from three ICUs in our period prevalence study.

For the period prevalence study, we will explore medication management and dosing in greater detail (of clonidine, dexmedetomidine, haloperidol, olanzapine, quetiapine and risperidone) and we will also obtain information regarding unstructured assessment of delirium status by bedside nursing staff (in addition to the data points collected in the point prevalence study). This information will be used to guide local improvements in delirium assessment, recognition, and management.

The Honours student will be supported by a multi-disciplinary team in the Intensive Care Unit and will be involved with data collection and data entry for the study.

Review of Victorian Medical Assistance Team (VMAT) disaster response capability

CONTACT: Associate Professor Peter Archer

EMAIL: peter.archer@unimelb.edu.au

CO-SUPERVISORS: Professor George Braitberg

LOCATION: Department of Critical Care, Parkville and Royal Childrens Hospital

Climate change impacts and geopolitical challenges, coupled with ongoing stress on prehospital and health systems, require Australian Emergency Medical Teams to be appropriately trained and prepared for disaster response as part of National, State and Territory disaster management capabilities.

At a global level, the Global Emergency Medical Team (EMT) initiative has emphasised the role of national response capabilities in effective and timely disaster management and the importance of applying standards, credentialing, and preparedness in their maintenance.

Victorian Medical Assistance teams, based at 16 hospitals since 2006 have been supported with medical kits to maintain capability. Following the 2019-20 bushfires, COVID-19 pandemic and 2022-23 floods, it is timely to review readiness and capacity for response. This review will encompass an assessment of adherence to global and Australian EMT standards, the availability of supplies, and the training of personnel.

The Honours student will be supported by a multi-disciplinary team in the Department of Critical Care. The research methodology will include a systematic review of the health disaster management framework in Victoria, a literature review of global Emergency Medical Team (EMT) standards and the development of a survey to gather data from key stakeholders.

Epidemiology and outcomes from Acute Respiratory Distress Syndrome (ARDS)

CONTACT: Associate Professor Adam Deane

EMAIL: adam.deane@unimelb.edu.au

CO-SUPERVISORS: Dr Yasmine Ali Abdelhamid, Dr Matthew Maiden

LOCATION: Royal Melbourne Hospital

Acute Respiratory Distress Syndrome (ARDS) is a condition that occurs when the lung tissue becomes very inflamed such that the lungs are then unable to do their normal function. Patients suffering from this need to receive artificial ventilation from a breathing machine. In this retrospective observational study, the Honours student will evaluate how frequent this condition is, risk factors associated with developing and outcomes following ARDS – with a specific focus on whether the amount of ‘stretch’ in the lungs is protective.

This project would suit an Honours student interested in going onto a clinical course (medicine or physiotherapy) or further scientific research (in respiratory physiology).

Evaluation of novel sleep monitoring technology in the Intensive Care Unit

CONTACT: Dr Laurie Showler

EMAIL: laurieshowler@doctors.org.uk

CO-SUPERVISOR: Associate Professor Adam Deane

LOCATION: Royal Melbourne Hospital Intensive Care Unit

Disrupted sleep during critical illness is common and associated with adverse outcomes, however quantifying this in the critical care environment has many barriers.

This study will assess the accuracy of a novel, wearable device to measure sleep against the “gold-standard” technique of polysomnography in 30 critically ill patients being treated in the Intensive Care Unit.

The honours student will work within a supportive multi-disciplinary team to recruit patients, use the device, and collect and analyse data in the Intensive Care Unit at The Royal Melbourne Hospital.

For more information:

<https://medicine.unimelb.edu.au/school-structure/critcare>

medicine.unimelb.edu.au/school-structure/critcare/study/coursework-degrees/honours

study.unimelb.edu.au/find/courses/honours/bachelor-of-biomedicine-degree-with-honours