



THE UNIVERSITY OF
MELBOURNE

Critical Care
Honours 2027

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.



Associate Professor Yasmine Ali Abdelhamid
Honours Coordinator, Department of Critical Care
Specialist Intensivist, Royal Melbourne Hospital

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.

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

Meet some of our supervisors



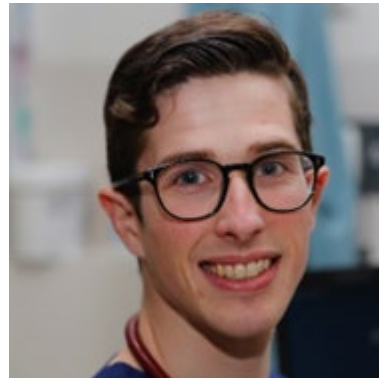
Dr Meg Allen

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.



A/Prof Jamie Young

Associate Prof Jamie Young is an academic clinician working as a pain specialist working in acute, chronic and cancer pain. He is currently the clinical lead for pain management at the Peter MacCallum Cancer Centre and has a long history with research including completing a PhD in non-pharmacological pain in multiple sclerosis and cancer pain research at the Peter MacCallum cancer centre ranging from systematic reviews to prospective trials. He also teaches medical students in professional practice and pain management trainees and is an examiner for the pain specialist exams.



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.

2027 Honours projects

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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: **Prof Yugeesh Lankadeva**

Location: **Austin 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.

Longitudinal study of taxane-induced peripheral neuropathy: a 10-year follow-up study

Contact: **A/Prof Jamie Young**

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

Co-supervisors: **Dr Ciara Power**

Location: **Peter MacCallum Cancer Centre**

This project investigates the long-term persistence of Chemotherapy-Induced Peripheral Neuropathy (CIPN) in patients treated with taxane-based regimens. While acute symptoms are well-documented, there is a significant gap in our understanding of the prevalence of chronic neuropathic pain many years after treatment.

This will be a cohort study, and the role of the student will be to call patients previously enrolled in a prevalence study and to collect data regarding the prevalence of pain and pain management strategies.

SENTINEL Study: Australia and New Zealand

Contact: **A/Prof Elliot Long**

Email: **longe@unimelb.edu.au**

Co-supervisors: **Prof Franz Babl, Dr Louise Shaw**

Location: **Royal Children's Hospital**

Sepsis affects 25.2 million children per year and causes 3.4 million deaths, with an annual cost of hospitalisation in the United States (US) of \$7.3 billion. Despite being common, severe, and expensive, therapies and outcomes from sepsis have not significantly changed in the last 20 years. Variable case-definition, lack of a gold standard for diagnosis, and broad spectrum of disease hamper efforts to evaluate therapies that may improve sepsis outcomes.

The Honours student will work within a supportive multidisciplinary team to analyse a large bi-national dataset of children presenting with suspected sepsis to emergency departments across Australia and New Zealand.

Projects will focus on clinically meaningful questions such as risk stratification, treatment patterns (e.g. fluids, vasoactives), and associations with outcomes. The student will gain experience in real-world clinical data analysis, supported by expert statistical input, and participate in regular research meetings, manuscript development, and paediatric emergency department clinical exposure.

This honours project will contribute to the larger SENTINEL Study (Sepsis Epidemiology in Australian and New Zealand Children landscape analysis), as part of the paediatric research PREDICT Network.

<https://www.predict.org.au/projects/sentinel-study/>

SENTINEL Study: International

Contact: **A/Prof Elliot Long**

Email: **longe@unimelb.edu.au**

Co-supervisors: **Prof Franz Bahl, Dr Louise Shaw**

Location: **Royal Children's Hospital**

Sepsis affects 25.2 million children per year and causes 3.4 million deaths, with an annual cost of hospitalisation in the United States (US) of \$7.3 billion. Despite being common, severe, and expensive, therapies and outcomes from sepsis have not significantly changed in the last 20 years. Variable case-definition, lack of a gold standard for diagnosis, and broad spectrum of disease hamper efforts to evaluate therapies that may improve sepsis outcomes.

The Honours student will contribute to the analysis of a unique international dataset of paediatric sepsis, including sites from 34 countries, with a strong representation from low- and middle-income settings. Projects will explore global variation in sepsis epidemiology, management, and outcomes, with opportunities to undertake comparative analyses between high- and low-resource contexts. The student will work with an internationally connected research team, with exposure to global health research, cross-cultural collaboration, and advanced statistical and epidemiological methods.

This honours project will contribute to the larger SENTINEL International Study (Sepsis Epidemiology in Paediatric Acute Care), as part of the paediatric research PREDICT Network.

<https://www.mcri.edu.au/research/projects/sentinel-international>

PRoMPT BOLUS: an international, multi-centre, randomised controlled trial

Contact: **A/Prof Elliot Long**

Email: **longe@unimelb.edu.au**

Co-supervisors: **Prof Franz Babl, Dr Louise Shaw**

Location: **Royal Children's Hospital**

The Honours student will undertake secondary analyses of data from a landmark multi-country randomised controlled trial (RCT) evaluating fluid resuscitation strategies in paediatric sepsis. Potential projects include exploring treatment heterogeneity, subgroup effects, and secondary outcomes to inform clinical practice and future trials. The student will gain experience working with clinical trial data, supported by senior trialists and statisticians, and will contribute to high-impact manuscript development.

This honours project will contribute to the larger PRoMPT-BOLUS Trial: PRagMatic Pediatric Trial of Balanced versus NOrmal Saline FIUid in Sepsis. The PRoMPT-BOLUS Trial is designed to test the relative effectiveness and safety of Balanced Fluids versus 0.9% Saline fluid resuscitation in children with suspected septic shock and was recently published in the New England Journal of Medicine.

<https://www.predict.org.au/projects/prompt-bolus-study/>

Living Evidence for PASSPORT Adaptive Platform Trial

Contact: **A/Prof Elliot Long**

Email: **longe@unimelb.edu.au**

Co-supervisors: **Prof Franz Babl, Dr Louise Shaw**

Location: **Royal Children's Hospital**

Every year, there are around 25.2 million children diagnosed with paediatric sepsis, resulting in 3.4 million deaths worldwide. The World Health Organization (WHO) has identified paediatric sepsis as a global health priority due to the infection's severity and the cost to hospitals. Despite significant efforts to improve outcomes for paediatric sepsis, randomised controlled trials (RCTs) have been unable to answer fundamental questions in children with sepsis in an effective and timely way.

PASSPORT is an adaptive platform trial designed to evaluate multiple interventions for paediatric sepsis, allowing researchers to quickly adjust treatments based in response to collected data. We believe this approach will help us find effective treatments quicker and improve global outcomes for critically ill children with sepsis.

The Honours student will work with the PASSPORT research team and collaborators from the Australian Living Evidence Collaboration to develop and maintain living systematic reviews that directly inform an adaptive platform trial in paediatric sepsis. This will involve evidence synthesis, critical appraisal, and integration of emerging data into trial design and interpretation. The student will gain skills in systematic reviewing, guideline development, and knowledge translation, with exposure to national and international leaders in evidence-based medicine.

<https://www.predict.org.au/projects/passport/>

Patient-consumer experiences of post-surgical pain management and co-design of post-discharge resources

Contact: **Dr Megan Allen**

Email: megan.allen@mh.org.au

Co-supervisors: **Dr Paul Emery**

Location: **Department of Anaesthesia and Pain Management, 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. Most measures so far have focused on the time of hospital admission but less is known about how best to support patients to manage their opioid analgesia following hospital discharge.

This project is part of a larger program of work and will aim to describe the:

1. Current discharge guidance provided to patient consumers on pain and opioid analgesia, and their perceptions of its modality and utility
2. Patient consumer suggested optimisations of discharge pain and opioid analgesia guidance

To achieve these aims, we will interview patient consumers who have undergone spine surgery with the Neurosurgical unit or major joint arthroplasty (hip, knee, or shoulder) with the Orthopaedic Surgery unit at RMH. These patients will be targeted because they commonly require opioid analgesia and undergo both planned and unplanned surgery. Furthermore, these patients are, by default, managed on standardised analgesia pathways endorsed by the Acute Pain Service at RMH, with individualised pain medicine input only if required. Therefore, they have a lived experience of the spectrum of perioperative opioid management within the RMH perioperative opioid stewardship framework. In addition to describing their current pain management experiences, their input on perioperative resources will be specifically sought to optimise these for future patient-consumers. The data analysis will be primarily qualitative.

The student role will be embedded within the Department of Anaesthesia at RMH. This allows for clinical exposure, if desired, in addition to the research commitment. The key attributes for the student are curiosity, independence and the ability to manage their time effectively. They will need to be confident in conducting patient recruitment and interviews independently once they are trained to do so.

Implementation of the findings of the SNaPP randomised controlled trial: Sugammadex, neostigmine and postoperative pulmonary complications

Contact: **Dr Megan Allen**

Email: megan.allen@mh.org.au

Co-supervisors: **Professor Kate Leslie**

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

The completion of the SNaPP randomised controlled trial: Sugammadex, neostigmine and postoperative pulmonary complications marks a significant achievement in advancing the state of knowledge about providing safe anaesthesia care internationally. The primary outcome was a composite of new pulmonary complication or death: both of great importance to patients and clinicians. The trial found that sugammadex was superior to neostigmine with respect to this composite outcome but with a number needed to treat of almost 50. Therefore, economic and health service factors will be important in adoption of trial findings into clinical practice. including perceived barriers and facilitators to practice change.

We will utilise an explanatory sequential mixed-methods study design to describe existing neuromuscular blockade reversal practice amongst ANZCA fellows at the completion of the SNaPP Study, their awareness of the trial findings, and how this relates to their practice, including location and profile. This project will involve collecting both quantitative (survey) and qualitative (survey and semi-structured interviews) data. The findings will be used to devise targeted implementation strategies to guide new knowledge into clinical practice. These strategies will be co-designed by the key stakeholders, in this case anaesthetists.

The student role will be embedded within the Department of Anaesthesia at RMH. This allows for clinical exposure, if desired, in addition to the research commitment. The key attributes for the student are curiosity, independence and the ability to manage their time effectively. They will need to be confident in conducting participant recruitment and interviews independently once they are trained. This project would suit students with flexible schedules, as it is vital that they can conduct the interviews at times that suit study participants.

Evaluating the efficacy of the Apple Watch and Somfit (EEG Patch) in monitoring sleep & stages of sleep

Contact: **Dr Marcus Young**

Email: marcus.young@unimelb.edu.au

Co-supervisors: **Tom Churchwood and A/Prof Natasha Holmes**

Location: **Austin Health**

Sleep disruption in critically ill patients has been reported to be associated with an increased risk of developing delirium. Delirium in the critically ill is a complex syndrome that presents as acute, fluctuating, disturbances in behavior and neurocognitive function. Further, delirium is associated with poor outcomes in this population. The reported association between disrupted sleep and delirium remain difficult to study in critically ill patients. In part, this is because of the complexity of measuring the quality and quantity of sleep in an environment where clinical workload is high and undertaking laboratory grade sleep studies is technically and clinically challenging. The Sleep Smart study will be the first in a research program that will consider the possible association between sleep and delirium in critically ill patients.

Wearable devices are increasingly being used to aid diagnosis in clinical medicine. Given the challenges in performing sleep studies in critically ill patients, we propose to perform a validation study to evaluate the sleep monitoring precision of two wearable devices: the Apple Watch 11 and Compumedics Somfit.

This study will be conducted within the sleep laboratory at Austin Health. The wearable devices will be studied by applying them to patients undergoing sleep studies in the laboratory. Simultaneous application will enable a comparison of the data reported by the wearables with data reported by the “gold standard” laboratory sleep monitors.

The Sleep Smart study will require students to undertake a literature review of current research in this area, support the sleep study program by assisting sleep laboratory staff to enable the wearables for each patient during the investigation, and collate and analyse the resultant data and write a report.

Two phase audit of compliance with emergency laparotomy quality indicators

Contact: **Professor David Story**

Email: **dastory@unimelb.edu.au**

Co-supervisors: **Dr David Bramley**

Location: **Austin Health and Department of Critical Care Parkville campus**

Emergency laparotomy (abdominal surgery) is common and carries significant risk to patients for complications and mortality after surgery. Although Australia has very good surgical outcomes, we can still do better. To further reduce complications and mortality after emergency laparotomy, the Australian Commission on Safety and Quality in Health Care has released a Clinical Standard. Within the Standard are 17 quality indicators that aim to: "...support healthcare services to monitor how well they are implementing the care recommended in the Clinical Care Standard."

Example standards include:

- Indicator 1a: Proportion of patients who had an emergency laparotomy whose blood lactate levels were available at first surgical review.
- Indicator 3b: Proportion of patients aged 65 years or older who had an emergency laparotomy, whose frailty was assessed using a validated tool and documented before surgery.
- Indicator 7b: Proportion of patients who had an emergency laparotomy, who had an unplanned admission to critical care from the ward.

This project has two phases with research questions:

- Phase 1: What is the feasibility of collecting the quality indicators from the Austin Hospital electronic medical record?
- Phase 2: What is the compliance with quality indicators for Austin emergency laparotomy patients?

Medical student and junior hospital doctor understanding of biostatistics and results in the medical literature

Contact: **A/Prof Jeffrey Presneill**

Email: **jeffrey.presneill@unimelb.edu.au**

Co-supervisors: **Professor Adam Deane**

Location: **Royal Melbourne Hospital**

Previous international studies have found that medical students and junior hospital doctors lack the knowledge in biostatistics needed to interpret many of the results published in clinical research. This project will involve surveying medical students and junior doctors in Victoria, using an established survey tool, to ascertain their understanding of biostatistics.

The Honours student will work in a supportive multidisciplinary team to conduct surveys, analyse data and present the results. The student will be supported by a supervisory team with excellent expertise in biostatistics, clinical trials and research supervision.

Noise levels in the Intensive Care Unit

Contact: **A/Prof Matthew Maiden**

Email: **mmaiden@unimelb.edu.au**

Co-supervisors: **Professor Adam Deane**

Location: **Royal Melbourne Hospital**

Noise levels in the Intensive Care Unit

Noise is known to impact well-being of patients and staff. For patients, excessive noise can disrupt patient sleep, provoke anxiety, exacerbate discomfort, and contribute to delirium. For staff, excessive noise can complicate communication and may compound the feeling of how 'busy' the ICU is.

This project seeks to determine noise levels through the ICU from a patient and staff perspective. The student will investigate how noise levels could be measured, where and when levels should be measured, and how this may align with patient and staff perception of noise.

Neurological assessment after cardiac arrest

Neurological injury is a profound consequence of cardiac arrest. International guidelines outline an approach to neuroprognostication, but it is not known how universally they are applied.

This project will describe the cohort of patients admitted to ICU after a cardiac arrest and summarise the approach to neuroprognostication. This work is intended to form the basis of a broader project to describe the approach to neuroprognostication in studies published from Australia and New Zealand.

Airway management in severe neck trauma at the Royal Melbourne Hospital

Contact: **Dr Ned Douglas**

Email: ned.douglas@mh.org.au

Co-supervisors: **A/Prof Elyssia Bourke**

Location: **Royal Melbourne Hospital**

Severe neck trauma is an uncommon but potentially life-threatening injury that presents significant challenges for airway management. Although airway management is a critical component of the initial resuscitation of these patients, there is limited high-quality evidence to guide decision-making regarding the optimal timing, technique and location of airway intervention.

This project will describe the epidemiology and management of severe neck trauma at the Royal Melbourne Hospital, a major adult trauma centre. The student will undertake a retrospective observational study using trauma registry and medical record data to characterise airway management practices, including indications for airway intervention, techniques employed (for example, rapid sequence induction, awake techniques or surgical airway), procedural success, complications and patient outcomes. The project may also explore associations between patient and injury characteristics and the need for advanced airway intervention.

This project will provide the student with experience in trauma research, clinical epidemiology, data management and statistical analysis. The findings have the potential to inform local clinical guidelines and contribute to the broader evidence base surrounding airway management in penetrating neck trauma.

The research will suit a highly-motivated and capable students with a strong capacity for self-directed learning and work. The research will be based at the Royal Melbourne Hospital Department of Anaesthesia and Pain Management, and the Emergency Department. It will require at least four days of in-person attendance per week to complete. The supervisors will provide direct supervision, feedback on work and support for academic activities. The student will need to need to be eligible for a honorary research appointment to the RMH (specifically have Australian citizenship, permanent residency or other permit to remain and work in Australia).

Systematic review with meta analysis of Clinical Frailty Scale (CFS) use in Emergency Departments (EDs)

Contact: **Dr Abdi Osman**

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

Co-supervisors: **Professor George Braitberg**

Location: **Austin Health**

The Clinical Frailty Scale (CFS) is increasingly used in Emergency Departments (EDs) to support risk stratification, clinical decision-making, and discharge planning for older adults. However, the strength and consistency of evidence regarding its predictive utility across ED settings remains unclear.

This systematic review with meta-analysis, will synthesize published literature evaluating the use of CFS in ED populations and examine associations with key outcomes, including mortality, hospital admission, length of stay, readmission, and functional decline. The project will provide researchers and research students with experience in evidence synthesis, critical appraisal, and quantitative research methods while addressing a clinically relevant and growing area of ED care.

Complex multi-morbidity or extreme age patients in the Emergency Department (ED) and assessment of the need for a different ED approach: a qualitative study

Contact: **Dr Abdi Osman**

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

Co-supervisors: **Professor George Braitberg**

Location: **Austin Health**

Emergency Departments (EDs) are increasingly caring for patients at extreme age and those with complex multi-morbidity, whose needs often extend beyond the traditional acute-care model. These patients frequently experience prolonged ED stays, higher admission rates, increased healthcare utilisation, and poorer clinical outcomes. However, it remains unclear whether standard ED processes adequately address their unique medical, functional, and social complexities.

The study will utilise qualitative method targeting different ED craft groups examining outcomes, care models, and interventions for older adults with multiple chronic conditions. The project will explore whether alternative or specialized ED approaches improve patient-centred and health-system outcomes. Findings may inform future models of ED care and identify opportunities for service redesign.

Evaluation of the new nursing-led Emergency Department Short Stay Unit (ED SSU) admission pathway: a mixed methods study

Contact: **Dr Abdi Osman**

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

Co-supervisors: **Professor George Braitberg**

Location: **Austin Health**

ED SSU are designed to improve patient flow, reduce unnecessary hospital admissions, and support timely, efficient care. A new nursing-led SSU admission pathway has recently been introduced, but its impact on patient outcomes, staff experiences, and operational performance has not been evaluated.

This mixed methods study will combine quantitative analysis of key service indicators including SSU admissions, length of stay, hospital admission rates, and ED throughput with qualitative exploration of staff perceptions, barriers, and facilitators to pathway implementation. By integrating quantitative and qualitative findings, the study will assess the effectiveness, acceptability, and sustainability of the pathway. Findings will inform local service improvement and contribute to the evidence base on the effectiveness of the model in emergency care.

A case study of the impact of high volume, low-value microbiology testing using Life Cycle Assessment (LCA)

Contact: **Dr Scott McAlister**

Email: **scott.mcalister@unimelb.edu.au**

Co-supervisors: **TBC**

Location: **Royal Melbourne Hospital, Western Health and Department of Critical Care, Parkville**

This project, Life Cycle Assessment (LCA) the impact of high volume, low-value microbiology testing; a Case Study in the Royal Melbourne Hospital, Melbourne, Australia, will take place as flexible learning model between the following locations:

- Department of Critical Care (DoCC) Offices for study and meetings
- Online Supervisor meetings
- Microbiological Laboratories at the Royal Melbourne Hospital / Western Health
- LCA Materials characterisation at the Healthcare Carbon (Living) Lab W301 of the Medical Building (Building 181) on Parkville Campus

Aims

Determine the environmental / economic impact of one high volume, low-value microbiology tests using Life Cycle Assessment (LCA) and Case Study data from the Royal Melbourne Hospital, Melbourne, Australia

Objectives

1. Literature review of microbiological testing from an environmental perspective.
2. Identify high frequency-low impact tests and low freq-high impact tests that could be explored further.
3. Life Cycle Assessment (LCA) methodology to determine the carbon footprint of one or more specific common low-value microbiological test/s
4. Economic modelling based on LCA findings using relevant microbiological testing at the Royal Melbourne Hospital as a Case Study.

Methods

You will undertake a traditional narrative literature review to understand what is currently known about your topic and develop a direction for this study. Together with your Supervisor, you will determine goals and a project scope wherein you can apply principles of Life Cycle Assessment (ISO standards 14040 and 14044) to produce a valuable research-based study that will contribute to knowledge on the impact of microbiological testing in Australia. Your study will explore the value of microbiological testing (generally) and demonstrate specific economic and environmental implications of reducing 'low value care' with the backdrop of the RMH case study data.

Life Cycle Assessment (LCA) of Adult Absorbent Hygiene Products (AHPs)

Contact: **Dr Scott McAlister**

Email: scott.mcalister@unimelb.edu.au

Co-supervisors: **Prof Wendy Bower**

Location: **Royal Melbourne Hospital**

This project involves modelling an LCA to compare environmental impacts of adult absorbent hygiene products, quantifying impacts across key categories and life cycle stages.

Key Research Questions

- Can existing infant LCA methodologies inform adult LCA analysis, and are the conclusions for both types of products similar?
- What are the environmental trade-offs between types of Absorbent Hygiene Products (AHPs) across raw material extraction, manufacturing, use, and end-of-life?
- How do the different types of adult absorbent hygiene products (pads, all in ones, sizes) influence the overall footprint?
- Which impact categories (e.g., global warming potential, water footprint, resource depletion, ecological toxicity) drive the differences?

Methodology

- Define a functional unit (e.g., one AHP-day or one Patient using AHPs for one year) and consistent system boundaries.
- Gather life cycle inventory data for both options from literature, infant AHP LCA reports, industry reports, and databases (e.g., Ecoinvent, OpenLCA).
- Apply impact assessment methods (e.g., impact categories aligned with ISO 14044; consider regional electricity mixes and wastewater treatment assumptions).
- Perform scenario analyses to reflect real-world variations (e.g., regional practices, washing technologies, diaper usage patterns).
- Conduct uncertainty and sensitivity analyses to test robustness.

Project Outcomes

- A transparent LCA evaluating environmental impacts of adult absorbent hygiene products.
- Policy-relevant insights for healthcare facilities, users, and product designers.
- A set of recommendations to reduce environmental footprint in incontinence care products.

Fluid bolus temperature and duration in children after cardiac surgery

Contact: **Dr Ben Gelbart**

Email: **ben.gelbart@rch.org.au**

Co-supervisors: **Warwick Butt**

Location: **Royal Children's Hospital**

Fluid bolus (FB) therapy is frequently administered to children in intensive care after cardiac surgery. The haemodynamic response to FB, in terms of systemic blood pressure, occurs in approximately two-thirds of children and rapid dissipation is common thereafter. Less is known regarding the microvascular response nor its duration. Fluid composition and volume have been subject to investigation however; fluid temperature has not. Whether cold fluid, compared to room temperature, affects the haemodynamic response to fluid bolus therapy is not known. Previous studies have also reported that the preferred duration of FBs is ten minutes or less. Longer duration may prolong the positive haemodynamic effects and reduce the need for subsequent FB. However, this also remains poorly categorised in children.

We will conduct two studies aiming to categorise the effects of temperature and duration on the haemodynamic response to fluid bolus in children after cardiac surgery.