2026 Student Project Handbook

Honours | Master of Public Health | Master by Research | PhD

Course Name: Master by Research (IAS) CRICOS Course Code: 053295G | Course Name: Doctor of Philosophy (IAS) CRICOS Course Code: 053291A CRICOS Provider No. 00300K (NT/VIC) | 03286A (NSW) | RTO Provider No. 0373

Menzies School of Health Research 2026 Student Project Handbook

As one of Australia's leading medical research institutes dedicated to improving the health and wellbeing of Aboriginal and Torres Strait Islander people, and a leader in global and tropical research into life-threatening illnesses, Menzies School of Health Research continues to translate its research into effective partnerships and programs in communities across Australia and the Asia-Pacific region.

With a history of over 40 years of scientific discovery and public health achievements, Menzies continues its endeavour to break the cycle of disease and to reduce health inequities in Australia and the Asia-Pacific region, particularly for disadvantaged populations.

In partnership with Charles Darwin University, Menzies School of Health Research delivers high quality research degrees to PhD, Master by Research and Honours students. Our students are supported and mentored by world-class researchers in their respective research fields.

This booklet contains a list of currently available research projects for students in a range of research areas of Indigenous health, global and tropical health, infectious diseases and child and maternal health. Students studying at Menzies School of Health research are enrolled through Charles Darwin University.

More information about eligibility criteria and how to apply can be found on the CDU website. To find out more about scholarship opportunities and application process please contact: researchdegrees@menzies.edu.au

menzies SCHOOL OF HEALTH RESEARCH

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Health related adaptation of culturally and linguistically diverse populations: challenges and opportunities

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In this era of world citizenship, it is important to document the overall impacts of heat on health and the adaptation practices which are often uniquely lined to cultural practices and the local climate. High-income countries such as the US, Germany, Saudi Arabia, Russia, UK, UAE, France, Canada, and Australia have the highest number of migrant populations in the world. Many of these migrants would be settle in entirely different climate zones. Such culturally and linguistically diverse (CALD) populations will often have different adaptation knowledge and heat health risk perceptions. There is evidence to indicate that people's personal experiences and cultural backgrounds can make them invincible to health-related risks (eg: Elderly Jewish members who survived the holocaust perceived extreme temperatures as no risk to their health; strict dress code for Orthodox Jews/Arab women can affect heat-related health risks). On the other hand, in terms of adaptation knowledge, migrant populations may also possess knowledge of low-cost ways to adapt to hot weather or specific cultural practices that could enable effective adaptation. The potentially sharable adaptation knowledge gained from countries of origin of such CALD communities could disappear during the process of acculturation. Thus, these factors can affect adaptive capacities by either increasing or decreasing vulnerability or resilience to hot weather. This project will explore heat-related adaptive capacity of CALD populations in Australia using a vulnerability-resilience framework.

The student will be part of a multi-disciplinary team of national researchers aiming to document effective adaptation practices and strategies that could be adopted in low-resource settings in Australia.

Supriya Mathew

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CRESTRA

The Menzies-led NHMRC Centre for Research Excellence in Strengthening Health Systems in Remote Australia (CRESTRA) is addressing critical priorities identified by remote health service and policy partners across remote Australia. The CRESTRA research program is generating new knowledge and impacts in four themes:

1. Improving health workforce retention
2. Addressing inequitable funding of primary health care (PHC)
3. Improving service integration and coordination
4. Building remote research capacity and capability

CRESTRA is seeking individuals who are passionate about better health outcomes for Aboriginal and Torres Strait Islander peoples and stronger remote health systems to join the research team as a Master by Research or PhD student. Priority topics for student-led research include: the political economy of PHC financing in remote Australia; improving the capacity and capability of remote health services to design, conduct and engage in impactful research; and supporting Aboriginal and Torres Strait Islander research careers in remote Australia.

Other topics on remote PHC costing classifications and estimation methods and on PHC funding models are available as research projects within the Master of Public Health degree. We welcome discussions with interested applicants on other topics aligned with the CRESTRA themes.

For further information, please contact:

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Alexandra Edelman
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CRESTRA Masters opportunities

The NHMRC Centre of Research Excellence for Strengthening Health Systems in Remote Australia (CRESTRA) is examining how to improve funding for remote primary health care (PHC). PHC is the first point of contact for the entire health system and PHC should be patient centred and community-based providing appropriate and continuous care to a wide range of health services.

Therefore, it is essential that PHC be funded on the basis of health needs rather than on historical expenditure or current service delivery.

Two opportunities exist for Master of Public Health or Master of Health Research students to complete scoping reviews as part of their course on:

1. Costing classifications and estimation methods in PHC; and
2. Funding models applicable to PHC settings

For more information: Please contact the CRESTRA Research Manager, A/Prof Deborah Russell: Deborah.russell@menzies.edu.au

Improving research and evaluation capacity and capability in remote health services

Master by Research | PhD

The NHMRC Centre of Research Excellence for Strengthening Health Systems in Remote Australia (CRESTRA) is examining and implementing strategies to build and sustain remote research capacity and capability. Research addressing locally determined health system priorities, co-designed with end users, is a key pillar of efforts to improve remote and rural health care and reduce health inequities.

Local-level research and evaluation partnerships, responding to community and service provider priorities, enable innovative models of care and evidence-based practice and policy. However, remote- based clinicians, health service administrators and policymakers face persistent barriers to research engagement, with challenges including limited resources and research career pathways, exacerbated by large distances from hubs of learning, workforce shortages, and high workforce turnover.

Strengthening the capacity and capability of remote and rural health services to engage in research will require a better understanding of needs and gaps (relating to staff, skills, mentoring, and career support) and co-developing targeted strategies at the remote service level. Working with multiple remote health service organisations through CRESTRA, the student will map research and evaluation capacity and capability aspirations and resourcing needs, investigate how services are managing their research load, and explore how research investments have led to policy and service delivery impacts. The work will engage with and inform broader efforts in CRESTRA to collaboratively build the capacity and capability of health service (and other key stakeholder) partners to design, conduct, and engage with remote research and evaluation and identify knowledge translation pathways and platforms.

Alexandra Edelman
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Supporting Aboriginal and Torres Strait Islander research Careers in Remote Australia

Master by Research | PhD

The NHMRC Centre of Research Excellence for Strengthening Health Systems in Remote Australia (CRESTRA) is examining and implementing strategies to build and sustain remote research capacity and capability. Aboriginal and Torres Strait Islander people in remote Australia are under-represented in research and academia, yet Indigenous-led research is essential to contribute to Closing the Gap in health outcomes. Ensuring that research to improve Indigenous health includes leadership by Aboriginal and Torres Strait Islander people is critical for ethical research practices, self-determination, and the sovereignty of Indigenous data and knowledge.

CRESTRA aims to improve localised career development and support for Aboriginal and Torres Strait Islander researchers in remote settings, particularly in the Northern Territory. Understanding key enablers and barriers to research career development will help to identify new strategies to enhance research career pathways. Working with researchers in CRESTRA, the candidate will engage collaboratively with Aboriginal and Torres Strait Islander organisations to understand needs, map existing programs, policies, and educational frameworks and examine Aboriginal and Torres Strait Islander research career pathways to inform strategies that strengthen research training and career development in remote settings.

Alexandra Edelman

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The political economy of primary health care financing in remote Australia

Master by Research | PhD

The NHMRC Centre of Research Excellence for Strengthening Health Systems in Remote Australia (CRESTRA) is developing tools and strategies to reduce remote health service funding inequities and their consequences for the health of remote communities and the sustainability of primary health care (PHC) services. Equitable funding models that overcome the 'inverse-care' situation characterising remote health services in Australia (wherein people who are most in need of health care are least likely to receive it) underpin the viability of high quality comprehensive PHC. However, despite ongoing efforts to develop the evidence base and advocate for greater equity, a substantial funding deficit persists.

A key component of CRESTRA's work involves determining the quantum of equitable funding required by remote PHC services and efficient mechanisms to allocate funds. However, there are limits to the extent to which exclusively technical strategies can transform financing to support efficient and equitable PHC. A political economy approach is needed to examine evolving social, political and economic conditions that act as enablers of and barriers to effective PHC financing reform.

Working with CRESTRA partners, the candidate will examine the political economy of PHC financing in remote Australia. Using social science methodologies, the project will consider steps of the policy cycle to examine how political, social and economic conditions shape financing for remote PHC. The candidates work will inform critical knowledge translation strategies in CRESTRA that aim to improve the integration of research findings into policymaking processes in the Northern Territory and nationwide, enabled by national and international research and policy networks.

Alexandra Edelman

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Nature-based interventions for climate and health

Master of Public Health | Honours | Master by Research | PhD

Nature-based solutions offer a promising approach to improving health and wellbeing while contributing to climate change adaptation and mitigation. With urbanisation, environmental degradation, and modern life challenges limiting access to nature, nature-based activities enhance physical, mental, and social health. Practices such as nature prescriptions, where health practitioners recommend nature-based experiences for managing chronic diseases, have shown benefits such as improved physical activity, blood pressure, social connections, and mental wellbeing. However, the environmental co-benefits of these interventions, particularly in mitigating climate change in remote Australia, remain under-explored. By integrating traditional Indigenous knowledge and promoting community-led nature-based solutions, we can reduce its carbon footprint and support local climate adaptations and mitigation plans. This approach aligns with Australia's net- zero commitments, potentially reducing the demand for carbon-intensive adaptation. This project aims to synthesise global evidence and work with remote community residents to co-design nature- based solutions to climate change.

Dr Manoj Bhatta

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The future of the health sector in remote Australia under a changing climate

Master of Public Health | Honours | Master by Research | PhD

The impacts of climate change have significant implications for public health and healthcare delivery in Australia, particularly in remote Australia. Remote Australia is home to a large proportion of First Nations people, who also experience a high burden of disease. Service delivery in remote Australia needs to account for varying health service demands of remote populations and also changing demands caused by climatic changes. Health workforce recruitment and retention is a huge issue in very remote communities, with studies showing more than 150% turnover among the health workforce in very remote communities. Thus, there is an increased reliance on short-term or 'fly-in, fly-out'/'drive-in, drive-out' health workforce over the last two decades in remote Australia.

Considering the potential effects climate change will have on the remote Australian population, health workforce and health service delivery, this project will explore climate health impacts and adaptation responses for remote Australians, with an overall objective to explore how the health sector, particularly the health workforce, will have to prepare for a changing climate.

The student will play an integral part in this program of work funded by the Wellcome Trust and MRFF by using mixed methods research to understand the current and potential future impacts of climate change on health service delivery in remote Australia.

The candidate will be encouraged to seek scholarship funding through Charles Darwin University Research Training Program Scholarship Scheme.

Supriya Mathew

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Impact of climate change on the spread of antimicrobial resistance

Master of Public Health

Climate change and antimicrobial resistance (AMR) are two of the top global health challenges identified but the World Health Organisation. There were an estimated 4.95 million deaths globally due to AMR in 2019. Changes in environmental conditions could lead to an increase in the spread of bacterial, viral, parasitic, fungal and vector-borne diseases in humans, animals and plants. There is substantial evidence linking rising temperatures and occurrences of extreme climate events to an increase in bacterial infection. Floods can spread waterborne diseases due to the overflow of contaminated sewage or runoff from livestock. The use of chemical fertilisers also contributes to the contamination of floodwaters during severe flooding events. Droughts can cause malnutrition, weaken immune systems, and increase vulnerability to infections. In summary, the increasing frequency of such extreme events can lead to a rise in infections, which may result in the overuse or misuse of antibiotics. Limited access to health care may also result in people self-medicating with antibiotics, especially in countries where the sale of pharmaceuticals is poorly regulated. Such interlinked challenges of climate change and AMR present a growing threat to global health.

This project will synthesise global evidence on the climate-mediated spread of AMR and explore the evidence using a systems thinking approach.

The successful candidate will be part of a broader citizen science program that aims to improve environmental health surveillance in remote Australia.

Rishu Thakur

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Supporting connection, self-efficacy and wellbeing of First Nations young people living with type 2 diabetes

Master by Research | PhD

Rates of type 2 diabetes amongst young First Nations people are increasing, and diagnosis of this condition is occurring at earlier ages. Current models of care for youth with type 2 diabetes (T2D) in the Northern Territory (NT) and Far North Queensland (FNQ) are primarily medical, with youth managed by the primary health care services within their community, and receiving intermittent visits from diabetes educators and dietitians, and clinical support from paediatricians and/or endocrinologists. Focusing on individual patient education and management is resource and time intensive for overstretched primary care services, and continuity of care is difficult to achieve.

Current practice appears sub-optimal in meeting the needs of young people or improving health outcomes as only 14% of youth achieve recommended glycaemic targets. Our previous work has demonstrated that young First Nations people and their families want, and need, new and innovative strengths- based models of care after a diagnosis of T2D, and increased peer connection and support. we have also reported a high burden of shame, stigma, diabetes distress and isolation in youth across Northern Australia and there is a need to enhance mental health and wellbeing support. these issues are known to be barriers to self- care in youth with T2D.

This project will be part of a project enhancing models of care for young First Nations people with type 2 diabetes across the NNT and FNQ and is situated within the Diabetes across the Lifecourse: Northern Australia Partnership. The project will evaluate a pilot of peer-support and peer-led diabetes education for young people living with T2D, using both qualitative and quantitative methodology. it will also analyse the educational and resource needs of health professionals in supporting the mental health and wellbeing of youth with T2D and evaluate the effect of programs focusing on these needs.

Dr Angela Titmuss

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Iron Infusion in Haemodialysis Study: Intravenous iron polymaltose for Indigenous patients with high ferritin levels on haemodialysis (INFERR); A prospective, open-label, blinded endpoint, randomised controlled trial

Master by Research | PhD

The INFERR study explores the safety and effectiveness of giving intravenous iron to Aboriginal and Torres Strait Islander patients on haemodialysis with anaemia, high ferritin (a marker of both iron levels and inflammation) and low blood levels of iron.

This treatment will potentially benefit the majority of haemodialysis patients in the Northern Territory (NT) who are currently receiving routine iron treatment, but for whom the safety and efficacy of treatment remain poorly defined.

A recent, large scale, multicentre, prospective, open label, blinded endpoint clinical trial from the UK (PIVOTAL) confirmed the safety and efficacy of high dose IV Iron (400mg of iron once a month). This provides the best evidence for standard iron treatment in people on dialysis. Most importantly, there were no differences in adverse effects such as increased risk of infections. However, the exclusion of patients with high ferritin makes the results of this trial difficult to extrapolate to dialysis patients in the NT given that the majority (> 80%) would have a ferritin higher than 700µg/L. This reinforces the need for a clinical trial to assess the safety and efficacy of IV iron in haemodialysis patients within the NT with high ferritin.

This study will generate evidence to underpin a part of routine care and to ensure we use IV iron appropriately for the benefit of Aboriginal and Torres Strait Island dialysis patients in the NT.

The MSc/PhD student will play a core part in this project and participate in all relevant aspects of the conduct of a large clinical trial.

The focus of the PhD could be to address a range of planned analyses of key study outcomes using quantitative biostatistical methods; or to use qualitative methods to explore critical issues around engagement of Aboriginal and Torres Strait Islander Australians in clinical trial research.

Professor Alan Cass
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Return to Country: A national platform study to return Indigenous renal patients' home

Master by Research | PhD

End-stage kidney disease (ESKD), when dialysis or a kidney transplant is required to maintain life, has a devastating impact on Indigenous patients and their families.
In remote communities, rates of ESKD are 15 or more times higher than amongst non-Indigenous Australians of the same age and sex, and people need to relocate to distant urban centres to take up dialysis.
Community-based dialysis or a kidney transplant allows a patient to return to live in their community.
Indigenous Australians have very low rates of such community-based treatment: a third the non-Indigenous chance of home-based dialysis treatment, and a quarter (overall) the non-Indigenous chance of a kidney transplant.
This multicentre mixed methods registry-based prospective interventional study is led by a team of Indigenous and non-Indigenous researchers who bring renal specialist, community-controlled health service and patient perspectives to inform research design, conduct and translation. It is characterising the socioeconomic, environmental, health service and biomedical factors driving the health outcomes and patterns of health service utilisation experienced by Indigenous
Australians with ESKD in 13 tertiary renal services around the country and will test if health service changes to address these identified barriers can get more people home for treatment.
This national collaboration, addressing a key priority in health service delivery - how to help Indigenous Australians get treatment at home - is essential to improve access to best- practice care.

Yomei Jones

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Evaluation of housing repair and maintenance program in NT remote Aboriginal communities

PhD

The student will work with a project to monitor and evaluate the activities, outputs, and outcomes of the Healthy Homes program. Adequate housing is fundamental to health and well-being. The Northern Territory (NT) and Australian governments have invested significant funding to overcome the challenge of providing adequate housing for NT Aboriginal people living in town camps and remote communities.

The NT Government has established the Healthy Homes program to deliver an enhanced approach to preventive and cyclical housing repairs and maintenance across remote communities and selected town camps, to ensure that houses' health hardware is functioning to support the nine Healthy Living Practices in the National Indigenous Housing Guide.

Menzies School of Health Research has been contracted by the NT Government to monitor and evaluate the activities, outputs, and outcomes of the Healthy Homes program.

Professor David Thomas

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Using linked data to better understand the patterns and impact of domestic and family violence

PhD

Domestic and family violence (DFV) is prevalent in the Northern Territory (NT). DFV affects individuals, particularly women and children, families and the communities. Addressing DFV has been recognised by NT government partners as a key policy priority that aims to keep Territorians safe and free from violence.

The SCAFOLD (Strengthening Child and Family Outcomes using Linked Data) research group at the Centre for Child Development and Education undertakes large scale population studies to develop evidence that informs policy and practice across health, education, child protection, and justice concerns for children and young people. Our research is primarily focused on using linked data assets we have developed comprising records from administrative, clinical, and research data systems linked at the individual level for the whole NT population. We use advanced statistical and data analytic techniques and support mixed methods approaches to describing and understanding a range of issues across the life course. The research program has strong links to decision makers in government and service providers and has an emphasis on research translation to inform policy and practice.

We are looking to support a student research project focused on investigating the influence of DFV on child development and later outcomes. Current developments will soon allow researchers to examine familial and intergenerational influences alongside traditional individual and system-level factors available in our data. The repository provides the opportunity for PhD studies across a wide range of topics focused on better understand DFV and its impacts, such as (but not limited to) assessing the impact of DFV on child development outcomes:

- Identifying opportunities for prevention and intervention by mapping life course trajectories from birth to adulthood associated with DFV
- Developing natural experiments to evaluate the impact of DFV policies/programs/services
- Predictive modelling of DFV and/or its outcomes

The candidate will have opportunities and be encouraged to work with policy and practice stakeholders from initial project development through to the translation of research findings.

Dr Hoang Phan
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Dr Bernard Leckning
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Characterisation of the hidden splenic burden of malaria in Africa

PhD

Malaria is a parasitic disease and a significant global health problem causing over half a million deaths each year, the majority (>94%) in Africa and mostly in children. Hidden reservoirs of infection represent additional obstacles in malaria elimination. Through studies in Indonesia, we recently discovered a large hidden biomass of malaria parasites in the adult human spleen and the presence of novel intrasplenic parasite life cycles, ma major paradigm-shift in understanding this illness. Major outstanding questions are the magnitude of splenic tropism in 1) children, and 2) residents of high transmission regions of Africa, the epicentre of malaria. Furthermore, the fundamental biology underlying the hidden splenic malaria reservoir remains understudied.

This project will use unique human spleen and blood samples from a cohort of individuals with current or past malaria infections in Uganda. You will quantify parasite biomass across spleen and blood samples and study the genetic diversity of the hidden splenic reservoir. You will compare transcriptomics profiles of parasite populations in the spleen and circulating blood and undertake in depth analysis of host parasite interactions that enable splenic parasite survival. You will apply advanced parasitology, imaging, molecular and phenotypic techniques (including IHC, qPCR, NGS, single-cell RNAseq, flow cytometry, spatial profiling) and analyse data using bioinformatic pipelines and advanced statistical methods.

This project will provide seminal knowledge advancements on the splenic burden of malaria in Africa, its underlying pathobiology, the mechanisms of splenic parasite survival, and may reveal additional barriers to malaria control and elimination. Findings may contribute to future improvement of malaria detection, prevention and treatment strategies.

This project required an individual with a background in parasitology, molecular biology and/or bioinformatics.

Dr Steven Kho

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Non-expert acquisition and remote expert review of echocardiography in communities to improve health outcomes (NEARER ECHO)

PhD

The NEARER ECHO team at Menzies School of Health Research are looking for a prospective PhD student to join the team from 2026. The PhD will offer opportunities for involvement in various aspects of a mixed methods evaluation of implantation of task-sharing echocardiography for rheumatic fever and rheumatic heart disease in remote primary healthcare settings across Australia and Timor-Leste. The student will learn skills in implementation science research, with areas of focus which could include: developmental evaluation of implementation strategies, working with communities; implementation science methodologies; and/or health economic evaluations. The student will lead on relevant aspects of implementation evaluation, with supervision and support from an experienced team who are committed to working effectively with and listening to communities that are affected by RHD, and developing strategies for RHD detection and follow-up that can be sustainable implemented at scale.

Interested candidates should be willing to travel to remote communities, have excellent listening and communication skills and some background experience in health research. Aboriginal and Torres Strait Islander people and Timorese citizens are strongly encouraged to consider submitting an expression of interest. The successful candidate will be supported by the team to apply for relevant scholarships opportunities. The PhD will be full time, commencing 2026 with anticipated completion in 2030.

Professor Josh Francis

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Assess the spatial and temporal prevalence of the melioidosis bacterium *Burkholderia pseudomallei* in Northern Australia

PhD

An exciting opportunity exists for a PhD project based in Darwin to join a national multidisciplinary team to assess the prevalence of melioidosis across northern Australia. Melioidosis is an emerging and neglected tropical disease and one of the most common causes of fatal, bacterial, community acquired sepsis and pneumonia in tropical Australia. It is caused by the environmental bacterium Burkholderia pseudomallei (Bps). Melioidosis cases are rising, and incidence is becoming less predictable with indications the melioidosis endemic zone is expanding due to Bps mobility influenced by changes in climate, environment and land use.

We are looking for an exceptional PhD student with a strong interest in spatial and spatio-temporal modelling to determine the spatial prevalence of Bps in the environment and the temporal dynamics of melioidosis incidence rates across northern Australia. This is to establish and evaluate statistical models to define and predict current and future melioidosis risk within and outside known endemic regions in Australia.

The successful applicant will be based in Darwin and work within a NHMRC funded project with A/Prof Oyelola Adegboye, a chartered biostatistician with extensive experience in spatial and spatio-temporal modelling and the Menzies melioidosis team including Mirjam Kaestli, Mark Mayo and Bart Currie and the JCU melioidosis team led by Jeff Warner in Townsville. The applicant will also partake in organising and conducting fieldwork collecting soil and water samples across the Top End and visit Queensland based melioidosis research centres at JCU Townsville and Cairns.

Mirjam Kaestli

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Impacts on hospital activity and cost-effectiveness of cultural safety initiatives at Northern territory hospitals

Master by Research | PhD

Can the impacts of cultural safety initiatives be measured using routinely collected patient data? The Communicate Study Partnership aims to find this out. We have been implementing cultural safety initiatives at Royal Darwin Hospital and other Northern Territory hospitals with the goal of improving the experience of healthcare for First Nations peoples. Activities have included training for healthcare providers, strategies to increase access to Aboriginal language interpreters, and supporting a culturally safe community of practice. Our hypothesis is that greater cultural safety could lead to more holistic and cost-effective care with subsequent improvements in health outcomes. A way to potentially measure this is through rates of self-discharge. Self-discharge occurs at high rates at NT hospitals, often attributable to inadequate communication. We have datasets available for analysis which include access to Aboriginal language interpreters (which we have been promoting to improve communication), self-discharge rates, diagnoses, length of stay and readmission rates.

We seek a research student (ideally full time and Darwin-based) with strong quantitative data skills to prepare, link and analyse patient level datasets that include interpreter requirements and uptake. The research student will use knowledge of the context to intelligently interpret the findings and participate in the broad multidisciplinary Communicate Study Partnership research team activities. The project will provide the researcher with statistical skills including time series and economic analysis.

Anna Ralph

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Creating and evaluating a culturally safe workplace for First Nations health staff

Master by Research | PhD

To improve First Nations patients experience and outcomes, more First Nations professionals must be employed at Northern Territory health services in clinical and non-clinical roles. In the NT, around 70% of hospitalised people identify as First Nations but only 7.8% of NT health staff do. Mainstream organisations struggle to recruit, support and retain First Nations staff because workplaces can be considered culturally unsafe. Communicate Study research found that some Aboriginal Interpreters have declined to work at RDH because doctors are perceived to be intimidating. First Nations staff working in health often carry additional responsibilities, such as liaising between non-Indigenous staff and patients, and being the go-to person for First Nations issues. The pressures associated with being a 'cultural broker' in addition to their job descriptions while also juggling cultural and kinship obligations often goes unrecognised by health services working within 'Western models of clinical governance and management'. The heavy workload and expectations of First Nations staff often results in staff burnout and subsequent resignation, stress contributing to poor health and hospitalisation, experiences of marginalisation leading to low self-worth and racism.

This project will:

- Understand the needs of First Nations health staff and how their needs are/are not currently being met
  Create opportunities for First Nations NT Health staff to meet, share their experiences and receive social and emotional support. These programs need to be implemented in partnership and evaluated with the support of research expertise
- Evaluate programs implemented to support staff, using metrics such as duration of staff retention, and workplace satisfaction

Anna Ralph
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Parasite and human genomics for the emerging Plasmodium knowlesi malaria

PhD

Insights gained from genomic analyses of human malaria parasites have advanced our understanding of basic disease biology, drug resistance, malaria epidemiology, and molecular ecology. Technological advancements coupled with reduced costs in molecular and genomic tools are being leveraged across malaria elimination efforts, including large-scale (> 20,000 P. falciparum whole genomes), collaborative efforts to produce publicly available population-level whole genome data and the use of targeted sequencing approaches to monitor real-time genetic changes within malaria populations. Much of this work has been focused on the primary human malaria causing parasites P. falciparum and P. vivax. However, as many countries approach the elimination of malaria caused by these two species, other malaria parasites, including the under-studied zoonotic P. knowlesi, are becoming a growing concern. Thus, part of our research program is using cutting-edge genomic and bioinformatic techniques to better understand the biology, ecology, and epidemiology of P. knowlesi. This work is conducted collaboratively with partners both overseas in Malaysia, Indonesia, Singapore, Thailand, United Kingdom, United States and the Netherlands, and also within Australia. Our genomic-centred program involves genome-wide association studies, large-scale population genetics analysis and the development of molecular surveillance tools. Our ultimate goal is to contribute to the malaria elimination efforts in Southeast Asia.

There is an opportunity for a PhD student to undertake a bioinformatics project within our program of work on zoonotic P. knowlesi malaria. The student will play a key role in large-scale genomic analyses, drawing on their high-level computational and statistical experience to develop and modify appropriate genomic tools for analyses in P. knowlesi. The student will be supervised by a team of world-leading malaria researchers and bioinformaticians from the Menzies School of Health Research and James Cook University and will work collaboratively within an international team. The research activities are the culmination of years of fieldwork and an unprecedented number of samples, as well as whole genome sequencing of the largest dataset of P. knowlesi isolates to date and genotyping of the first P. knowlesi infected human dataset. This is a great opportunity for a student looking to further develop their computational skills in applied bioinformatics.

Jacob Westaway
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Molecular characterisation of the hidden splenic parasite reservoir in human malaria

Master by Research | PhD

Malaria is parasitic disease and a significant global health problem causing over half a million deaths each year. Hidden reservoirs of infection represent additional obstacles in malaria elimination. We recently discovered a large hidden biomass of malaria parasites in the human spleen and the presence of novel intrasplenic parasite life cycle, a major paradigm-shift in understanding this illness. The fundamental biology underlying the hidden splenic malaria reservoir remains understudied.

This project will use unique spleen and blood samples from a cohort of individuals with current or past malaria infections in Indonesia. You will study the genetic diversity of the hidden splenic reservoir and compare transcriptomics profiles of parasite populations in the spleen and circulating blood. You will apply advanced molecular and phenotypic techniques (including qPCR, NGS, single-cell RNAseq, flow cytometry, spatial profiling) and analyse data using bioinformatic pipelines and advanced statistical methods.

This work will provide seminal knowledge advancements on the mechanisms of splenic parasite survival, will search for unique signatures of splenic malaria parasites, and may reveal novel parasite populations/forms related to dormancy and their susceptibility to treatment. Findings may contribute to future improvement of malaria detection, prevention and treatment strategies.

This project requires an individual with fluent Bahasa Indonesia and a background in molecular biology and/or bioinformatics.

Dr Steven Kho

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Immunological correlates of melioidosis survivors

Master by Research | PhD

Melioidosis is caused by the bacterium *Burkholderia pseudomallei* and is predominately a disease of tropical climates, especially in Southeast Asia and Northern Australia where it is widespread. The bacteria causing melioidosis are found in contaminated water and soil. Melioidosis was first described in 1912 in Burma as a newly recognised glanders-like disease of humans. Reports from other Southeast Asian countries soon followed. While only first described in Australia from 1949, melioidosis is endemic across tropical Northern Australia, with the highest incidence rates of disease globally being reported from urban Darwin, although total case numbers are higher in Thailand. The Darwin Prospective Melioidosis Study (DPMS) commenced at Menzies School of Health Research (Menzies) and Royal Darwin Hospital (RDH) on 1 October 1989, prospectively documenting all melioidosis cases in the tropical Top End of the Northern Territory, Australia. As of 1 November 2020, there have been 1,196 culture-confirmed melioidosis cases, with 134 (11%) deaths. We have detailed epidemiological and clinical data on all cases and one or more (~5,000 total) *Burkholderia pseudomallei* (Bp) isolates stored from 1,156 (97%) DPMS cases. We also have stored serum samples on the DPMS with 300 plus serum samples from consented patients available for melioidosis research.

This project aims to investigate the clinical data collected from patients who have survived a melioidosis infection and compare it to immunological correlates, which are biological markers such as disease- specific antibodies which correlate with protection against disease, and which are measurable with immunological assays. Menzies has a collaboration between Menzies Melioidosis Program and Northern Arizona University Keim Laboratories which has successfully characterized antibody responses to *Burkholderia pseudomallei* (Bp) in humans using a machine called the MAGPIX. Major antigens eliciting antibodies during melioidosis have been identified and ongoing

analysis is looking at patterns of antigen response that correlate with severity and outcomes of melioidosis.

The Master by Research/PhD student will join the Melioidosis programme at Menzies and working with a multidisciplinary team (clinical, laboratory and genomics team) to research Immunological correlates of melioidosis survivors.

Mark Mayo
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The occurrence of the melioidosis agent *Burkholderia pseudomallei* in the Darwin urban environment

Master by Research | PhD

Melioidosis is caused by the bacterium *Burkholderia pseudomallei* and is predominately a disease of tropical climates, especially in Southeast Asia and Northern Australia where it is widespread. The bacteria causing melioidosis are found in contaminated water and soil. Melioidosis was first described in 1912 in Burma as a newly recognised glanders-like disease of humans. Reports from other Southeast Asian countries soon followed. While only first described in Australia from 1949, melioidosis is endemic across tropical Northern Australia, with the highest incidence rates of disease globally being reported from urban Darwin, although total case numbers are higher in Thailand. The Darwin Prospective Melioidosis Study (DPMS) commenced at Menzies School of Health Research (Menzies) and Royal Darwin Hospital (RDH) on 1 October 1989, prospectively documenting all melioidosis cases in the tropical Top End of the Northern Territory, Australia. As of 1 November 2020, there have been 1,196 culture-confirmed melioidosis cases, with 134 (11%) deaths. We have detailed epidemiological and clinical data on all cases and one or more (~5,000 total) *Burkholderia pseudomallei* (Bp) isolates stored from 1,156 (97%) DPMS cases. We also have 600 human Bp isolates from Australian and international collaborators, 645 animal Bp isolates and from our environmental studies ~8,000 Bp soil and water isolates and ~5,000 near-neighbour *Burkholderia* isolates.

This project aims to add to our existing knowledge of the presence of bacterium *Burkholderia pseudomallei* in the Darwin urban environment. It will enhance previous environmental sample, testing and analysis and help us to understand the ecological niches that exist in an urban setting. Further analysis examining the geographical associations and genomic similarities between clinical and environmental isolates will allow for better understanding of melioidosis source attribution in Darwin and may help to develop public health measures mitigating against the infection in other endemic regions.

The Master by Research/PhD student will join the Melioidosis program at Menzies and working with a multidisciplinary team (clinical, laboratory and genomics team) will be using various microbiological, molecular and genomic approaches to understand the nature of melioidosis in the Top End of Australia.

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Whole genome analysis of *Burkholderia pseudomallei* from animal and environment samples in the Northern Territory

Master by Research | PhD

Melioidosis is caused by the bacterium *Burkholderia pseudomallei* and is predominately a disease of tropical climates, especially in Southeast Asia and Northern Australia where it is widespread. The bacteria causing melioidosis are found in contaminated water and soil. Melioidosis was first described in 1912 in Burma as a newly recognised glanders-like disease of humans. Reports from other Southeast Asian countries soon followed. While only first described in Australia from 1949, melioidosis is endemic across tropical Northern Australia, with the highest incidence rates of disease globally being reported from urban Darwin, although total case numbers are higher in Thailand. The Darwin Prospective Melioidosis Study (DPMS) commenced at Menzies School of Health Research (Menzies) and Royal Darwin Hospital (RDH) on 1 October 1989, prospectively documenting all melioidosis cases in the tropical Top End of the Northern Territory, Australia. In endemic areas, melioidosis has also been identified in a wide array of animal species. Certain animals are acknowledged to be particularly susceptible to infection and disease, including goats, sheep, camels and alpacas. Cases have also been reported in domestic pets and native wildlife, with the animals often having prior ill health. Exotic animals imported to zoos in endemic regions appear especially at risk, most notably primates, including iconic species such as gorillas.

This project main aim is to analyse the whole genome sequences (WGS) of *Burkholderia pseudomallei* isolates from animals and environmental samples (soil and water). The environmental samples have been collected during environmental investigations to find the potential source of the animal case/s in the Northern Territory. WGS analysis will help use not only compare animal and environmental isolates but enable further understanding of how this relates to human cases in an endemic region.

The Master by Research/PhD student will join the Melioidosis programme at Menzies and working with a multidisciplinary team (field, clinical, laboratory and genomics), will be using various microbiological, molecular and genomic approaches to understand animal melioidosis in the Northern Territory.

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The Communicate Study: Improving Aboriginal patient experiences and outcomes of care in the Northern Territory

Master by Research | PhD

Aboriginal people interacting with healthcare services often experience racism, poor communication and poor quality of care. Health systems need to change to genuinely meet the needs of Aboriginal peoples. Health system improvements that incorporate cultural safety, wider uptake of Aboriginal interpreters and greater utilisation of Aboriginal health practitioners, can be implemented within existing systems to start to bridge these gaps in quality of care, create a cultural shift among healthcare providers, and improve the experience of care and health outcomes for Aboriginal peoples.

To date, the dynamic Communicate Study team has forged collaborations with NT Health, NT Aboriginal Interpreter Service and Aboriginal community leaders in the Top End. Research has focused on Royal Darwin Hospital. We are keen to expand the body of work to other hospitals and primary health care. This project has both qualitative and quantitative PhD/Master by Research opportunities.

Examples of study activities to be undertaken by the qualitative research scholar include:

- Scale up and evaluate the impact of novel cultural safety educational approaches for NT healthcare providers, building on the multi-award-winning podcast, 'Ask the Specialist' which is delivered alongside reflexive discussion groups.
- Implement and measure the effects of a suite of health service interventions including clinical championing of cultural safety, new models of working with Aboriginal interpreters and Aboriginal Health Practitioners.
- Explore the impact of cultural safety interventions on health provider attitudes and behaviour with a particular focus on intercultural communication.
- Explore the impact of cultural safety interventions on patient healthcare experience and outcomes of new approaches to communication including around surgical consent.

Alongside this work, a quantitative research scholar will:

- Develop, monitor and analyse key performance indicators (KPI) on language documentation, interpreter use, and rates of self-discharge (leave against medical advice) from hospital in the tertiary system, and /or long-term medication adherence in the primary care setting.
- In partnership with health services, implement initiatives to help achieve KPI targets including technological improvements such as iPad-based interpreter access via video link and development of resources for common medical conditions in Aboriginal languages.
- Feedback data in a continuous quality improvement process to key health system stakeholders and front-line healthcare providers to build momentum to achieve better KPI targets.

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Blood transfusion in the Northern Territory: Improving patient outcomes through better understanding of risks and benefits in the Northern Territory context

Honours | Master by Research | PhD

In certain settings, blood transfusions have the potential to offer benefit to patients and can save lives. Blood transfusions are used in the setting of major bleeding, severe anaemia, and in a variety of bleeding disorders. However, transfusions also carry some risk of harm. Recipients of blood transfusions may develop alloantibodies to foreign antigens present in the blood donor but not the recipient of the transfusions. These alloantibodies can affect future pregnancies in women and pose a higher risk for both men and women in finding compatible blood for future blood transfusions. There are biological reasons why Aboriginal and Torres Strait Islander people (respectfully referred to as First Nations people herein) are more at risk of such reactions, due to different blood group antigens compared to the general blood donor population of Australia. Transfusion also poses a risk of other immune related reactions, and infection, and is associated with increased length of hospital stay.

In the Northern Territory context, the risks, and benefits for blood transfusion for First Nations people are poorly understood. In addition, the tyranny of distance in the NT poses unique challenges to the management of blood transfusions: remote clinics and hospitals are based many hundreds of kilometres from tertiary hospitals with comprehensive transfusion services. This research project aims to inform best practice in blood transfusion for First Nations, rural and remote Northern Territorians with respect to blood transfusion.

This project offers a range of opportunities to candidates for either a PhD or MSc. This includes a large multicentre five retrospective cohort study examining transfusion triggers and outcomes across all NT hospitals for obstetric and intensive care patients, and NT patients referred to South Australia for heart surgery. The focus of a PhD or MSc program of research could also include a systematic review, qualitative studies on the patient experience of blood transfusion, the design and evaluation of patient health education tools, and a health economics/cost effective analysis.

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Bacteriology of Chronic Suppurative Otitis Media

Master by Research | PhD

Chronic suppurative otitis media (CSOM) is a severe form of middle ear infection. In CSOM, the middle ear has a complex polymicrobial environment, which often leads to poor treatment response and ongoing infection. CSOM is prevalent in low socio-economic populations, and Australian First Nations children who live in remote areas.

Using 16S bacteriome (DNA based) analyses we have identified a genus rarely reported in eras, Oligella. Bacteriome guided culture has recovered a new bacterial species we have named Oligella otitis.

This project will generate new full-length 16S bacteriome data from CSOM ear discharge swabs to guide microbiologic culture-based recovery of Oligella for antimicrobial susceptibility testing and whole genome sequencing and to describe the presence of Oligella in temporally and geographically diverse samples. Whole genome data will be used to generate species specific targets for PCR design and testing.

The Master by Research/PhD student will have the opportunity to learn DNA extraction methods, bioinformatic analysis of 16S and whole genome sequence data, and microbiologic culture techniques. They will be part of a broader program of CSOM research in bacterial pathogenesis and treatment.

Dr Jemima Beissbarth

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The Hearing for Learning Initiative: A stepped wedge cluster randomised trial to evaluate a model of primary health care workforce enhancement through local training and job creation

PhD

The goal of the project is to improve ear and hearing services for First Nations children in remote and rural communities of the Northern Territory. Ear disease and associated hearing loss is devastating the lives of many children and families. Children with hearing loss and sound deprivation experience communication and language difficulties, isolation, discrimination, behavioural problems, and social and educational disadvantage. Yet ear disease is an infection that is preventable.

This project aims to train local community members in the skills needed to use screening equipment (otoscopy and tympanometry, and basic hearing tests). This saves health professionals time, can be done in the home, school, or clinic. Local Ear Health Facilitators have potential to provide a sustainable culturally appropriate service. The student will join the HfLI to evaluate the workforce model. There are opportunities to apply quantitative methods, qualitative, or a mixed methods approach. There is potential to evaluate the effectiveness (general, health, and economic impacts) of all phases of the HfLI, from initial community consultations, implementation, and effectiveness of the training component, and transition to employment in the health service.

The student will visit remote communities to conduct structured and in-depth interviews with trainees, the Community Reference Group members, health service and school staff, parents, and children about their perspectives of the workforce model. The outcomes will be publishable and will inform policy regarding upscaling and funding of this model Territory-wide and across different health issues.

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Early life microbiome, immune development and susceptibility to acute respiratory infection

Master by Research | PhD

We are recruiting for a Masters/PhD student project within part of a research program that aims to achieve sustainable improvements in the respiratory health of Aboriginal children.
Background: Indigenous children have a high burden of early infectious disease. A growing body of research shows the early life gut microbiome shapes future immune function and health. Exposure to antibiotics, preterm birth, C-section, and bottle feeding are shown to influence the composition of the infant gut microbiota increasing the risk of ARI. Understanding the relationship between the gut microbiome and infant susceptibility to infectious disease is an essential stepping stone toward larger studies and clinical trials of microbiome modifying factors such as probiotics.
These simple interventions could have profound benefits for Indigenous child health.
Hypothesis: Early life events can alter the neonatal gut microbiome, impacting immune development and the risk of acute respiratory infection (ARI) in the first year of life.
The aims of this pilot study are to describe associations between the neonatal gut microbiome and:

1. Upstream drivers: Antibiotic exposure, gestation at birth, mode of delivery and mode of feeding
2. Downstream outcomes: Oral and nasopharyngeal (NP) IL-22 levels, NP pneumococcal carriage, ARIs

Project outline: We propose a pilot microbiome study among a cohort of NT Indigenous infants. Nested within the D-Kids RCT (NHMRC 1138604; HREC 2018-3160) the clinical team are collecting faecal samples from consented infants at both birth and 4 months of age.
Following stool DNA extraction, shotgun metagenomic sequencing will be conducted at the Australian Genome Research Facility. Microbiota (MetaPhlAn2, Kraken2) and functional (KEGG) profiles will be produced using established pipelines. Non-stool sampling, microbiology, systemic immunology assays and clinical data generated by the funded D-Kids trial and will contribute to the analysis.

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