

**AUSTRALIAN INSTITUTE
OF HEALTH INNOVATION**

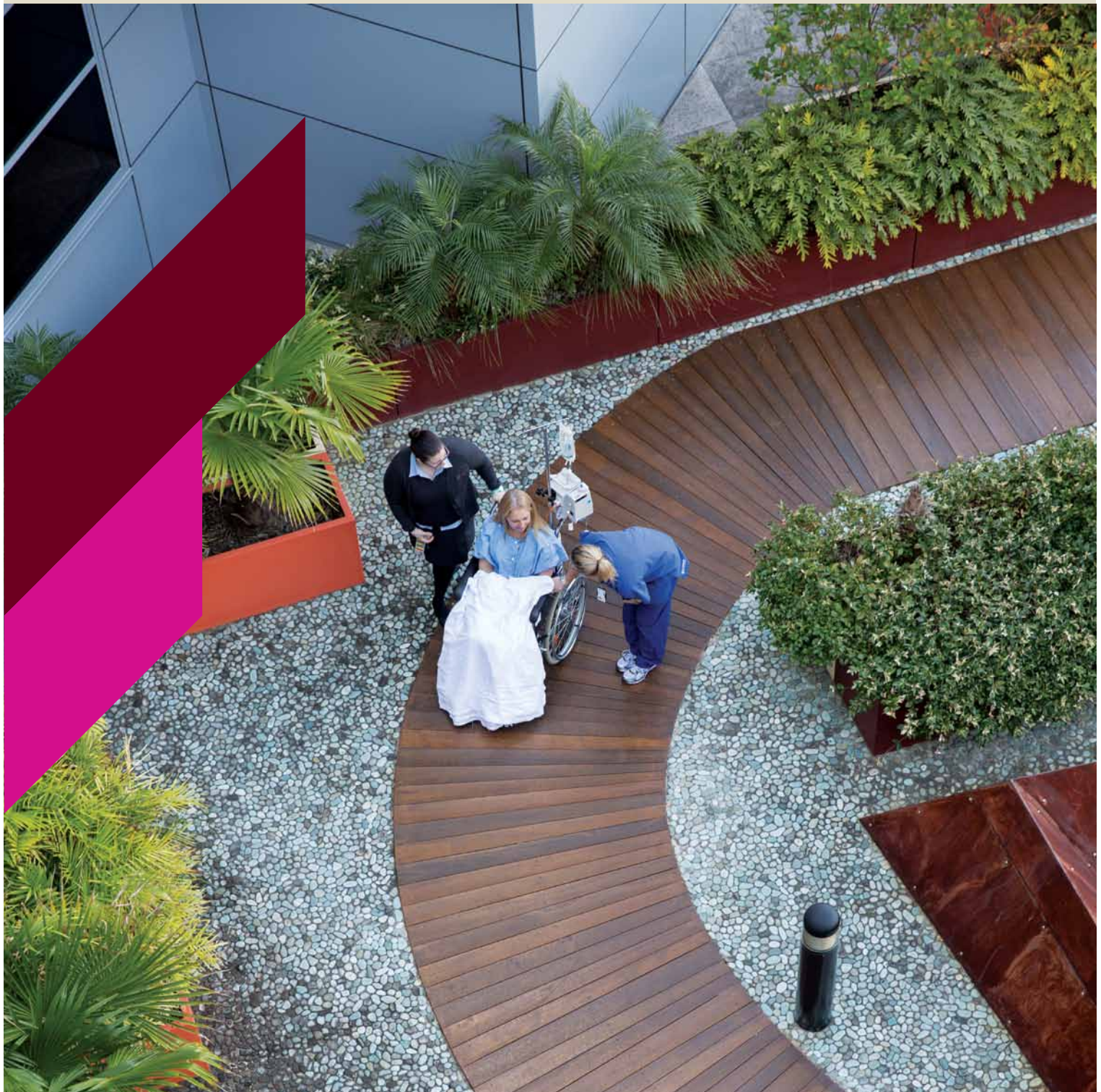
*Faculty of Medicine and
Health Sciences*



**MACQUARIE
University**

Research Insights

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Health system sustainability

Sustainability of health systems is a key concern in Australia and elsewhere in the developed world. Much has been written about fiscal sustainability as well as getting better value from what is already spent. Sustainability implies that the health system endures and adapts by ensuring limited resources (physical, financial and human) are used efficiently and responsibly enough to continually maintain or improve population and individual health and wellbeing in a constantly changing external environment. It must deliver on the triple bottom line i.e. simultaneous financial, social and environmental return on investment. It includes adapting how we deliver services, health promotion, more prevention, corporate social responsibility and developing more resilient and enduring models of care.

Our researchers conduct sustainability analyses of health systems and explore models for conceptualising and creating sustainable organisations to deliver healthcare in the 21st century. We contribute to national and international models for health system sustainability. AIHI researchers are committed to seeing health systems improvement move from a localised,

small-scale empirical endeavour, to one that is theoretically sound, efficient and cost-effective when performed at scale, and with the ability to be widely deployed and to have sustainable results.

RESEARCH THEMES

Our research spans a range of themes including:

- understanding appropriateness and quality of care in the health
- applying big data techniques and analytics to reduce health care costs and improve patient health outcomes and quality of life
- leveraging e-health and advancing technologies to deliver improved patient-centred outcomes
- using studies and trials to improve clinical and health policy decisions to support and optimise health outcomes
- improving consumer and clinical engagement through shared health information
- contributing to health policy, practice and health system performance sustainability through the development of new models of care



JOIN OUR TEAM

We welcome policy makers, researchers, clinicians, information technologists, economists, computer engineers, students, government and industry who share our vision of health system sustainability to join our team.

For more information on current research opportunities at AIHI visit aihi.mq.edu.au/study-aihi





Helping to make challenging decisions easier



Dr Anne Hogden
E: anne.hogden@mq.edu.au

While researchers continue in their search for a cure for Motor Neurone Disease (MND), health services experts like Dr Anne Hogden translate research into clinical practice, by working with MND patients to help make their lives better while they fight the disease.

“When diagnosed with a terminal illness like MND, patients – who may still be reeling from their diagnosis – need to make a number of rapid decisions to ensure they are able to make the most of their time,” explains Dr Hogden, a Research Fellow in the Centre for Healthcare Resilience and Implementation Science.

“We have established that over the lifespan of care for MND patients there are around 50 common separate decisions patients may need to make, relating to medication, procedures and the services they will call on during the course of their illness.”

Working with both MND experts and patients to understand their priorities, she is developing decision support tools for patients to use with their healthcare providers.

For example, a doctor may recommend using Riluzole, a drug that may extend patients’ lifespan for several months; however, patients need to understand what the drug is, how it works, its benefits and shortcomings.

“Even though it is a very emotional time, and patients don’t want to think ahead to the future, they need to be sure that any decisions they make fit with their life values and the lives they want to lead in the time they have,” Dr Hogden says.

“If these decisions are left, then a patient’s quality of life may deteriorate much earlier than it needs to. For example, having well-timed respiration support means that patients sleep better and are able to

be more active during the day which enhances their enjoyment of life.”

She says that patients living in metropolitan areas are generally well serviced with specialist clinics that can provide access to fact sheets and other information, but in more remote areas patients are under the care of a generalist provider.

“Journeying to the city for consultations can be very fatiguing, and may require an overnight stay for both the patient and their carer which is both costly and time-consuming.

“By developing a suite of tools, which may be a combination of paper and web-based information systems, we will help ensure they have all the information they need to make an informed decision.”

Changing behaviours to change lives



Dr Natalie Taylor
E: n.taylor@mq.edu.au

Simple behavioural changes have the potential to save many lives, particularly in healthcare settings.

Dr Natalie Taylor, a Senior Research Fellow and the lead for Health and Healthcare Behaviour Change Research at AIHI is using behavioural change methodologies to make lasting improvements in healthcare settings.

“Behavioural change and implementation science are two fields that can be combined to overcome psychosocial and environmental barriers to improving clinical practice,” explains Dr Taylor.

A methodology combining behaviour change and implementation science has been used in the UK to reduce the risk of death by feeding through misplaced nasogastric tubes, anaesthetic overdose (particularly in emergency departments), and injectable medicines to improve the processes and practice for monitoring patient reactions to antibiotics and making appropriate adjustments to dosage.

“In Australia, we’re working on improving the referral rate of colorectal cancer patients with a high risk of hereditary cancer (known as Lynch Syndrome).”

She says that in the best case, patients whose tumour pathology test results and other clinical indicators indicate a high likelihood risk of Lynch Syndrome would be referred to a genetic counsellor, offered the option of genetic testing and, for those identified as carriers, offered more frequent screening for cancers for which they are most at risk. Patients would also be able to tell family members about their own risk of carrying the Lynch syndrome gene, and their eligibility for genetic testing.

Following discussion with clinicians working at Prince of Wales and St George Hospitals, Dr Taylor’s team is designing a series of interventions that can be rolled out to suit the situation.

“For example, if the barrier is environmental, such as the referral system isn’t working properly then we would use strategies such as environmental restructuring to improve that.”

She says that her research has shown that the barrier may also be an emotional one, where clinicians find it difficult to raise the issue with patients. “In this case we would support the clinicians to develop strategies that help them to explain the issue and next steps in the process.”

Dr Taylor says as well as systemic change, social influence also plays a role in behavioural change, by ensuring junior members of staff are empowered to speak up and that senior staff members role-model good behaviour.

Along with team members, Dr Janet Long and Dr Deborah Debono, Dr Taylor is currently working on a series of articles that outline their process mapping and audit techniques, and exploring the importance of context when it comes to overcoming behavioural issues in healthcare settings.

“There is no one size fits all solution,” she says.

Exploring the gap between GP and aged care facility medication charts



**Associate Professor
Meredith Makeham**
E: meredith.makeham@
mq.edu.au

For residents living in residential aged care facilities (RACF), having their GP come to them is an important part of their health care.

Residents' medication charts are kept up to date at their facilities, however, when a change needs to be made by their doctor, this presently requires a duplication back at their GP's practice record system. If this doesn't occur, often due to time constraints, these changes are not reflected in the records at the GP's office, which could create a risk to patient safety in an emergency.

"Ideally a GP's medication list for their RACF patients at their practice is up to date and the same as the aged care facility, but this is not always the case and may be due to things like time pressures or simply remembering to make those alterations again at the other location," explains Associate Professor Meredith Makeham from the AIHI Centre for Health Systems and Safety Research.

Associate Professor Makeham, whose research focuses on the impact of digital health initiatives on patient safety, has recently undertaken a large research study known as the General Practice and Residential Aged Care Concordance of Medications (GRACE-Med) Study, which compared the information held in GPs' records with that held by aged care facilities.

"The study demonstrated that GPs looking after residents in aged care facilities keep a medical record for their patients back at their practice, but the list of current medications can be quite different. This could have major safety implications when digital health systems that share information between GPs' practices, pharmacies, hospitals and aged care facilities are used, such as the national My Health Record system.

"We analysed the differences in over 5000 medication orders, and how much of a risk these differences posed to patient safety. We found that the majority of orders contained a difference, and around 20 per cent of the differences involved a high risk medicine for these residents."

Associate Professor Makeham says that many clinicians in primary and secondary care are probably aware that the GPs' medication records may not match those held by residential care facilities, and take steps to confirm medication lists when a patient is admitted to hospital, for example.

"But it's really important to improve our understanding of how large this medication gap at our general practices really is, and the level of risk it poses for these residents, particularly as we move toward using more digital health tools like Shared Health Summaries that might be generated from our GP practice software."

She says the qualitative findings of the study are also highlighting the fact that busy GPs, whose intention it is to keep their records up to date, are facing a number of barriers to achieving this, and digital health may have a large role to play in developing solutions to reduce these medication record differences.

"Our focus is on reducing avoidable threats to patient safety. Hopefully this study will provide baseline evidence needed to help drive digital health improvements in aged care. We need to try to automate changes to medication records in aged care facility and GP systems, to reduce the risk for these residents from a safety point of view."

This research is funded by the National eHealth Transition Authority (NEHTA).

Monitoring paediatric electronic medication system rollout



Dr Magda Raban
E: magda.raban@mq.edu.au

Medication errors can have serious consequences for any patient, but children are particularly vulnerable to mistakes in their medication.

“Electronic medication management systems are designed to reduce medication errors, but despite hospitals and other medical services investing in new systems, only limited data has been collected about their impacts on patients and staff, particularly in paediatrics,” explains Dr Magda Raban, a Research Fellow at the Centre for Health Systems and Safety Research at AIHI.

Westmead Children’s Hospital is one of the first paediatric hospitals in Australia to get an electronic medication management system (eMM) and will give researchers a unique insight into how it will impact patients and staff.

“The system is expected to be both safe and effective at reducing medication errors, but as it is progressively rolled out across the hospital we will have the opportunity to learn first-hand what impact it has on both errors, workflow and procedures.”

Dr Raban says that the study is innovative because the study design will provide rigorous evidence on the impact of eMM and is the first time such a study has been undertaken in either adults or children. The study will look at both medication administration errors and prescribing errors.

“To measure medication administration errors, during an 11-week period six trained observers will work on nine study wards to see the change from a paper based system to an electronic system.”

The observers are trained RNs who are collecting data on medicine administration on a tool developed for the purpose, she continues. “Later we will be comparing what’s in the charts to what’s administered.”

She says that while the study results won’t be published until next year, any issues identified will be addressed promptly.

“Our aim is to feed back to the hospital as soon as possible and to make any necessary changes before the same system is rolled out at the Randwick Children’s Hospital.

“Paediatric patients are more vulnerable to medication errors and any mistakes can have serious ramifications. We want to deal with any potential safety risks as soon as possible.”

This research is part of a large project funded by an NHMRC Partnership Projects Grant with partners, Sydney Children’s Hospital Network; NSW Office of Kids and Families and eHealth NSW.

Making patients more compliant

Image: Chris Stacey



Dr Annie Lau
E: annie.lau@mq.edu.au

Surgery is just the first step in repairing serious injuries, with months of physiotherapy and other treatment needed to ensure the best outcome.

However, research has shown that despite being made aware of the importance of following post-operative treatment protocols many orthopaedic patients fail to follow through and frequently re-injure themselves as a result.

Dr Annie Lau is helping develop new technologies that will help make it easier for patients to follow their treatment plan and recover sooner.

“This project was launched following conversations with researchers and orthopaedic surgeons who were having problems with rotator cuff repairs,” explains Dr Lau, who leads the Consumer Informatics stream at the Centre for Health Informatics at AIHI.

After patients have surgery to repair muscles and tendons in their shoulder, they need to follow a post-operative rehabilitation protocol, which involves wearing a sling for six weeks and doing exercises for an additional 12 weeks.

“But the re-tear rate is 30 percent because patients don’t follow instructions,” Dr Lau says. “Nurses already explain to patients why the exercises are an important part of the recovery process but the problem persists.”

Dr Lau’s team has developed an app so that if patients are unclear about how to do a particular exercise they can look at the app and watch videos if needed.

“We have also developed a questionnaire that takes only a minute each day and measures patients’ progress, with feedback from surgeons in response.”

The team has ethics approval to test whether the app will increase compliance rates and reduce shoulder re-tear rates in patients.

“We’re also interested in feedback on what should or shouldn’t be included to make the app’s format as patient-friendly as possible.

“We are currently recruiting patients for the study. Anyone who has had a rotator cuff repair at Macquarie University Hospital and has an Android or iPhone can become part of the study.”

Contact Dr Annie Lau, Centre for Health Informatics, Australian Institute of Health Innovation, Macquarie University by email at annie.lau@mq.edu.au for more information about becoming a part of the study.



Predicting patient mortality rates



Dr Blanca Gallego Luxan
E: blanca.gallegoluxan@mq.edu.au

Knowing which patients are more likely to die during a hospital stay or shortly after discharge can help medical staff to plan ahead and result in better patient outcomes.

However, until recently, being able to predict death for hospitalised patients beyond 24 hours into the future was more art than science.

“Serious adverse events, including deaths will always happen in hospitals, but in many instances they can be predicted and, if appropriate, prevented,” explains Dr Blanca Gallego Luxan, a Senior Research Fellow in the Centre for Health Informatics at AIHI. “These predictions can be used to extend the concept of Rapid Response Teams.”

Dr Gallego Luxan started research in this field back in 2012, when little work had been done.

“The field has now advanced tremendously, but we were among the first to use the data captured in the hospitals’ electronic records to predict whether hospitalised patients would survive the next day, few days or week.”

She says that, surprisingly, it is very easy to predict short-term death in hospitalised patients, by using simple outcomes that are well captured in hospitals’ electronic records systems.

“We are able to predict future health trajectories in an automated fashion that does not require human intervention using data collected as part of routine care, such as pathology results, surgical interventions and ward movements.”

“As more information becomes available we are able to refine our predictions in a similar way to meteorologists using weather prediction systems.”

Dr Gallego Luxan and her team are currently working with St Vincent’s Hospital, Sydney to translate these models into clinical practice to saving lives and improving the outcomes of hospitalised patients.

Improving quality of medicines in residential aged care



Dr Lisa Pont
E: lisa.pont@mq.edu.au

Dr Lisa Pont is a Senior Research Fellow at the Centre for Health Systems and Safety Research at AIHI with a passion for improving the quality and safety of medicine use. She has been working with aged care providers to reduce medication-related harms for people with dementia in residential aged care.

All medicines have harms, and when the wrong medicine is used for the wrong condition or in the wrong person, the risk of harm increases.

In dementia we know that antipsychotic medications can be beneficial for a small number of the behavioural and psychological symptoms associated with the condition, yet for the majority of these symptoms there is just no benefit to using an antipsychotic. We also know that using antipsychotics is linked with a whole range of harms. Yet despite this limited benefit and risk of harms antipsychotics are commonly used in the management of dementia.

Dr Pont has a NHMRC Translating Research into Practice fellowship and is working with Catholic Healthcare to trial an innovative program in residential aged care to ensure that the patients who receive antipsychotics are the patients who are actually benefiting from their use. The program implements new organisational processes, Quality Use of Medicines Quality Circles at each facility and educational materials for health professional and care staff.

“By getting health professionals and care staff to sit down together and talk about antipsychotics in their Quality Circles, we are encouraging them to think about whether the individual with dementia is actually benefiting from their antipsychotic medicine or have they just been exposed to increased risk of harm. Did they benefit in the past but now their dementia has progressed? Therefore they are no longer experiencing the same symptoms and no longer need their antipsychotic medicine.”

The Quality Use of Medicines in Aged Care (QUMAC) study is helping us make sure that aged care residents with dementia are having their antipsychotics tailored to their needs. We are simply making sure the right people get the right medicines.





Industry engagement



WORK OBSERVATION METHOD BY ACTIVITY TIMING (WOMBAT)

The Work Observation Method by Activity Timing (WOMBAT) technique was developed by the Centre for Health Systems and Safety Research to undertake direct observational studies of health professionals using a handheld computer tool, allowing observers to capture multi-dimensional aspects of work and communication patterns. WOMBAT automatically captures all time data related to tasks, as well as detailing interruptions to work and multi-tasking.

The WOMBAT technique has now been applied by 14 international research teams, including an AIHI collaboration with researchers in the US on a project commissioned by the American Medical Association. The aim of the project was to describe how physician time is spent in ambulatory practice. A physician work task classification relevant to US ambulatory care practices was devised and incorporated into the WOMBAT tool. The classification had 12 broad, mutually exclusive work task categories, which were grouped under four activities: 1) direct clinical face time between physician and patient or physician and staff; 2) EHR (electronic health record) and deskwork; 3) administrative work; and 4) other. WOMBAT was used to record 430 hours of observation of 57 ambulatory care physicians across four specialties. The study found that for every hour physicians provide direct clinical face time to patients, there is an additional nearly two hours of physician time spent on EHR and deskwork within the clinic day. The study has been published in *Annals of Internal Medicine*.



THE “BITCOIN FOR HEALTHCARE”

Healthbanc is a new US-based start-up company created to commercialise our consumer e-health technologies (known as **Healthy.me**). Healthbanc was founded by entrepreneur and pharmacist, Ken Lee in 2015.

Healthbanc is a rewards program and booking app that helps patients save money on healthcare expenses, save time making appointments and creates a healthcare professionals network.

Healthbanc aims to become the distribution hub for new medical technologies, delivered at lower cost by creating a unique virtual Healthcare currency, a “Bitcoin for Healthcare” (Healthbanc points).

Patients accumulate Healthbanc points which they can then redeem for certain free activities, to reduce their healthcare costs.

Collaboration – Past Institute seminars

The Institute delivers a regular lunchtime seminar program to encourage the exchange of ideas across the Institute, University and health sector both nationally and internationally. We invite distinguished professionals to our offices at Macquarie University to give presentations on topics of current interest. Speakers may discuss recently completed or early-stage research they have undertaken or report other types of professional activity they are involved with. The topics presented align closely with the Institute's current research directions. Below is a list of seminars held in the last financial year.

Seminar title	Speaker	Organisation
NPS Medicinewise and choosing wisely Australia; improving use of medicines and medical tests	Dr Lynn Weekes	NPS MedicineWise
Why bother to teach patient safety before graduation?	Emeritus Professor Kim Oates	Clinical Excellence Commission
The long journey: building quality and safety within the electronic health record at Memorial Hermann	Dr Robert Murphy	University of Texas School of Biomedical Informatics
Applying ergonomics/human factors to study and improve 'patient work'	Professor Richard J. Holden	Indiana University School of Informatics and Computing, and founding Director of eHealth for the Center for Brain Care Innovation at Eskenazi Health
Medical tourism: patient, organisational and system-level perspectives	Dr Neil Lunt	University of York
Building a scalable health analytic platform: computational phenotyping and cloud-based predictive modelling	Associate Professor Jimeng Sun	Georgia Institute of Technology
Culturum, improvement and patient safety hub in region Jönköping County, Sweden	Dr Axel Ros and Berit Axelsson	Region Jönköping County
Resilient health care: re-conceptualising patient safety	Professor Jeffrey Braithwaite	Australian Institute of Health Innovation, Macquarie University
Tales from the (almost) front line – what's clinical governance in reality?	Dr Annette Pantle	Royal Australasian College of Medical Administrators
The implications of summative usability test results required for meaningful use certification for Australian clients	Associate Professor Anne Miller	Australian Institute of Health Innovation, Macquarie University
Incident reporting driving a co-produced primary care improvement agenda for Australia	Dr Andrew Carson-Stevens	PISA Research Group at Cardiff University
Quality and safety in England: the role of regulation	David Behan CBE	Chief Executive of the Care Quality Commission
Do hospital boards matter for better, safer, patient care? Fresh evidence from the English NHS	Professor Russell Mannion	University of Birmingham and Director of Research at the Health Services Management Centre (HSMC)
What is on your wall? A rational approach to safety and quality	Professor Cliff Hughes AO	President of the International Society for Quality in Health Care (ISQua)

Seminar title	Speaker	Organisation
Big history, population and collective learning	Dr David Baker	Macquarie University
Conceptualizing fraudulent studies as infectious viruses: a new model for handling retractions in the scientific knowledge base	Professor Kathleen Montgomery	University of California, Riverside
"The view from over here"	Professor Patrick Bolton	Prince of Wales Hospital
Patient safety initiatives in China – Start, progress and lessons learnt	Dr Hao Zheng	Tongji University School of Medicine
Meeting with directors and stream leaders	Professor Peter Lachman	Great Ormond Street Hospital
Integrating clinical registries and administrative data for evidence-based health care performance evaluation: experiences in EU and OECD projects	Professor Fabrizio Carinci	University of Surrey
Collaboration spaces: Understanding health information systems design for collaborative healthcare delivery	Associate Professor Craig Kuziemsky	Telfer School of Management, University of Ottawa
Harnessing the information revolution: how better use of data and technology transforms outcomes and costs in health and care	Tim Kelsey	Commercial Director, Telstra Health
The learning health system and clinical Informatics	Dr Jonathan Palma	Stanford University
Hidden and not so hidden bias in nutrition research	Professor Lisa Bero	Charles Perkins Centre, University of Sydney
Healthcare rebel in paradise	Dr Faisal Saeed	ADK Hospital, Maldives. Visiting Fellow, Agency for Clinical Innovation
Bridging the gaps: the "Why, What and How" of remote critical care	Dr Timothy Buchman and Cheryl Hiddleston	Emory Critical Care Centre
Systematic reviews and research synthesis outside the clinical sciences	Professor Annette O'Connor	Iowa State University

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L6, 75 Talavera Road
Macquarie University
NSW 2109, Australia

Macquarie University
North Ryde, New South Wales 2109
T: (02) 9850 2400
mq.edu.au



Professor Jeffrey Braithwaite

Founding Director, AIHI
Director, Centre for Healthcare Resilience and
Implementation Science
E: jeffrey.braithwaite@mq.edu.au

Professor Johanna Westbrook

Director, Centre for Health Systems and
Safety Research
E: johanna.westbrook@mq.edu.au

Professor Enrico Coiera

Director, Centre for Health Informatics
E: enrico.coiera@mq.edu.au

Mr Reza Bilimoria

Institute Manager
E: reza.bilimoria@mq.edu.au

CRICOS Provider 00002J



Image: Chris Stacey