



# SWERI

South Western Emergency  
Research Institute

PROSPECTUS • FEBRUARY 2018



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The Emergency Medicine Research Unit (EMRU) represents the research capacity of the Emergency Department at Liverpool Hospital; it is led by A/Professor Paul Middleton, an academic emergency physician with a 50% salaried commitment to this role; and otherwise comprises a part-time senior research fellow, a part-time research fellow, a UNSW Medical Sciences Honours student and several volunteer emergency physician and emergency nurse collaborators. The EMRU also employs an executive assistant / research manager, and is imminently to employ a post-doctoral data scientist and a full-time senior research fellow.

Over the course of 2017, the EMRU scientific program has developed around multiple themes:

## Clinical epidemiology

Clinical epidemiology provides the methodology with which to assess the effectiveness of clinical care.

## Multicultural emergency medicine epidemiology

To investigate common and potentially high-risk presenting problems, potentially having a major impact on the health of SWSLHD residents, in the setting of a unique multicultural community.

## End-of-life and geriatric emergency medicine

Investigation of the culture of emergency medicine moving from providing stabilisation of acute medical urgencies to a more patient-goal-centred culture.

## Critical illness diagnosis and treatment

Critical illness and injury at Liverpool Hospital ED and across SWSLHD forms a major proportion of work for emergency departments, and investigating diagnostic and therapeutic effectiveness is essential.

## Non-invasive monitoring

To investigate both the use and effectiveness of current non-invasive monitoring modalities, and the potential of novel and innovative techniques to improve patient care.

## Data visualisation and pattern recognition

Investigating the human factors and

psychology of perception, visual display, and pattern recognition in the identification of deterioration and severe illness.

## Complex adaptive systems as applied to emergency departments, hospital function and patient flow

Investigation of non-linear analyses and sophisticated computing approaches to the complexities of emergency department and patient management.

## Clinical structures and interactions

Research into the impact of human interactions such as interruption, knowledge levels, seniority, training and decision-making in the emergency department setting.

## Geographic Information System (GIS) modelling and health economic analyses

GIS mapping allows the correlation of multiple datasets with geographic location, and identification of hidden patterns of disease and causation.

An opportunity to extend these research themes into an LHD-wide Emergency Medicine Research Institute, with the prospect of developing a critical mass of researchers and collaborating organisations both in hospital and academia, and then into the community, has been proposed, which suggests huge potential for the sort of collaborative multi-disciplinary emergency medicine research network which has not been seen before in NSW, and is relatively unknown in Australia.

Central to success in applying for the structural assistance needed to construct the South-Western Emergency Research Institute (SWERI), and core to the ongoing function of such an enterprise, would be a demonstration of our ability to set up a strong collaboration between emergency departments, in-hospital specialities, hospitals, Local Health District institutions, and researchers and departments from a number of academic centres and universities.

To this end, discussion have taken place with a broad range of potential

collaborating researchers and organisations, leading to agreements with the SWS Clinical School of UNSW, the UNSW School of Public Health and Community Medicine, the UNSW Graduate School of Biomedical Engineering, the UNSW Centre for Big Data Research in Health and the UNSW EPIcentre, an initiative between the UNSW School of Medicine and UNSW Art and Design.

We also have commitments from the WSU School of Nursing and Midwifery, the WSU MARCS Institute, the WSU Translational Health Research Institute (THRI), the Simpson Centre for Health Services Research, the UNSW Centre for Health Equity Training, Research and Evaluation (CHETRE), the Academic General Practice Unit (AGPU), among others. We also have commitments from the ACU Nursing Research Institute, the Centre for Health Systems and Safety Research (CHSSR) at Macquarie University, the Faculty of Science, Medicine and Health at the University of Wollongong, NSW Ambulance and the SWS Primary Health Network.

Finally, we also have collaborative commitment from SWS Health Language Services, NSW Refugee Health Service and Bangala Eastern Campus, Aboriginal Health; SWS Health Promotion Service, SWS Multicultural Health Service, Consumer and Community Participation, and the Transfer of Care and HeartSmart for Women projects.

This prospectus describes in detail the collaborations and collaborators, including example track records, research domains and specific exemplar studies, plans for further expansion dependent on resources, and governance arrangements already underway.

We wish this prospectus not only to serve as a descriptive document highlighting the exciting development of the unique SWERI, but also to serve as an application for any potential funding opportunity.



**Conjoint Associate Professor**  
**Paul M Middleton**  
February 2018



# Emergency medicine

Emergency medicine is the medical specialty dedicated to the diagnosis and treatment of unforeseen illness or injury. It encompasses a unique body of knowledge, and the practice of emergency medicine includes the initial evaluation, diagnosis, treatment, coordination of care among multiple providers, and disposition of any patient requiring expeditious medical, surgical, or psychiatric care.

Emergency medicine is not defined by location, but may be practiced in a variety of settings including hospital-based and freestanding emergency departments (EDs), urgent care clinics, observation medicine units, emergency medical response vehicles, at disaster sites, or via telemedicine.

Emergency medicine encompasses planning, oversight, and medical direction for community emergency medical response, medical control, and disaster preparedness. Emergency medicine professionals provide valuable clinical, administrative, and leadership services to the emergency department and other sectors of the health care delivery system.

The ED is a unique location at which patients are guaranteed access to emergency care 24 hours a day, 7 days a week. It is able to deal with all types of medical emergencies (illness, injury and mental health) in all age groups. For the general public, the ED is the “shop window” of the health service.

Emergency Medicine (EM) is one of the youngest medical specialties, having been in existence for the last 50 years. Its rise and spread across the globe occurred through an almost simultaneous development in the International Federation of Emergency Medicine (IFEM) founder nations of Australia, Canada, New Zealand, United States, and the United Kingdom.

The model of emergency medical care in these countries made the Emergency Department (ED) - based on a hospital site with supporting inpatient specialties – the hub of the Emergency

Care system. Patients attend EDs on an ad-hoc basis, or pre-hospital personnel transport patients to EDs for EM specialists and their trainees to resuscitate, assess and either admit to the hospital or discharge to the community as appropriate.

The ED is being increasingly utilised by patients, who often regard it as providing accessible, timely and high-quality health care. The rise in the use of EDs exceeds population growth and changes in population morbidity, and presents particular system challenges of crowding, assessment and treatment delays and a reduction in both the quality and safety of care, if capacity cannot grow to match demand.

The most important consideration is that the ED cannot function in isolation, and commonly exists as the hub of an Emergency Care System (ECS) where the patient journey will start in the community, and return there either directly from the ED or after an inpatient stay. EDs cannot function without recognising the need for a systems approach to quality within these other parts of the ECS; similarly, a dysfunctional ED will adversely affect the pre-hospital environment and inpatient service.

Finally, it is important to recognise that the ECS must interface with the planned elements of a healthcare system – particularly the demand for hospital beds and the availability of specialists – but also with a public health perspective. Efforts to improve quality and safety can be perceived to have negative impacts on other areas of care, such as when emergency patients compete for beds with patients scheduled for planned admission. However, a hospital and community which embraces a culture of quality will welcome efforts by the ED to improve quality and support the implementation of changes that will improve care across the system.

*Ann Emerg Med. 2016; 68:142-143.*



## South Western Sydney Local Health District

The South-West Sydney Local Health District (SWSLHD), which covers seven Local Government Areas from Bankstown to Wingecarribee, has a population of approximately 820,000 people, and is projected to grow to over more than a million people in the next decade.

Almost a third of the population of SWSLHD speak a language other than English at home, and in this culturally and linguistically diverse (CALD) community Arabic is the most common language spoken other than English, followed by Vietnamese and Cantonese.

The largest number of Aboriginal residents in metropolitan Sydney live in the SWSLHD with 13,070 people identified as having an Aboriginal or Torres Strait Islander background; and 36 per cent of local residents were born overseas compared to 26 per cent in NSW.

The Population Health Needs Assessment for the Communities of South Western Sydney states “Local communities are not homogenous and comprise people of many ages, cultures and backgrounds. South Western Sydney has some of the most diverse communities in Australia with a large number of Aboriginal residents, an array of people from culturally and linguistically diverse communities, variation in socioeconomic status, metropolitan and rural communities, significant public housing estates and large numbers of people experiencing health and social disadvantage.”

Pockets of considerable disadvantage exist with Fairfield, Liverpool, Bankstown and Campbelltown amongst the most disadvantaged LGAs in metropolitan Sydney. There are systematic demographic differences on many levels between SWSLHD and the rest of NSW. SW Sydney has a higher fertility rate than NSW, and has a young population profile compared to NSW, with 187,274 children aged

0-14 years old and 129,130 young people aged 15 – 24 years old.

Cultural groups may reside in distinct areas; for example, Assyrian speakers primarily reside in Fairfield, whilst people speaking Korean and Indonesian primarily reside in Bankstown. Almost 8,000 humanitarian arrivals settled in the region between 2008 and 2013 (37% of all NSW humanitarian arrivals), with the majority settling in Fairfield and Liverpool.

Humanitarian arrivals often have complex health problems related to their prior access to health care and / or their individual experiences of persecution or trauma. Due to these experiences, refugees in Australia have health needs that differ from the wider population including a higher prevalence of mental health conditions, specific infectious diseases, nutritional deficiencies, obstetric complications, and disability.

The people of South Western Sydney are socioeconomically diverse, with a higher level of unemployment in Fairfield, Liverpool, Bankstown and Campbelltown than the NSW average, and median household incomes in some suburbs below the NSW median of \$1,237 per week. Worryingly, in 2013, 20.9% of SWS residents were defined as obese based on their reported height and weight, and 33.6% were defined as overweight, both slightly above the NSW rate of 32.6%.

19.2% of SWS residents aged over 16 years reported they were current smokers, with rates particularly high in Campbelltown (25.3%) and Liverpool (22.3%) compared with the state average of 17%. The rate of smoking by pregnant women is significantly higher than the state average and is particularly problematic for local Aboriginal women, who are 5.3 times more likely to report smoking during pregnancy than non-Aboriginal women.

The rate of alcohol attributable hospitalisations for the local Aboriginal population was significantly higher than for the non-Aboriginal population (982.9 per 100,000 population compared to 522.1 respectively). The hospitalisation rate for local Aboriginal people was significantly higher for intentional self-harm than the rest of the local population for 15-24 year olds (603.9 compared to 304.6 per 100,000 population), and for all ages (367.6 compared to 136.5 per 100,000 population).





# Emergency Medicine in South Western Sydney

At Liverpool Hospital, an annual census of approximately 85,000 patients passing through the emergency department (ED), and an admission rate of over 50%, means that on average 115 patients each day are sick enough to be admitted to hospital with acute illness or injury, and a similar number are discharged to their own care, to primary care, or to an outpatient consultation. Some patients leave against medical advice.

More precisely, in 2016 Liverpool Hospital ED cared for 83,112 patients; Campbelltown ED 67,196 patients, Bankstown ED 53,512 patients, Fairfield ED 35,362 and Bowral ED 19,250 patients, making a total of 258,432 patients in all. Despite this remarkable workload, which is growing by between 2-6% each year, there is little knowledge of the demographics, presenting complaints and degree of illness suffered by ED patients.

The largest proportion of patient presentations were in the 0-4 age, and more men presented to the ED than women. Paediatric patients were responsible for 21.6% of presentations, the majority in the 0-4 age group.

Pain was the most common complaint, followed by respiratory, trauma, and

gastrointestinal complaints. The most common individual presenting complaint was chest pain, then abdominal pain and dyspnoea.

93 patients received fluid bolus therapy, with normal saline the most commonly used, with a median volume of 1000 mL, followed by Hartmann's solution and packed red blood cells.

Chest pain was the second most common presentation; most commonly reported in those aged 30-34 years old followed by 65-69 years. Undifferentiated chest pain was the most common discharge diagnosis, followed by musculoskeletal pain and gastro-oesophageal reflux disease.

An elevated respiratory rate was reported in 68% of dyspnoeic patients at triage and was sustained to ED departure in 8 adult patients; 5 were admitted to a non-critical care ward, 2 were treated and discharged, and 1 was admitted to ICU.

Trauma was the most common presentation among patients within the 20-24 age group, and was more common in males than females consistent with both reported age distributions and the x2.4 greater likelihood of males experiencing injury in NSW.



## One Day in Emergency (ODE) study

**43.6%**  
of Culturally And Linguistically Diverse (CALD) patients

**41.2%**  
of residents in the Local Government Area (LGA) have a CALD background

**16min**  
difference in ED LOS for CALD patients in comparison to non-CALD background patients

**21.6%**  
of presentations were paediatric patients, with the majority in the 0-4 age group

**68%**  
of dyspnoeic patients were reported with an elevated respiratory rate at triage



# Emergency Medicine Research Unit

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# Multicultural Emergency Medicine Collaboration

In 2017, we established the Multicultural Emergency Medicine Collaboration (MEMC) between a number of collaborators, with an intent to closely analyse the epidemiology, degree of illness, health literacy and health outcomes of all CALD patients attending emergency departments in SWSLHD. We believe we should use the culturally diverse demographics of the district to formally study CALD patients' expectations, experiences and health outcomes, with a view to maximising patient outcomes from emergency care, and collaborating with the PHN and community bodies to deliver potentially preventative emergency health education to the community.

In establishing the MEMC, discussions have taken place with a broad range of potential collaborating researchers and organisations, leading to agreements with the SWS Clinical School of UNSW, the UNSW School of Public Health and Community Medicine, the UNSW Graduate School of Biomedical Engineering, the UNSW Centre for Big Data Research in Health and the UNSW EPIcentre, an initiative between the UNSW School of Medicine and UNSW Art and Design.

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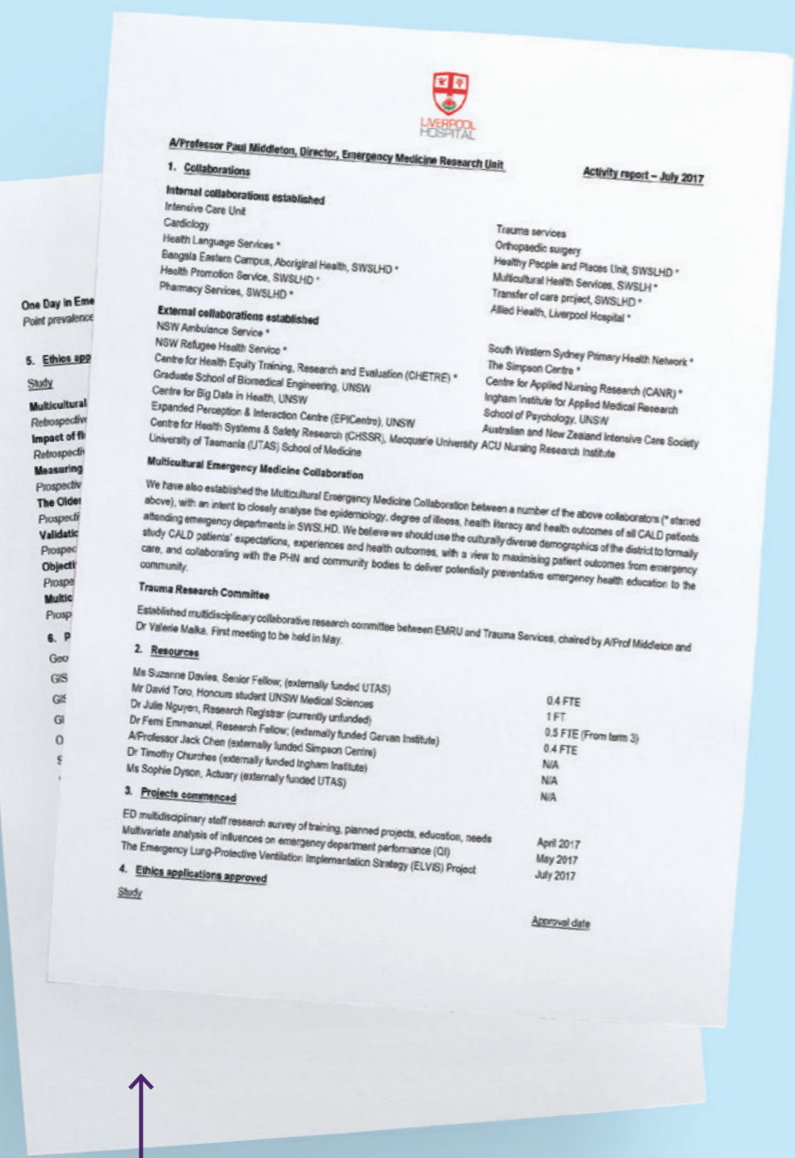
The MEMC is a unique conglomeration of researchers, clinicians, health and community workers and external academics, with a mission to investigate health across the spectrum of our unique and multicultural community.

Our aim to produce new knowledge about the health needs of individuals and groups, research the place of health knowledge and interventions in this setting, understand the multiple and complex intersections of culture, language and health, and to embed evidence-based care to improve survival and quality of life for all.





# Research Reports

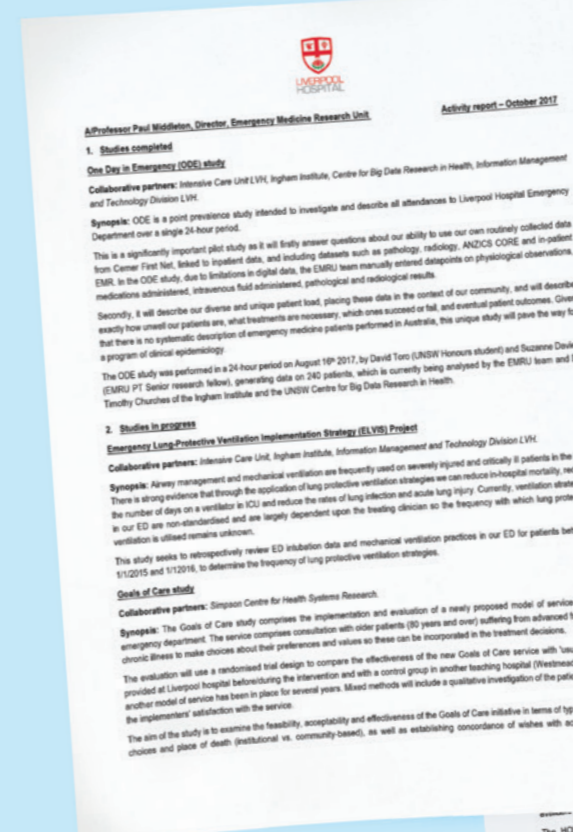


## July 2017

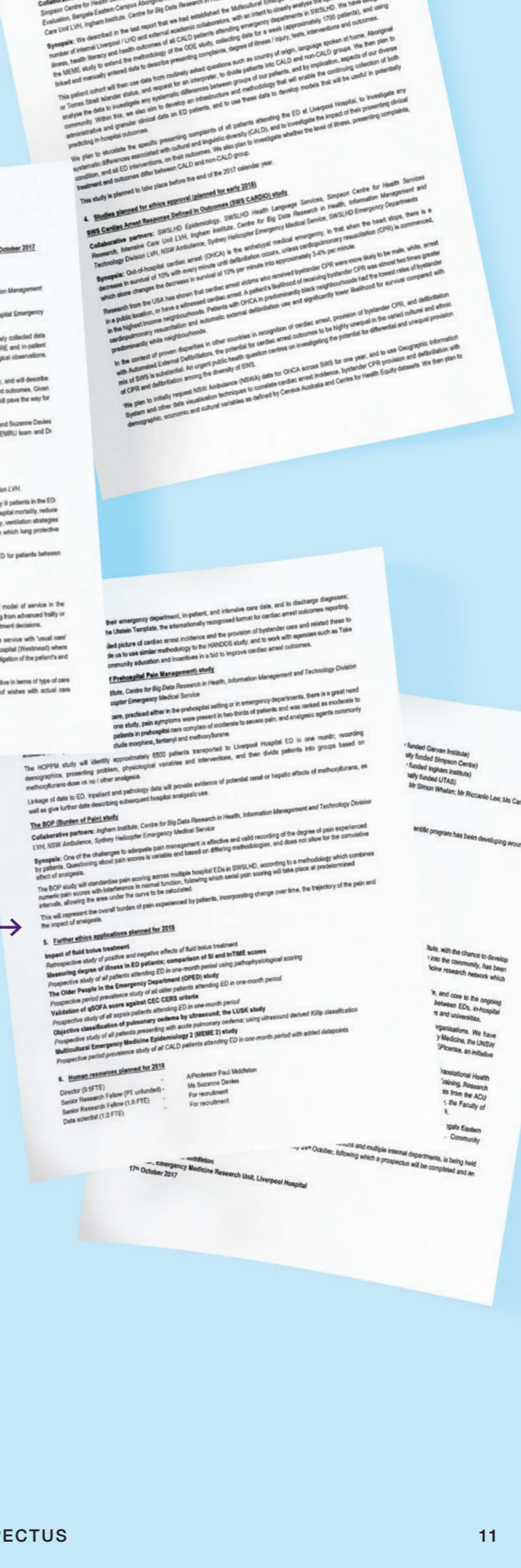
- Internal collaborations established with intensive care, trauma services, cardiology, orthopaedic surgery, Health Language Services, Healthy People and Places Unit, Bangala Eastern Campus, Aboriginal Health, NSW Ambulance Service, South Western Sydney Primary Health Network, NSW Refugee Health Service, The Simpson Centre for Health Services Research, and the Centre for Health Equity Training, Research and Evaluation (CHETRE).
- We have also established the Multicultural Emergency Medicine Collaboration between a number of the listed collaborators, with the intention to closely analyse the epidemiology, degree of illness, health literacy and health outcomes of all CALD patients attending emergency departments in SWSLHD.
- ED multidisciplinary staff research survey of training, planned projects, education, needs completed; multivariate analysis of influences on emergency department performance, and the Emergency Lung-Protective Ventilation Implementation Strategy (ELVIS) Project commenced.

## October 2017

- One Day in Emergency (ODE) study completed, a 24-hour point prevalence study intended to investigate and describe 240 attendances to Liverpool Hospital Emergency Department over a single 24-hour period. This significantly important pilot study will answer questions about our ability to use our own routinely collected data from Cerner First Net, linked to inpatient data, and including datasets such as pathology, radiology, ANZICS CORE and in-patient EMR. It will describe our diverse and unique patient load, placing these data in the context of our community, and will describe exactly how unwell our patients are, what treatments are necessary, which ones succeed or fail, and eventual patient outcomes. Given that there is no systematic description of emergency medicine patients performed in Australia, this unique study will pave the way for a program of clinical epidemiology.
- Emergency Lung-Protective Ventilation Implementation Strategy (ELVIS) study commenced, investigating the implementation of lung protective ventilation strategies to reduce in-hospital mortality, reduce the number of days on a ventilator in ICU and reduce the rates of lung infection and acute lung injury.



- Goals of Care study investigates the implementation and evaluation of a newly proposed model of service in the emergency department, comprising consultation with older patients (80 years and over) suffering from advanced frailty or chronic illness to make choices about their preferences and values to allow incorporation in treatment decisions.
- Multicultural Emergency Medicine Epidemiology (MEME) study submitted for ethical approval. The MEME study extends the methodology of the ODE study, collecting data for a week (approximately 1700 patients), and uses linked and manually entered data to describe presenting complaints, degree of illness / injury, tests, interventions and outcomes. Data from routinely asked questions such as country of origin, language spoken at home, Aboriginal or Torres Strait Islander status, and request for an interpreter, will be used to divide patients into CALD and non-CALD groups. We then plan to analyse the data to investigate any systematic differences between groups of our patients, and by implication, aspects of our diverse community.





# Ingham Institute for Applied Medical Research

The Ingham Institute is a global leader and centre of excellence in population and health services research. With a vision of “Inspiring health. Transforming care”, and core values of relevance, integrity, impact and inclusivity, the Ingham Institute’s world-class medical research is rooted in and driven by the needs of our local South West Sydney community. We are committed to inspiring better health of our local community, and transforming the treatment and care of people living with common medical conditions and disease.

Through applied medical research and partnerships with universities, hospitals and our local healthcare community, the Ingham Institute is working to radically transform health outcomes for the better – creating thriving communities, both locally and globally.

The Ingham Institute comprises a strategic network of medical research centres of excellence, produce world-class insights and discoveries for application to health care services and systems transforming community wellbeing locally and globally.

The SWERI has been chosen to be a core member of the Population and Health Services Research stream at the Ingham. Population and health services research aims to understand the origins of health and disease to improve the wellbeing of all generations, including babies and children. Through the PHSR stream, we will work directly with our diverse and growing community of South West Sydney to develop health services and treatment programs that serve the current and emerging health needs of our community.

# List of recent publications

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2. Cone DC, Middleton PM. Are out-of-hospital cardiac arrest survival rates improving? Resuscitation 2015; 91: A7-A8.
3. McRae PJ, Bendall JC, Madigan V, Middleton PM. Paramedic-performed Fascia Iliaca Compartment Block for Femoral Fractures: A Controlled Trial. J Emerg Med. 2015 May; 48(5): 581-9.
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10. Lee QY, Redmond SJ, Chan GSH, Middleton PM, Steel E, Malouf P, Critoph C, Flynn G, O’Lone E, Lovell NH. Estimation of cardiac output and systemic vascular resistance using a multivariate regression model with features selected from the finger photoplethysmogram and routine cardiovascular measurements. Biomed Eng Online 2013; 12: 19. doi: 10.1186/1475-925X-12-19. (Designated Highly Accessed via BioMed Central).
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16. Middleton PM. Practical use of the Glasgow Coma Scale; a comprehensive narrative review of GCS methodology. Australas Emerg Nurs J. 2012 Aug; 15(3): 170-83.
17. Simpson PM, Bendall JC, Patterson J, Middleton PM. Beliefs and expectations of paramedics towards evidence-based practice and research. Int J Evid Based Healthc 2012 Sep;10(3):197-03.
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22. Simpson PM, McCabe B, Bendall JC, Cone DC, Middleton PM. Paramedic-performed digital nerve block to facilitate field reduction of a dislocated finger. Prehospital Emergency Care 2012; 16(3): 415-7.
23. Smith JE, Rickard A, Gay D, Middleton PM. Outcome of wrist injuries with clinical suspicion of scaphoid injury after normal computed tomography. European Journal of Emergency Medicine 2012; 19: 188-192.
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# South West Emergency Research Institute

In mid-2017 the suggestion was made that the EMRU considered the possibility of expansion to become an SWSLHD-wide Emergency Research Institute (SWERI). To that end A/Professor Middleton has developed the conceptual basis for the SWERI; this is based on our unique position at the fulcrum of both the patient journey and the research continuum.

Our philosophy is that good clinical research is an essential core activity that should run 24 hours a day and is integral to the function of our Emergency Departments. Structured research protocols bring high quality evidence-based practice to the bedside right now to benefit our patients, and help us to improve treatments and outcomes in the future.

Our principal aim is to improve patient care and clinical outcomes in the ED. This includes reducing the number of patients requiring ED care through the development of strategies to prevent serious illness, and reducing the time patients are required to stay in hospital by improving the emergency care they receive.

Our position in the centre of the patient journey balances community and prehospital care on one hand, and in-hospital care including speciality management and critical care, then return to primary care and rehabilitation if needed, on the other hand. The research continuum commences with clinical epidemiology of all emergency medicine patients, particularly emphasising our multicultural community; observational research, interventional trials, translation of evidence into practice, a particularly thorny issue in the maelstrom of emergency departments, and finally innovative approaches in both clinical practice and novel enterprise technology.

SWERI has agreement and commitment from collaborators in the university sector, including:

- **University of New South Wales (UNSW)**
- **Western Sydney University (WSU)**
- **University of Wollongong (UOW)**
- **University of Sydney (USyd)**
- **Macquarie University (MU)**
- **Australian Catholic University (ACU)**
- **University of Tasmania (UTAS)**
- **University of Technology Sydney (UTS)**

Collaborations have been established across academic areas as diverse as public health and epidemiology, biomedical engineering, psychology, patient and health systems safety, translational research, academic nursing, academic allied health, health equity, data visualisation, big data research and health service management.

A/Professor Middleton has recruited academic emergency collaborators from Liverpool Hospital, including emergency specialists, registrars, nurses, allied health and clerical staff, and has also recruited collaborators from similar backgrounds from Campbelltown, Fairfield, Bankstown and Bowral Hospitals, including a commitment from the Directors and Nurse Unit Managers of SWSLHD Emergency Departments to actively collaborate in research.

We have confirmed internal collaborations with services including intensive care, trauma, respiratory medicine, neurology, cardiology, orthopaedics, general surgery, pharmacy and the LVH Community Participation Coordinator.

There have also been extended discussions with other bodies both within the SWSLHD and without, and SWERI has agreements to work co-operatively with NSW Refugee Health, Bangala Eastern Campus, Aboriginal Health, SWSLHD bodies such as Epidemiology, Health Language Services, Health Promotion Service, Multicultural Health Service, Consumer and Community Participation and Transfer of Care; the SWS Primary Health Network of 900 general practitioners, the NSW Ambulance Service and the Sydney Helicopter Emergency Medical Service (HEMS).

This prospectus and application is currently being prepared to apply for potential funding opportunities in 2018 and onwards, and positive discussions have already been had with Professor Chris Levi from SPHERE, in terms of the potential for SWERI to become involved as a discrete group within SPHERE in the future.



# SWERI and the patient journey

A patient becomes sick or injured in the community, either at home, at work, or in some other location.

This may sound obvious, but our health system is segmented and compartmentalised into organisations and domains that are divorced from each other, not only lacking in collaborative approaches but having minimal or no ability to share data, to communicate effectively, or to take part in any of the other activities which have been internationally identified as essential to provide high-quality care.

For instance, a patient who has chest pain has two choices, other than to do nothing; either to attend their general practitioner or to attend the emergency department. Following this they have the choice to consult either of these health settings by travelling independently, by car, on foot or by public transport; or by calling an ambulance.

Many factors impinge on these decisions, but foremost among them is the perception of urgency that the patient has, which may in turn depend on their prior health literacy, the severity of their symptoms, or the advice of friends or family. Thus, patients presenting with chest pain may have called an ambulance to attend the emergency department, or may have waited for their relative to come home from work, have been driven to the general practitioner, and then have been driven to the ED to present through the waiting room.

Both of these patients may be having a heart attack.

A similar situation is true when a patient leaves the hospital after their episode of chest pain, which may be following angioplasty and recovery through an admission to the coronary care unit, or may involve leaving

the ED having been seen by a doctor, had an electrocardiograph and blood tests searching for heart muscle damage, and having been classified as low risk with arrangements made to follow up through their GP.

What this describes is the patient journey; acknowledging that patients get sick in the community, and hopefully return to the community for either recovery, or to take part in a process of rehabilitation towards health.

The emergency department, therefore, is at a crucial hub between the community and primary care, and specialist intervention in the hospital setting; at this hub lie the critical processes of risk assessment, resuscitation, emergency intervention, recognition of degree of illness, diagnosis and disposition.

Research in emergency medicine, therefore, potentially encompasses every stage in a patient journey, from health at home to primary care and ambulance involvement, through the ED itself, and on through their inpatient stay and definitive interventions, and on to their recover in the community and their involvement in activities of daily living.

Research through the SWERI is therefore planned to be essentially collaborative, working with colleagues from prehospital, emergency medicine, medical and surgical specialities and primary care, to ensure that the data we analyse, and the conclusions we make, are based on the whole patient and their place in the community, rather than simply one small segment of their journey.

## PATIENT JOURNEY



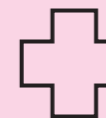
COMMUNITY



AMBULANCE +  
PREHOSPITAL



EMERGENCY  
MEDICINE



HOSPITAL



PRIMARY  
CARE





## Big Data

Big data analytics is becoming increasingly popular. According to Google Trends, the number of searches using the keyword “big data” started to increase dramatically in 2011 and reached its peak this year. Although the term “big data” sounds as if it is related to the area of data science only, it actually plays an important role in healthcare research, including emergency medicine.

Compared with clinical practitioners, data scientists are more familiar with research that is focused on data. Particularly, analysing very large numbers of hospital records of the whole population is one of the big data approaches that are becoming more and more popular. The big data approach is cost effective because hospital records already exist; thus, the data-collection process can be avoided. Moreover, the quality of hospital records is expected to be more accurate than data obtained through questionnaire surveys.

Wong and Lai extracted ambulance-use records from the data set and aggregated them into time-series data by different socio-demographic and health factors. The time series were then regressed on different meteorological time-series data, such as daily temperature and

relative humidity, obtained from the Hong Kong Observatory (HKO) website. Finally, high-risk groups—such as women, low-income groups, and the elderly—were identified to be more sensitive to extreme weather conditions.

Wong and Lai also successfully demonstrated that the HKO seven-day weather forecast report was useful for improving short-term daily ambulance-demand forecasts, and have also used ambulance demand big data to develop a long-term projection of ambulance demand for the year 2036. They used the big data and the population projection compiled by the Planning Department of Hong Kong to make the projection through combining regression models; their results considered to be a warning signal for the government, as without considering the rapidly aging population, the long-term ambulance-demand projection will largely be underestimated.

NSW and the SWSLHD are fortunate in that there a relatively ubiquitous emergency department information system in use in Cerner First Net, which collects demographic, clinical, investigational and outcome data. Furthermore, work is currently being performed on deterministic linkage between ED data and other important datasets, including the inpatient Electronic Medical Record, Primary Health Network general practice data mediated through My Health Record

and the Interoperability Project; and NSW Ambulance and the NSW Data Analytic Centre.

Furthermore, large relevant datasets are increasingly available and accessible, such as those constructed from the Australian Census, New South Wales State and Local Government Area Population Projections, and the Centre for Health Equity Training, Research and Evaluation (CHETRE)’s Locational Disadvantage program giving information on health equity.

Data analytic approaches using techniques such as complex systems dynamic statistical and computational models, non-linear regression and data visualisations hold great promise for revealing patterns within large datasets, and geospatial techniques such as Geographic Information System mapping allow relationships between data to be discerned.

For healthcare, the goal is to provide a continually learning infrastructure with real-time knowledge production and to develop a system that is preventative, predictive, and participatory. Big data analysis clearly has tremendous potential to improve healthcare and transform the health of populations. The SWERI believes that a unique opportunity exists to leverage these current initiatives to develop data-based science in all aspects of emergency medicine research, including clinical epidemiology, health services research, health economics, surveillance of disease and preventative programs based in the community.

The SWERI is recruiting a post-doctoral data scientist with speciality training in advanced data analytics and modeling, statistics, predictive analytics, supervised and unsupervised machine learning, survival analysis, neural networks, data mining, text mining and language processing. This scientist will work with clinical and data colleagues at the Ingham Institute, the UNSW Centre for Big Data Research in Health, the WSU MARCS Institute and the SWSLHD Business Intelligence Unit to drive a unique and internationally competitive centre of excellence in emergency and acute medicine data science.

## RESEARCH SPECTRUM





# SWERI and the research spectrum

## Clinical epidemiology

*The application, by a physician who provides direct patient care, of epidemiologic and biometric methods to the study of diagnostic and therapeutic process in order to effect an improvement in health.*

**David Sackett,**  
*Journal of Epidemiology,*  
*February 1969*

Evidence forms the basis of modern medicine. Clinical research provides us with this evidence, guiding health professionals towards solutions to problems that they face in daily practice. Transferring existing problems

in medical practice to a research setting is a challenging process that requires careful consideration, and the practice of clinical epidemiology aims to address this through the application of established approaches for research in human populations, while at all times focusing on the problem at hand from a clinical perspective.

The discipline of clinical epidemiology includes trials methodology, quality of life measurement, meta-analysis, guidelines development, decision analysis, health services research, non-experimental design, and clinical economics.

Australia, in line with other developed countries, spends more on the healthcare of its citizens than on any other single budgetary item. This already burdensome amount is projected to increase, mostly as a function of an increasingly aging population and the availability of sophisticated (and expensive) technologies. The care of patients in emergency departments accounts for a substantial proportion of these healthcare costs. In New South Wales, Australia's most populous state, there are over two million visits to emergency departments every year, a figure equivalent to almost a third of the state's population.

Recent Australian national data report just on eight million separate episodes of care over the preceding 12 months, a number that has been steadily increasing, and is expected to continue increasing, at a national average of 2.5% per year. Associated with these national ED presentations were 10,000 deaths and 80,000 hospital admissions due to acute coronary syndromes, 28,179 attendances as a result of a workplace injury, and just under half a million

*We cannot improve that which we do not measure*

**Michael Kurz,**  
*Resuscitation 2013*

paediatric presentations. Emergency department episodes of care for children under 14 have increased at a rate over 4 times that of the overall increase in ED presentations.

Despite over two million people attending NSW emergency departments with undifferentiated disease, ranging from sprained ankles and upper respiratory tract infections to acute coronary syndromes, major trauma and cardiac arrest, there is no central infrastructure or mechanisms to collect and analyse clinical or process data. This has led to a situation where both clinicians and policy-makers are bereft of the basic information and evidence required to make outcomes-based patient care decisions. Diagnostic strategies and therapeutic interventions within the prehospital and emergency settings are therefore made based on best available evidence, but with minimal outcome data to reinforce or modify practice.

An enormous problem is that there is no way, either in NSW or elsewhere in Australasia, to perform epidemiological investigation into emergency and acutely ill or injured patients. When we treat the ill and injured, we need sufficient detail to let us understand why they got sick, how sick they really are, how urgently they need treatment, which interventions were most needed and whether those interventions actually worked or not. To ensure that we are performing these tasks correctly, and to show that our interventions are beneficial for patients, whether they comprise resuscitation, investigations or other intervention, we need to study the detail of clinical presentations and management and relate them to both short and long-term

patient outcomes.

Furthermore, topics such as the place of the emergency department within the hospital, its integration into hospital processes and the tension between the management of emergency and elective patients have been the subject of intense scrutiny across the world, with interventions of being implemented with varying success, but the level of scientific assessment and analysis still lags well behind clinical research, despite the expense and health system impact.

The main issue, therefore, is that NSW, and Australasia generally, undertakes no systematic collection of granular clinical data in emergency patients, such as, for example, characteristics of chest pain, acute physiological condition, resuscitation interventions, medications given, electrocardiogram findings and investigation results. The lack of these clinical data means that we have no mechanism to improve any patient care, because we do not know what we currently do for patients or how successful our interventions are.

Clinical epidemiology lies at the heart of SWERI activity, and forms a core of scientific methodology aimed at designing research to describe the patients we see in emergency departments, build predictive models based on patient data to precisely diagnose illness and injury and to accurately estimate the effects of interventions on outcome, and to implement proven, evidence-based strategies to support these. SWERI epidemiological work is underpinned by point prevalence studies such as the ODE and MEME studies, precisely describing all patients attending emergency departments, their presenting problems, degrees of illness, clinical stability, need for resuscitation and intervention, clinical course and outcomes, both short-term within the hospital, and longer term in the community. Areas of immediate interest include multicultural emergency health, cardiac arrest, chest pain, traumatic injury, respiratory disease including dynamic influenza mapping, paediatric illness and sepsis, sepsis related to CALD status, impact of CALD status on time

to presentation and utilisation of the emergency department.

The SWERI plans to undertake extensive clinical epidemiological research, defining, describing and predicting the outcomes of our patients across SW Sydney. This will be undertaken by investigators and data collectors working in all SWSLHD emergency departments, and data will be linked to a backbone of routinely collected demographic and clinical data derived from Cerner FirstNet, the Electronic Medical Record, and external linkages to NSW Ambulance and SWS Primary Health Network data via My Health Record.

## Observational research

Cohort, cross sectional, and case-control studies are often referred to as observational studies because the investigator simply observes, and no interventions are carried out by them. With the emphasis on evidence based medicine, the profusion of systematic reviews and meta-analyses driven by the evolution of resources such as the Cochrane Database of randomised controlled trials, such studies have been somewhat glibly maligned. However, they remain important because many questions can be efficiently answered by these methods and sometimes they are the only methods available.

Observational research, as a set of epidemiological techniques, may be used to study prevalence, incidence, cause, prognosis, or effect of treatment; although potential for confounding means that randomised controlled trials are a superior methodology for the last area of investigation. Having said that, the pragmatic approach needed for the processes of research in an environment such as emergency medicine means that statistical techniques such as regression and propensity score matching may be effectively used to provide robust statistical analysis.

The SWERI intends to use the techniques of observational research, particularly cohort and cross-sectional





studies, to investigate incidence and prevalence of disease in our population, and the impact of factors such as language barriers, health literacy, pre-existing health status, delays to presentation, and culturally-mediated health behaviours, among others.

We intend to commence data collection in a quality registry format, similar to cardiac arrest or trauma registries, in order to standardise data collection and data variables, develop database management and data cleaning methodologies, and develop the infrastructure and reporting standards to support this.

According to the Australian Commission on Safety and Quality in Health Care (ACSQHC) Framework for Australian clinical quality registries, a quality registry is "...an organisation which systematically monitors the quality (appropriateness and effectiveness) of health care, within specific clinical domains, by routinely collecting, analysing and reporting health-related information.

The information is used to identify outcome benchmarks, significant outcome variance, and inform improvements in healthcare quality."

We plan to create an Emergency Medicine Clinical Outcomes Registry (EMCOR) and a SWS Chest Pain Epistry, that could be used in SWSLHD and promulgated to the rest of greater Sydney and NSW at a later date.

## Interventional research

Interventional studies are usually prospective and are specifically tailored to evaluate the direct impact of treatment or preventive measures on disease. Each study design has specific outcome measures that rely on the type and quality of data utilised, and additionally each study design has potential limitations that are more severe and need to be addressed in the design phase of the



study. The most common and strongest interventional study design is a randomised controlled trial, however, there are other interventional study designs, including pre-post study design, non-randomised controlled trials, and quasi-experiments.

Interventional research studies include three elements; 1) definition and measure of exposure in two or more groups, 2) measure of health outcome(s) in these same groups, and 3) statistical comparison made between groups to assess potential relationships between the exposure and outcome.

The SWERI considers that interventional research is an essential component of a comprehensive emergency medicine research strategy, however we are also aware of the flaws in research methodology and the historical errors that have been prevalent in this domain of academic endeavour, particularly small study size and lack of methodological expertise. Because of this the SWERI

intends to develop a detailed plan for the incremental introduction of interventional research across SWSLHD, bearing in mind both the risks of losing clinician goodwill for the entire research agenda and enterprise, the need to ensure that adequate resources are available for the appropriate preparation and conduct of interventional research, and the place of interventional research in the process of building an evidence base to support effective clinical care in acutely ill and injured patients.

In this context, the SWERI will develop a consensus approach to agreement to collaborate in trials organised by bodies external to emergency medicine, and elaborate a limited schedule of trials which can be carried out in emergency departments and with emergency medicine patients. A framework will be established to ensure that there is only one channel for proposals to be submitted to the SWERI, and agreement on the involvement of emergency medicine clinicians and scientists.

In addition to this, the SWERI will also develop a plan for the introduction of interventional trials which are generated from emergency medicine, and considered to be important or essential in the scientific program. A strict schedule of trials, including dates, investigators, responsibilities, data and sites will be maintained.

## Translational | health services research

### Translational research

In a speech to the BioMelbourne Network, Professor Ian Chubb, the ex-Chief Scientist of Australia, said that Australia's basic research scientists "...produce 3% of the world's research with 0.3% of the population..." and that although the "...amount of basic research being

conducted is sky high and budgets are far larger than they were in the 1980's or 90's..." "...research advances (in quality and quantity) have not led to a marked increase in new cures. Much of what we now use to treat many common ailments is based on research from years ago."

This is particularly true in emergency care, whether driven by medicine or nursing, or prehospital or in-hospital. Just as the adult literature does not always translate to children, treatments or care delivery paradigms generally accepted as effective in one region or population may prove harmful in another. For example, in the FEAST study, paediatric resuscitation according to Paediatric Advanced Life Support guidelines proved harmful when resuscitating febrile children in East Africa. Setting-specific research prevents inappropriate extrapolation of treatments across disparate populations and provides evidence for practice guidelines to improve patient care.

A definition from Academic Emergency Medicine stated that translational research "...fosters the multidirectional and multidisciplinary integration of basic research, patient-oriented research, and population-based research, with the long-term aim of improving the health of the public."

Translational research includes two areas of translation.

One is the process of applying discoveries generated during research in the laboratory, and in preclinical studies, to the development of trials and studies in humans.

The second area of translation concerns research aimed at enhancing the adoption of best practices in the community. Cost-effectiveness of prevention and treatment strategies is also an important part of translational science.

The interaction of several disciplines is required to translate knowledge from one type of research to another (e.g., to move a basic science discovery to the bedside), therefore collaboration through multidisciplinary teams facilitates the emergence of novel concepts and approaches to addressing important health issues.



The emergence and development of new ideas are goals of translational research, and there are many possible models of training that can provide the academic path to these goals.

The ultimate goal of translational research - to improve human health - requires meaningful community engagement across the entire spectrum of research from basic science to community and population health research, and communities can contribute to the full range of clinical and translational research in important ways that are not always recognised.

For example, partnerships with community representatives can identify community health needs and priorities, provide critical input and data on clinically relevant questions, develop culturally appropriate clinical research protocols, promote successful enrolment and retention of research participants, and, ultimately, disseminate and implement research results more effectively.

The SWERI is resolutely a multidisciplinary organisation, with currently active researchers coming from medical, nursing, physiotherapy, clerical and paramedical backgrounds. We fully intend to implement a program of translational research involving all disciplines, ensuring that translation from basic science and published evidence on best practice care is carried out on a scientific basis, with structures and processes supporting this which will ensure that outcome metrics are routinely and comprehensively collected and analysed.

### Health services research

Health services research is a multidisciplinary scientific field that examines how people access health care practitioners and health care services, how much care costs, and what happens to patients as a result of this care. Studies in HSR investigate how social factors, health policy, financing systems, organisational structures and processes, medical technology, and personal behaviours affect access to health care, the quality and cost of health care, and quantity and quality of life.

The SWERI plans to collaboratively

perform health services research in two main domains, **Implementation Research** and **Impact Evaluation**.

### Implementation research

The World Health Organisation describes implementation research as the scientific study of the processes used in the implementation of initiatives as well as the contextual factors that affect these processes. It can address or explore any aspect of implementation, including the factors affecting implementation (such as poverty, geographical remoteness, or traditional beliefs), the processes of implementation themselves, and the outcomes, or end-products of the implementation under study.

Importantly, the WHO also states “We spend billions on health innovations, but very little on how best to use them. This problem affects everyone, but in particular populations in low- and middle-income countries where the implementation challenges are greatest.” This is important because implementation of health strategies in the emergency and acute illness are injury settings is challenging in itself, but there are added layers of difficulty in ensuring good health outcomes when there is a broad variability in culture, language and health literacy. This may be apparent between countries as defined by the WHO, however this is poorly defined in Australia’s multicultural society.

Despite abundant evidence of the efficacy of affordable, life-saving interventions, there is little understanding of how to deliver those interventions effectively in diverse settings and within the wide range of existing health systems. Implementation issues often arise as a result of contextual factors that policy-makers and health system managers may not even have considered.

### Impact evaluation

Research with emphasis on effectiveness of health care practices and organisation of care, using a narrower range of study methods such as systematic reviews of health system interventions. One large health impact evaluation study in the UK, for instance, showed that government-initiated large-scale reorganisations aimed at improving access to



health services across a seven-day week may negatively impact care quality without additional financial investment, as demonstrated by worsening of some outcomes.

We plan to study and evaluate both implementation and impact of health interventions and education both across the emergency care spectrum and across the SWSLHD community.

### Leading Better Value Care

The Leading Better Value Care (LBVC) program is focused on what patients, clinicians and the public health system value: improving the health of individuals and communities, doing it safely, doing it efficiently and optimising the use of health system resources.

Led by the NSW Ministry of Health, and supported through the Agency for Clinical Innovation (ACI) and the Clinical Excellence Commission (CEC), the Program is about

improving the experience of care for everyone. According to the LBVC website... “The NSW health system is refocussing away from the traditional approach of measuring value in terms of volume/output (in relation to costs), to measuring value in terms of the Institute for Healthcare Improvement’s Triple Aim of health outcomes, experience of care and efficient and effective care (in relation to costs). The aim is to provide health services that are patient focused, evidence based, safe, high quality, effective and efficient.”

On this basis, SWERI programs are intimately related to the desired outcomes for patients of NSW Health, being designed to discover, assess and implement best-evidence based care for all emergency department patients. The LBVC program is largely focused on non-emergency medicine problems, however, but what is common to all is the concept

of *unwanted clinical variation* in care.

### Unwarranted clinical variation

Unwarranted clinical variation (UCV) is an ongoing barrier to providing safe and effective care for patients. Recognising and addressing UCV has been identified as a shared priority across the NSW Health system.

UCV is “variation that cannot be explained by the condition or the preference of the patient; it is variation that can only be explained by differences in health system performance”. It can reduce safety, quality, performance effectiveness and efficiency outcomes

The Bureau of Health Information (BHI) ‘Healthcare in Focus’ reports, as well as service utilisation data from the admitted patient data collection, have flagged variations in inpatient care, and the Agency for Clinical

Innovation has been partnering with clinical teams to investigate variation using clinical audit tools designed to benchmark care against evidence based guidelines.

The SWERI has had discussions with ACI UCV program officers and will undertake to design research, quality and audit approaches to UCV in the emergency medicine setting, a task not being undertaken in any other area.

The SWERI will furthermore work with collaborating investigators, such as Professor Mary-Louise McLaws, the Primary Health Network and the Academic General Practice Unit to investigate variations in metrics such as antibiotic prescribing, biochemical and radiological investigation ordering, hospital admissions and discharge to primary care.

### Health economic and actuarial analyses



As part of our commitment to taking emergency care into the community, we will work with community partners and representatives to ensure that changes in clinical care are not only fit-for-purpose but also consistent with the distribution of pathological problems in our local populations. Furthermore, we hope to integrate our translational programs with education and preventative interventions, in order to work on safely decreasing ED attendances by early and effective intervention.

A fundamental part of the SWERI translational research program is the partnership with our health economist and actuarial colleagues and co-investigators. Partnerships with expert bodies such as the Australian Institute of Health Service Management (AIHSM) at the University of Tasmania will allow the building of expert collaborations, which in turn offer the opportunity to perform unique investigations into the real costs of emergency health care on the levels of emergency department, ambulance, institution and community. The SWERI has a part-time research fellow who is trained both as a paramedic and an actuary, as well as a collaborating health economist.

We plan to ensure that all clinical and health services studies are accompanied by health economic and cost-benefit analyses, in order to guarantee that appropriate best-practice in clinical care is accompanied by best-practice in budget management.

### Decision making and clinician error

The emergency department environment is characterised by the need for urgent but accurate decision-making, although whether at triage, screening or in resuscitation, this has to be done with minimal, or at least insufficient, information. The science of decision making is key to patient wellbeing, as a function of evidence based practice, and best patient outcomes, and we urgently need to study how to ensure that our patients are placed at least risk, despite often being undifferentiated, quickly deteriorating and being managed by staff of variable seniority.



We are working with the School of Psychology at UNSW, and the Centre for Health Systems and Safety Research at Macquarie University, to investigate decision making under time stress, the effect of knowledge and debiasing on cognitive function in emergency diagnosis and treatment, communication processes, and the impact of interruption on clinical work.

## Innovation, impact and enterprise

The clinical management of a large cohort of undifferentiated patients provides large areas of uncertainty in the diagnosis, elucidation of

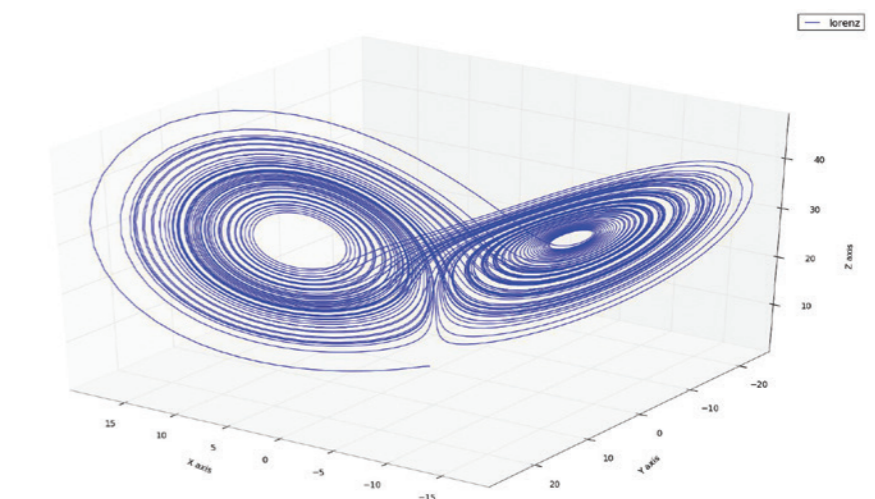
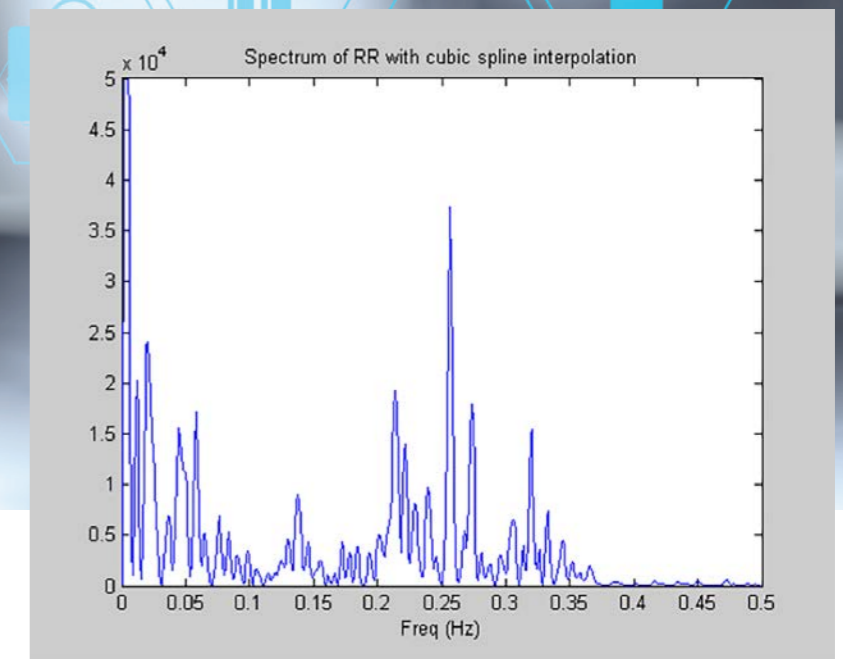
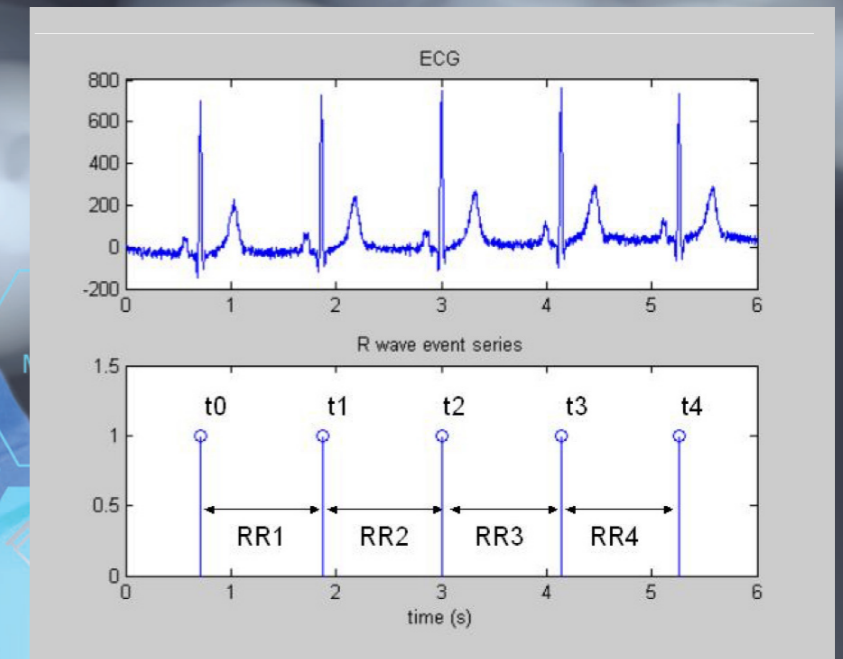
pathophysiology and detection of deterioration. Australian and worldwide innovations have sought to produce tools which are able to add value to these areas, particularly in the critical care and emergency medicine arenas.

SWERI personnel have experience in multiple areas of non-invasive and innovative monitoring and diagnostic modalities, and have been in extended collaborations with eminent expert bodies such as the UNSW Graduate School of Biomedical Engineering and the Biomedical Systems Laboratory. Current collaborations, including those with the MARCS Institute from Western Sydney University and start-ups such as Elula, will allow innovation in diverse enterprise areas such as innovative monitoring medical devices, non-linear analyses

of patient flow, prescriptive analyses, and investigation of complex adaptive system mathematics in emergency department function.

We already have a track record in innovative diagnostic techniques using novel interpretations of non-invasive devices such as the cross-correlation between frequency spectral analysis of photoplethysmography and R-R interbeat intervals; and have also developed non-linear analytic approaches to factors causing emergency patient flow delay.

We plan to bring the hardest and most intractable problems together with the most advanced analytics, and in doing so, develop solutions which may lend themselves to intellectual property protection and commercialisation.





# The unique SWERI proposition

The SWERI is unique; it comprises a inimitable blend of expert emergency clinicians, from medical, nursing, allied health and prehospital backgrounds; health service academics from emergency medicine, critical care, medical specialties, epidemiology and public health; university academics from public health, biomedical engineering, psychology, robotics, geography, statistics and big data, patient safety and toxicology, to name but a few; and finally close links with community and primary care stakeholders such general practice, community engagement, health language services, aboriginal health and refugee health.

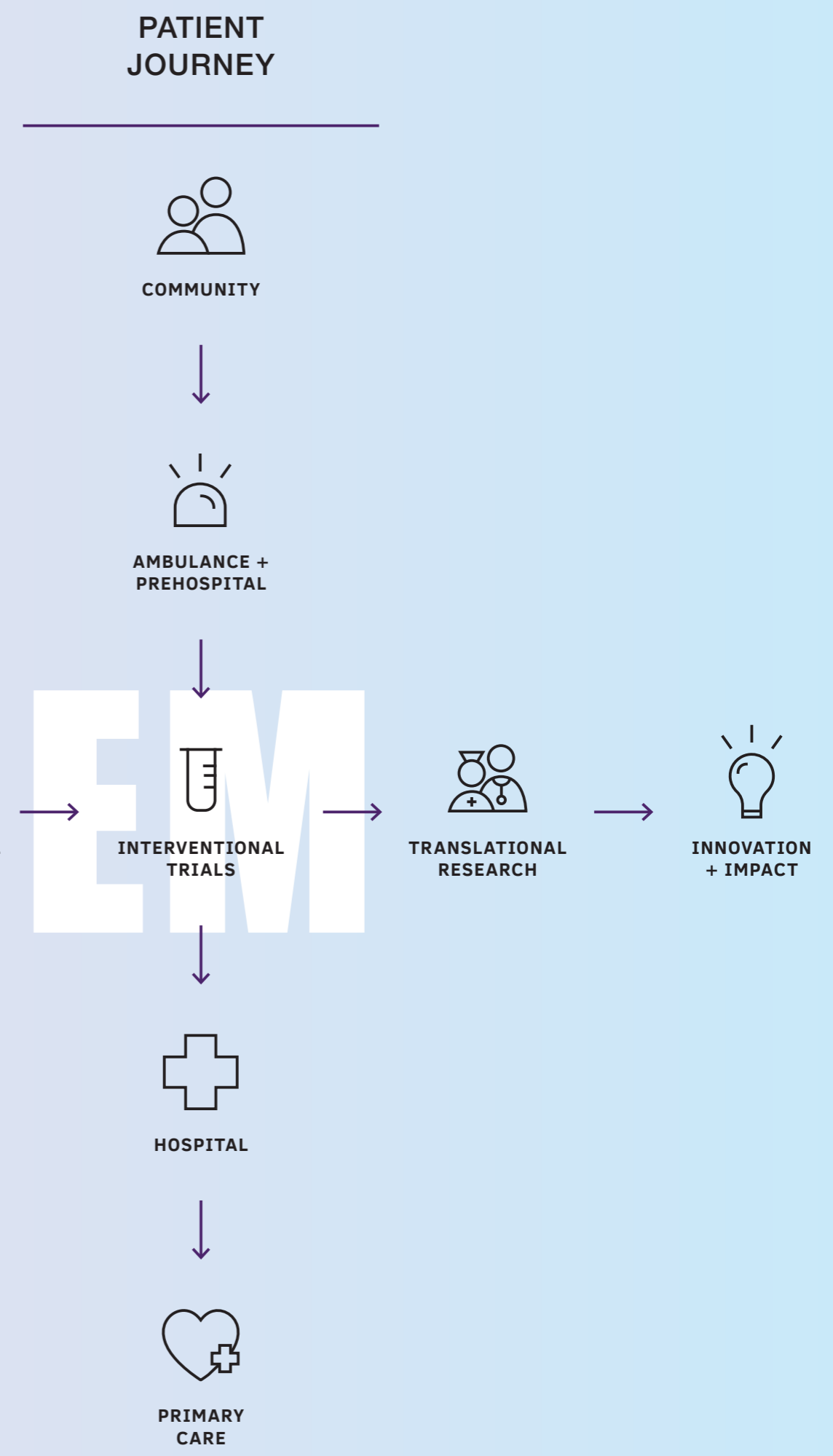
These exceptional collaborations allow us to seamlessly investigate questions along the patient journey, from community to ambulance, through emergency medicine, intensive care and inpatient hospital wards, to rehabilitation and community care; ensuring that our analyses are not limited to one domain of care alone, but incorporate clinical issues, treatment interventions and outcomes that normally would never be available.

The titration of clinical academics and university departments, together with colleagues from a multitude of backgrounds, and with community organisations, also allows SWERI to combine our unique patient journey-based approach

with the performance of research across the spectrum of methodologies. These range from prehospital, emergency and critical care epidemiology, a particular strength of the SWERI and its collaborators, and in particular epidemiology focused in our multicultural community; through large-scale observational research and quality registry and epistry construction; and design, implementation and cooperation in interventional trials. Innovative techniques such as geospatial mapping and data correlation will allow us to investigate predictors of emergency presentations, and potentially allow us the capacity to intervene within the community setting.

A further unique potential within SWERI lies in the translation of research findings into clinical practice, across medical, nursing and allied health domains; investigation of the implementation of innovation and quality initiatives into acute and emergency clinical care and in the community, coupled with health services research in allied areas such as clinical variation and health economics.

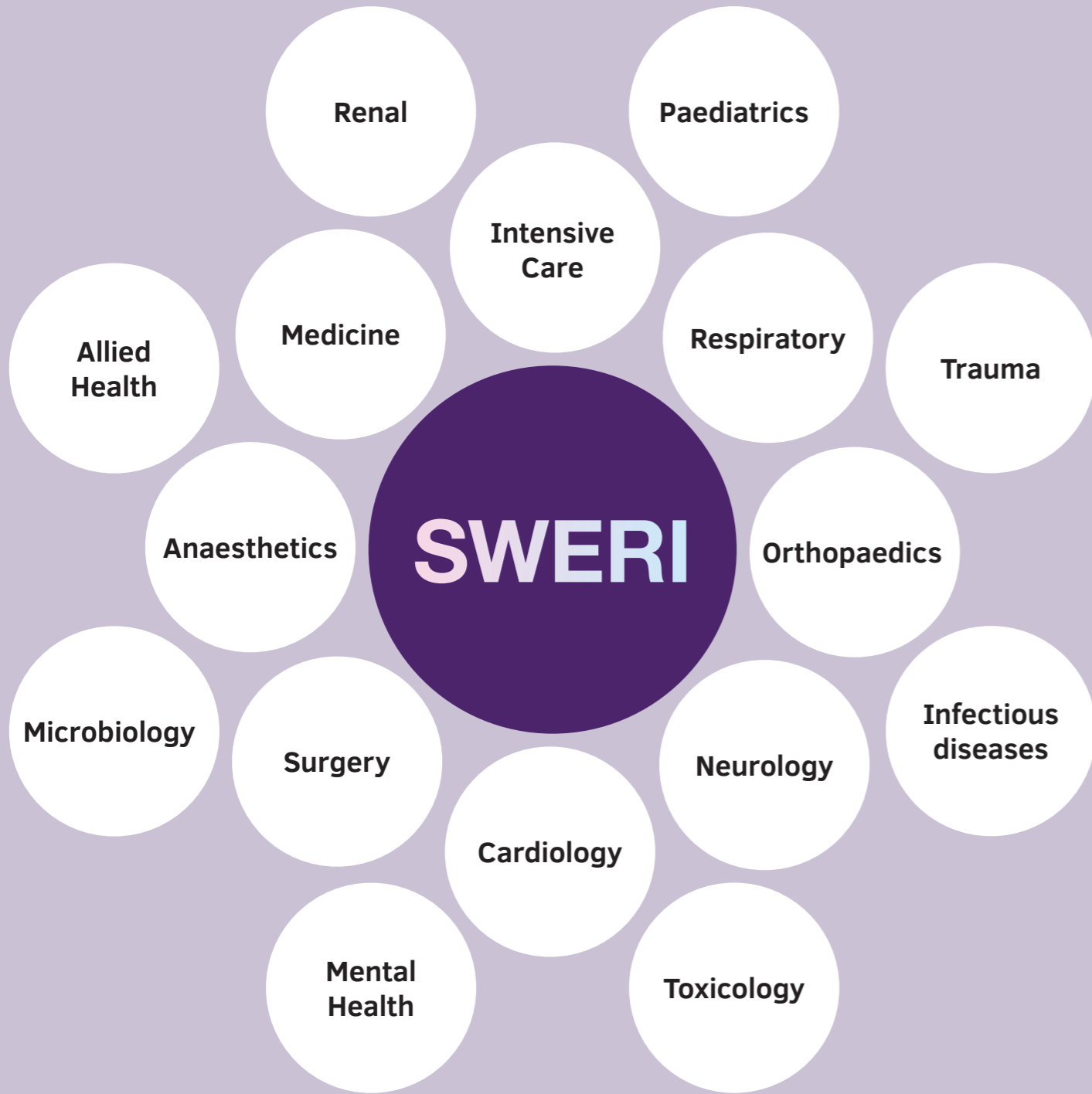
RESEARCH SPECTRUM





# Collaboration

## Collaborating clinical departments

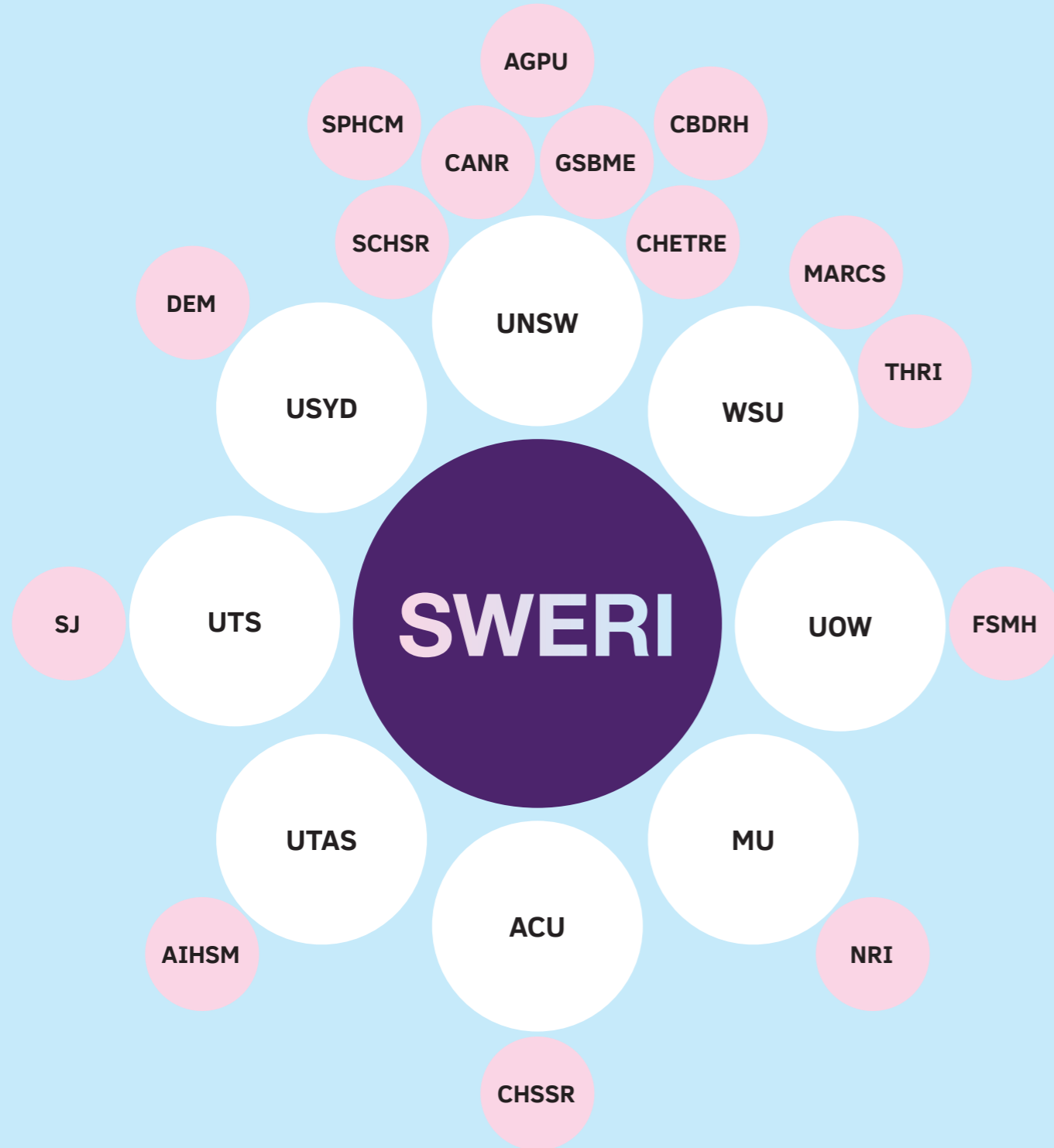


# Local Health District Collaborations





# Collaborating academic departments



School of Public Health and Community Medicine  
 Graduate School of Biomedical Engineering  
 School of Psychology  
 Centre for Big Data Research in Health  
 Centre for Health Equity Training, Research and Evaluation  
 Centre for Applied Nursing Research  
 Expanded Perception & Interaction Centre  
 School of Civil and Environmental Engineering  
 South Eastern Sydney Research Collaboration Hub



**WESTERN SYDNEY UNIVERSITY**  
 MARCS Institute for Brain, Behaviour & Development  
 School of Nursing and Midwifery  
 Translational Health Research Institute



Australian Institute of Health Service Management



**MACQUARIE University**  
 Centre for Health Systems and Safety Research



Faculty of Science, Medicine and Health



Nursing Research Institute



Discipline of Emergency Medicine



**LIVERPOOL HOSPITAL**  
 Emergency Medicine  
 Intensive Care  
 Anaesthesia  
 Orthopaedics  
 Trauma services  
 Respiratory medicine  
 Neurology  
 Allied Health  
 General surgery  
 Cardiology  
 Pharmacy  
 Community Participation Coordinator



**NSW GOVERNMENT**  
 SWSLHD Epidemiology  
 SWSLHD Health Language Services

SWSLHD Health Promotion Service

SWSLHD Multicultural Health Service

SWSLHD Consumer and Community Participation

SWSLHD Transfer of Care

SWSLHD NSW Refugee Health Service

SWSLHD Bangala Eastern Campus, Aboriginal Health



SWS Primary Health Network



NSW Ambulance



Pan-Asian Resuscitation Outcomes Study



Cardiac Arrest Registry to Enhance Survival



Yale Emergency Medicine



# Collaborating academics

The strength of the SWERI collaboration is in its collaborators.

Our named collaborators have published approximately 1700 peer-reviewed papers and numerous book chapters, abstracts and books.

The collaborators named in this prospectus have, in the last 5 years, been successful in winning over \$140 million in competitive funding.



## Professor Mary-Louise McLaws

*PhD in Medicine MPH DTPH*

*Deputy President Academic Board, UNSW*

*Professor - Epidemiology, Healthcare Infection and Infectious Diseases Control*

*World Health Organization Expert Core Group Infection Prevention & Control Global Unit*

*Awarded MJA Best Research for "Sepsis Kills" state-wide ED project*

### Australian leadership appointments

Commonwealth Department of Health and Ageing to review Australia's Pandemic Influenza Infection Control for Healthcare Workers' Guideline

NSW Ministry - Clinical Excellence Commission advisor on state-wide patient safety projects and standing committee on healthcare associated infection

NSW Ministry of Health established first standardized surveillance of healthcare associated infections for public hospitals pilot

### Personal Research Area

Patient safety for infection control, prevention and surveillance

Healthcare worker behaviour associated with patient safety

Clinical epidemiology of infections in health services

Health service provisions during pandemics

### Competitive Grant Funding (last 5 years)

\$3,131,290 funding in total from Industry, Ministries of Health, NHMRC/ARC

### Research output and publications

167 papers

4 book chapters

9 Ministerial reports

2 World Health Organisation Guidelines

2 World Health Organisation Mission Reports

h-index=42 i10-index 103 citations 6083 g-index >50, WoS 10; Europe PMC 19

### Completions

17 PhD and Masters

19 theses in partial requirement of MPH

3 international medical research internship projects



## Professor Ken Hillman

*Professor of Intensive Care at the University of New South Wales*

*Director of the Simpson Centre for Health Services Research*

Professor Hillman graduated from Sydney University in 1973; trained in Sydney, Australia and in London in the United Kingdom and has been a Lecturer at the University of London, a Senior Lecturer at the University of London and Director of Intensive Care at Charing Cross Hospital in London before returning to Australia. He remains an actively practising Intensive Care clinician, at Campbelltown and Liverpool Hospitals, which complements his interest in Health Services Research – developing and evaluating new and innovative ways of practising health care. He has

active research interests in areas such as recognising and responding to seriously ill hospitalised patients in a timely fashion; and improving the management of dying patients.

Professor Hillman has published over 175 peer-reviewed papers; written 65 chapters; co-written and co-edited 4 textbooks; been invited to give lectures at 121 national and 126 international conferences and has over \$25 million in peer-reviewed grants. He has written two books – Vital Signs: Stories from Intensive Care and A Good Life to the End which was published in 2017.

He has been an examiner for 12 years in intensive care and has held many professional positions related to health. He is internationally recognised as a pioneer in the introduction of the Medical Emergency Team and is part of the Executive of the International Rapid Response Society.

He has published extensively on the care of the elderly frail at the end-of-life and has a NHMRC Program grant to continue research in this area. Because of his continuing work in the area in 2016 he was an invited presenter at TEDx which was held at the Sydney Opera House.

His research now concentrates on Health Services Research. He has developed a tool to predict mortality in the elderly frail. His team are in the process of putting this tool into clinical practice and to use it to begin discussions with the elderly and their carers, empowering them to make choices about how they would want their future life managed. He is also the recipient of the Order of Australia for his work.

### Top Five Publications

Hillman KH, Chen J, Cretikos M, Bellomo R, Brown D, Doig G, Finfer S, Flabouris A, MERIT Study Investigators. Introduction of the medical emergency team (MET) system: A cluster randomised control trial. *Lancet* 2005; 365(9477): 2091-2097.

Cheatham ML, Malbrain ML, Kirkpatrick A, Sugrue M, Parr M, De Waele J, Balogh Z, Leppäniemi A, Olvera C, Ivatury R, D'Amours S, Wendon J, Hillman K, Wilmer A. Results from the international conference of experts on intra-abdominal hypertension and abdominal compartment syndrome. *II. Recommendations. Intensive Care*

*Med* 2007; 33(6): 951-62.

Chen J, Bellomo R, Flabouris A, Hillman K, Finfer S, Cretikos M and the MERIT Study Investigators for the Simpson Centre and the ANZICS Clinical Trials Group. The relationship between early emergency team calls and serious adverse events. *Crit Care Med* 2009; 37(1): 148-153.

Cardona-Morrell M, Hillman K. Development of a tool for defining and identifying the dying patient in hospital: Criteria for Screening and Triaging to Appropriate Alternative care (CrISTAL). *BMJ Support Palliat Care* 2015; 5: 78-90.

Cardona-Morrell M, Kim JCH, Turner RM, Anstey M, Mitchell IA, Hillman K. Non-beneficial treatments at the end of life: a systematic review on extent of the problem. *Int J Qual Health Care* 2016; 1-14. Advanced access published 27 June 2016.



## Professor Sandy Middleton

*RN PhD*

*Professor of Nursing, Australian Catholic University*

*Director, Nursing Research Institute, St Vincent's Health Australia (Sydney)*

### Australian leadership appointments

Professor Middleton has expertise in leading large, multi-site implementation research including the NHMRC-funded T3 Trial: Triage, Treatment and Transfer of patients with stroke in the emergency department. She also led the landmark NHMRC-funded QASC cluster trial demonstrating decreased death and dependency following implementation of protocols to manage fever, hyperglycaemia and swallowing post-stroke, winning multiple international awards.

Professor Middleton led the successful translation of this intervention into all 36 NSW stroke units, winning the 2014 NSW Premier's Public Sector Award for Improving Performance and Accountability, and the 2014 NSW Health Nursing and Midwifery Award for Excellence in Innovation Research – the highest NSW accolade for a nurse researcher. These protocols now are being translated into 300 hospitals in 12 European countries.

Professor Middleton is a Ministerial appointment to the NHMRC Research Committee.

### Competitive Grant Funding (last 5 years)

78 grants totalling \$33.3 million

21 as CIA

23 Category 1 funded



## Professor Evelyne de Leeuw

*MSc MPH PhD*

*Director of the Centre for Health Equity Training, Research and Evaluation (CHETRE) at the University of New South Wales*

*Director, Population Health Division, South Western Sydney Local Health District*

*Stream Leader, Population and Health Services Research Stream, Ingham Institute*

She obtained her MSc and PhD from Maastricht University, and MPH from UC Berkeley.

She has a distinguished career in health promotion and Healthy Cities research and development in Europe, Oceania and the Americas. She has provided consultancy to WHO Geneva,



EURO and PAHO. She has published widely (books, peer-reviewed papers) with the overall pursuit to advance health political science: the rigorous and methodical application of theories and methods from political science to the public health domain.

She is Editor-in-Chief of Health Promotion International, Editor of the Encyclopedia of Healthy Cities and Communities, and Editor of the Palgrave Series in Public Health Policy Research

#### Top Five Publications (last 5 years)

Greer, S.L., Bekker, M., de Leeuw, E., Wismar, M., Helderma, J.-K., Ribeiro, S., Stuckler, D. (2017) Policy, politics and public health. *European Journal of Public Health*, 27(suppl4), 40–43, <https://doi.org/10.1093/eurpub/ckx152>

De Leeuw, E. (2017). Engagement of Sectors Other than Health in Integrated Health Governance, Policy, and Action. *Annual Review of Public Health* 38:329-49

Browne, J., de Leeuw, E., Gleeson, D., Adams, K., Atkinson, P., & Hayes, R. (2017) A network approach to policy framing: A case study of the National Aboriginal and Torres Strait Islander Health Plan. *Social Science & Medicine*, 172, 10-18

De Leeuw, E., M. Hoeijmakers & D.T.J.M. Peters (2016) Juggling Multiple Networks in Multiple Streams. *European Policy Analysis* 2(1) 196-217

de Leeuw, E. (2015) М Е Ж С Е К Т О Р А Л Ь Н О Е ВЗАИМОДЕЙСТВИЕ, ПОЛИТИКА И СТРАТЕГИЧЕСКОЕ РУКОВОДСТВО В ЗДОРОВЫХ ГОРОДАХ ЕВРОПЫ. ПАНОРАМА ОБЩЕСТВЕННОГО ЗДРАВООХРАНЕНИЯ 1(2) 183-191

#### Competitive Grant Funding (last 5 years)

Hazelwood Mine Fire Inquiry II 2015, AU\$20,000. Population health development in the Latrobe Valley - A literature review of world best practice in building healthy communities and health systems

PAHO/AMRO Health in All Policies from Global to Local 2015, US\$15,000. White Paper & Consultation

WHO/EURO 2012-2014, US\$1,200,000. Phase V Healthy Cities Evaluation



### Professor Alison L Jones

*MD MBChB, B Med Sci (Hons) FAACT FACMT FRACP FRCP FRCPE*

*Deputy Vice-Chancellor (Health and Communities) and Executive Dean, Faculty of Science, Medicine and Health, University of Wollongong*

*Staff Specialist in Clinical Toxicology, Blacktown Hospital*

*Clinical Academic in General Medicine, Wollongong Hospital*

#### Selected Publications

Jones AL. Chloroquine and quinine poisoning AND Complications of chronic alcoholism that affect critical illness. In: *Critical Care Toxicology 2nd Edition*. Ed: J Brent, KK Burkhart, PI Dragan, B Hatten, B Megarbane and R Palmer. Switzerland: Springer International Publishing 2017: 1271-1286. ISBN: 978-3-319-17899-8

Jones AL. Management of opioid poisoning. In: *Oxford Textbook of Critical Care 2nd Edition*. Ed: A Webb, D Angus, S Finfer, L Gattinoni and M Singer. Oxford University Press 2016. Chapter 319: 1523-1525. ISBN: 9780199600830

Doogue M and Jones AL. Chapter 4 Clinical Pharmacology and Toxicology. In: *Essentials of Internal Medicine* Ed: NJ Talley, B Frankum, D Currow. Australia: Elsevier 2015: 27-55. ISBN: 9780729540810

Jones AL. Paracetamol (acetaminophen) overdose. In: *Davidson's 100 clinical cases 2nd Edition* Chapter 16, Elsevier 2012. ISBN: 978-0-7020-4459-5

Jones AL, Dargan PI. *Churchill's Textbook of Toxicology*. Churchill Livingstone, Edinburgh 2001. ISBN 0-443-06476-8

#### Competitive Grant Funding (last 5 years)

NHMRC Partnership Grant (1113396) 2016 – 2020, \$845,278. Does Omega-3 supplementation attenuate aggressive behaviour: a multi-centre randomised controlled trial of a broadly disseminable strategy.

NSW Health 2016-2017, \$330,000. SMS SOS: Using SMS text messages to prevent self-harm.

Horticulture Innovation Australia Strategic Co-Investment Pool (GC15005) 2016-2021, \$3,279,176. Greener cities healthier lives: measuring the wider social benefits.

NHMRC Centre of Research Excellence (1030259) 2012-2017, \$2,411,828. Understanding and ameliorating the human health effects of exposure to air pollution from knowledge to policy and public health practice.



### Professor Johanna Westbrook

*BAppSc(Dinstinc.) GradDipAppEpid MHA PhD FACMI FACHI*

*Director, Centre for Health Systems and Safety Research (CHSSR), Australian Institute of Health Innovation (AIHI)*

#### Selected Publications

Professor Westbrook's expertise centres on the design and execution of complex multi-method evaluations in the health sector. She is internationally recognised for her research evaluating the effects of information and communication technology (ICT) in health care. Integral to assessing the effectiveness of ICT to innovate work and improve safety and quality of care, is gaining a deep understanding of clinical work and

communication processes. Thus, a core element of Prof Westbrook's research has been developing and applying novel approaches to investigate these processes in a range of health settings. She leads the largest health informatics evaluation research team in Australia. She has an extensive publication track record with over 350 publications. In the last five years she has 175 refereed works. Her papers have received >8600 citations (h-index=48, i-10=167). Her research has translated into significant practice and policy changes in relation to the use, design and evaluation of clinical IT systems, along with changes to medication safety.

#### Top Five Publications (last 5 years)

Westbrook JI, Duffield C, Li L Creswick N (2011) How much time do nurses have for patients? A longitudinal study of hospital nurses' patterns of task time distribution and interactions with other health professionals. *BMC Health Services Research*, 11: 319. Direct observational study demonstrating significant changes in patterns of work & communication over 3 years (149 cites)

Sinskey C, Colligan L, Prgomet M, Li L, Reynolds S, Goeders L, Westbrook J, Tutty M, Blike G, (2016) Allocation of physician time in ambulatory practice: A time and motion study in 4 specialties. *Annals of Internal Medicine*, DOI: 10.7326/M16-0961. Collaborative study with American Med Assoc. using Westbrook's WOMBAT technique to study US physicians. (107 cites)

Westbrook JI, Reckmann M, Li L, Runciman WB, Burke R, Lo C, Baysari MT, Braithwaite J, Day RO (2012) Effects of two commercial electronic prescribing systems on prescribing error rates in hospital in-patients: a before and after study. *PLoS Medicine*. 9(1): e1001164. Reports one of the first studies to compare the effectiveness of different e-prescribing systems in reducing medication errors. It has been viewed >26,000 times online. (105 cites)

Westbrook JI, Li L, Georgiou A, Paoloni R, Cullen J (2013) Impact of an electronic medication management system on hospital doctors' and nurses' work: A controlled pre-post, time and motion study. *Journal of the American Medical Informatics*

Association, 20(6):1150-1158. Observational study of > 100 clinicians to quantify how IT impacts work & communication practices. The study used the WOMBAT software developed by Prof Westbrook. WOMBAT was commercialised in 2012 and is now used by research teams in eleven countries. (47 cites)

Westbrook JI, Li L, Lehnbohm, Baysari M, Braithwaite J, Burke R, Conn C, Day RO (2015) What are incident reports telling us? A comparative study at two Australian hospitals of medication errors identified at audit, detected by staff and reported to an incident system. *International Journal of Quality in Health Care*, 27(1): 1-9. Major study quantifying detection and reporting of errors in hospital and highlighting opportunities to leverage IT systems to identify errors in real-time. Received Alan Welford Award for the best human factors paper published in 2015. (43 cites)

#### Research support

Westbrook has secured with colleagues 72 research grants to a total career value of \$53M (\$48M from NHMRC and ARC). This includes >\$29 million in the past five years (11 NHMRC and ARC grants). Westbrook was CIA on 5 and CIB on a further 3 of these 11 grants.



### Professor Ben R. Newell

*BSc PhD*

*Professor in Cognitive Psychology, and Deputy Head of School, School of Psychology, UNSW Australia.*

Professor Newell's research focusses on the cognitive processes underlying judgment, choice and decision making and the application of this knowledge to environmental, medical,

financial and forensic contexts.

#### Top Five Publications (last 5 years)

Newell, B.R & Le Pelley, M.E. (in press). Perceptual but not complex moral decisions can be biased by exploiting the dynamics of eye gaze. *Journal of Experimental Psychology: General*.

Schulze, C., & Newell, B. R. (2015). Compete, coordinate, and cooperate: How to exploit uncertain environments with social interaction. *Journal of Experimental Psychology: General*, 144, 967-981.

Newell, B.R., Lagnado, D.A. & Shanks, D.R (2015). *Straight Choices: The Psychology of Decision Making (Second Edition)*. Psychology Press: Hove, UK.

Newell, B.R., & Shanks, D.R. (2014). Unconscious influences on decision-making: A critical review. *Behavioral and Brain Sciences*, 37, 1-63.

Newell, B.R. (2005). Re-visions of rationality? *Trends in Cognitive Sciences*, 9, 11-15.

#### Competitive Grant Funding (last 5 years)

Leverhulme Trust 2012, UK£124k. Experience based choice

ARC DP 2012, AU\$225k. Category-Based Induction

ARC Linkage 2012, AU\$220k. Cognition and Climate Change

ARC Future F'ship 2012, AU\$498k. Adaptive Cognition

ARC DP 2014, AU\$317k. Risky Inter-temporal Choice

ARC Linkage 2015, AU\$360k. Super-annuation Engagement

ARC DP 2016, AU\$330k. Modelling Experience-Based Choice





## Professor Kate Stevens

*BA Hons I (Psychology) PhD (Psychology)*

*Director, MARCS Institute for Brain, Behaviour & Development*

*Professor, Western Sydney University, School of Social Sciences & Psychology*

### Top Five Publications (last 5 years)

Novembre G, Varlet M, Muawiyath S, Stevens CJ, Keller PE. The E-music box: an empirical method for exploring the universal capacity for musical production and for social interaction through music. *R. Soc. open sci* 2015. 2: 150286.

Bläsing B, Calvo-Merino B, Cross E, Jola C, Honisch J, Stevens CJ. Neurocognitive control in dance perception and performance. *Acta Psychologica* 2012, 139, 300-308.

Stevens C., Walker G., Boyer M, Gallagher M. Severe tinnitus and its effect on selective and divided attention. *International Journal of Audiology* 2007, 46, 208-216.

Grove R., Stevens C, McKechnie S (Eds.). *Thinking in four dimensions: Creativity and cognition in contemporary dance*. Carlton: Melbourne University Press 2005.

Keller P, Stevens C. Meaning from environmental sounds: Types of signal-referent relations and their effect on recognizing auditory icons. *J Experimental Psychol: Applied* 2004, 10, 3-12.

### Competitive Grant Funding (last 5 years)

Dementia Collaborative Research Centre 2017-18, AU\$45K. Knowledge Translation and Time Travelling with Technology (KT-TTT).

Australian Association of Gerontology CI4 2017, AU\$4K. Fingers TAP to the music - with Jennifer MacRitchie, Sarah McIntyre, Paul Breen.

Department of Defence 2016-17, AU\$128K. Factors affecting trust in autonomy - with Chris Stanton.

Dementia Collaborative Research Centres 2016-17, AU\$49K. Time Travelling with Technology (TTT): Evaluating benefits of Liquid Galaxy-Based Reminiscence Therapy for people with dementia - with D. Parker, A. Leahy, J Stokes (Baptist Care)

NHMRC-ARC Dementia – Research Development Fellowship GNT1109197 2016-19, AU\$601K. Mood Regulation Using Music: A Community Health Strategy for Improving Quality of Life in People with Mild Dementia – S. Garrido (CI/Fellow)

ARC Discovery CI2 DP140100465 2014-16, AU\$293K. I like you and I just can't help it: Explaining automatic affective responses – G. Weidemann

ARC Linkage CI1 LP130100670 2013-16, AU\$150K. Thinking Brains and Bodies: Distributed Cognition and Dynamic Memory in Australian Dance Theatre

ARC Discovery CI2 DP120102426 2012-14, AU\$254K. Loudness moves! Roles of changing acoustic intensity in the perception of music – R. Dean, F. Bailes



## Scientia Professor Nigel Lovell

*B Eng (Hons) PhD (Eng)*

*President (2017-2018), Institution of Electrical and Electronic Engineers (IEEE) Engineering in Medicine and Biology Society (EMBS)*

Professor Lovell's work in research and development demonstrates a mix of scientific excellence, scholarship, innovation and leadership that maintains all the best traditions of academic life but also engages both industry and the community.

The University of New South Wales has recognised his extensive research contributions by awarding a Scientia Professorship (2011-2022).

Lovell's research expertise can be categorised into three research themes: Neural Prosthetics (including the development of the first

Australian bionic eye); Physiological Modelling and Control; and Telehealth (including technologies for managing chronic disease and falls in the elderly, as well as big data analytics for predicting health risks).

### Research output and publications

246 journal articles

290 refereed conference proceedings

4 books/proceedings

23 book chapters

150 abstracts

h-index is 48 with over 11800 citations (Google Scholar). Elsevier SciVal benchmarks him as the fifth most published author in the biomedical engineering discipline in the world. This is complemented by more than 100 invited talks including keynote and plenary presentations.

### Competitive Grant Funding

Professor Lovell has been awarded over \$80 million in research and infrastructure funding in which he was a named CI over his research career.

Professor Lovell was CIB on an ARC Special Research Initiative in Bionic Vision Technologies that was awarded \$50 million (2010-15). His specific role was to lead the stimulation strategy program which investigates the basic science behind retinal activation and how this can be translated to effective algorithms to provide the best visual perception for implantees.

For his major contribution to the profession he was awarded the prestigious IEEE Millennium Medal, recognising him as one of the technology innovators in the largest professional society in the world.



## Professor Ian Harris AM

*MBBS MMed (Clin Epi) PhD FRACS(Orth) FAHMS*

*Professor of Orthopaedic Surgery, UNSW*

*Co-director of the Whitlam Orthopaedic Research Centre*

*Deputy Director of the AOANJRR*

*Co-Chair ANZ Hip Fracture Registry*

*Founding Executive Committee member, ANZMUSC (ANZ Musculoskeletal Clinical Trials Network)*

*Investigator for STREAM Health (Sydney Translational Research and Educational Alliance for Musculoskeletal Health) – of the SPHERE (Sydney Partnership for Health, Education, Research and Enterprise) Academic Health Science Partnership*

Ian Harris is Professor of Orthopaedic Surgery at UNSW (since 2008) and a clinician at 3 public hospitals in NSW. His research covers the fields of clinical epidemiology, clinical trials, systematic reviews, cohort studies and registry science with a focus on the outcomes of surgery, particularly joint replacement surgery.

### Top Five Publications (last 5 years)

Siemieniuk RAC, Harris IA, Agoritsas T, Poolman RW, Buchbinder R, van de Velde S, Englund M, Knutsen G, MacDonald H, Hailey L, Lytvyn L, Krist A. Arthroscopic surgery for degenerative knee arthritis and meniscal tears: a clinical practice guideline. *BMJ* 2017; 257: j1982.

Buhagiar MA, Naylor JM, Harris IA, Xuan W, Kohler F, Wright R, Fortunato R. Effect of inpatient rehabilitation vs a monitored home-based program on mobility in patients with total knee arthroplasty. *The HIHO Randomized clinical trial. JAMA*, 2017; 317(10): 1037-1046.

Matheson S, Lin C, Maher C, Latimer J, McLachlan A, Harris IA, Billot L, Day R. Trial of Pregabalin for Acute and Chronic Sciatica. *N Eng J Med* 2017; 376: 1111-20.

Mittal R, Harris IA, Adie S, Naylor JM. Surgery for Type B Ankle Fracture Treatment: A Combined Randomised and Observational Study (CROSS-BAT). *BMJ Open*, 2017; 7: e013298.

Buchbinder R, Maher C, Harris IA.

Setting the research agenda for improving health care in musculoskeletal disorders. *Nat Rev Rheumatol*, 2015; 11(10): 597-605.

### Competitive Grant Funding

Professor Harris has received grant funding of totalling over \$20 million since 2012, including NHMRC Project Grants, Partnership Grant, Centre for Research Excellence, Program Grant, and state government and private research support.



## Associate Professor Samsung Lim

*BA (Mathematics) MA (Mathematics) PhD (Aerospace Engineering and Engineering Mechanics)*

*Associate Professor, Geospatial Engineering Group, School of Civil and Environmental Engineering, University of New South Wales*

A/Prof Samsung Lim has been teaching Geographic Information Systems (GIS) in the Surveying and Geospatial Engineering Group, School of Civil and Environmental Engineering, University of New South Wales (UNSW), Sydney, Australia, since July 2004.

Samsung's main research interests are GIS and Remote Sensing. In 2005 Samsung developed an address-based search tool for the first time in Australia that can be integrated into web-map services such as Google Earth, Google Maps, Bing Maps, etc.

Samsung's 3D model of the UNSW campus developed in 2006 with the airborne lidar technology was one of a kind in that all buildings were photo-realistically textured and therefore enabled the virtual reality.

Samsung is a national delegate of Commission 3, International Federation of Surveyors (FIG), and a professional member of International Association of Geodesy (IAG).

### Top Five Publications

MacIntyre, CR, Engells, TE, Scotch M, Heslop, DJ, Gumel, AB, Poste, G, Chen, X, Herche, W, Steinhöfel, K, Lim, S & Broom, A (2017). 'Disruptive Technology, Risk and New Frontiers in Health Security', *Environment Systems and Decisions*, (accepted for publication on 11 November 2017)

Figuerola, LL, Lim, S & Lee, J (2016), 'Modelling the effect of deprived physical urban environments on academic performance in the Philippines', *GeoJournal*, DOI: 10.1007/s10708-016-9751-x

Liu, X & Lim, S (2016), 'Integration of spatial analysis and agent-based model into evacuation management for shelter assignment and routing', *Journal of Spatial Science*, DOI 10.1080/14498596.2016.1147393, pp. 1-16.

Aghighi, H, Trinder, JC, Lim, S & Tarabalka, Y (2015), 'Fully spatially adaptive smoothing parameter estimation for Markov random field super-resolution mapping of remotely sensed images', *International Journal of Remote Sensing*, Vol. 36, No. 11, pp. 2851-2879.

Lim, S, Helinski, B & Lee, H (2010), 'Geocorrelation of Contributing Factors to Asthma in New South Wales', *International Journal of Geoinformatics*, Vol. 6, No. 4, pp. 41-48.

### Competitive Grant Funding

Career total research funding of 40 research grants (\$6.6M) from ARC and other peer-reviewed sources, including the funding from Australian Space Research Program (\$2.8M) and two ARC linkages (\$536K and \$168K), and three CRC-SI grants (\$1.4M, \$205K, and \$102K). Below is the list of the most recent five research grants.

CI Scotch M, MacIntyre R, Lim S, Hogue BG, Steinhofel K, Stelzer-Braid S, 2016. Reducing the Risk of a Human-to-Human Transmissible Form of Highly Pathogenic H5N1 Influenza Virus, *PLuS Alliance Collaborative Research*.

CI Whitty M, Homaira N, Lim S, Jaffe A, 2016. Identification of indoor localisation solutions for tracking patients



in hospital environments to minimise cross-infection, CRCSI Project.

CI O'Reilly D, Shewan L, Armstrong R, Lim S, Chang N, Domett K, Halcrow S, 2015. Unraveling the Mystery of the Plain of the Jars, Lao PDR, ARC-DP150101164, 2015 – 2019.

CI Zhang K, Teunissen P, Rizos C, Lim S, Marshall JL, Kuleshov Y, Liou Y, 2010. Platform Technologies for Space, Atmosphere and Climate, Australian Space Research Program (ASRP), May 2010 – April 2013.

CI Lim S, Trinder JC, Turner R, 2010. Full-Waveform Lidar Remote Sensing for Forest Inventory, ARC, ARC-LP100100847, January 2010 – January 2012.



### Professor Sheree Smith

*B.Nurs M.SocPlan PhD*

*Professor, School Of Nursing And Midwifery, Western Sydney University*

Professor Sheree Smith is an internationally recognised researcher in respiratory care and leads a program of acute and primary health services research. Professor Smith was the founder and leads the multi-institutional Lung, Sleep and Heart Health research network which provides opportunities for nurse clinicians to build their research capacity and capability through project experience. Sheree has received national and international research awards including the inaugural Co-operative Research Centre for Asthma and Asthma Australia PhD top-up scholarship and the first international Post-doctoral Capability Bursary to the University of Oxford's Department of Primary Health Care and Centre for Evidence Based Medicine. In 2009 Sheree was awarded the Millennium Bursary form

the Worshipful Company of Curriers for COPD intermediate care research whilst working at St Mary's Hospital, Department of Respiratory Infection and Medicine's Imperial Clinical Respiratory Research Unit.

#### Selected publications

Metcalf L, McNally S, Smith, S. A review of inpatient ward location and the relationship to Medical Emergency Team calls; *International Emergency Nursing* 2017; 31: 52 – 57.

Beasley R, Chien J, Douglas J, Eastlake L, Farah C, King G, Moore R, Pilcher J, Smith S. Target oxygen saturation range: 92-96% versus 94-98%; *Respirology* 2017; 22(1): 200 – 202.

Johnson A, Smith S. A review of general pain measurement tools and instruments for consideration of use in COPD clinical practice; *The International Journal of COPD* 2017; 12: 923 - 929.

Johnson A, Smith S. Respiratory clinical guidelines inform ward-based nurses' clinical skills and knowledge required for evidence-based care, *Breathe* 2016; 12 (3): 257 - 266.

Evans L, Bell D, Smith S. Resilience in chronic obstructive pulmonary disease and chronic heart failure; *Journal of Chronic Obstructive Pulmonary Diseases* 2016; 1(3):

#### Research support

2016/19 Maridulu Budyari Gumal, The Sydney Partnership for Health, Education, Research and Enterprise Stream Award for Respiratory, Sleep and Environmental and Occupational Health \$500,000 Lead Applicant: Prof Guy Marks (UNSW) Co-applicant: Smith SM (WSU) et al

2016/19 Maridulu Budyari Gumal, The Sydney Partnership for Health, Education, Research and Enterprise Stream Award for Aboriginal Health and Wellbeing, \$650,000 Lead Applicant Prof Jackson Pulver Co-applicant: Smith SM (WSU) et al

2016/19 Maridulu Budyari Gumal, The Sydney Partnership for Health, Education, Research and Enterprise Stream Award for Age and Aging, \$500,000 Lead Applicant Dr Friedbert Co-applicant: Smith SM (WSU) et al

2016/17 NSW Agency for Clinical Innovation, Tracheostomy Guideline update \$3996 PI: Smith SMS

2016 Western Sydney University Career Interruption Award 'Influenza Symptoms and Home Quarantine Studies' \$5692 PI: Smith SMS

2015 American Thoracic Society International Nursing Research Priorities: CARES [Critical Care, Adult Respiratory Health, and Sleep] 20,865 USD CI: Smith SMS

2013 Western Sydney Summer Research Student Scholarship, Halo-therapy in COPD, R Rashleigh, \$3,000 Supervisor Sheree Smith"



### Associate Professor Ben Harris-Roxas

*BSW (UNSW) MPASR (Macquarie) PhD (UNSW)*

Ben Harris-Roxas is a health impact assessment, public health and program evaluation specialist with over 16 years' experience in Australia and overseas. He has worked for several universities, consulting firms, government agencies and NGOs.

He is currently Director of the South Eastern Research Collaboration Hub (SEaRCH), a joint initiative of UNSW Australia and the South Eastern Sydney Local Health District in Sydney, Australia. Ben trained as a social worker and in social research, and received his PhD in public health in 2014.

#### Top Five Publications (last 5 years)

Harris-Roxas B, Harris E. The Impact and Effectiveness of Health Impact Assessment: A conceptual framework, *Environmental Impact Assessment Review*, 42: 51-59, 2013. doi: 10.1016/j.eiar.2012.09.003

Harris-Roxas B, Viliani F, Bond A, Cave B, Divall M, Furu P, Harris P, Soeberg

M, Wernham A, Winkler M. Health Impact Assessment: The state of the art, *Impact Assessment and Project Appraisal*, 30(1): 43-52, 2012. doi:10.1080/14615517.2012.666035

Harris-Roxas B, Harris E. Differing Forms, Differing Purposes: A Typology of Health Impact Assessment, *Environmental Impact Assessment Review*, 31(4): 396-403, 2011. doi: 10.1016/j.eiar.2010.03.003

Vohra S, Cave B, Viliani F, Harris-Roxas BF, Bhatia R. New international consensus on health impact assessment, *The Lancet*, 376(9751):1464-1465, 2010. doi:10.1016/S0140-6736(10)61991-5

Harris-Roxas B, Simpson S, Harris E. Equity Focused Health Impact Assessment: A literature review, Sydney: CHETRE on behalf of the Australasian Collaboration for Health Equity Impacts Assessment, 2004.

#### Competitive Grant Funding

Total Funding \$2.37 million at November 2016

Category 1 \$405,598 (Competitive Peer Reviewed Funding)

Category 2 \$1,532,433 (Australian government funding)

Category 3 \$429,001 (International and industry funding)



### Professor David Greenfield

*Director of the Australian Institute of Health Service Management (AIHSM), University of Tasmania*

*Honorary Professor, Australian Institute of Health Innovation, Macquarie University*

*Visiting Professor, UNSW Medicine, University of New South Wales*

*Fellow of the International Society for Quality in Health Care (ISQua)*

*Fellow of the Australasian Association for Quality in Health Care*

#### Selected Publications

250 peer reviewed academic outputs, including 60 book chapters or journal publications, 22 conference papers, 150 conference abstracts and 18 reports.

343 presentations to national and international audiences, including 22 chairing of sessions, 206 conference and 114 knowledge translation seminar presentations.

Greenfield, D., Banks, M., Hogden, A. and Braithwaite, J. (2017) Disseminating from the centre to the frontline: diffusing a national health policy through the use of icons, in McDermott, A., Kitchener, M. and Exworthy, M. (eds) *Attaining, Sustaining and Spreading Improvement: Art or Science?* London, Palgrave Macmillan, pp. 169 – 182.

Phillips, R., Hogden, A. and Greenfield, D. (2017) Motivational interviewing to promote self-management, in Martz, E. (Ed) *Promoting Self-management of Chronic Conditions*, Oxford University Press, Washington, United States, pp. 126-143 (invited chapter).

Greenfield, D., Hogden, A., Hinchcliff, R. Mumford, V., Pawsey, M., Debono, D., Westbrook, J. and Braithwaite, J. (2016) The impact of national accreditation reform on survey reliability: a two-year investigation of survey coordinators' perspectives, *J Eval Clin Pract*, 22(5):662-7.

Hinchcliff, R., Greenfield, D., Hogden, A., Sarrami Foroushani, P., Travaglia, J. and Braithwaite, J. (2016) Levers for change: an investigation of how accreditation programs promote consumer engagement in healthcare, *International J Qual Health Care*, 28(5) 561-565.

Greenfield, D., Hinchcliff, R., Hogden, A., Mumford, V., Debono, D., Pawsey, M., Westbrook, J. and Braithwaite, J. (2015) A hybrid health service accreditation program model incorporating mandated standards and continuous improvement: interview study of multiple stakeholders in Australian health care, *Intern J Health Plan Manag*, 31: E116–E130 [published online 5/6/15].

#### Competitive Grant Funding (last 5 years)

Studying the impact of the Sydney Local Health District health service management program 2017-2021, AU\$1.25M.

Investigating the 'South Western Sydney Local Health District Transforming Your Experience' program 2017-2019, AU\$540,000.

NHMRC 2016 -2020, AU\$1.1M. Delivering safe and effective test result communication, management and follow-up.



### Professor Anders Aneman

*MD PhD EDIC FCICM*

*Senior Staff Specialist / Deputy Director / Director of ICU Research*

*Intensive Care Unit, Liverpool Hospital*

*Conjoint Professor, UNSW*

*Clinical Professor, Macquarie University*

#### Selected Publications

146 peer reviewed papers published in international journals

10 invited editorials

5 book chapters

38 published abstracts

h-index Scopus: 26 (based on 141 documents) with 4255 citations (excluding self-citations)

Stammet P, Collignon O, Hassager C, Wise MP, Hovdenes J, Aneman A et al; TTM-Trial Investigators. Neuron-Specific Enolase as a Predictor of Death or Poor Neurological Outcome After Out-of-Hospital Cardiac Arrest and Targeted Temperature Management at 33C and 36C. *J Am Coll Cardiol* 2015; 65: 2104-14

Gupta K, Sondergaard S, Parkin G, Leaning M, Aneman A. Applying mean



systemic filling pressure to assess the response to fluid boluses in cardiac post-surgical patients. *Intensive Care Med* 2015; 41: 265-72

Holst LB, Haase N, Wetterslev J, Wernerman J, Guttormsen AB, Karlsson S, Johansson PI, Aneman A et al; TRISS Trial Group; Scandinavian Critical Care Trials Group. Lower versus higher hemoglobin threshold for transfusion in septic shock. *N Engl J Med* 2014; 371: 1381-91

Nielsen N, Wetterslev J, Cronberg T, Erlinge D, Gasche Y, Hassager C, Horn J, Hovdenes J, Kjaergaard J, Kuiper M, Pellis T, Stammet P, Wanscher M, Wise MP, Aneman A et al; TTM Trial Investigators. Targeted temperature management at 33C versus 36C after cardiac arrest. *N Engl J Med* 2013; 369: 2197-206

Perner A, Haase N, Guttormsen AB, Tenhunen J, Klemenzson G, Aneman A et al; 6S Trial Group; Scandinavian Critical Care Trials Group. Hydroxyethyl starch 130/0.42 versus Ringer's acetate in severe sepsis. *N Engl J Med* 2012; 367: 124-34

#### Competitive Grant Funding (last 5 years)

Generated in excess of 350,000 AUD for Liverpool ICU by grants and research revenue.



#### Dr Tim Churches

*MBBS MPhilPH*

*Senior Research Fellow in Health Data Science*

*South Western Sydney Clinical School, UNSW Medicine / Ingham Institute for Applied Medical Research*

#### Selected Publications

CITATION INDICES as calculated by Google Scholar:

Number of citations: all: 1622; since 2012: 852; h-index: all: 20; since 2012: 16; i10-index: all: 30; since 2012: 20

O'Keefe C, Westcott M, O'Sullivan M, Ickowicz A, Churches T. Anonymization for outputs of population health and health services research conducted via an online data center.

*J Am Med Inform Assoc* 2017;24 (3), 544-9.

O'Keefe C, Gould P, Churches T. Comparison of two remote access systems recently developed and implemented in Australia. *International Conference on Privacy in Statistical Databases*, 2014; 299-311

Randall DA, Jorm LR, Lujic S, Eades SJ, Churches TR, O'Loughlin AJ, Leyland AH. Exploring disparities in acute myocardial infarction events between Aboriginal and non-Aboriginal Australian: roles of age, gender, geography and area-level disadvantage. *Health Place*. 2014 Jul; 28: 58066. doi: 10.1016/j.healthplace.2014.03.009. PMID: 24751666.

Trevena JA, Rogers KD, Jorm LR, Churches T, Armstrong B. Quantifying underreporting of pathology tests in Medical Benefits Schedule claims data. *Aust Health Rev*. 2013 Nov; 37(5): 649-53. doi:10.1071/AH13902. PubMed PMID: 24160673.

O'Keefe CM, Westacott M, Ickowicz A, O'Sullivan M, Churches T. Protecting Confidentiality in Statistical Analysis Outputs from a Virtual Data Centre. *Joint UNECE / Eurostat Work Session on Statistical Data Confidentiality*, Ottawa, 28-30 Oct 2013



#### James Kemp

*MComm (UNE) BComm (Acct, Econ) UNSW*

*Chief Operating Officer*

*Translational Health Research Institute, Western Sydney University*

#### Areas of research interest and support

Implementation science, knowledge translation, change management, commercialisation, policy implementation, eHealth innovation

#### Career Overview

I have worked across the NSW Government and public health sectors, and have built an expertise and interest in the nexus between quality health care and cost effectiveness in health service delivery. Our challenge in our health system is sustaining an integrated system which provides timely access to quality health and medical services with limited resources. I have developed models and systems, educational courses and evaluation methodologies for the NSW public health system to empower clinicians and health managers to better utilise existing resources and design new models of care which deliver on the triple goal of access, quality and value for money health care.

#### Workshop Development and Delivery

Translating Research into Practice

Project Implementation

Business Case Development

Measuring and Evaluating Models of Care

# Exemplar research projects in progress



# Clinical epidemiology – “MEME” - Multicultural emergency medicine epidemiology study

Analysis of the epidemiology, degree of illness, health literacy and health outcomes of all CALD patients attending emergency departments in SWSLHD; extending the methodology of the ODE study, collecting data for a week (approximately 1700 patients), and using linked and manually entered data to describe presenting complaints, degree of illness / injury, tests, interventions and outcomes.

Use of data from routinely asked questions such as country of origin, language spoken at home, Aboriginal or Torres Strait Islander status, and request for an interpreter, to divide patients into CALD and non-CALD groups; followed by analysis of the data to investigate any systematic differences between groups of our patients, and by implication, aspects of our diverse community.

Develop an infrastructure and methodology that will enable the continuing collection of both administrative and granular clinical data on ED patients, and to use these data to develop models that will be useful in potentially predicting in-hospital outcomes.

Elucidate the specific presenting complaints of all patients attending the ED at Liverpool Hospital, to investigate any systematic differences associated with cultural and linguistic diversity (CALD), and to investigate the impact of their presenting clinical condition, and all ED interventions, on their outcomes.



## Collaborators



# Clinical epidemiology – “CARDIO” - Multicultural impact on cardiac arrest survival in SWSLHD study

When the heart stops, there is a decrease in survival of 10% with every minute until defibrillation, unless cardiopulmonary resuscitation (CPR) is commenced. This improves the decrease in survival from 10% per minute to 3-4% per minute, and further benefits accrue from Automated External Defibrillator (AED) use. Across the world, community based interventions incrementally increase cardiac arrest survival.

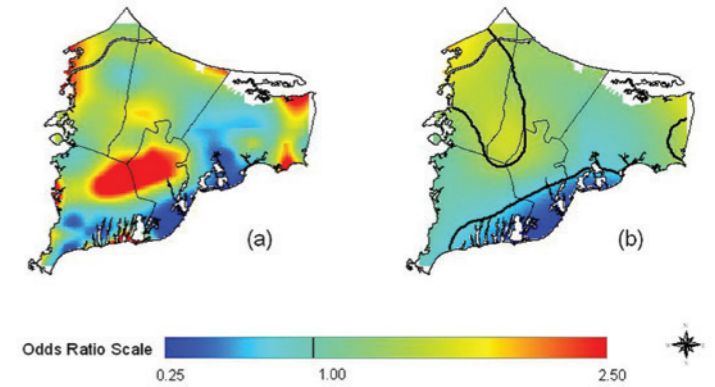
Research from the USA - cardiac arrest victims who received bystander CPR were more likely to be male, white, arrest in a public location, or have a witnessed cardiac arrest. X2 likelihood of receiving bystander CPR in the highest income neighbourhoods.

Patients in predominantly black neighbourhoods had the lowest rates of bystander CPR and AED use and significantly lower likelihood for survival compared with predominantly white neighborhoods.

In the context of demonstrated disparities in other countries in the recognition of cardiac arrest, provision of bystander CPR, and defibrillation with Automated External Defibrillators, the potential for cardiac arrest outcomes to be highly unequal in the varied cultural and ethnic mix of SWS is substantial.

NSW Ambulance (NSWA) data for OHCA in SWS for a 12-month period will be mapped using Geographic Information System techniques to correlate cardiac arrest incidence, bystander CPR provision and defibrillation with demographic, economic and cultural variables.

We will derive a detailed picture of cardiac arrest incidence and the provision of bystander care and relate these to survival. These data should then enable us to use similar methodology to the HANDDS study, and to work with agencies such as Take Heart Australia, to provide targeted community education and incentives in a bid to improve cardiac arrest outcomes. Health economic and actuarial analyses will also be undertaken.



## Collaborators





# Observational research – OVARI (Outcomes with Volume And Rate of Infusions) study

No human studies have measured cardiac output in septic patients before and after fluid resuscitation in the ED, nor have attempts been made to measure vital organ blood flow; no human studies have measured how much such cardiac output increases when a fluid bolus is given; how long such an increase might last, and what its impact on outcome may be. There is no data on the impact of emergency department fluid treatment on outcomes such as length of stay, iatrogenic complications, morbidity and mortality. There is increasing doubt over the usefulness, or even appropriateness, of fluid bolus therapy in sick patients.

As a first in a series of planned studies investigating the impact of fluid resuscitation in acutely ill and injured patients, we will perform a point prevalence study of patients receiving fluid resuscitation in the emergency department (ED) at Liverpool Hospital over a 24-hour period. We will identify all patients attending the ED from Cerner First Net, link admitted patients with data on length of stay, interventions, intensive care admission, and discharge diagnosis from the Hospital Information System, and gather data from non-computerised medical and nursing notes in the ED, including fluid prescriptions, fluid charts documenting administration, investigation results and interventions, and add these datapoints to the overall dataset.

Multivariate analyses will assess the individual and combined effect of fluid treatment and other interventions, using statistical techniques such as propensity analysis to separate the effect of these interventions from potential biases and confounders, allowing us to derive the relationship between fluid resuscitation and both surrogate and final outcomes, in patients with a variable spectrum of disease.



# Interventional research – PATCH-Trauma (Prehospital Anti-fibrinolytics for Traumatic Coagulopathy & Haemorrhage) study

The PATCH-Trauma Study is an international multi-centre, randomised, double-blind, placebo-controlled trial of pre-hospital treatment with tranexamic acid for severely injured patients at risk of acute traumatic coagulopathy. The study aims to determine the effects of early administration of tranexamic acid on survival and recovery of severely injured patients treated within advanced trauma systems.

Bleeding is the most common preventable cause of death following severe injury. Up to a quarter of severely injured patients develop a condition known as acute traumatic coagulopathy that is observed shortly after injury and is associated with excessive clot breakdown and increased mortality. Bleeding is exacerbated by early-onset clotting defects, which are associated with high mortality. Tranexamic Acid (TXA) has been shown to reduce mortality due to bleeding when given in hospital, but its usefulness as a pre-emptive strike at the scene of an injury in the context of advanced trauma systems is unknown.

Civilian and military experts have argued that a prospective randomised study performed in a controlled environment with laboratory monitoring of coagulation and standardised transfusion protocols is essential before TXA becomes standard of care in trauma.

The PATCH-Trauma Study will contribute new knowledge on the early administration of TXA for severely injured patients treated in advanced trauma systems.

- International multi-centre, double-blind, randomised, placebo-controlled trial
- 1200 participants at high risk of acute traumatic coagulopathy
- Pre-hospital treatment with tranexamic acid in advanced trauma systems
- Mortality and functional recovery at six months
- Assessment of fibrinolysis, coagulation, and thrombotic events



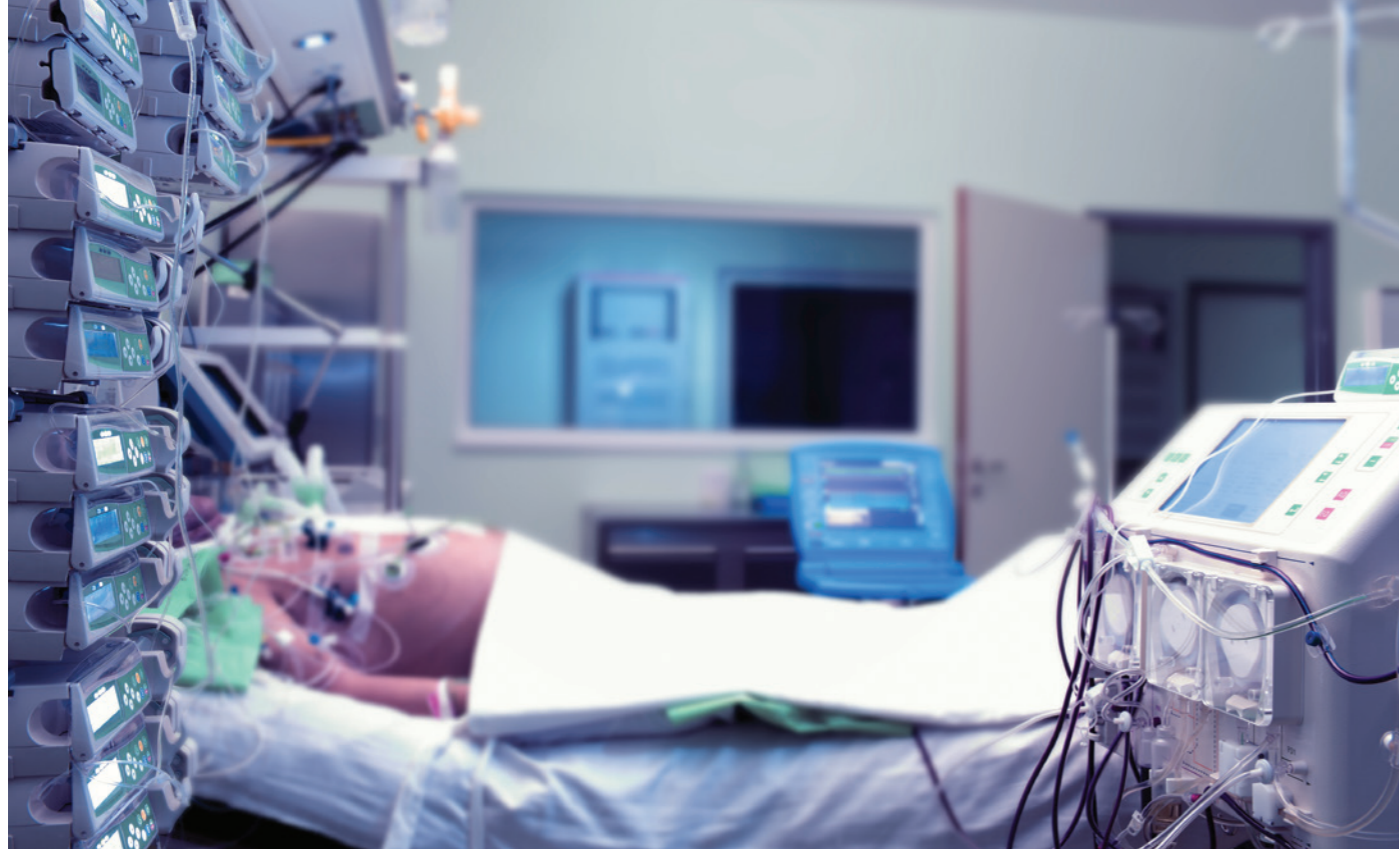
## Collaborators



## Collaborators







# Translational research – The ELVIS (Emergency Lung-Protective Ventilation Implementation Strategy) Study

Endotracheal intubation and mechanical ventilation are used in severely injured and critically ill patients who present to the ED. Evidence suggests that lung protective ventilation strategies (tidal volumes of 6-8mL/kg of ideal body weight and plateau pressures of <30cmH2O) decrease mortality in Acute Lung Injury (ALI) patients.

Currently, ventilation strategies in our ED are non-standardised and dependent upon the treating clinician. The frequency with which lung protective ventilation is utilised remains unknown and is currently under retrospective investigation. In ELVIS, all mechanically ventilated patients in Liverpool Hospital ED (with the exception of those excluded by clinician discretion) will have their ventilation strategy optimised by the ELVIS aide-memoire.

Clinical data will be reviewed to establish the effectiveness of this strategy including patient demographics, intubation details, physiological observations, ventilation parameters, blood gas results and patient outcomes.

Once the impact of ELVIS is analysed, and benefit shown in terms of short- and long-term patient outcomes, a model of care will be developed based on these ventilation strategies.

We are working with a number of partners in this and other translational research initiatives, in particular the Translational Research Institute at Western Sydney University.

## Collaborators

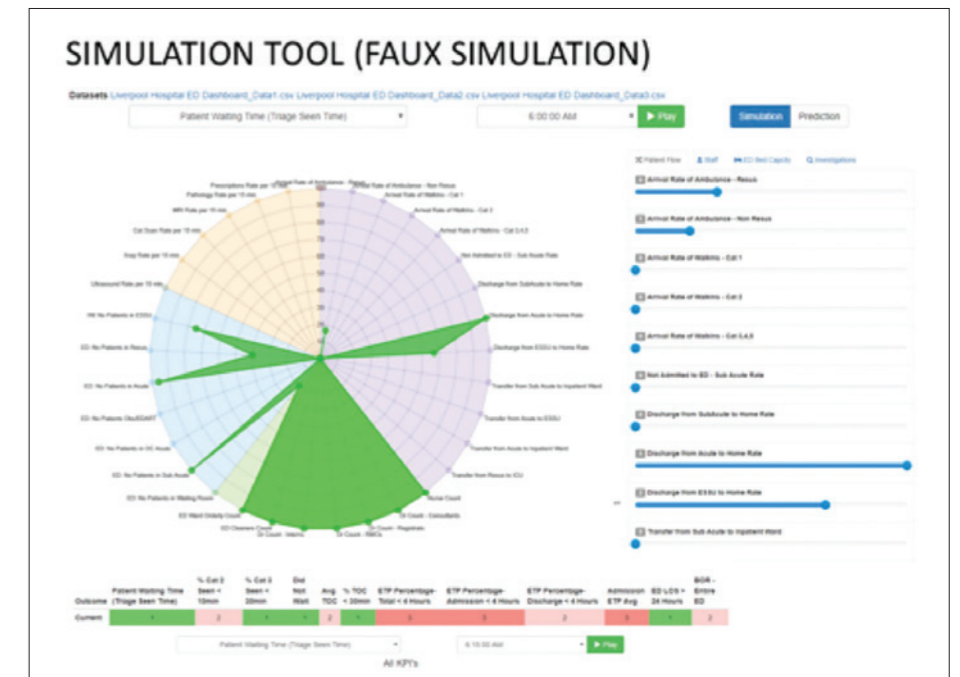


# Health systems research - The EDNA (Emergency Department Nonlinear Analysis) Study

Emergency department effectiveness is measured by many metrics, many of which are based on process rather than patient outcomes, however process driving factors are non-simple, and cannot be reduced to obvious causes. Reductionist and simplistic modelling cannot predict the non-linear outcomes resulting from the interaction of multiple causative factors.

EDNA will use novel complex system analytic techniques to estimate the impact of multiple potential drivers of multifaceted relationships and real-world outcomes, such as trajectory of patient and ambulance arrivals, bed usage and cycle times, bed block and staff numbers.

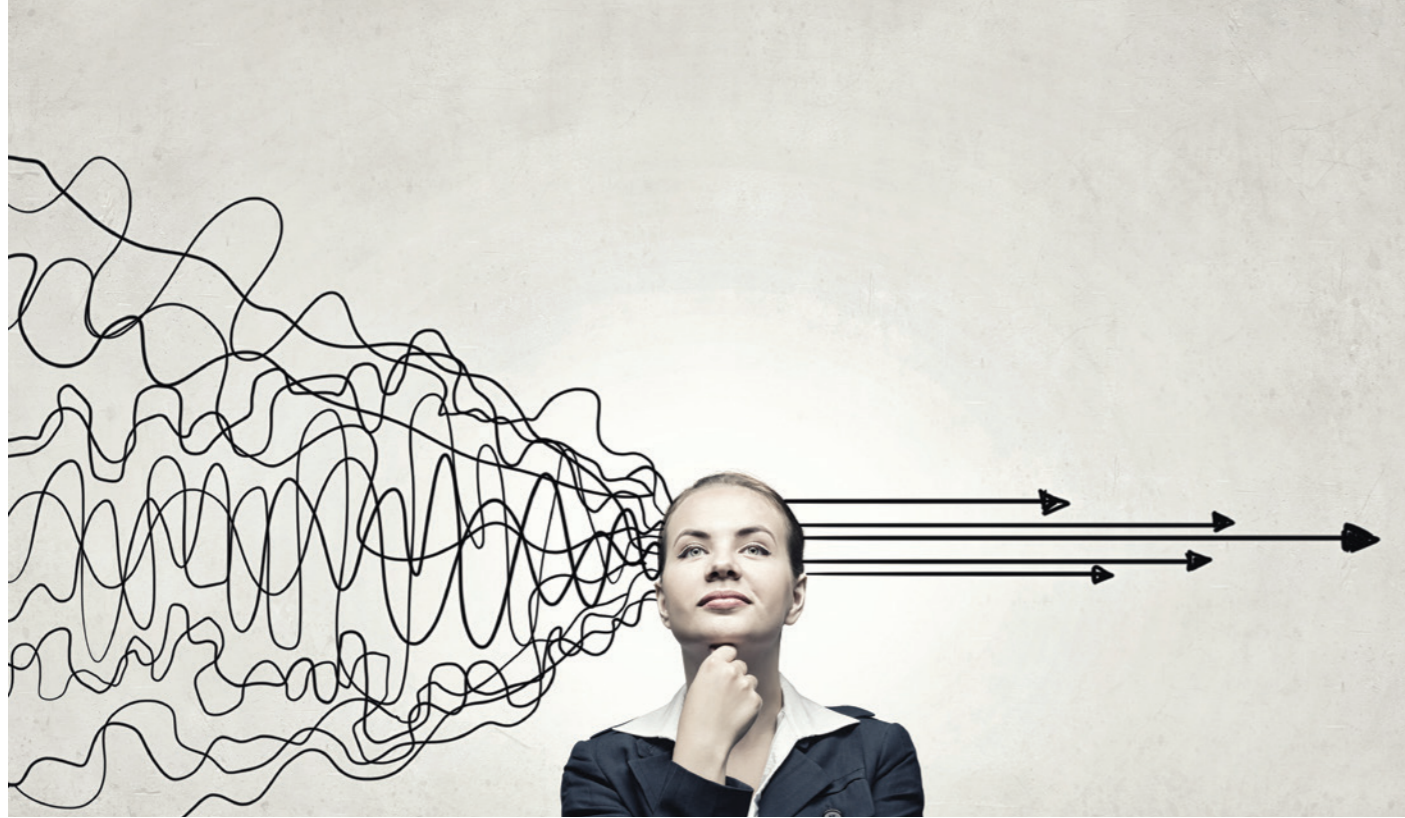
Contemporary data visualisation methods, together with computing techniques such as machine learning and artificial intelligence, will assist in building a realistic interactive representation and allow modelling of the impact of changes on ED processes and outcomes.



## Collaborators







## Health systems research – The COKED (COgnition and Knowledge in Emergency Decision-making) study

Emergency medicine needs urgent but accurate decision-making, whether at triage, screening or in resuscitation, and this has to be done with minimal, or at least insufficient, information. Decision making science is key to patient wellbeing, for evidence based practice, and for best patient outcomes, and we urgently need to study how to ensure that our patients are placed at least risk, despite often being undifferentiated, quickly deteriorating and being managed by staff of variable seniority.

Two key features of the ED environment are decision density and maximal diagnostic uncertainty, yet clinicians need to make the right decision, fast. The heuristics and biases, and more recently the dual-system, models have become the dominant framework for understanding

the cognitive processes underlying these fast, dense, uncertain decisions.

A more fruitful alternative approach to thinking about ER decision making, and training clinicians, is known as a “speed-accuracy trade-off”. Is the clinician trying to maximise the number of patients attended to or maximise the number of patients given the optimal treatment? In an ideal world, the answer is both but in the real world, the trade-off is unavoidable. This new approach opens up novel directions for improving education, thinking and diagnosis, particularly in ‘metacognition’ about the degree of uncertainty faced in a given situation.

### Collaborators



## Health systems research – Integration of care delivery between GP and ED

Integrated care can be defined as “seamless, effective and efficient care that responds to all of a person’s health needs, across physical and mental health, in partnership with the individual, their carers and family.”. This concept is broad and encompasses the coordination of activities and processes at the system-wide, organisational, professional, and patient levels.

At the primary and acute care interface, it is crucial for high-quality care delivery with high patient safety and satisfaction. In particular, good communication and connectivity between providers have been identified as important in transitions including referral, discharge/handover and communication about patient care.

Patient experience explored in qualitative research has identified problems related to the ED/GP interface. Gaps identified may encompass communication, coordination, relationships and personal values.

In this SWSPHN-funded study, a series of semi-structured interviews are being conducted with a purposive sampling of GP and ED staff in Liverpool Local Government area (LGA). Provider perspectives on barriers, facilitators and strategies to support effective integration of service delivery are being collected and analysed. This is being followed by a deliberative forum in the format of a workshop with interviewees and other stakeholders to disseminate results and identify priority areas for a subsequent quality improvement projects.

### Collaborators





# Health systems research – Clinician wellbeing

Dr Atul Gawande says that medicine lies at “the messy intersection of science and human fallibility”, and according to the AMA, doctors need to be well to deliver high-quality health care to their patients and the community, and to experience medicine as a rewarding and satisfying career.

The WHO defines health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”, and most doctors have an above average health status. They are less likely than the general population to suffer lifestyle-related illnesses, such as heart and smoking-related disease, but doctors are at greater risk of mental illness and stress-related problems, and more susceptible to substance abuse. Furthermore, depression and anxiety are common among doctors and their suicide rate is higher than in the general population.

We plan to work with collaborative partners such as the Universities of Wollongong and South Australia, as well as with organisations such as The Black Dog Institute and Wellbeing Australia, to investigate stress and coping strategies among junior and senior clinical staff in the prehospital, emergency, and critical care settings. Similar to work being done in the education sector, we also plan to investigate questions such as:

- What is the nature of current and emerging wellbeing issues facing both junior and senior clinicians as they develop?
- What are the impacts of wellbeing on learning and professional practice outcomes?
- What early intervention and proactive strategies can be employed for sustained wellbeing?
- How can the educational, physical, mental, social, spiritual and emotional wellbeing of clinicians be enhanced?

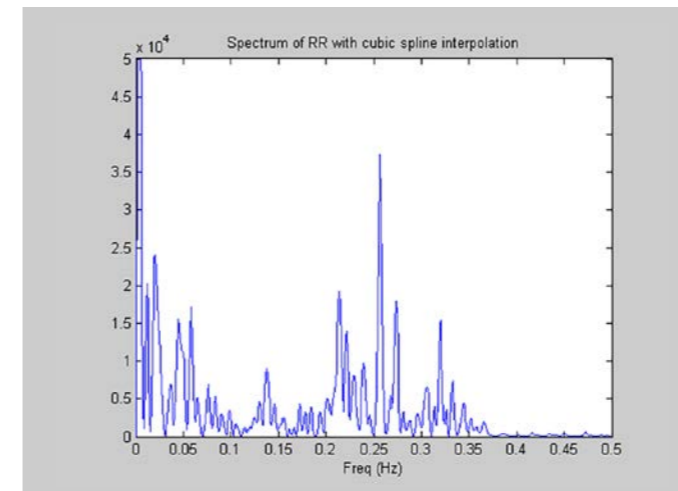
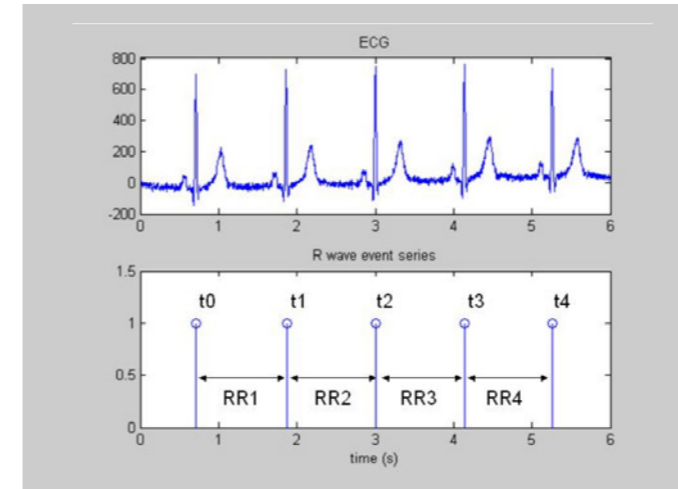
We further plan to investigate the benefit of interventions such as creating a culture of skilled debrief and positive feedback, providing online resources such as a free on-line wellbeing game, and building employee resilience through wellbeing in organisations.



## Collaborators



# Enterprise – Device development for novel visualisation of physiological parameters



Detection of the deteriorating or physiologically unstable patient is uppermost in the assessment and evaluation of emergency patients, however there are substantial flaws in the use of ubiquitous and expensive monitoring systems. Research has shown that sensitive rather than specific alarm settings, short-term memory overload and cognitive bias mean that clinician discrimination of deterioration is often poor.

Well known psychological studies have demonstrated the lack of ability of most people to integrate and construct coherent mental models from streams of dynamic data, particularly in the setting of stress and time-pressure. Furthermore, it has been demonstrated that processing visual information is more intuitive to humans than processing other types of information such as text or numbers.

We are planning and designing a sophisticated data visualisation interface which integrates dynamic data, including novel parameters developed as a specialty of SWERI researchers, such as direct measures of physiological compensation.

We will also be developing machine learning and artificial intelligence analytic solutions to aid in the interpretation and translation of these integrated pathophysiological models. We expect the results of this novel research to be commercially attractive and plan to work with industry in their commercialisation.

## Collaborators





# Consensus meeting

On Tuesday 24th October 2017, a meeting was held of forty-six collaborators, representing university academics, emergency departments, general practice, ambulance, in-hospital medical and surgical specialists and local health district bodies. After presentations from Professor Les Bokey, Director of Research for SWSLHD, and A/Professor Paul Middleton, the EMRU Director, participants were able to hear a selection of eminent researchers describe their areas of expertise, their departmental research agendas, and their hopes for collaborative research with the SWERI. Participants heard from Professor Kate Stevens from the MARCS Institute for Brain Behaviour & Development; Professor Ben Newell from the UNSW School of Psychology; Professor Johanna Westbrook from the Centre for Health Systems and Safety Research at the Australian Institute on Health Innovation, Macquarie University; Mr James Kemp from the Western Sydney University Translational Health Research Institute; and Ms Marija Morretti, Research and Evaluation Officer from the South Western Sydney Primary Health Network.

Following the presentations, the collaborators were divided into groups, and asked to find consensus answers to three questions.

## **Question 1. On what would you spend \$750,000?**

## **Question 2. What benefits to the SWS community / clinical services would a South Western Emergency Research Institute have?**

## **Question 3. Nominate three research questions that you would prioritise for a newly formed SWERI.**

The responses were as follows:

## **Question 1. On what would you spend \$750,000?**

### **Red group**

- Link data sets between PHN / Ambulance / Hospital / GP / laboratory
- Improve health literacy
- Implement Evidence Based Practice
- Collect pilot data to inform grant applications (health needs, current providers / services) - from PHN → Ambulance → Hospital
- Fund research assistants
- Build collaborations

### **Black group**

- Building of research network with funding rather than focus on one project
- Recruit co-ordinator of research network
- Knowledge dissemination / translation person
- Infrastructure / administration of the research network
- Seed funding / small grants / research assistant support

### **Blue group**

- Project co-ordinators
- Data management
- Statistical analysis
- Educators → implementation
- Facilitators → drive
- Students → nursing, medical, allied health

### **Green group**

- Staff (recruit to do research)
- Research Fellow
- Nursing or any background
- Partnering with others
- Data Scientist (collaborating)
- Research Platform
- Improving ethics and use of data
- Complex data collected
- Pool of data → readily available for research studies
- Streamline the steps of ethics approval
- Across the district (shared data) → business intelligence
- ED data linked to Centre for Health Record Linkage; help follow up, cost and number of patients linked, trace patient health



## **Question 2. What benefits to the SWS community / clinical services would a South Western Emergency Research Institute have?**

### **Red group**

- Improving health literacy
- Improving best practice

### **Black group**

- Improving patient outcomes
- More efficient allocation of resources
- Patient experience
- Staff morale / experience / working conditions
- Attract innovation → planning, model of care (MOC)

### **Blue group**

- Improved patient outcomes
- improved communication = ↓ errors
- ↑ diagnostic accuracy
- ↑ patient satisfaction
- ↑ staff satisfaction
- ↑ patient engagement and involvement in care provision
- ↓ unnecessary interventions
- ↑ system capacity
- ↓ Cost efficiency

### **Green group**

- Epidemiology data collected continuously / periodically
- Physiological outcomes of older people in ED, snapshot of cohort → can be replicated from trauma
- Translational studies – survival, presenting in ED in near future?
- Paediatric data – children's hospital different to adult
- Predictive models
- Safety / Quality should be focus

## **Question 3. Nominate three research questions that you would prioritise for a newly formed SWERI.**

### **Red group**

- Understanding whole system
- Why do people present to ED?
- Map existing services
- Focus on implementing services

### **Black group**

- KPI on patient outcomes → Treatment > 4 hrs?
- Workforce development (all levels)
- Cognitive load, accuracy, impact on performance

### **Blue group**

- Communication
- Inter-service; interdisciplinary; relevance; accuracy; reliability
- Implementation
- Translation; behaviours; communication; evaluation
- Continuum of care
- Patient journey; life; diagnostic accuracy; evaluation

### **Green group**

- KPI on patient outcomes → treatment in 4 hrs?
- The POOPED Study (Physical outcome of people presenting to ED)
- Translational → using and implementing guidelines to see if they are effective
- Focus on qualitative or quantitative outcomes



# Alignment with existing initiatives

## Transforming Your Experience

Transforming Your Experience is a long term SWSLHD strategy to transform the patient, consumer, staff and community experience. We believe that this is an essential component of safe, effective and personalised care for patients, particularly in the context of our multicultural community. Our epidemiological work, which forms the foundation of SWERI activity, is designed to understand our patients, their illnesses and injuries, and the context in which they seek care.

Often medical problems that bring them to the emergency department have their genesis in poor health literacy, deficits in self-care or lack of early intervention. Projects such as the "One Day in Emergency" and "Multicultural Emergency Medicine Epidemiology" are key in understanding our patients. Communications strategies, and work with colleagues such as Health Translation Services, Aboriginal Health and Refugee Health, as well as the SWS Primary Health Network, will increasingly enable us to provide high-quality personalised care, and also provide a starting point for exploring how we can take emergency medicine out into the community in terms of educational and early preventative initiatives.

We are also actively supporting Transforming Your Experience for elderly and palliative patients, by work such as analysis of the Time Is Precious program to provide appropriate care to palliative patients, and the Goals of Care study with the Simpson Centre, evaluating frailty and limitations of care in the elderly.

## Heart Smart for Women

The Heart Smart for Women (HSW) project was developed as an initiative of Women's Health, South Western Sydney Local Health District to address the high prevalence of cardiovascular disease and its associated risk factors among women living in the region. The project commenced in 2010 as a pilot in Warwick Farm, a socioeconomically disadvantaged suburb in South Western Sydney.

The HSW project utilises a community capacity-building approach to build sustainable skills and resources within the community around cardiovascular disease prevention, with an aim to reduce the prevalence of risk factors for cardiovascular disease among women over 40 years of age. The HSW methodology is to reduce modifiable lifestyle cardiovascular disease risk factors, through health promotion, education and social marketing.

An evaluation was planned which asked questions regarding the implementation and processes of HSW, including:

- Was the pilot project implemented as intended?
- Were partnerships effectively developed with key stakeholders to support a gender based approach to CVD prevention in Warwick Farm?
- Was the level of knowledge and awareness of CVD among women in Warwick Farm increased?
- Was access to services which promote cardiovascular health improved for women in Warwick Farm?
- Was screening implemented and effective for assessing CVD risk among women over 40 years in Warwick Farm?

We plan to work with HSW to investigate the distal outcomes of the program, such as the incidence of presenting problems potentially related to cardiovascular disease bringing women from Warwick Farm to emergency departments, and clinical outcomes including incidence of diagnosed cardiovascular diseases such as angina, myocardial infarction and hypertension.

## Leading Better Value Care / Unwarranted Clinical Variation

Commencing in 2017/18 the NSW Health system will refocus - away from the traditional approach of measuring value in terms of volume / output in relation to costs, to measuring value in terms of the Institute for Healthcare Improvement Triple Aim of health outcomes, experience of care and efficient and effective care (in relation to costs). In this context, health outcomes are defined as the outcomes that matter to patients.

Leading better value care is an initiative by the NSW Ministry of Health and the NSW Agency for Clinical Innovation, to analyse areas of variation from clinical best practice which may impact on patient outcomes, then to use monitoring, analysis and clinical quality interventions to align care with that best practice. The SWERI is currently in discussions with the team at the ACI regarding the potential to collaboratively explore this approach in the context of emergency medicine in SWSLHD.

This collaboration directly abuts our plans for Health Services Research, in particular the Impact Evaluation stream, and also our engagement in the increasingly accepted principle that great gains can be made from activity on the boundary between research and quality improvement. It also fits well with the current emphasis on clinical redesign and models of care in the emergency department.



# Alignment with existing frameworks and strategies

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## Key:

BD - Big Data  
CE - Clinical Epidemiology  
O - Observational research  
Int - Interventional research  
T - Translational research  
HS - Health Services research  
Inn - Innovation and Enterprise

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## NSW State Health Plan

The NSW State Health Plan: Towards 2021 is constructed around three Directions and four Strategies. These are:

**Direction 1** - Keeping People Healthy

**Direction 2** - Providing World-Class Clinical Care

**Direction 3** - Delivering Truly Integrated Care

**Strategy 1** - Supporting and Developing our Workforce

**Strategy 2** - Supporting and Harnessing Research and Innovation

**Strategy 3** - Enabling eHealth

**Strategy 4** - Designing and Building Future-Focused Infrastructure

SWERI research domains and priorities map to all three Directions and all four Strategies, as they are based around using health data for epidemiology and understanding our patients and their community; providing best-evidence supported integrated health care in the pre-hospital, emergency and critical care areas, but also planning to deliver preventative care and emergency health education in the community; understanding and supporting our clinician workforce to enable them to deliver care; harnessing research and innovation; working with colleagues and organisations to leverage and develop eHealth initiatives, and planning future focused infrastructure in both data and diagnostic tools.



## NSW Health and Medical Research Strategic Review

The 2012 NSW Health and Medical Research Strategic Review described the vision that NSW will have a global reputation as a resilient, innovative centre of excellence for health and medical research that strongly supports a high-quality health system that is highly responsive to scientific advances and that generates health, social and economic benefits for the state and beyond.

The two strategies described within this vision were to:

**Strategy 1** - Foster translation and innovation from research

**Strategy 2** - Build world class research capacity

To achieve this, eleven themes were described, which were:

### Strategy 1

1. Encourage research and innovation in health services

2. Leadership in clinical trials
3. Maximise the use of research in policy, practice and health service delivery
4. Focus intellectual property expertise
5. Support early-stage venture capital

### Strategy 2

6. Enhance health and medical research hubs and collaboration
7. Strengthen the research workforce
8. Improve research infrastructure support
9. Build and optimise the use of shared research assets
10. Leverage all investment sources
11. Improve NSW Health research administration

SWERI research domains and priorities map to the Strategic Review strategies and themes as shown below.



Strategy	Theme	SWERI domain						
		BD	CE	O	Int	T	HS	Inn
Foster translation and innovation from research	Encourage research and innovation in health services	✓	✓	✓	✓	✓	✓	✓
	Leadership in clinical trials				✓			✓
	Maximise the use of research in policy, practice and health service delivery	✓	✓	✓		✓	✓	✓
	Focus intellectual property expertise	✓					✓	✓
	Support early-stage venture capital						✓	✓
Build world class research capacity	Enhance health and medical research hubs and collaboration	✓	✓	✓	✓	✓	✓	✓
	Strengthen the research workforce	✓	✓	✓	✓	✓	✓	✓
	Improve research infrastructure support	✓	✓	✓	✓	✓	✓	✓
	Build and optimise the use of shared research assets	✓	✓	✓	✓	✓	✓	✓
	Leverage all investment sources	✓					✓	✓
	Improve NSW Health research administration	✓	✓				✓	

## Research Strategy for South Western Sydney Local Health District 2012 – 2021

The Research Strategy for South Western Sydney Local Health District 2012 – 2021 articulated a vision that stated, “Researchers in South Western Sydney have a reputation for high quality health research that improves the health and health outcomes of local communities and has broad applicability nationally and internationally.”

The SWSLHD Research Strategy described seven aims:

1. Support and further develop the capacity for research across the SWSLHD.
2. Enhance the profile of current research in the SWSLHD.
3. Strengthen the quality and quantity of research in the SWSLHD.

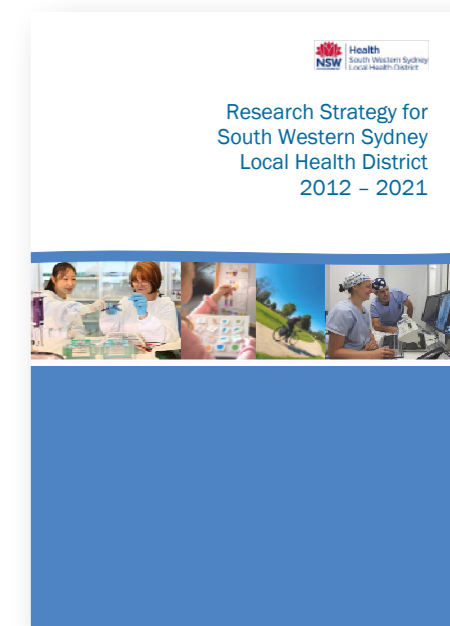
4. Encourage new researchers, including junior staff, and sustain the commitment to research of SWSLHD personnel in management, support and research roles.

5. Identify resourcing required to implement the strategies in the Plan and potential sources of funding.

6. Develop governance arrangements ensuring accountability and responsibility for research conducted according to ethical principles, scientific, regulatory and professional standards and the principles of risk management.

7. Ensure structures support creativity and lead to research which improves health and health service provision.

SWERI research domains and priorities map to the Research Strategy as shown below.



Aims	SWERI domain						
	BD	CE	O	Int	T	HS	Inn
Support and further develop the capacity for research across the SWSLHD	✓	✓	✓	✓	✓	✓	✓
Enhance the profile of current research in the SWSLHD	✓	✓	✓	✓	✓	✓	✓
Strengthen the quality and quantity of research in the SWSLHD	✓	✓	✓	✓	✓	✓	✓
Encourage new researchers and sustain the commitment to research	✓	✓	✓	✓	✓	✓	✓
Identify resourcing						✓	✓
Develop governance arrangements	✓	✓	✓	✓	✓	✓	✓
Ensure structures support creativity and lead to research which improves health and health service provision	✓	✓	✓	✓	✓	✓	✓



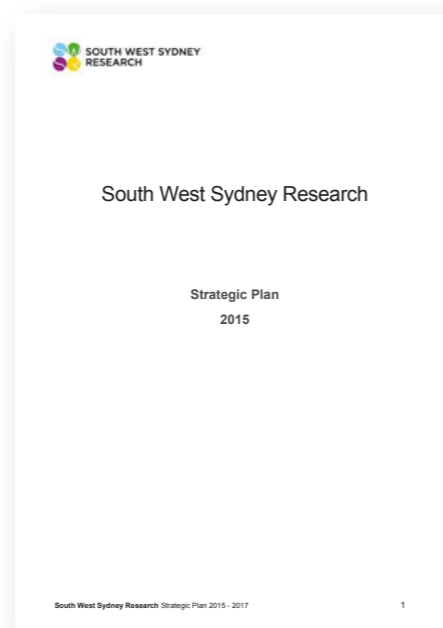
## South Western Sydney Research - Strategic Plan 2015

As stated in the strategic plan, South West Sydney Research (SWSR) represents a broad collaboration between health, research and education entities in the region who work together to improve the health of our local community and those beyond.

It also states that “Collaboration is fundamental to research quality and success. It occurs across disciplines, institutions and national and international boundaries. Members of the SWSR include hospitals, health facilities, universities, research institutes, non-government organisations and government departments.”

The SWERI is fundamentally supportive of, and aligned to, the SWSR principles, and in fact many SWSR member organisations are also SWERI collaborative partners. These include universities such as UNSW, WSU, UOW and USyd, and bodies such as the NSW Refugee Health Service, SWSPHN and the SWSLHD.

SWERI research domains and priorities map to the Strategic Plan as shown below.

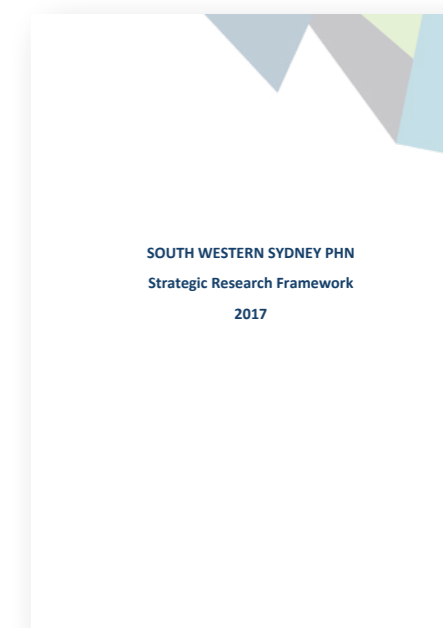


## South Western Sydney Primary Health Network - Strategic Research Framework 2017

The SWSPHN Strategic Research Framework states that research is one of the key means by which the PHN can pioneer innovation in primary health care and will allow the PHN to take advantage of opportunities to support and collaborate in quality research as they arise; provide a systematic approach to how SWSPHN will approve, determine capacity and suitability of research; as well as to maximise the value of the PHN's work by establishing partnerships with researchers and other relevant stakeholders.

The SWSPHN's goals are:

- A healthier community
- An informed and empowered community
- A better health system, experienced by General Practitioners and primary care providers
- An integrated health system that is fit for purpose
- Primary healthcare that demonstrates value



Strategic priority	Objective	SWERI domain						
		BD	CE	O	Int	T	HS	Inn
Strengthen research capacity and facilitate the implementation of health and medical research findings	Lead strategic capacity building in the district via an integrated network based in South Western Sydney	✓	✓				✓	
	Establish efficient and effective governance of the Hub to best serve members in the support of research excellence							
	Support capacity building through effective and open leadership	✓	✓	✓	✓	✓	✓	✓
	Promote translation and implementation of health and medical research findings	✓	✓	✓	✓	✓	✓	
	Increase the research capacity of Hub members	✓	✓	✓		✓	✓	
	Improve the effectiveness and efficiency of research governance	✓	✓	✓				
Facilitate collaborative engagement to improve resource access and research literacy	Expand resource access and research literacy of professionals as Hub members		✓	✓	✓	✓	✓	
	Contribute to community engagement with health research programs and research literacy	✓	✓	✓	✓	✓	✓	
	Support IT system development to aid data access and use	✓	✓	✓	✓	✓	✓	✓
	Actively participate in the wider research networks	✓	✓	✓	✓	✓	✓	✓
Develop areas of emerging research excellence with a focus on community need	Drive innovation and change that brings value to the local community	✓	✓	✓	✓	✓	✓	✓
	Build strong links amongst community and partner organisations	✓	✓	✓	✓	✓	✓	✓
	Facilitate hub members to support research and research culture	✓	✓	✓	✓	✓	✓	✓
	Contribute to the national and international agenda	✓	✓	✓	✓	✓	✓	✓

Organisational Goal	Strategies	SWERI domain						
		BD	CE	O	Int	T	HS	Inn
A healthier community	Investigate, track and analyse data to better inform priority setting, planning and systems development	✓	✓	✓		✓	✓	✓
	Commission services that enhance equitable access to care according to prioritised population needs as identified in our needs assessment	✓	✓	✓		✓	✓	✓
	Address the specific health needs of our culturally and linguistically diverse, refugee, aboriginal and rural populations	✓	✓	✓	✓	✓	✓	✓
An informed and empowered community	Enhance the health literacy of the community to help them make better informed health decisions	✓	✓	✓		✓	✓	✓
	Empower our community and their families with access to relevant self-management strategies according to need	✓	✓	✓		✓	✓	✓
A better health system, experienced by General Practitioners and primary care providers	Partner with our community in the planning, development, implementation and evaluation of our services	✓	✓	✓		✓	✓	✓
	Improve practice capabilities through the provision of timely and relevant service supports	✓	✓	✓		✓	✓	✓
	Implement a system for ongoing learning, development and diversification	✓	✓	✓				
	Engage General Practitioners and primary care providers in the planning, development, and evaluation of our services	✓	✓	✓		✓	✓	

(Table continued on next page)



Organisational Goal	Strategies	SWERI domain						
		BD	CE	O	Int	T	HS	Inn
An integrated health system that is fit for purpose	Coordinate and integrate health planning and service development with the SWSLHD and other key stakeholders	✓	✓	✓		✓	✓	
	Enable person-centred continuity of care systems that effectively link primary and acute health care providers	✓	✓	✓		✓	✓	✓
	Establish multi-sectorial partnerships that support integration of healthcare	✓	✓	✓		✓	✓	✓
Primary healthcare that demonstrates value	Support primary health care providers to contribute to improved health outcomes	✓	✓	✓		✓	✓	✓
	Facilitate the co-design and development of innovative models that ensure quality care is delivered	✓	✓	✓		✓	✓	✓
	Progressively monitor and evaluate the performance of procured services to ensure targeted solutions demonstrate cost-effectiveness, sustainability, and scalability	✓	✓	✓			✓	

## Western Sydney University - Research and Development Plan 2015-2017

One of four research themes in the WSU Research and Development Plan 2015-2017 is “Health and Well-being:

Translation, Service and Innovation”, which explores how health initiatives can prevent disease and illness, encourage healthy lifestyles in individuals and communities, and reduce the cost and impact of illness.

WSU research in health and well-being adopts an integrated approach that is, by necessity, interdisciplinary. Disciplines outside the health fields contribute to this research orientation, particularly in the areas of eHealth, infant speech perception and language acquisition, policy, and urban planning for community well-being.

The WSU Health and Well-being research theme also maps to strategic priorities, namely:

- Research outcomes will help to build resilient communities and achieve a state of physical, mental and social wellbeing, and not merely the absence of disease, or infirmity, for all Australians in whichever part of Australia they live.
- Optimise effective delivery of health care and related systems and services
- Improve the health and wellbeing of Aboriginal and Torres Strait Islander people

The SWERI collaborative approach supports and reinforces the WSU “Health and Well-being:

Translation, Service and Innovation” Research Theme in all aspects of its research domains, in particular Big Data, Clinical Epidemiology (including projects such as MEME and CARDIO), Observational research, Translational research, Health Services research and Innovation and Enterprise.

Aims	SWERI domain						
	BD	CE	O	Int	T	HS	Inn
Research outcomes will help to build resilient communities and achieve a state of physical, mental and social wellbeing	✓	✓	✓	✓		✓	✓
Optimise effective delivery of health care and related systems and services	✓	✓	✓	✓		✓	✓
Improve the health and wellbeing of Aboriginal and Torres Strait Islander people	✓	✓	✓	✓		✓	✓



## University of New South Wales - B2B Blueprint to Beyond: UNSW Strategic Intent

UNSW is distinctive in that it is the only Australian research-intensive university established with this unique focus, modelled on universities such as MIT in the USA and European technical universities.

In the B2B Blueprint to Beyond, UNSW's defines its aspiration as to "Continuously improve our position as a leading research-intensive university in the Asia-Pacific region, focusing on contemporary and social issues through defined strengths in professional, scientific and technological fields."

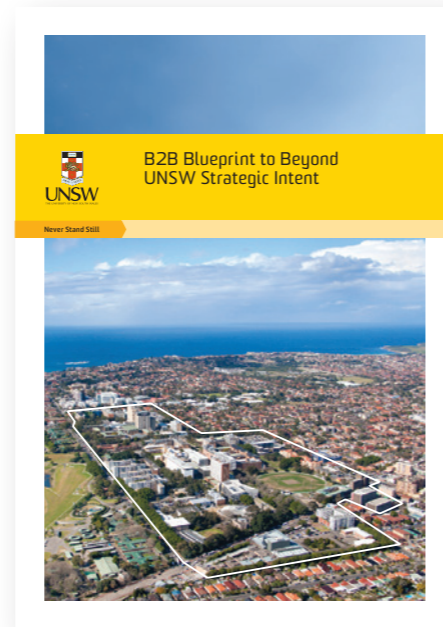
This aspiration is built on three objectives:

- Research - Continue to build on our position as a peer of the best globally
- Community Engagement - Be a valued partner with key communities
- Student Experience - Develop globally focused graduates who are rigorous scholars, leaders and professionals

Similar to the correlation between SWERI operating principles and domains of research and other institutions, there are many crossover areas between these and the details within the UNSW Objectives of Research and Community Engagement, however the SWERI also plans to engage UNSW in the fulfilment of the final objective, Student Experience.

In the year of its operation, the EMRU has strengthened links with UNSW both by involvement with medical student education, and also by Honours student supervision. Such has been the success of this relationship, in 2018 the SWERI will host five Honours students from the Medical Sciences program, as well as two PhD students. SWERI staff and academics are committed to providing the highest quality teaching, supervision and experience to students in whatever capacity they are engaged.

Further work is currently underway to provide students on their emergency medicine rotation with limited research teaching and experience, with involvement in ongoing Institute projects.



## Sydney Partnership for Health Education Research and Enterprise (SPHERE)

The aim of the SPHERE is to integrate outstanding research, top quality education and professional practices across partner organisations to improve health outcomes, deliver better healthcare, generate economic benefits, and be a magnet for recruitment and retention of staff and investment in health and research.

On the SPHERE website is the statement "The SPHERE Council is a strong governance structure which brings together Directors, Chief Executive Officers, Chairs, Deans and Vice Chancellors from partner organisations. SPHERE partners work together to recruit and retain the very best clinicians and academics, drive top quality research and education, foster excellence in clinical leadership and multi-disciplinary patient-centred care, improve health outcomes and work closely with industry to generate economic prosperity."

The SPHERE Council, and the SPHERE ethos of collaboration among teams of researchers, steered by a group of senior researchers in a leadership role, provides a gold-standard model upon which to base the kind of broad, far-reaching partnership that SWERI is planned to be. We have therefore designed a similar structure and ethos for SWERI.



SPHERE key objectives	SWERI domain						
	BD	CE	O	Int	T	HS	Inn
Strong alignment between partners that result in improved care and health outcomes for local populations.	✓	✓	✓	✓	✓	✓	✓
Enhanced educational and learning experiences in a variety of clinical and non-clinical settings	✓	✓	✓		✓	✓	✓
Research discovery and rapid translation of those discoveries and innovations to patient and population benefit.					✓	✓	✓
Strong relationships with industry and local communities to improve health and generate wealth	✓	✓	✓	✓	✓	✓	✓



# SWOT analysis

## Strengths

- Experienced and highly qualified Director of Emergency Medicine Research Unit and senior research personnel
- Unique collaboration between clinical academics, multiple university departments and Local Health District staff
- Proven and effective large organisation research unit design; driven by proficient and practiced core team comprising director, data scientist, biostatistician and senior research fellow
- Enthusiastic and highly evidence-based multidisciplinary clinical team across multiple departments and LHD sites

## Weaknesses

- Lack of track record as a collaborative group and as a research institute
- Unfamiliarity of many emergency department and LHD staff with the need for, and techniques of, epidemiology and research
- Implementation of a new research institute in the context of a number of extremely busy clinical departments
- Lack of consistent funding stream

## Opportunities

- Rapidly expanding population of patients
- A plethora of unanswered questions on various levels, including population health, clinical epidemiology, observational and health systems research
- Culturally and linguistically diverse community, with variable levels of English language proficiency, health literacy and demographics; with a range of pathological conditions with highly limited insight
- Unparalleled opportunities to undertake ground-breaking research in all pathologies, across all demographic and age groups
- Unparalleled opportunities to undertake research in highly important areas such as Aboriginal and indigenous health
- Unique prospect of working with community to implement health literacy, awareness, preventative health and therapeutic interventions, in the context of a multilingual and multicultural population

## Threats

- Inability to source adequate funding to support potential research team needed to carry out academic program
- Inability to source appropriately trained research staff to work within SWERI and SWS Emergency Department
- Inability to garner sufficient political or executive support to carry out planned research agenda



# Governance

## Executive Committee

The Executive Committee will be responsible for the strategic direction, ethical operation, scientific guidance, risk management and financial operations of the South Western Sydney Emergency Research Institute.



**Conjoint Associate Professor Paul Middleton**

Director of the Emergency Medicine Research Unit at Liverpool Hospital, and the South Western Sydney Emergency Research Institute (SWERI). A/Professor Middleton will chair the SWERI Executive Committee and the SWERI Core Operational Group.



**Professor Mary-Louise McLaws**

Professor of Epidemiology at the School of Public Health and Community Medicine, UNSW, and Deputy President of the UNSW Academic Board. Professor McLaws has an extensive track record in academic achievement, as well as success in competitive grant application and in building and directing public health programs in Australia and in developing countries.



**Professor Chris Levi**

Past Director of Clinical Research and Translation for the Hunter New England Local Health District, and the Hunter Medical Research Institute. Professor Levi is a stroke neurologist and established acute stroke services in Hunter New England, now a nationally leading stroke service, and has been co-leader of the Priority Research Centre for Stroke and Brain Injury. In 2017 he was appointed as Director of the Sydney Partnership for Health, Education, Research & Enterprise (SPHERE).



### Professor Ken Hillman

Professor of Intensive Care at the UNSW SWS Clinical School, the Foundation Director of the Simpson Centre for Health Services Research, and an actively practising clinician in Intensive Care. He is internationally recognised as a pioneer in the introduction of the Medical Emergency Team which recognises and responds to seriously ill hospital patients early in their deterioration, and which has been adopted in the majority of hospitals in the United Kingdom, United States of America and several European countries.

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### Professor Sandy Middleton

Director of the Nursing Research Institute, a joint initiative between St Vincent's Health Australia (Sydney) and Australian Catholic University. She is a Member of the National Health and Medical Research Council (NHMRC) Research Committee, Board member of the Clinical Excellence Commission (CEC), Board member of the NSW Agency for Clinical Innovation (ACI), Clinical Council member of the National Stroke Foundation, and Chair of the Australian Stroke Clinical Registry (AUSCR) Steering Committee.

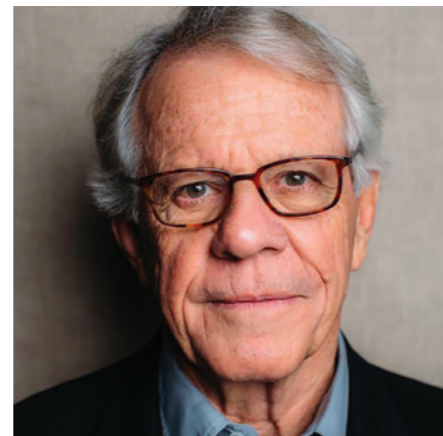
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### Professor Anders Aneman

Senior staff specialist, Fellow of the College of Intensive Care Medicine, and Director of Research in the Intensive Care Unit at Liverpool Hospital. He is a Conjoint Associate Professor at the University of New South Wales and a Clinical Associate Professor at the Macquarie University.

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### Mr Peter Joseph AM

Peter Joseph is the Chairman of the Black Dog Institute Board of Directors, and Director of St James Ethics Centre. Peter had a long career in business and investment banking, and for 30 years he has concurrently had a second career in the not-for-profit sector including schools, hospitals and research institutes.

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### Dr Michele Harris

Director of Medical Services at Liverpool Hospital, responsible for the management and administration of Medical Heads of Department with overall responsibility for medical appointments. Dr Harris oversees medical, governance and workforce issues for the hospital and has responsibility for medical and clinical governance advice to the hospital executive.

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### Mr Matthew Jennings

Physiotherapist and Allied Health Executive Director at Liverpool Hospital. He has worked at Liverpool Hospital since 2000 and had previous clinical and management experience in the UK, Western Australia and rural and metropolitan NSW. Matthew has a particular interest in musculoskeletal conditions and the management of chronic disease. He has conducted and published research in collaboration with the Universities of Sydney, Newcastle and Queensland, and The George Institute for Global Health. Matthew is Co-Chair of the NSW ACI Musculoskeletal Network and is a Conjoint Senior Lecturer, School of Science, UWS and Honorary Associate, Discipline of Physiotherapy, University of Sydney. He is involved with the Ingham Institute Injury Research stream and PCHRU and is currently coordinating a number of projects and grant activities in collaboration with ACI, UNSW, UWS and SWSLHD.

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### Dr Serena Ayers

Director of Emergency Medicine at Liverpool Hospital, responsible for the strategic and operational frameworks of the Emergency Department, currently the busiest in NSW. Serena has also been the Director of a large Regional ED in NSW, where she led a functional and physical Redesign of the Emergency Department and its Models of Care. She has played an active role at her Specialty College (ACEM), as part of the group delivering the review and modernisation of the College curriculum, assessments and examinations framework, launched in 2015. She is one of ACEM's Mentoring Champions and is a Gallup StrengthsFinder Coach. In addition to her work in Australia, she has experience of the health-care system in the UK, where she worked as a Director of Training and a Director of Simulation in London.

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# Meetings

Full meetings of the SWERI Executive Committee will occur every three months, with meetings of the Core Operational Group every month.

# Research conduct

The SWERI has a commitment to abide by the recommendations detailed in the Joint NHMRC/AVCC Statement and Guidelines on Research Practice - Australian Code for the Responsible Conduct of Research, specifically including:

- General principles of responsible research
- Management of research data and primary materials
- Supervision of research trainees
- Publication and dissemination of research findings
- Authorship
- Peer review
- Conflicts of interest
- Collaborative research across institutions

The document and these principles provide a SWERI research governance framework through which research will be assessed for quality, safety, privacy, risk management, financial management and ethical acceptability; specifying the roles, responsibilities and accountabilities of those involved in SWERI research.

# Contestable grant funding

The strength of the SWERI collaboration is in its collaborators. This may seem obvious, but strength not only lies in the track record of the collaborators, which in publication terms equates to 1700 peer-reviewed papers and numerous book chapters, abstracts and books, but in grant success. The collaborators named in this prospectus have, in the last 5 years, been successful in winning over \$140 million in competitive funding. This remarkable success, together with the broad, patient-centred research program, means that the unique SWERI collaboration is perfectly poised to undertake regular and comprehensive applications for funding from all sources.

# Enterprise – funding and fundraising

We intend that the SWERI seeks funding from a number of sources, rather than solely relying on traditional research support. In this we hope that the extensive business and not-for-profit experience of Mr Peter Joseph, a member of the Executive Committee, will prove to be of great assistance.

We fully intend to work with the UNSW Research Office and the Ingham Institute in appropriate applications to the NHMRC and ARC, both to support individual researchers and the SWERI itself, leveraging our collaborations in order to compete for contestable funds.

We plan to apply for internal University funding and specific awards. For example, SWERI researchers, in collaboration with the UNSW School of Psychology, were recently successful in applying for Scientia funding for two PhD student bursaries, to a value of \$50,000; in addition to a \$20,000 UNSW Science Industry Network Seed Funding grant to support decision-making research in the emergency department.

We are actively seeking industry funding for appropriate projects and programs, in the context of the appropriate governance framework described above. An example of our potential for this type of funding is the unrestricted research grant of ~\$112,000 from Mundipharma Ltd, to support a senior research fellow / research nurse in the area of acute pain research. This was successfully applied for in mid-2017 and was awarded in Q4 2017.

We have established a collaborative relationship with a fundraising specialist, Ms Kate Ingham, and her company Ki Media Pty Ltd, whose specific areas of expertise are constructing novel fundraising approaches, business development, and access to government grants and private sector investment. We plan to work with Ms Ingham and Mr Joseph, to devise short, medium and long-term strategic approaches to leverage the SWERI and SWS hospitals' position within the community for fundraising. We are also working with Being Brands, a communications and advertising agency, to maximise the SWERI's brand, aims and achievements within local, regional and national media.

# Enterprise – innovation and intellectual property

One of our core domains of research is novel device and data-driven patient flow algorithm development, working with the UNSW Graduate School of Biomedical Engineering, the WSU MARCS Institute for Brain, Behaviour & Development, CSIRO and industry bodies such as Elula.

We plan to work with the Ingham Institute for Applied Medical Research, academic partners and the SWSLHD to construct a detailed and proactive IP policy, to ensure that novel inventions and innovations are protected, and that any commercial benefit derived from SWERI activity and research accrues to the Institute.

# SWERI

South Western Emergency  
Research Institute