POSITION DESCRIPTION

THE UNIVERSITY OF MELBOURNE

Department of Infectious Diseases
Melbourne Medical School
Faculty of Medicine, Dentistry and Health Sciences

NCAS Clinical Data Science in Surgical Antimicrobial Stewardship, PhD Position

Salary	$39,500 per year (indexed annually)
Superannuation	Employer contribution of 17%
WORKING HOURS	1.0 FTE
BASIS OF EMPLOYMENT	Fixed contract
Other Benefits	https://about.unimelb.edu.au/careers/staff-benefits
How to Apply	Online applications are preferred. Go to http://about.unimelb.edu.au/careers, select the relevant option ('Current Opportunities' or 'Jobs available to current staff'), then find the position by title or number.
contact For enquiries only	Dr Courtney Ierano Email courtney.ierano@unimelb.edu.au *Please do not send your application to this contact*

For information about working for the University of Melbourne, visit our website:
about.unimelb.edu.au/careers

Acknowledgement of Country

The University of Melbourne acknowledges the Traditional Owners of the unceded land on which we work, learn and live: the Wurundjeri Woi Wurrung and Bunurong peoples (Burnley, Fishermans Bend, Parkville, Southbank and Werribee campuses), the Yorta Yorta Nation (Dookie and Shepparton campuses), and the Dja Dja Wurrung people (Creswick campus).

The University also acknowledges and is grateful to the Traditional Owners, Elders and Knowledge Holders of all Indigenous nations and clans who have been instrumental in our reconciliation journey.

We recognise the unique place held by Aboriginal and Torres Strait Islander peoples as the original owners and custodians of the lands and waterways across the Australian continent, with histories of continuous connection dating back more than 60,000 years. We also acknowledge their enduring cultural practices of caring for Country.

We pay respect to Elders past, present and future, and acknowledge the importance of Indigenous knowledge in the Academy. As a community of researchers, teachers, professional staff and students we are privileged to work and learn every day with Indigenous colleagues and partners.

Position Summary

The Department of Infectious Diseases, based at the Peter Doherty Institute for Infection and Immunity (the Doherty Institute), is seeking to appoint a highly motivated PhD candidate within the National Centre for Antimicrobial Stewardship (NCAS)**.** This PhD position is funded through the NCAS RADAR One Health Centre of Research Excellen**ce**, led by Professor Karin Thursky, and will commence from early 2026.

The PhD will contribute to a high-impact research program focused on Surgical Antimicrobial Stewardship, with the overarching aim of improving antibiotic prescribing and patient outcomes in surgical settings. Under supervision, the candidate will undertake original doctoral research applying machine learning and clinical data science methods to complex hospital datasets, including electronic health records.

The project will span the end-to-end clinical data science lifecycle, from navigating and harmonising real-world healthcare data to the development, validation, and interpretation of predictive models relevant to surgical infections and antimicrobial use. This work will be conducted in close collaboration with the University of Melbourne Centre for Digital Transformation in Health, providing access to expertise in health data infrastructure, advanced analytics, and digital health implementation. The candidate will work with clinicians, data scientists, and digital health researchers to ensure modelling approaches are robust, clinically meaningful, and translatable to antimicrobial stewardship practice.

As part of the NCAS RADAR One Health Centre of Research Excellence, the PhD candidate will collaborate with other PhD candidates funded under the RADAR program across complementary research streams, including antimicrobial stewardship in hospitals, aged care and community settings, veterinary sciences, human factors, and implementation science. This provides a unique opportunity to engage in interdisciplinary, cross-sectoral research aligned with a One Health approach to antimicrobial resistance.

This position offers the opportunity to contribute to nationally significant antimicrobial stewardship research while developing advanced research skills at the intersection of machine learning, clinical informatics, and digital health within a leading Australian research environment.

1. Key Responsibilities

1.1 RESEARCH AND RESEARCH TRAINING

- Undertake original doctoral research involving the extraction, cleaning, harmonisation, and analysis of longitudinal healthcare data, including electronic health records (EHRs), pathology, and pharmacy datasets.
- Design, implement, and evaluate machine learning and deep learning models addressing problems such as surgical site infections, clinical risk stratification, and antibiotic utilisation.
- Develop high-quality, reproducible research software using Python and appropriate machine learning frameworks.
- Address challenges inherent in real-world clinical datasets, including missing data, noise, bias, and class imbalance.
- Critically evaluate model performance with emphasis on robustness, generalisability, and clinical relevance for antimicrobial stewardship and clinical decision-making.
- Disseminate research findings through peer-reviewed publications and presentations at national and international conferences and professional forums.
- Demonstrate progressive development toward research independence under supervision.

1.2 LEADERSHIP AND MANAGEMENT

- Manage doctoral research milestones in accordance with University of Melbourne HDR requirements and timelines.
- Demonstrate initiative, accountability, and independence in progressing the research program with appropriate supervision.
- Contribute to the NCAS PhD & Post-Doctoral Network and support the development and delivery of NCAS education and training activities, including seminars, workshops, and postgraduate learning opportunities.
- Collaborate effectively within multidisciplinary teams, including clinicians, researchers, and data scientists, and communicate research objectives and outcomes to technical and non-technical stakeholders.
- Effective demonstration and promotion of University values including diversity and inclusion and high standards of ethics and integrity.
- Comply with Occupational Health and Safety (OH&S) and Environmental Health and Safety (EH&S) responsibilities as outlined in Section 5 of the Position Description.

1.3 TEACHING AND LEARNING

- Actively participate in the academic activities of NCAS, the department, and the broader University, including seminars, workshops, and scholarly discussions.
- Translate advanced analytical outputs into clinically meaningful insights for healthcare and antimicrobial stewardship contexts.
- Engage in continuous professional development and positively support the learning and career development of self and others.
- Demonstrate and promote University of Melbourne values, including diversity and inclusion, and high standards of ethics and integrity.

2. Selection Criteria

2.1 ESSENTIAL

- An honours or master's qualification in a relevant discipline (e.g. computer science, data science, biomedical engineering, health informatics, epidemiology, or related field) with experience analysing healthcare datasets, that meets the entry requirements for PhD enrolment at the University of Melbourne.
- Demonstrated proficiency in Python for data analysis, machine learning, and reproducible research software development.
- Demonstrated experience applying quantitative research methods, including data preprocessing, modelling, and statistical or machine learning analysis.
- Understanding of challenges associated with real-world healthcare or clinical data, including missing data, noise, bias, and class imbalance.
- Demonstrated ability to conduct supervised research activities, including troubleshooting technical problems and progressing work with appropriate supervision.
- Experience working collaboratively in team-based research environments, with evidence of effective contribution to shared research goals.
- Strong written and verbal communication skills, with the ability to communicate research concepts and findings to technical and non-technical audiences.
- Demonstrated commitment to ethical research conduct, integrity, and University of Melbourne values, including diversity and inclusion.

2.2 DESIRABLE

- Experience with machine learning or deep learning frameworks such as Scikit-learn, PyTorch, or TensorFlow.
- Experience working with longitudinal healthcare datasets, such as electronic health records, pathology, or pharmacy data.
- Familiarity with high-quality software development practices, including version control, testing, and documentation.
- Familiarity with large language models and/or agent-based orchestration frameworks.
- Prior research outputs (e.g. conference papers, journal articles, reports, or preprints) relevant to digital health, clinical informatics, or machine learning.
- Experience contributing to teaching, tutoring, mentoring, or peer learning activities in an academic or research setting.
- Demonstrated organisational skills, including attention to detail, record keeping, and the ability to manage competing priorities and deadlines.
- Proficiency with common IT systems (e.g. Microsoft Office) and adaptability to online research and administrative systems.

3. Job Complexity, Skills, Knowledge

3.1 LEVEL OF SUPERVISION / INDEPENDENCE

The PhD Candidate will report to their primary supervisor Dr Courtney Ierano and co-supervisor Prof Daniel Capurro.

The PhD Candidate will be required to work independently and engage with the staff of NCAS and The RMH Guidance Group in addition to the Centre for Digital Transformation of Health at the University of Melbourne and interact and collaborate with hospital clinicians and electronic medical record and business intelligence teams.

3.2 PROBLEM SOLVING AND JUDGEMENT

The PhD Candidate is expected to be able to identify issues and if major, work with NCAS to come up with solutions, implement those solutions, and evaluate their effectiveness.

3.3 PROFESSIONAL AND ORGANISATIONAL KNOWLEDGE

The PhD Candidate will be asked to perform tasks which will require proficiency in following NCAS and RMH Guidance Groups processes and techniques (e.g. The National Antimicrobial Prescribing Survey Platform) and knowing how they interact with other related functions.

The candidate will collaborate closely with hospital Electronic Medical Record (EMR) and Business Intelligence teams to support data extraction, integration and validation. The role also requires engagement with key clinical stakeholders, including surgeons, anaesthetists and Infection Prevention and Control teams, to ensure outputs are clinically meaningful, implementable and aligned with stewardship priorities.

The PhD Candidate will be expected to be familiar with current and historical NCAS projects and will be provided with opportunities to upskill in areas that support NCAS's strategic aims and objectives.

3.4 RESOURCE MANAGEMENT

The PhD candidate is expected to:

- Maintain accurate records of their doctoral research activities, including project milestones, outputs, and publications, in accordance with University of Melbourne HDR requirements.
- Support research administration activities related to their project, including contributing to compliance and reporting requirements under supervision.
- Contribute to the organisation and delivery of research seminars and community engagement activities relevant to the research program.
- Use University human and physical resources responsibly and in accordance with University policies and procedures applicable to HDR candidates.
- Contribute, where appropriate, to the development of research funding proposals (e.g. ARC, MRFF, NHMRC) through literature review, data preparation, or methodological input under supervision.

3.5 BREADTH OF THE POSITION

The PhD Candidate may be expected to perform a greater range and complexity of tasks as they obtain further experience.

4. Equal Opportunity, Diversity and Inclusion

The University is an equal opportunity employer and is committed to providing a workplace free from all forms of unlawful discrimination, harassment, bullying, vilification and victimisation. The University makes decisions on employment, promotion, and reward on the basis of merit.

The University is committed to all aspects of equal opportunity, diversity and inclusion in the workplace and to providing all staff, students, contractors, honorary appointees, volunteers and visitors with a safe, respectful and rewarding environment free from all forms of unlawful discrimination, harassment, vilification and victimisation. This commitment is set out in the Advancing Melbourne strategy that addresses diversity and inclusion, equal employment opportunity, discrimination, sexual harassment, bullying and appropriate workplace behaviour. All staff are required to comply with all University policies.

The University values diversity because we recognise that the differences in our people's age, race, ethnicity, culture, gender, nationality, sexual orientation, physical ability and background bring richness to our work environment. Consequently, the People Strategy sets out the strategic aim to drive diversity and inclusion across the University to create an environment where the compounding benefits of a diverse workforce are recognised as vital in our continuous desire to strive for excellence and reach the targets of Advancing Melbourne.

5. Occupational Health and Safety (OHS)

All staff are required to take reasonable care for their own health and safety and that of other personnel who may be affected by their conduct.

OHS responsibilities applicable to positions are published at:

https://safety.unimelb.edu.au/people/community/responsibilities-of-personnel

These include general staff responsibilities and those additional responsibilities that apply for Managers and Supervisors and other Personnel.

6. Other Information

6.1 DEPARTMENT OF INFECTIOUS DISEASES

https://medicine.unimelb.edu.au/school-structure/infectious-diseases

The Department of Infectious Diseases is a recently established department of the Melbourne Medical School, Faculty of Medicine, Dentistry and Health Sciences that is based at The Peter Doherty Institute for Infection and Immunity (Doherty Institute). Research within the department encompasses infectious diseases including antimicrobial resistance and healthcare associated infections, malaria, HIV, tuberculosis, influenza, viral hepatitis, sexually-transmitted infections, skin pathogens and emerging infectious diseases such as COVID-19. Our researchers come from diverse backgrounds, including discovery research and basic scientists, clinician researchers, epidemiologists, public health physicians and microbiologists.

6.2 MELBOURNE MEDICAL SCHOOL

https://medicine.unimelb.edu.au

Established in 1862, Melbourne Medical School (MMS) in the Faculty of Medicine, Dentistry and Health Sciences at The University of Melbourne is the oldest medical school in Australia. It is

internationally renowned for global leadership in teaching and training, health research, policy and practice. MMS is ranked 14th in the world (Times Higher Education World University Rankings 2022 for clinical, pre-clinical and health), has strong academic partnerships and ground-breaking collaborative research programs with leading public and private hospitals, as well as leading medical research institutes and centres in Australia and internationally.

Under the leadership of Professor John Prins, MMS spans all major fields of medicine and is comprised of thirteen clinical departments:

- Baker Department of Cardiometabolic Health;
- Clinical Pathology;
- Critical Care;
- General Practice;
- Medical Education;
- Infectious Diseases;
- Medicine;
- Obstetrics and Gynaecology;
- Paediatrics;
- Psychiatry;
- Radiology;
- Rural Health; and
- Surgery.

MMS has more than 1,000 academic and professional staff members located at the Parkville campus or embedded within health services throughout metropolitan Melbourne and rural Victoria. Staff are privileged to work alongside more than 2,725 honorary appointees from the health sector who generously contribute their time, knowledge, research and clinical expertise.

MMS is committed to improving community wellbeing through the discovery and application of new knowledge. With annual research income of $165 million, the School's research effort is highly collaborative, spanning research programs from basic to translational. The School has research collaborations across the 47 partner organisations in the vibrant Melbourne Biomedical Precinct, as well as nationally and internationally. These partnerships enable medical advances to impact healthcare delivery as rapidly and seamlessly as possible.

The School's flagship Doctor of Medicine (MD) degree was the first Masters level entry-to-practice qualification of its kind developed in Australia, setting a new benchmark in medical education. Now, the new curriculum launched in 2022 has created more responsive, modular, technology-enhanced learning for state-of-the-art curriculum delivery. Continuous research and discovery options, and an ability to tailor the degree, allows each student to gain deeper experience in areas of greatest interest. The MD Rural Pathway offers students the opportunity to undertake their entire program in rural Victoria, with a $6.5 million expansion of facilities in Shepparton to accommodate this. There is also an expanded range of joint degree pathways on offer. The School utilises the Department of General Practice's continually expanding network of general practitioners and primary healthcare providers in the community to ensure that MD students are also provided with quality community-based medical education.

In addition to the MD, MMS has an ever-expanding portfolio of other vocationally oriented programs. These teach research skills, leadership and continuing professional development in specific disciplines. An emphasis on the clinician-scientist career trajectory – with training, support and ongoing career pathways at graduate and postgraduate levels – is central to the School's development of future leaders in all aspects of healthcare, education, research and policy. MMS has over 600 higher degree by research candidates located both within Departments and across its network of partners.

School staff and honorary appointees lead and participate in public debate and advocacy around key health issues and policy based on the MMS values of commitment, integrity, compassion, respect and service. The School also offers a range of initiatives and programs in

support of its diverse and inclusive culture: https://medicine.unimelb.edu.au/about/diversity-and-inclusion

MMS is always looking to recruit talented individuals across a wide range of medical disciplines which include leadership roles. This presents a wonderful opportunity for appointees to help drive the strategy, growth and continued excellence of Australia's leading medical school.

6.3 FACULTY OF MEDICINE, DENTISTRY AND HEALTH SCIENCES

www.mdhs.unimelb.edu.au

The Faculty of Medicine, Dentistry & Health Sciences has an enviable research record and is the University of Melbourne's largest faculty in terms of management of financial resources, employment of academic and professional staff, teaching of undergraduate and postgraduate (including research higher degree) students and the conduct of basic and applied research. The Faculty's annual revenue is $630m with approximately 55% of this income related to research activities.

The Faculty has a student teaching load in excess of 8,500 equivalent full-time students including more than 1,300 research higher degree students. The Faculty has approximately 2,195 staff comprising 642 professional staff and 1,553 research and teaching staff.

The Faculty has appointed Australia's first Associate Dean (Indigenous Development) to lead the development and implementation of the Faculty's Reconciliation Action Plan (RAP), which will be aligned with the broader University – wide plan. To enable the Faculty to improve its Indigenous expertise knowledge base, the Faculty's RAP will address Indigenous employment, Indigenous student recruitment and retention, Indigenous cultural recognition and building partnerships with the Indigenous community as key areas of development.

6.4 THE PETER DOHERTY INSTITUTE FOR INFECTION AND IMMUNITY

https://www.doherty.edu.au/

The Doherty Institute is a world-class institute combining research, teaching, public health and reference laboratory services, diagnostic services and clinical care into infectious diseases and immunity. It was officially opened in September 2014 and is a joint venture between the University of Melbourne and Melbourne Health. The Doherty Institute has a major focus on diseases that pose serious public and global health threats such as influenza, tuberculosis, HIV, viral hepatitis, Ebola and drug resistant bacteria. The Doherty's activities are multi-disciplinary and cross-sectoral, placing great emphasis on translational research and improving clinical outcomes. Teams of scientists, clinicians and epidemiologists collaborate on a wide spectrum of activities - from basic immunology and discovery research, to the development of new vaccines and new preventative and treatment methods, to surveillance and investigation of disease outbreaks.

6.5 THE UNIVERSITY OF MELBOURNE

Established in 1853, the University of Melbourne is a leading international university with a tradition of excellence in teaching and research. The main campus in Parkville is recognised as the hub of Australia's premier knowledge precinct comprising eight hospitals, many leading research institutes and a wide-range of knowledge-based industries. With outstanding performance in international rankings, the University is at the forefront of higher education in the Asia-Pacific region and the world.

The University employs people of outstanding calibre and offers a unique environment where staff are valued and rewarded.

Further information about working at The University of Melbourne is available at http://about.unimelb.edu.au/careers

6.6 ADVANCING MELBOURNE

The University's strategic direction is grounded in its purpose. While its expression may change, our purpose is enduring: to benefit society through the transformative impact of education and research. Together, the vision and purpose inform the focus and scale of our aspirations for the coming decade.

Advancing Melbourne reflects the University's commitment to its people, its place, and its partners. Our aspiration for 2030 is to be known as a world-leading and globally connected Australian university, with our students at the heart of everything we do.

- We will offer students a distinctive and outstanding education and experience, preparing them for success as leaders, change agents and global citizens.
- We will be recognised locally and globally for our leadership on matters of national and global importance, through outstanding research and scholarship and a commitment to collaboration.
- We will be empowered by our sense of place and connections with communities. We will take opportunities to advance both the University and the City of Melbourne in close collaboration and synergy.
- We will deliver this through building a brilliant, diverse and vibrant University community, with strong connections to those we serve.

The means for achieving these goals include the development of the University of Melbourne's academic and professional staff and the capabilities needed to support a modern, world-class university. Those means require a commitment to ongoing financial sustainability and an ambitious infrastructure program which will reshape the campus and our contribution to the communities we engage with. This strategy, and the priorities proposed, is centred around five intersecting themes; place, community, education, discovery and global.

6.7 GOVERNANCE

The Vice Chancellor is the Chief Executive Officer of the University and responsible to Council for the good management of the University.

Comprehensive information about the University of Melbourne and its governance structure is available at https://about.unimelb.edu.au/strategy/governance