



Infectious Disease:

UNSW – a leading international centre of expertise in infectious diseases epidemiology and control

Never Stand Still

Medicine

School of Public Health and Community Medicine



We offer a vibrant and dynamic environment of multidisciplinary, leading international research in infectious diseases epidemiology and control.

Professor Raina MacIntyre
Head of School

Learn more about Infectious Disease at the School of Public Health and Community Medicine

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Infectious diseases are unique because they are usually transmitted from human to human, and have the capacity to cause epidemics. As long as pathogens have the ability to mutate and spread, endemic, epidemic, emerging and re-emerging infections will remain a threat to humans. The public health control of infectious diseases is the complex and challenging subject of our research. We are an internationally recognised research group in this field. Our group is underpinned by continuing education as well as a Master of Public Health Program (MPH) specialisation plan in Infectious Diseases Epidemiology and Control. SPHCM is also a member of the World Health Organization's Global Outbreak Response Network and a founding partner in ARM (www.arm.org.au), a national network which provides surge response capacity for regional and cross-jurisdictional infectious diseases outbreaks. We specialise in multidisciplinary research in infectious diseases including:

- epidemiology including applied field epidemiology
- mathematical modelling
- health economic modelling
- data linkage
- special risk populations
- social research
- clinical research

Our subject areas span vaccinology and vaccine-preventable diseases (such as influenza, pneumococcal disease, HPV, measles, hepatitis A), emerging

infections, hospital infection control, refugee and migrant health, travel related infections and many other areas. PhD and research student opportunities may be available in any of the following areas:

Clinical research

Professor Raina MacIntyre, Dr Holly Seale, Dr Padmanesan Narasimhan, Dr Anita Heywood

We conduct investigator designed and driven clinical research on interventions to control infectious diseases in Australia and overseas. Many of our clinical trials are in the area of vaccines and respiratory pathogens, and on the prevention and transmission dynamics of these pathogens. We also conduct observational epidemiologic studies in the clinical setting such as case control and cohort studies. We have a large program of research including the use of face masks in the community and in health care workers, the relationship of infections to ischaemic vascular disease (see: <http://heart.bmj.com/content/99/24/1843.long>) and adult vaccine research, including studies in vulnerable populations such as immunosuppressed and the frail elderly. We have successfully obtained funding from key research funding bodies, such as the National Health and Medical Research Council (NHMRC) and the Australian Research Council (ARC) to conduct these studies. Specific disease areas include Influenza, HPV, TB, pneumococcal disease and other respiratory pathogens, and hospital



infections. Our research sites include Australia, India, China and Vietnam. Prof MacIntyre leads a NHMRC Centre for Research Excellence which also conducts clinical studies in vaccination of special risk groups.

Observational epidemiology and data linkage

AIProfessor Glenda Lawrence, Dr Heather Gidding, Dr Bette Liu, Dr Anita Heywood, Dr Anthony Newall, Dr Holly Seale, Dr James Wood, Professor Raina MacIntyre

Infectious disease epidemiological research provides evidence for policy development and evaluation of disease control programs. We conduct research in the areas of infectious disease epidemiology (patterns of infectious diseases in the community) and the impact of disease prevention and control measures, such as immunisation, on the burden of disease. Primary sources of epidemiological data include routinely collected disease notification, hospitalisation and death records. Analysing linked records for people across multiple data sources brings together a wealth of information about each person and improves estimates of the burden and determinants of infectious diseases. Observational methods are also used to study the epidemiology of infectious diseases and the impact of control methods. For an example of a high impact PhD student publication on the link between human papillomavirus and oesophageal cancer, see: <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0069238>.

Healthcare-associated infection epidemiology, prevention and control

Professor Mary-Louise McLaws, Dr Holly Seale, Professor Raina MacIntyre

Our research focuses on reducing the risk of transmitting infections

in healthcare facilities. Our patient safety improvement research focuses on patients and healthcare workers through clinical practice improvement and through culture change improve healthcare worker's knowledge, attitude and beliefs associated with infection control practices.

Professor MacIntyre's group is the leading research group internationally on the use of face masks and respirators in health care workers, having published the largest and the most RCTs in this subject. Other collaborators in this research include the Beijing Center for Disease Prevention and Control. See: <http://www.atsjournals.org/doi/pdf/10.1164/rccm.201207-1164OC>

Dr Seale has done extensive research on patient and health workers behaviour and attitudes to preventive strategies such as vaccines and masks. Professor McLaws has collaborated with the Clinical Excellence Commission, the Department of Health and Ageing and the World Health Organization First Global Patient Safety Challenge on the development of the WHO Hand Hygiene Guidelines and pilot testing of the Guidelines on compliance and infection rates in six test sites globally. Other patient safety collaborations include the Australian Group for Antimicrobial Resistance to statistical modelling of the resistant *Staphylococcus aureus* infection, and Liverpool Hospital to test cybernetics for map predictors of transmission of infection. For a key publication, see: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2661074>.

Immunisation

Professor Raina MacIntyre, AIProfessor Glenda Lawrence, Dr Heather Gidding, Dr Anita Heywood, Dr Anthony Newall, Dr Holly Seale, Dr Bette Liu, Dr James Wood

Vaccines are one of the greatest achievements in public health with dramatic reductions in morbidity and mortality from vaccine-preventable diseases. With the expansion of available



vaccines and the cost and complexity of immunisation programs in Australia and internationally, there is a need for high quality, multimethod research that informs vaccine policy and practice. Immunisation and vaccine-preventable diseases are a key focus of the research undertaken within the School and we have advanced expertise across a range of methodologies including clinical research, epidemiology, disease and economic modelling, data linkage and social research methods. We are currently involved in numerous research projects spanning from program evaluation, the impact of immunisation program schedule changes and predictors of behavioural factors associated with vaccine uptake in vulnerable and high risk populations. Specific vaccines and vaccine-preventable diseases of interest include influenza, pneumococcal disease, HPV,

NHMRC CENTRE OF RESEARCH EXCELLENCE IN POPULATION HEALTH RESEARCH



We also have NHMRC Centre for Research Excellence in Population Health, led by Professor MacIntyre, in immunisation titled "Immunisation in under studied and special risk populations: closing the gap in knowledge through a multidisciplinary approach" (see www.creimmunisation.com.au). The CRE involves a multidisciplinary and collaborative team across UNSW, The National Centre for Immunisation Research and Surveillance of Vaccine Preventable Diseases, The Children's Hospital at Westmead, The Kirby Institute, Westmead Hospital, The University of Sydney and the University of Antwerp. The NHMRC Centre for Research Excellence in Immunisation has four streams of research on immunisation in: The frail elderly; maternal and neonatal; Aboriginal and Torres Strait Islanders; and traveller, migrant and refugee immunisation issues.

herpes zoster, measles, mumps, rubella, pertussis, hepatitis A and travel vaccines.

Infectious disease and health economic modelling

Dr James Wood, Dr Anthony Newall, Professor Raina MacIntyre, Dr Heather Gidding, Dr Anita Heywood, Dr Bette Liu

We have a large program of research in mathematical modelling and economic evaluation of infectious disease prevention. Modelling has become an important tool to help inform our understanding of infectious disease epidemiology and control. Infectious disease models can be used to predict the impact of alternative control strategies and can be linked with economic models to estimate the cost-effectiveness of these programs. Together these factors can play a major role in policy and funding decisions. Infections of interest include vaccine preventable diseases, particularly influenza, rotavirus, varicella zoster virus, measles, mumps, rubella, tuberculosis, pertussis and pneumococcal disease, among others. We also have interests in more theoretical questions such as structural uncertainty in model outcomes and the impact of antibody decline on disease elimination. Dr Anthony Newall is a leader in vaccine health economics (see: link.springer.com/article/10.1007%2Fs40273-013-0060-7). Dr Wood is a leader in modelling of vaccine preventable diseases. For a key publication which has informed national pandemic planning, see: aje.oxfordjournals.org/content/169/12/1517.full.

Social and behavioural research

Professor Juliet Richters, Professor Heather Worth, Dr Holly Seale, Dr Niamh Stephenson, Professor Nick Zwar, Professor Mary-Louise McLaws, Dr Patrick Rawstorne, Dr Angela Kelly

We have high level expertise in social research methods and sociology at

SPHCM. Research in these areas includes sexual health, prison health, social aspects of global control of HIV, behaviour and attitudes of health care workers and how this impacts on infection control and healthcare workers' and the community's behavior associated with pandemic influenza policy and public understandings. The School is also involved in a number of HIV social and behavioural research projects being undertaken in Asia and the Pacific (see International HIV group below). For a key publication, see: www.sciencedirect.com/science/article/pii/S0277953613006345.

International HIV Group

Professor Heather Worth, Dr Angela Kelly, Dr Patrick Rawstorne

Under the leadership of Professor Heather Worth and the International HIV Research Group, the School also has a large number of collaborative research projects in Asia and the Pacific. Specific projects include a large-scale qualitative project understanding sex work and HIV risk in a number of Pacific countries; a study of the Fiji Crimes Decree 2009, which further criminalized sex work in Fiji and led to the detainment and ill-treatment of sex workers in that country; a longitudinal study of HIV, pregnancy and parenthood and other HIV research in PNG; HIV risk on the border of PNG and Indonesia in collaboration with the PNG National AIDS Council and the Papua Provincial AIDS Council; a study of older gay Chinese men in collaboration with Tsinghua University. See: <http://sphcm.med.unsw.edu.au/centres-units/international-hiv-research-group>.

Traveller health research

Dr Anita Heywood, Professor Raina MacIntyre, Professor Nick Zwar, Professor Heather Worth, Dr Holly Seale

International travellers are important sources of infectious disease in countries with low disease incidence and strong national disease control systems, such

as Australia. Current research in the School aims to control the importation of diseases into Australia by understanding traveller behaviour and travel patterns, including epidemiologic research on travel related infections, travel vaccine research and social and behavioural research. Our research identifies areas for national disease control policy development in the prevention of travel-related infectious diseases in travellers and their contacts and provides data for modelling the impact of global disease transmission and travel patterns on Australia's national disease control. Important work on travel, border control and screening has directly informed Australia's national pandemic response. Our research examining the knowledge, attitudes and behaviours of international travellers to infectious disease risks and preventative health practices has identified poor uptake of pre-travel health advice and vaccination in travellers, particularly migrant Australians who travel. The School is also involved in the promotion of health travel through representation on the Travel Health Advisory Group. For a key publication, see: www.biomedcentral.com/1471-2334/12/43.

Migrant and refugee health research

Dr Mohamud Sheikh, Dr Anita Heywood, Professor Raina MacIntyre, Professor Nick Zwar, Professor Heather Worth, Professor Robyn Richmond, Dr Holly Seale

The potential impact of population mobility, particularly in complex humanitarian emergencies, on health care provision is significant. Research in the School aims to develop understanding of the trends and burden of infectious diseases in complex humanitarian situations and also on refugees and Internally Displaced Persons (IDPs) who resettle in Australia but become marginalised members of the community. The School is engaged in studies on the epidemiology of





exotic infectious diseases of refugees and internally displaced persons, immunisation issues and access to diagnostic and therapeutic services upon resettlement. This research aims to inform planning and management of outbreaks of infectious diseases and the development of high level management guidelines to improve access to healthcare services of this cohort.



Health inequity and provision of health care is a challenge identified in migrant communities worldwide. The influence of culture on health service utilisation and health outcome has been well documented. Migrant Australians from culturally and linguistically diverse populations more like to have a passive rather than active role in treatment with under-diagnosis of health problems a concerning issue.

Migrants who return to their country of birth to visit friends and relatives (VFR travellers) are at increased risk of infectious diseases compared to other travellers. VFR travellers are a special category of migrants that deserve special attention in disease prevention and travel health. Current research seeks to identify practical opportunities for addressing the higher risks of infectious diseases through quantifying the burden of travel-associated disease in VFR travellers and identifying current practices and barriers

to healthcare utilisation and areas of concern within health practitioners and community members. For proceedings of a national stakeholder workshop on migrant and refugee health see:

www.creimmunisation.com.au/sites/default/files/newsevents/events/Proceedings_CREMigrantRefugeeWorkshop.pdf.

Frail elderly

Professor Raina MacIntyre, Dr Bette Liu, Dr Anthony Newall, AIProfessor Chris Poulos

The School has strengthened its focus on aged care research with the establishment in 2011 of the Hammond Chair of Positive Ageing and Care, in partnership with the Hammond Care group. Together with other key staff from the SPHCM, the nucleus for a new focus on aged care research within the School has been generated. The aged care research partnership between the SPHCM and Hammond Care has already delivered approximately \$1.6 million dollars of funding from various Commonwealth government grants and other funding bodies.

The School is involved in a number of research projects with frail older adults undertaken in hospital and aged care facility settings. Specific projects include investigating the burden of respiratory infections in older adults; investigating specific aspects of adult immunisation practices, beliefs regarding adult immunisation in hospitals and aged care facilities involving healthcare workers, inpatients and residents and long term immunity following vaccination in older adults. We also have an interest in equity and ethical aspects of vaccination in the elderly - see [dx.doi.org/10.4236/health.2013.512A011](https://doi.org/10.4236/health.2013.512A011).

Research degrees

Potential students interested in a PhD or other research degree can search the research profiles of academics in our group by name at: research.unsw.edu.au/researcher

For students who do not meet entry requirements for a PhD, our MPH in Infectious Diseases Epidemiology and Control has the option of doing a research project as an elective, with an intercalation pathway into the PhD program.

The Master of Public Health (MPH) in Infectious Diseases Epidemiology and Control

The Master of Public Health (MPH) in Infectious Diseases Epidemiology and Control provides students with strong training in the principles of communicable diseases epidemiology and modelling.

This program is aimed at public health trainees who seek a career in communicable disease control in the health sector or in international health, or who wish to progress to postgraduate research in infectious diseases epidemiology.

“With heightened government concern over bioterrorism and emerging diseases in the early years of this century, I had the opportunity to be involved in the development of a near real-time syndromic surveillance system using first emergency department and then ambulance dispatch administrative databases. This was the first of its kind on such a large scale in Australia. In 2009, through an NHMRC Capacity Building Grant, I found myself spending some months in Professor Raina MacIntyre’s team at the School of Public Health and Community Medicine. This was a great opportunity to commence a PhD on the surveillance and epidemiology of influenza...”

David Muscatello, PhD student (graduate 2014) and recipient of a 2011 Deans List Award. David’s PhD work led to him being invited to participate in the WHO’s Global Pandemic Mortality Burden study.