Australian Institute of Health Innovation
ANNUAL REPORT
2019
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Founding Director’s Report

At any point in time across the Australian Institute of Health Innovation (AIHI), there’s a wide range of research going on. We are studying and evaluating healthcare from many angles at considerable depth and with a great deal of purpose through our efforts on over 100 projects. That is the joy of working here. I invite you to delve into this research across the pages of our 2019 Annual Report.

We are passionate about our work, motivated by the fact there is plenty of evidence that we make a difference. Indeed, that is why we are here: to do innovative, interesting, and meaningful research that improves health services and systems and contributes to healthy populations.

As to that evidence, 2019 provided much to celebrate. To list only a few examples, Professor Johanna Westbrook was named as the ‘National Research Leader in Medical Informatics’ in a special report by The Australian. The Australian Alliance for Artificial Intelligence in Healthcare led by Professor Enrico Coiera increased from 50 member organisations to 90. Our Centre for Health Informatics celebrated its 20th anniversary as Australia’s largest and longest running academic research group in this discipline.

Contributions by the Centre for Health Systems and Safety Research and the Centre for Healthcare Resilience and Implementation Science’s CareTrack Aged team to the Royal Commission into Aged Care Quality and Safety were included in the Interim Report of the Commission. The Centre for Healthcare Resilience and Implementation Science completed two large programs of work – the Deepening our Understanding of Quality in Australia (DUQuA) project, involving 32 of the largest hospitals in Australia, and the CareTrack Kids studies examining over 160,000 occasions of care. The National Health and Medical Research Council (NHMRC) Partnership Centre for Health System Sustainability contributed evidence to the national debate on many issues in order to create a health system that is built to last, especially around low-value care and overdiagnosis of cancer.

This year we presented at Macquarie University’s TEDx, including curating the event with talks from Dr Robyn Clay-Williams, Professor Enrico Coiera.
and myself. There was sustained growth in PhD and Master of Research enrolments and submissions and the Macquarie University Doctor of Medicine Academic Research Program has continued to grow under the coordination of AIHI and led by Professor Frances Rapport.

We collaborated with many people to achieve our results, enjoying long term and newly forged relationships with partners in academia and industry, nationally and internationally. During 2019 we proudly expanded our portfolio to include a new NHMRC Partnership Project, two NHMRC Investigator Grants and a Medical Research Future Fund Project.

Ultimately, we are researchers and we like metrics. A key to quantifying our performance is to ask how we measure up against others internationally. The SCIVAL Field-Weighted Citation Impact for AIHI stands this year at 2.01, meaning our research articles are cited at 101% above world average.

Professor Jeffrey Braithwaite
FOUNDING DIRECTOR
Who we are

The Australian Institute of Health Innovation (AIHI) is a globally recognised research-intensive centre, with a steadfast commitment to improving healthcare services and health systems in Australia and beyond. We are part of Macquarie University – ranked in the top 1% of universities worldwide – and our work is synergistic with and an integral part of MQ Health, Australia’s first fully integrated academic health sciences centre.

Our partnerships with those providing or receiving health services in real-life contexts ensure that our world-class, high-impact research has a positive influence on patients, health professionals and society more broadly.

AIHI comprises three independent, complementary and highly collaborative university research centres, each of which takes a systems perspective to solve healthcare problems, utilizing highly innovative and wide-ranging research methods.

1. Centre for Health Systems and Safety Research (CHSSR)
2. Centre for Healthcare Resilience and Implementation Science (CHRIS)
3. Centre for Health Informatics (CHI)

Our leadership in translational health services research is further evidenced by the innovative work of our three National Health and Medical Research Council (NHMRC funded) centres:

4. NHMRC Partnership Centre for Health System Sustainability
5. NHMRC Centre of Research Excellence in Implementation Science in Oncology
6. NHMRC Centre of Research Excellence in Digital Health

Reflecting our consistently high value research contribution, in 2019 AIHI managed grants and contracts valued at $32 million. We also contributed to research associated with a further $41 million worth of grants administered by other institutions.

Our highly successful approach is contributed by 190 academics and visiting researchers, including a skilled team of professional staff. We supervise 38 higher degree students and are contributing to the Macquarie University Master of Public Health program, and importantly, are involved in teaching and administering the Macquarie University Doctor of Medicine Academic Research Program.

Reflecting our consistently high value research contribution, in 2019 AIHI managed grants and contracts valued at $32 million.
AIHI at a glance
HEAL. LEARN. DISCOVER.

OUR RESEARCH AND PROJECTS

$10m
New research funding for 2019

31
Total new projects commenced in 2019

$32m
Enterprise value of projects under AIHI management

85
Number of research projects under AIHI management

$41m
Enterprise value of grants administered elsewhere involving AIHI

17
Number of projects administered elsewhere involving AIHI

$23m
Category 1 Funding for grants under management 2019

190
Researchers, visiting appointees and professional staff

38
PhD, Master of Research and Master of Philosophy students

357
Peer-reviewed outputs

30
Outreach events

344
Media Print, TV and radio
WHAT WE DO

- Improve the safety and quality of care for patients and staff
- Support better aged and community care
- Enhance services for people with chronic ill-health
- Optimise AI and machine learning, for safe, efficient and ethical support
- Integrate services, making delivery and access easier
- Build a sustainable health system for future generations

FUNDING HIGHLIGHTS

$10m
New funding awarded in 2019

$32m
Under AIHI management

GRANTS UNDER MANAGEMENT 2019 BY FUNDING CATEGORY

- CATEGORY 1
  14 grants, $23,198,194
- CATEGORY 2 & 3
  47 grants, $7,635,840
- OTHER
  24 grants, $954,627
Our Board

CHAIR
Professor
Patrick McNeil

MACQUARIE UNIVERSITY
Professor
Jeffrey Braithwaite

MACQUARIE UNIVERSITY
Professor
Johanna Westbrook

MACQUARIE UNIVERSITY
Professor
Enrico Coiera

MACQUARIE UNIVERSITY
Professor
Cliff Hughes AO

MACQUARIE UNIVERSITY
Professor
Lesley Hughes

NSW HEALTH SYSTEM
Professor
Adam Jaffé

NSW HEALTH SYSTEM
Professor
Chris Cowell

NSW HEALTH SYSTEM
Professor
George Rubin

NSW HEALTH SYSTEM
Professor
Patrick Bolton

NSW HEALTH SYSTEM
Professor
Sally Redman AO

NSW HEALTH SYSTEM
Ms Carrie Marr

INDEPENDENT MEMBERS
Professor
Les White AM

INDEPENDENT MEMBERS
Dr Karen Owen

BOARD SECRETARIES
Ms Joanna Holt
Ms Sue Christian-Hayes
Our Partners

The Australian Institute of Health Innovation is proud to partner with a broad range of government, industry, health services and research institutions. We also highly value our engagement with health consumers through advocacy groups and clinical trials. A full list of our partners can be found on our website at aihi.mq.edu.au with a selection listed here.

- Agency for Clinical Innovation NSW
- Anglicare
- Australasian Association of Clinical Biochemists
- Australasian College of Health Informatics
- Australian Commission on Safety and Quality in Health Care
- Australian Defence Force
- Australian Genomics Health Alliance
- Australian Research Council
- Black Dog Institute
- Bond University
- Bupa Health Foundation Australia
- Bureau of Health Information
- Cancer Institute NSW
- Children’s Cancer Institute Australia
- Clinical Excellence Commission (NSW)
- Cochlear Ltd
- Commonwealth Department of Health plus State and Territory departments of health
- Consumers Health Forum of Australia
- CSIRO Australian e-Health Research Centre
- Curtin University
- Dementia Australia Research Foundation Limited
- Harvard Medical School (USA)
- Health Quality & Safety Commission New Zealand
- Healthdirect Australia
- Independent Hospital Pricing Authority
- KPMG Australia
- Local Health Districts - various
- Melanoma Institute Australia
- Mito Foundation Australia
- Murdoch Children’s Research Institute
- National Children’s Digital Health Collaborative
- National Health and Medical Research Council
- National Library of Medicine (USA)
- NSW Department of Communities and Justice
- NSW Health Pathology
- Primary Health Networks - various
- Research Australia
- Royal College of Pathologists of Australasia
- Sax Institute
- St Vincent’s Health Australia
- Sydney Children’s Hospital Network
- University College London (UK)
- University of Melbourne
- University of New South Wales
- University of Notre Dame Australia
- University of Oxford (UK)
- University of South Australia
- University of Sydney
- University of Wollongong
Our Directors

**PROFESSOR JEFFREY BRAITHWAITE**  
Founding Director, Australian Institute of Health Innovation  
Director, Centre for Healthcare Resilience and Implementation Science

Professor Jeffrey Braithwaite is a leading health services and systems researcher, internationally recognised for his work. He has considerable expertise in researching the culture and structure of acute settings, leadership, management and change in healthcare, quality and safety in healthcare, accreditation and surveying processes in international contexts and the restructuring of health services. He has published extensively, with over 600 refereed contributions and over 17,470 citations. Professor Braithwaite is the recipient of research funding of over $142 million spread over 96 grants. New research funding in the last five years amounts to over $84.9 million; more than 87% of his funding is at the category one level.

His cutting-edge research on culture, reform and resilience has produced an extensive body of work that includes 14 highly regarded books. Professor Braithwaite has also led research laying new underpinnings of the discipline, particularly applying complexity science to healthcare improvement and reform. The International Society for Quality in Health Care has indicated his research is the most valuable international research in the field and, amongst others, the WHO and OECD have made extensive use of his work on quality indicators and Safety-II.

A major breakthrough is represented in papers providing advances in healthcare structural change, and the need to deploy more sophisticated change strategies e.g., culture change or organisational change through collaborative networks. In 2019, he successfully secured, as lead investigator, a $1.5 million Medical Research Future Fund Grant for keeping people out of hospitals. He was also awarded an NHMRC Leadership Award in the form of an Investigator Grant to examine genomics medicine implementation, creating a genomics learning organisation, valued at $1.35 million.

**PROFESSOR JOHANNA WESTBROOK**  
Director, Centre for Health Systems and Safety Research

Professor Johanna Westbrook is internationally recognised for her research evaluating the effects of information and communication technology (ICT) in healthcare. Professor Westbrook has led important research in the development and application of approaches to evaluate ICT, including new tools and methods which have been adopted internationally. She has extensive expertise in the study of medication safety. Professor Westbrook has contributed to theoretical models regarding the design of complex multi-method ICT evaluations and conducted large trials of their effects. 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. Her research has included the development of the Work Observation Method by Activity Timing (WOMBAT) software to support the conduct of observational workflow studies, which is now used by 30 research teams across 12 countries. Her research has led to significant advances in our understanding of how clinical information systems deliver (or fail to deliver) expected benefits and supported translation of this evidence into policy, practice, and IT system changes. Professor Westbrook has over 450 publications, and has been awarded more than $50 million in research grants. In 2019, Professor Westbrook was named as the ‘National Research Leader in Medical Informatics’ by *The Australian*. Between 2016-2019, she was appointed by the Federal Minister for Health to the Board of the Australian Digital Health Agency.
and in 2014 was named Australian ICT Professional of the Year by the Australian Information Industry Association. Professor Westbrook is Chair of the Deeble Institute of Health Policy Advisory Board, Australian Healthcare and Hospitals Association, and a member of the Boards of the Sax Institute and the International Medical Informatics Association.

**PROFESSOR ENRICO COIERA**  
**Director, Centre for Health Informatics**  

Trained in medicine and with a computer science PhD in Artificial Intelligence (AI), Professor Enrico Coiera is Foundation Professor in Medical Informatics at Macquarie University and Director of the Centre for Health Informatics, a group he co-founded in 2000. He is also Director of the NHMRC Centre of Research Excellence in Digital Health and founder of the Australian Alliance for Artificial Intelligence in Healthcare. With a research background in industry and academia, Professor Coiera has a strong international reputation for his work on decision support and communication processes in biomedicine. Professor Coiera spent ten years at the prestigious Hewlett-Packard Research Laboratories in Bristol UK where he led numerous health technology projects. He has overseen the development and trial of multiple e-Health interventions, including the Healthy.me consumer app and clinical decision support systems.

The third edition of his textbook *Guide to Health Informatics* has been translated into several languages and is widely used internationally. Professor Enrico has over 350 publications and over 16,100 citations in Google Scholar with an H-index of 63 (Google Scholar). Of these publications, 40 have more than 100 citations, nine more than 300 citations and one has more than 2,050 citations.
Reforming aged care

The Royal Commission into Aged Care Quality and Safety incorporated research evidence provided by AIHI into the first Interim Report, titled *Neglect*. Professor Johanna Westbrook was an expert witness to the Commission and discussed the appropriate use of linked data to make a difference in the lives of older Australians and their carers.

Professor Westbrook presented AIHI’s research focusing on the power of information and communication technologies and existing healthcare data in electronic record systems to monitor and improve quality and safety in aged care and reduce the administrative burden on aged care staff. Professor Westbrook commented on the high volumes of routinely collected data in aged care in both electronic and paper-based format, and described how well-integrated electronic data is essential for assessing the impact of policy reforms and increasing transparency.

Professor Westbrook provided insights into how the research undertaken by AIHI, using data from existing sources including integrated electronic medical records and linked aged care datasets, has illuminated important issues relating to appropriate medication administration including in the areas of osteoporosis and antidementia and antipsychotic medications.

In an important first for Australian aged care research, AIHI found that among aged care facility residents with dementia across 68 facilities, 65% used antipsychotics longer than guidelines recommend. This groundbreaking research demonstrates how existing electronic data can be maximised to monitor quality use of medicines in aged care.

These data have also been analysed to examine trends in pressure injuries; the effects of community aged care services on delaying entry into aged care facilities; and the link between aged care services and quality of life for older adults.

In August 2019, AIHI brought together community aged care clients and staff, senior management from Uniting, health consumer representatives, Department of Health, and members of our Aged Care Evaluation and Research team for our second annual Ageing Well Stakeholder Forum. Discussions related to social engagement and community aged care services including integrated care and consumer choice.
CASE STUDY
Providing evidence that makes the difference
First evaluation of rapid flu test

In a world first review, AIHI researchers confirmed the efficacy of the breakthrough rapid molecular diagnostic test for influenza which delivers results in two hours. The review provided evidence that the test improves patient outcomes and reduces unnecessary resource utilisation both in hospital emergency departments (ED) and inpatient settings.

Influenza poses a substantial health and economic burden every year, with 1,255 deaths in Australia in 2017 alone. After the rapid molecular diagnostic test for influenza was introduced in NSW in July 2017, researchers from the AIHI Diagnostic Informatics team, in collaboration with NSW Health Pathology, conducted a series of large multicentre studies to assess its impact.

As reported in the Medical Journal of Australia, 70% of patients can be accurately diagnosed while in the ED, compared to less than 2% using the conventional test. There was also a 4% reduction in the rate of hospital admission. Further, and as outlined in the Journal of Clinical Microbiology, the use of the rapid test for adults hospitalised with respiratory illnesses was associated with a shorter hospital stay and a reduction in ancillary laboratory testing.


A landmark study for child health

“One of the most important papers in child health in the last 5 years.” This is how the Editor-in-Chief of JAMA Network described CareTrack Kids when results were published in the Journal of the American Medical Association, one of the world’s prestige medical journals.

CareTrack Kids is a landmark national study into the standard of healthcare provided to children in Australia. Results showed children receive care in line with clinical practice guideline recommendations on average 60% of the time.

By examining 17 common childhood conditions, the study measured adherence by GPs and paediatricians to clinical practice guideline recommendations. Care was evaluated for 6,689 children 15 years of age and younger who had 15,240 visits to emergency departments, for inpatient admissions, or to pediatricians and general practitioners in selected urban and rural locations in three Australian states. These visits generated 160,202 quality indicator assessments.

The outcomes of CareTrack Kids will guide the efficient, safe and effective delivery of healthcare to future generations of Australian children.
Understanding how quality measures impact hospital care

Deepening our Understanding of Quality in Australia (DUQuA) is the largest study on quality management in Australian public hospitals and one of the largest conducted internationally.

For the first time, hospital quality management systems, leadership and culture were studied for how they relate to healthcare delivery, quality and patient factors.

DUQuA is an NHMRC funded research project and was conducted in 32 large public hospitals around Australia, encompassing 119 participating departments, and 2,387 participants, including clinicians (doctors, nurses, and allied health professionals), hospital managers, and patients.

DUQuA extends the work undertaken in the Deepening our Understanding of Quality Improvement in Europe study, which examined the relationships between quality management systems, clinical processes, and patient factors in 188 hospitals across seven European countries.

Results were published in the International Journal for Quality in Health Care and other peer-reviewed journals, and presented at international conferences and symposiums. Individually tailored benchmarking reports were provided to each of the 32 hospitals and are reportedly being used to assist those preparing for accreditation.

**DUQuA is the largest study on quality management in Australian hospitals.**


Unlocking AI for healthcare

The Australian Alliance for Artificial Intelligence in Healthcare (AAAiH), led by Professor Coiera, has grown from 50 organisations at the start of 2019 to over 90 organisations with 250 individual members from Australia, the UK, US, New Zealand and Canada.

AAAiH brings together national and international partners and engaged stakeholders in academia, government, consumer, clinical, industry organisations, and peak bodies to translate frontier AI technologies into real-world health services.

The group has developed a number of initiatives including a green paper on AI in healthcare, an Australia-wide workforce survey, and a national workshop. AAAiH was also an official conference partner of the first AI Med global summit in Australia.

CASE STUDY
Providing evidence that makes the difference
Detecting personality traits using eye-tracking data

In ground-breaking research using AI, personality detection has been made more accurate and may be used to enhance medical care.

Personality detection is an important task in psychology, as personality traits are linked to various behaviours and real-life outcomes. Detecting personality traits traditionally involves the time-consuming analysis of lengthy questionnaires which is frequently unreliable, especially if the respondents do not answer honestly.

This research project used a new framework for objective personality detection using humans’ physiological responses to stimuli. These responses were processed and fed into machine learning algorithms capable of accurately predicting personality traits.

Across all the subjects and personality traits, the predictions achieved accuracy of almost 90%. The project resulted in multiple publications, one of them winning the Best Paper Award of the ACM International Conference on Human Factors in Computing Systems (CHI-2019), the premier conference in human-computer interaction.

AIHI was proud to be part of the sold-out Macquarie University TEDx in September 2019, resulting in three talks being promoted on the official TED website.

**Professor Jeffrey Braithwaite**
Turning, breaking, or vanishing point?

**Professor Enrico Coiera**
Will AI mean we no longer need doctors?

**Dr Robyn Clay-Williams**
Gender equality requires gender-based design.

The event was organised by members of AIHI including Hossai Gul, Director and Curator, TEDx Macquarie University, and Zeyad Mahmoud, Director and Producer, TEDx Macquarie University. Highlighting the leadership skills that abound in AIHI, other volunteer organisers from AHI included Chiara Pomare, Melissa Miao, Dr Amalie Dyda and Sheila Pham.
Researchers of the future

RABIA BASHIR
Winner of the 2019 Macquarie University Dean’s Award for Research Excellence

A NEW PERSPECTIVE ON RESEARCH INEFFICIENCIES
My PhD research examined inefficiencies in the systematic review ecosystem. My background was in software engineering, so I took that perspective and proposed the development of a new method for helping researchers to decide when a systematic review update is warranted. This has the potential to benefit meta-research and clinical research informatics.

I was truly blessed to undertake my doctoral research with two amazing supervisors, Associate Professor Adam Dunn and Dr Didi Surian, who always motivated and encouraged me to become an independent researcher. During my studies, I gained innovative skills, learned new methodologies, and articulated brand new concepts. I am now an Honorary Postdoctoral Associate with AIHI.

ZEYAD MAHMOUD
Cotutelle PhD candidate with University of Nantes, France

RESEARCH ACROSS DISCIPLINES AND CONTINENTS ENHANCES HOSPITAL MANAGEMENT
My PhD, entitled Hospital Management in the Anthropocene, was the first multinational interdisciplinary research project designed to address one of the greatest challenges faced by health systems in our modern era: striking a balance between efficiency and human centricity. Building on our existing knowledge in the fields of Management Science, Health Services Research and Big History, I developed a unique management framework that can be easily operationalised for hospitals looking to improve the efficiency of operating theatres while empowering and supporting their nursing staff.

My PhD journey has been extremely rewarding; I have been honoured to speak to academics, clinicians, health administrators, and policymakers at 12 conferences and seminars in four countries. I am grateful to my supervisors and to the culture at AIHI that provides students with the flexibility and support needed to advance their careers; my colleagues at AIHI have been with me every step of the way. I am now a Postdoctoral Research Fellow with AIHI.
Our bright and dedicated PhD students are working on research projects that address complex problems and contribute real solutions.
Organisational structure
Introducing our Centres

The Australian Institute of Health Innovation (AIHI) is powered by three complementary Centres dedicated to improving the services and systems that deliver healthcare to patients:

- Centre for Health Systems and Safety Research
- Centre for Healthcare Resilience and Implementation Science
- Centre for Health Informatics

The Centres contribute their collective expertise to explore the big questions of safety, quality, technology and sustainability that challenge health systems nationally and internationally.

The success of AIHI’s collaborative approach is apparent in being funded for three additional Centres: the NHMRC Partnership Centre for Health System Sustainability, the NHMRC Centre of Research Excellence in Digital Health and the NHMRC Centre of Research Excellence in Implementation Science in Oncology.

AIHI also contributes to student supervision (PhD and Master of Research candidates) and to the Faculty of Medicine, Health and Human Science’s teaching programs. Key teaching responsibilities include supervision of Doctor of Medicine (MD) students’ research projects and teaching in the MD and Master of Public Health Programs.

As part of MQ Health, Macquarie’s academic health sciences centre, encompassing Macquarie University Hospital, AIHI is at the forefront of bringing together education, biomedical and translational research with state-of-the-art clinical care.
Centre for Health Systems and Safety Research

From hospitals to aged care services, health information technologies are designed to make things better – from greater efficiency to improved patient safety. Challengingly, the implementation of these technologies is complex and often disrupts healthcare delivery. The Centre for Health Systems and Safety Research (CHSSR) tackles important research questions about how health information technologies can be designed and utilised to deliver improved outcomes for Australians. Effective information exchange, communication and teamwork are essential elements of the patient safety puzzle. Through our design and application of complex multi-method evaluation models, our research is delivering high quality evidence to inform decision making and drive changes in healthcare policy and practice.

During 2019 the CHSSR team conducted internationally leading studies and were awarded two significant new grants:

$1.8 million
Funding to undertake an NHMRC Partnership Project aimed at creating a digital dashboard of integrated aged care data to identify and support residents at risk of poor outcomes. The project also aims to address several issues highlighted at the Royal Commission into Aged Care Quality and Safety, including the monitoring of pressure injuries and medication management.

$2.5 million
Five-year NHMRC Investigator Grant to continue research into how information technologies can improve healthcare services, patient safety and outcomes in the area of medication safety.

“2019 was incredibly rewarding in seeing the translation of key research findings directly influencing policy and practice in the health system, from the management of medications in paediatrics to interim recommendations of the Royal Commission into Aged Care Quality and Safety.”

PROFESSOR JOHANNA WESTBROOK
Sydney Morning Herald and Fairfax Media featured Professor Westbrook’s opinion piece on “Patient safety put at risk by negative workplace cultures.”

The Royal Commission into Aged Care Quality and Safety adopted evidence provided by AIHI into its first Interim Report.

The first national sepsis epidemiology report established an epidemiological and statistical reference for the Australian Commission on Safety and Quality in Health Care (ACSQHC) to develop national clinical care standards to improve sepsis patient outcomes.

More than $500,000 of commissioned work was completed to evaluate and develop guidelines for electronic medication management systems in aged care, for government organisations including ACSQHC.

Systematic review of the impact on medication errors of double-checking during medication administration was listed as one of the top 10 most read papers in BMJ Quality and Safety.

Development of a tool for the assessment of potential and actual harm from medication errors, providing a standardised approach to assessing medication related harm.

The NHMRC Partnership Project with the Sydney Children’s Hospital Network and eHealth NSW has resulted in reviews of guidelines and changes to electronic systems.

The first cross-country study was completed using the WOMBAT software to quantify the impact of electronic medication management systems on hospital pharmacists’ work in Australia and in England. The results were published in the International Journal of Medical Informatics.

Professor Westbrook chaired and facilitated the Inaugural John Deeble Lecture and panel discussion at Parliament House, Canberra.
CHSSR Research Streams

AGED CARE EVALUATION AND RESEARCH (ACER)
Dr Mikaela Jorgensen
mikaela.jorgensen@mq.edu.au
Our mission is to improve the health and wellbeing of older Australians through enhancing the delivery of community-based and residential aged care services. As clients and providers begin to use new information technologies, our team is focused on:

• Unlocking and integrating health and aged care data to better understand care journeys.
• Developing new approaches to help care providers improve meaningful outcomes such as quality of life and cognition.
• Evaluating models of aged care service and technology delivery and providing timely feedback to inform policy.
• Co-designing research with aged care clients and the workforce to better suit their needs and preferences.

DIAGNOSTIC INFORMATICS
Professor Andrew Georgiou
andrew.georgiou@mq.edu.au
Diagnostic informatics encompasses major areas of research across the diagnostic analytical process. This ranges from the clinical choice of diagnostic request, the quality and efficiency of the analytical process, right through to the interpretation and follow-up of test results and their impact on patient care outcomes. Diagnostic informatics involves laboratory medicine, anatomic pathology and medical imaging. Whilst diagnostic testing may account for a small (less than 5%) proportion of most hospital budgets, it is considered to have a huge influence on medical decision-making. It underpins much of our health care system, generating information that is crucial to the prevention, diagnosis, prognosis, stratification of risk and treatment of disease.

MEDICATION SAFETY AND ELECTRONIC DECISION SUPPORT
Dr Magda Raban
magda.raban@mq.edu.au
The Medication Safety and Electronic Decision Support research team focuses on evaluating and optimising electronic systems and decision support to improve the delivery of healthcare and health outcomes. Our research spans multiple health settings, including hospitals and residential aged care.

WORK INNOVATION, COMMUNICATION AND EHEALTH
Dr Neroli Sunderland
neroli.sunderland@mq.edu.au
Understanding the way clinical care is delivered is central to supporting effective and safe delivery models including the design of new service models. Our research investigates patterns of clinicians’ work, and the factors that influence workflow and workloads, task errors, and patient and staff safety and wellbeing.

HEALTH ANALYTICS
Associate Professor Ling Li
ling.li@mq.edu.au
Health data analytics provides insights into rich, dynamic data available from electronic health record systems. The Health Analytics team is focused on:

• Developing and applying rigorous, cutting-edge research methods to evaluate the impact of eHealth interventions on patient safety and outcomes.
• Utilising rich dynamic electronic health record data to improve patient care delivery.
• Providing real-time information that can support decisions and deliver actionable insights.
Centre for Healthcare Resilience and Implementation Science

Ageing populations, technological breakthroughs, limited resources and consumer expectations all combine to make health system improvement a challenge of the greatest magnitude. The Centre for Healthcare Resilience and Implementation Science (CHRIS) is reconceptualising healthcare research to build more resilient systems to meet this challenge.

CHRIS pursues highly collaborative, multidisciplinary research and is pioneering new approaches to ensure research findings are translated into better and more cost-effective care. By scrutinising the myriad interactions between interconnected webs of professionals, patients and technologies, CHRIS is committed to enhancing understanding of the big picture of healthcare delivery.

The Centre is leading new research into the factors that combine to produce system-wide resilience. Such resilience can be harnessed to ensure organisations are more resistant to costly challenges and are able to improve patient outcomes and reduce wasteful use of resources. CHRIS is also scrutinising the processes of change to help ensure that many more research findings are translated into real world gains for patients, policymakers, healthcare providers and funding agencies.

During 2019, CHRIS secured funding for two major new research projects:

**$1.35 million**

NHMRC Investigator Grant to design and implement a real-world learning healthcare system to improve care for children with rare cancers.

**$1.5 million**

Funding from the Australian Medical Research Future Fund to develop a program to support best practice care across the New South Wales health system harnessing implementation science, complexity science and evidence-based care.

CHRIS’s leadership is expressed in various ways including being involved in the NHMRC Partnership Centre for Health System Sustainability and the NHMRC Centre of Research Excellence in Implementation Science in Oncology. We also work with international bodies including the WHO, OECD, The International Society for Quality in Health Care and The Society for Organisational Behaviour in Health Care to support global healthcare reform.
We welcome health system advocates, research scientists and industry as partners in our efforts to develop innovative solutions and ensure healthcare system efficiency, effectiveness and sustainability.

PROFESSOR JEFFREY BRAITHWAITE
CareTrack Kids, a NHMRC Partnership Grant project, published papers in the areas of preventive care, autism, acute abdominal pain, croup, depression and anxiety, bronchiolitis, upper respiratory tract infection, asthma and tonsillitis.

The Interim Report of the Royal Commission in Aged Care Quality and Safety cited the NHMRC Project CareTrack Aged protocol paper published in BMJ Open.

The Patient Reported Implementation Science Model (PRIME) offers for the first time an overarching vision and framework to explain the delivery of care for people with complex epilepsy.

Research on cochlear implant use has been integral to the development of a global statement on hearing loss and was the basis of an informative video on the barriers and facilitators to people receiving a cochlear implant.

The National Child Injury Prevention Strategy, secured with research from the Health Outcomes team, began foundational development and consultations.

Dr Robyn Clay-Williams was featured on SBS TV Insight program titled “Female Firsts”.

PhD candidates Chiara Pomare, Kristiana Ludlow, Zeyad Mahmoud and Hossai Gul contributed to major studies in health services improvement.
CHRIS Research Streams

**APPROPRIATENESS OF CARE AND PATIENT SAFETY**
Professor Jeffrey Braithwaite  
jeffrey.braithwaite@mq.edu.au
Associate Professor Peter Hibbert  
peter.hibbert@mq.edu.au
The Appropriateness of Care and Patient Safety stream investigates the level of evidence-based or best practice healthcare that Australians receive. Our suite of research includes a number of internationally recognised long-term population-based studies including CareTrack Australia, CareTrack Kids and CareTrack Aged.

**IMPLEMENTATION SCIENCE**
Professor Frances Rapport  
frances.rapport@mq.edu.au
The Implementation Science stream examines how to bring about service improvements, faster patient care pathways, more informed patients and greater shared care services across primary, community and tertiary contexts. The desired outcome is sustainable high-quality and safe healthcare services, informed equally by patients and healthcare professionals, and clear models of professional care delivery.

**COMPLEX SYSTEMS**
Professor Jeffrey Braithwaite  
jeffrey.braithwaite@mq.edu.au
Complex Systems research takes a holistic approach to investigating the health system, recognising that it is a Complex Adaptive System, with multiple individuals, a network of multidisciplinary teams and patients, complicated technologies and processes, and complex interdependencies of resources. Our diverse work exploring useful ways to capture, leverage and embrace the complexity of our health system, focusses on aspects of organisational culture and how to measure it, implementation of genomic medicine, and implementation evaluation of mental health initiatives.

**HEALTH OUTCOMES**
Associate Professor Rebecca Mitchell  
r.mitchell@mq.edu.au
The Health Outcomes research stream examines the burden of injury and disease to determine priorities for prevention efforts and conduct research in the population and within the health system aimed at identifying where health outcomes could be improved.

**HUMAN FACTORS AND RESILIENCE**
Dr Robyn Clay-Williams  
robyn.clay-williams@mq.edu.au
The Human Factors and Resilience research stream provides a vital contribution, nationally and internationally, to understanding how healthcare systems function, and how to make them safer for patients. We aim to understand how everyday work is done by doctors, nurses, and allied health practitioners on the frontlines of patient care, and we use that knowledge to develop processes and tools for increasing the number of things that go right and thereby making care better for patients and their families. Our work addresses healthcare needs at multiple levels, from local health district, to hospital, to clinical teams.

**LEARNING HEALTH SYSTEMS**
Professor Jeffrey Braithwaite  
jeffrey.braithwaite@mq.edu.au
Despite many efforts over 25 years, modern healthcare systems persistently underperform. Errors, suboptimal care and waste come at a high human and economic cost. This ambitious project, sitting at the intersection of technology and human behaviour, aims to help break this impasse. By harnessing information technologies, data mining, machine learning and genomics, the learning system will help drive the transition from today’s standardised treatment protocols to precision and personalised medicine.
Centre for Health Informatics

The Centre for Health Informatics (CHI) celebrated its 20th anniversary in 2019 and is Australia’s largest and longest running academic research group in this discipline.

In 2009, CHI joined with the Centre for Clinical Governance Research at UNSW and the Simpson Centre at Liverpool Hospital to establish AIHI which subsequently moved to Macquarie University in late 2014.

Over 20 years, CHI has been awarded more than $21 million in government funding, over $5 million from industry and over $20 million from other sources including university support, published 854 publications, including three editions of Guide to Health Informatics (Coiera) which has been translated into several languages. Three commercialisations have also occurred.

2019 was also a year of growth with the addition of a new Precision Health Research stream bringing expertise in human-computer interaction and machine learning for health applications, precision healthcare, evaluating AI technologies, and person-centred health informatics.

During 2019, CHI celebrated three PhD completions:

1. Dr David Lyell, Automation bias in electronic prescribing: The effects of over-reliance on clinical decision support in relation to errors, cognitive load and verification.
2. Dr Rabia Bashir, Using software engineering principles to improve the completeness and efficiency of the systematic review ecosystem.
3. Dr Toby Hodgson, Evaluating the use of speech recognition for electronic health record documentation.

CHI’s researchers featured prominently as keynote speakers and facilitators at national and international conferences, workshops and seminars in New Zealand, the UK, Japan and Sri Lanka throughout 2019.
Twenty years ago, when the Centre for Health Informatics was founded, digital health seemed to many like a futurist’s fantasy. Today it is the bedrock of modern healthcare. What tomorrow will bring through AI will just blow you away.

PROFESSOR ENRICO COIERA
Evidence review
The National Library of Medicine in the United States awarded a National Institute of Health grant to accelerate evidence synthesis by coupling results data from ClinicalTrials.gov and bibliographic databases.

Incident reporting
Work contributing to Australia’s first standardised health IT-related incident classification system has been adapted for the Australian Commission on Safety and Quality in Health Care for their Guidance for hospitals: Classifying EMM-related adverse events and incidents.

Health apps
A review of the safety of consumer health apps, published in JAMIA, has remained in the top 5 most read list since publication.

AI safety
Associate Professor Farah Magrabi received a prestigious University of York UK Fellowship and is the only Australian on the international team of a £12 million program to examine safety governance of AI in all domains.

AI and ethics
The International Network on the Future of AI and Medical Ethics, named Associate Professor Magrabi as a foundation member, and the only informatician.

Clinical predictive tool
Using the “GRASP” tool (for grading and assessment of predictive tools), clinicians increased their correct decisions by 64%, 88% of participants reported GRASP useful.

Voice assistants
Research found that that in more than 50% of cases voice assistants like Siri and Alexa did not recognise a crisis situation and offer appropriate direction. Research has led to improvements by developers.

Vaping
Research found that young people and non-smokers were at risk of taking up vaping when exposed to positive online advertising or social messages about vaping.

Vaccinations
Research shows that anti-vaccination messages spread more quickly and have a wider reach than public health messages.
CHI Research Streams

**PRECISION HEALTH**

Associate Professor Shlomo Berkovsky
shlomo.berkovsky@mq.edu.au

The Precision Health research stream focuses on the use of machine learning methods to develop patient models and personalised predictions of diagnosis and care. In addition, the stream studies how sensors and physiological responses can predict medical conditions, and how clinicians and patients interact with health technologies.

We undertake collaborative projects with leading national research groups, such as the Melanoma Institute Australia, Kolling Institute, and Optus-Macquarie Cyber Security Hub.

**CONSUMER INFORMATICS**

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

The Consumer Informatics team investigates the science, design and impact of digital health for patients and consumers. We are passionate about understanding and improving the health of individuals through the use of digital technology.

We work closely with patients, consumers and multidisciplinary colleagues to identify important gaps, and together develop innovative ideas and apply rigorous methods to test the boundaries of how digital technologies can improve health.

**PATIENT SAFETY INFORMATICS**

Associate Professor Farah Magrabi
farah.magrabi@mq.edu.au

Ensuring patients do not come to harm during healthcare is one of the key aims of health services research. The Patient Safety Informatics program examines how health service delivery can be made safer through the effective use of digital health. We also investigate the risks of current and future technologies including AI. Our work is used nationally and internationally by healthcare organisations, government departments, patient safety agencies and industry.

**DIGITAL EPIDEMIOLOGY**

Associate Professor Adam Dunn
adam.dunn@mq.edu.au

The Digital Epidemiology team translates the applications of machine learning and network science to solve problems related to the production, reporting, and use of evidence in clinical medicine and public health.
The NHMRC Partnership Centre for Health System Sustainability (PCHSS) is a $10.75 million, five-year collaboration involving 17 lead investigators, 20 expert advisors and over 40 system implementation partners from around Australia. PCHSS is led by Professor Braithwaite, founding director of AIHI. In 2019, PCHSS continued to expand its internationally recognised research to improve healthcare services and systems.

PCHSS LEAD INVESTIGATORS AND PARTNER ORGANISATIONS

WESTERN AUSTRALIA
Dr Delia Hendrie RL
Prof Liz Geelhoed RL
Dr Darren Gibson RL
WA Dept of Health*

NORTHERN TERRITORY
Department of Health, NT*

SOUTH AUSTRALIA
Prof Jon Karnon RL
PHN Country SA*
PHN Adelaide*

VICTORIA
Prof Tony Scott RL
Prof Rachelle Buchbinder AO RL
Prof Helena Teede RL
Circle Health*
Monash Partners*
Dept of HHS Victoria*
PHN South Eastern
Melbourne*
Cabrini Health*

TASMANIA
University of Tasmania*
Dept of HHS Tasmania*
PHN Primary Health Tasmania*

QUEENSLAND
Prof Paul Glasziou RL
Prof Leonard Gray RL
Prof Robyn Ward AM RL
Metro South Health*
Queensland Health*
PHN Brisbane South*
James Cook University*

NEW SOUTH WALES
Prof Jeffrey Braithwaite CIA
Prof Enrico Coiera RL
Prof Johanna Westbrook RL
Dr Teresa Anderson RL
Dr Jean-Frédéric Levesque RL
Mr George Leipnik RL
Mr James Downie RL
Prof Christine Bennett AO RL
Ms Annette Schmiede RL
Sydney LHD and Sydney Health Partners*
Macquarie University Hospital*
PHN Sydney North Health Network*

ACT
Ms Leanne Wells RL
ACT Health*

NATIONAL COLLABORATORS
Consumers Health Forum of Australia
Aged Care Guild
Independent Hospital Pricing Association
HammondCare

CIA – Chief investigator first listed
RL – Research lead Investigator
* System-based implementation partner organisation
VISION
Our research findings will significantly influence the development of a resilient healthcare system that is affordable, cost-effective and delivers improved health outcomes for all Australians.

ADDRESSING THE CHALLENGES
The Australian healthcare system is challenged by multiple threats to its capacity to deliver high-quality care. These include ageing populations, increasing rates of chronic and complex diseases, growing cost pressures from new medical technologies and medicines, wasteful spending on low-value care, inefficiencies arising from system fragmentation and limited use of data and evidence to support reform. PCHSS aims to explore these and other challenges to health system sustainability and develop and evaluate a set of practical interventions that are appropriate from clinical, patient, and economic perspectives.

ACHIEVEMENTS IN 2019
The second full year of PCHSS operation provided many opportunities for research, translation and implementation. A key highlight was the public event, “Treatment overload: Lifting the burden of too much healthcare” which was held in Sydney and attended by more than 100 clinicians, researchers, policy makers, journalists and consumers. The Secretary of NSW Health, Ms Elizabeth Koff, opened proceedings and the day featured a dynamic simulation game on healthcare complexity. Videos of the event on YouTube have been viewed over 1,000 times.

The three broad themes of our research are:

- Using analytics, technology and shared data
- Reducing waste and low-value-care
- Promoting better value for the health dollar

Health System Sustainability
NIHMRC Partnership Centre

>$12m
in leverage funding

>60
health system collaborators

>250
publications

27
collaborating health system organisations

>180
media engagements
PCHSS Research Streams

**USING ANALYTICS, TECHNOLOGY AND SHARED DATA**

Professors Johanna Westbrook, Enrico Coiera and Len Gray

We tackle important questions in informatics and healthcare including using big data to improve care, diagnostic testing and medication management, as well as designing analytics to guide better healthcare decisions.

We are also examining how telehealth might best be deployed and funded to improve healthcare across the country.

<table>
<thead>
<tr>
<th>HIGHLIGHTS</th>
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<tr>
<td><strong>DEMENTIA CARE</strong></td>
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<td>Research on patients with dementia in Australian aged care facilities revealed a dual set of challenges related to medication. On the one hand, some patients were missing out on potentially beneficial medications for reasons that were not clinically relevant (such as the patient’s primary language), while on the other hand, some dementia patients were being unnecessarily sedated with antipsychotic drugs for more than 200 days at a time, twice as long as the maximum time recommended. This research was covered by media nationally.</td>
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| **DIGITAL SCRIBES** |
| Research on digital scribes (tools designed to automatically capture clinician-patient verbal interactions) has shown they are not living up to their full potential. Multiple obstacles to the effective use of digital scribes were found and the next step is to develop digital scribes that are fit-for purpose and acceptable to patients and clinicians alike. |

The cost of healthcare worldwide is rising unsustainably. To counter this growth, alternative service models that are cost effective and maintain the quality of care are needed.
REDUCING WASTE AND LOW VALUE CARE
Professors Paul Glasziou and Rachelle Buchbinder

While 30% of delivered healthcare is wasteful or of low value, we are finding ways to reduce wasteful expenditure and to deliver needed care more cost-effectively.

HIGHLIGHTS

ALTERNATIVE HEALTHCARE
The cost of healthcare worldwide is rising unsustainably. To counter this growth, alternative service models that are cost effective and maintain the quality of care are needed. A scoping review of systematic reviews (which included more than 550 reviews) was conducted to identify and synthesise evidence on alternative healthcare delivery arrangements in high-income countries. This research aims to support future health system planning, identify new models of care delivery and explore other sustainability initiatives.

OVER-DIAGNOSIS OF CANCER
The lifetime risk of cancer diagnosis and mortality in Australia is overestimated by current calculation methods. New research revealed that many of the most common cancers were over-diagnosed – that is, detected cancers that would likely not have substantially affected a patient’s health had they gone undetected or untreated.
PROMOTING BETTER VALUE FOR THE HEALTH DOLLAR
Professors Jon Karnon, Tony Scott and Dr Delia Hendrie

We are developing new frameworks and metrics to improve health system sustainability.

HIGHLIGHTS

BETTER INCENTIVES
Research to guide the design of government incentives, found that current incentives to entice GPs to move from urban to more rural practices were not very effective.

BETTER EVALUATION
Two Primary Health Networks trialled the in-DEPTH (Evidence-informed, co-creation framework for the Design, Evaluation and Procurement of Health services) framework to develop evidence-informed procurement specifications for services for people with mental health problems or alcohol and other substance abuse. in-DEPTH supports a systematic approach to commissioning services that are evidence-informed, contextually relevant and informed by stakeholder perspectives.
HIGHLIGHTS

LEARNING HEALTH SYSTEMS
Learning Health Systems are seen as models for the future of healthcare as they bring science, informatics, incentives and culture into alignment, thereby making knowledge generation an integrated part of the day-to-day functioning of health systems. Professor Braithwaite, Associate Professor Zurynski and colleagues published a working paper on Learning Healthcare Systems. Further, we are currently undertaking a systematic review, which includes more than 190 papers, synthesising the state of knowledge in this field.

NETWORKS
Professors Braithwaite and Westbrook and colleagues put forward an evaluation framework to underpin understanding of the effectiveness and sustainability of clinical and health networks. Drawing on the literature on networks and communities of practice in healthcare, as well as theoretical and evidence-based studies of the evaluation of health and non-health networks, the framework comprises network goals, characteristics and relationships at member, network and community levels.

CONSUMERS HEALTH FORUM OF AUSTRALIA
In collaboration with the Consumers Health Forum of Australia and the Royal Australian College of General Practitioners, a roundtable was held about social prescribing – the practice of health professionals connecting patients with social services and community groups to address social determinants of poor health. A report on the outcomes of the roundtable have been published.

MEDIA ENGAGEMENT
A number of editorials were published in outlets such as Croakey News, MJA Insight+ and The Conversation. These included articles on patient safety, breaking down healthcare silos, and the relevance of climate to health system sustainability.

For more details visit our website healthsystemsustainability.com.au
The NHMRC Centre of Research Excellence in Digital Health (CREiDH) had a very productive year publishing widely in highly respected journals such as *JAMIA*, *npj Digital Medicine*, *JMIR*, *The Lancet* and *BMJ*, with a strong focus on AI and human computer interaction. CREiDH is led by Professor Enrico Coiera and administered by AIHI.
**NHMRC Centre of Research Excellence in Digital Health**

**THE FELLOWSHIP BY TRAINING PROGRAM**

In 2019, the CREIDH and Australasian College of Health Informatics welcomed a new digital peak body, the Australasian Institute of Digital Health (AIDH). Lead Informaticians within the Health Informatics Society voted for this new peak body and in 2020 will see the Fellowship by Training Program managed by AIDH, with support from the CREIDH.

In 2019, the Program delivered strong learning outcomes including seven Master Classes and ten Journal Clubs. The Program arranged candidate’s participation in conferences and colloquiums, at which some candidates were recipients of prestigious awards.

During 2019, two candidates completed the Program and now have a PhD academic qualification and a portfolio of work with industry contacts.

**HIGHLIGHTS**

Researchers are working on creating a **Digital Scribe** using speech recognition and AI to transcribe and summarise consultations between doctors and patients and reduce the clinical burden.

The **Advanced Clinical Analytics** team produced a Systematic Review process using 15 different tools to produce reviews within two weeks, normally a one-year timeframe. Research into a ‘Green Button’ concept supported by Natural Language Processing in the area of chest pain stratification is also being conducted.

The **Safety and Quality** team conducted research into the safety concerns of consumer-facing mobile apps and context-aware systems for chronic disease patients and developed a classification for tracking digital health incidents involving medications in conjunction with the ACSQHC’s National Roundtable on Medications Management. The Team has also been working with the Clinical Excellence Commission (NSW) to assist with machine learning methods for analysis of safety incident monitoring data.

The **Consumer Informatics** team is using deep learning to analyse large sets of body camera data collected from participants with multiple chronic conditions – examining what works and doesn’t work in self-care.

The **Rapid Response** team is working with the National Children’s Digital Health Collaborative in the areas of consumer generated data entered in electronic health records or portals and consumers’ engagement with electronic health records, portals and apps.
Australian cancer survival rates are amongst the best in the world and are incrementally improving, creating a growing cohort who require ongoing support and management. This growth in demand for services places stresses on our health system, a system that is also dealing with rapid growth in new treatments and treatment strategies for cancer, along with an increased focus on patient experience. To address these challenges, the NHMRC Centre of Research Excellence in Implementation Science in Oncology is working to understand how cancer services are currently delivered. As we proceed, this understanding will inform strategies to improve the adoption of evidence-based practices.

The Centre is administered by AIHI with a central coordinating team comprising: Dr Gaston Arnolda (team leader), Dr Bróna Nic Giolla Easpaig, Dr Yvonne Tran, Dr Klay Lamprell, Ms Teresa Winata and PhD Student Ms Mia Bierbaum. The AIHI team collaborates with the South Australian Health Economics Team led by Professor Jon Karnon.

**HIGHLIGHTS**

- Building teams with key industry partners, the South-Eastern and South-Western Sydney Local Health Districts.
- Implementing a large-scale qualitative study to characterise multi-disciplinary oncology service provision in two Local Health Districts and to explore patient-reported measures (protocol and methodology papers published).
- Interviewing clinicians to understand their views of oncology clinical practice guidelines and to understand facilitators/barriers to effective multidisciplinary team meetings.
- Performing systematic reviews on clinicians’ views of patient-reported measures in oncology, clinicians’ views on oncology clinical practice guidelines, and on the use of nudges to alter clinicians’ behaviour.
- Exploring predictors of oncology patient satisfaction.
- Exploring oncology outpatient staffing and financing.

CHIEF INVESTIGATORS

Professor Jeffrey Braithwaite
AIHI, Macquarie University
Professor Robyn Ward AM
University of Sydney
Professor David Currow
Flinders University
Professor Geoff Delaney
South-Western Sydney Local Health District
Professor Richard Keeford AM
Macquarie University

Professor Ian Olver AM
University of South Australia
Professor Jonathan Karnon
Flinders University
Professor Phil Crowe
University of New South Wales
Associate Professor Winston Liauw
South-Eastern Sydney Local Health District
Professor Johanna Westbrook
AIHI, Macquarie University
Our staff

At AIHI, we recognise and value the diversity of cultural and professional backgrounds of our staff, gaining collectively from global perspectives in healthcare. We attract highly skilled clinicians, scientists, engineers, epidemiologists, statisticians, psychologists and analysts who are developing expert communities of practice, multi-disciplinary research teams and synergistic networking and co-authorship.

We are proud to have coordinated the Macquarie University International Women’s Day event for the past two years as well as celebrating the World Health Organisation’s World Sepsis Day (pictured) and World Patient Safety Day.

5 Professors
6 Associate Professors
6 Senior Research Fellows
29 Research Fellows
17 Postdoctoral Fellows
56 Professional and other staff
70 External academics
38 HDR students
41 PACE students
Awards

**AIHI CENTRE FOR HEALTH SYSTEMS AND SAFETY RESEARCH**
**AGED CARE EVALUATION AND RESEARCH – DEMENTIA AND AGED CARE SERVICES TEAM**

**ASSOCIATE PROFESSOR FARAH MAGRABI**
Awarded the Assuring Autonomy International Programme Fellowship from the University of York, UK.

**ASSOCIATE PROFESSOR PETER HIBBERT AND PROFESSOR JEFFREY BRAITHWAITE**
Awarded the Peter Reizenstein Award for Best Paper published in the *International Journal for Quality in Health Care* in 2018.

**ASSOCIATE PROFESSOR REBECCA MITCHELL**
Awarded joint first prize for the Golden Issue of Injury.

**ASSOCIATE PROFESSOR SHLOMO BERKOVSKY**

**ASSOCIATE PROFESSOR STEPHANIE BEST, DR JANET LONG AND PROFESSOR JEFFREY BRAITHWAITE**
Awarded second best oral presentation at the Australian Genomics Health Alliance National Conference.

**CHIARA POMARE**
First place in the Higher Degree Researcher Image Prize at the 4th Annual EnCouRage Research Symposium, Macquarie University.

**DR JOYCE SIETTE**
Received a Conference Travel Award from the NHMRC National Institute for Dementia Research, Dementia Centre for Research Collaboration.

**DR MAGDA RABAN**
Named most Prolific Tweeter during Health Services and Policy Research Conference for the Health Services Research Association of Australia and New Zealand.

**DR MIKAELA JORGENSEN**
Outstanding Oral Presentation award at the International Association of Gerontology and Geriatrics Asia/Oceania Regional Congress, Taiwan.

**KRISTIANA LUDLOW**
Awarded Best NSW-Based Student Presentation at the 18th National Conference of Emerging Researchers in Ageing.

**PROFESSOR FRANCES RAPPORT, DR VIRGINIA MUMFORD AND DR ROBYN CLAY-WILLIAMS, DR PATTI SHIH, DR MONA FARIS, PROFESSOR JEFFREY BRAITHWAITE**
Named one of the top five best-cited papers published for 2017-2018 in Epilepsy and Behaviour.

**PROFESSOR JOHANNA WESTBROOK**
National Research Leader in the field of Medical Informatics awarded by The Australian Research Magazine.

**PROFESSOR JEFFREY BRAITHWAITE**
Winner Editor’s Choice award for *International Journal for Quality in Health Care*.

**RABIA BASHIR**
Awarded the 2019 Macquarie University Ramy Razavian Dean’s Award for Excellence in Higher Degree Research.
Institute engagement

AIHI SEMINAR SERIES

The AIHI Seminar Series provides a public monthly forum for the sharing of ideas, new research and calls to action that invigorate debate and contribute to improving the health system in Australia and internationally. We are pleased to present the most popular of the 24 sessions held during 2019. A complete list of seminars is available on our website.

THE USE OF DIGITAL RESOURCES BY THE AGEING GENERATION
SPEAKER: PROFESSOR HEIKO GEWALD
Center for Research on Service Sciences
Neu-Ulm University of Applied Sciences, Germany
Digital resources like smartphones, fitness trackers and health apps have evolved as ubiquitous powerful media for society. This seminar presented findings from recent studies on technology adoption of senior citizens and discussed avenues for future research.

SAFETY IN HEALTHCARE – STATE OF THE ART OR STATE OF MIND?
SPEAKER: PROFESSOR CLIFF HUGHES AO
Australian Institute of Health Innovation
In recognition of the World Health Organisation’s World Patient Safety Day, this seminar highlighted factors to consider when thinking about safety in healthcare. According to WHO, more than 134 million adverse events occur in healthcare settings each year worldwide, leading to 2.6 million deaths.

NSW BUREAU OF HEALTH INFORMATION: OPPORTUNITIES FOR RESEARCH AND COLLABORATION
SPEAKER: DR DIANE WATSON
Chief Executive, NSW Bureau of Health Information
This seminar presented an overview of the NSW Bureau of Health Information’s work, in particular the Bureau’s Strategic Plan: 2019-21, and the different ways researchers can work with the Bureau and use its patient-reported experiences and outcomes survey data.

THE POWER OF THE PATIENT VOICE
SPEAKER: MAUREEN WILLIAMS
Patient Advocate
This powerful seminar outlined the importance of patient voices in healthcare quality and safety, exploring the possibilities of including patients in medical research, the pitfalls of informed consent and the power of patient narrative in healthcare.

THE PATIENT DIED – WHAT ABOUT INVOLVEMENT IN THE FOLLOWING REGULATORY INVESTIGATION OF THE ADVERSE EVENT? EXPERIENCES FROM NORWAY.
SPEAKER: PROFESSOR SIRI WIIG
Quality and Safety in Healthcare Systems
University of Stavanger, Norway
Norway does not have a well-established tradition of user involvement when investigating adverse events. This seminar presented results from a one-year process evaluation focusing on the perspectives of patients’ next of kin as well as investigators who participated in a new regulatory investigation process related to adverse events causing patient death.
MD Research Program

The new Macquarie University Doctor of Medicine (Macquarie MD) is a four-year, fast-track program designed for students with a first degree who are high flyers; who engage in a variety of experiences and activities; have the interpersonal skills desirable in a medical student and doctor; and the resilience, commitment and desire to help improve the health of Australian and global communities.

Embedded into the Macquarie MD is a rigorous structured research program developing key research skills where the students work on a research project focusing on an aspect of health systems, patient safety and quality, clinical research or public health. AIHI oversees the research program on behalf of the University.
Higher degree researcher program

Drawing on the expertise of our internationally regarded pool of academics, the AIHI Higher Degree Research (HDR) program represents a key period of training in the career of health systems researchers. Many have gone on to secure senior roles in academia, health services and industry, both in Australia and abroad.

AIHI HDR candidates are valued members of our research community, where we seek to provide them with real-world opportunities to make a difference.

Postgraduate candidates can pursue several qualifications including:

- Master of Research (MRes)
- Master of Philosophy
- Doctor of Philosophy

Read about our programs and see profiles of our PhD and Masters graduates: [goto.mq/aihistudy](http://goto.mq/aihistudy)  
E: aihi.hdr@mq.edu.au

We foster an environment of collaborative learning.
REAL WORLD LEARNING WITH PACE
The multi-award-winning PACE (Professional and Community Engagement) program at Macquarie University supports undergraduate students with authentic workplace experiences. In 2019 AIHI hosted 41 PACE students, placing them alongside academics to participate in projects ranging from conversational chatbots to social networks in aged care.

MEET JOSH JUNG
Josh Jung is one of the first graduates of the Bachelor of Clinical Sciences at Macquarie University, joining AIHI via the PACE program with Dr Annie Lau and Dr Kathleen Yin. After the 12-week program, Josh stayed on as a part-time Research Assistant. He gained valuable skills including pre-screening and interviewing patients and writing up interview summaries along with carrying out thematic analysis to support the principal researchers. In 2019, Josh was accepted into the Macquarie University Doctor of Medicine.

Each year Macquarie University holds a 3 Minute Thesis competition. Here students at AIHI attend an "elevator pitch" preparation workshop. In the Faculty heat, AIHI’s Chiara Pomare secured second place and Kristiana Ludlow placed third.
Our publications
1 JANUARY TO 31 DECEMBER 2019

1 JANUARY TO 31 DECEMBER 2019


BOOKS EDITED (3)


BOOK CHAPTERS (34)


81. **Hibbert P.** Independent investigation needed into hospital failures. *MJA InSight.* 2019; Published Online First: 14 October 2019.


181. **Shah Z, Dunn AG.** Event detection on Twitter by mapping unexpected changes in streaming data into a spatiotemporal lattice. *IEEE Transactions on Big Data.* 2019; (Accepted 16 October 2019).


198. Testa L, Seah R, Ludlow K, Braithwaite J, Mitchell R. Models of care that avoid or improve transitions to hospital services for residential aged care facility residents: an integrative review. Geriatric Nursing. 2019; Published Online First: 12 March 2019.


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<tr>
<th>Page</th>
<th>Author(s)</th>
<th>Title</th>
<th>Journal/Citation</th>
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<tr>
<td>209</td>
<td>Walter SR, Dunsmuir WTM, Westbrook JI</td>
<td>Inter-observer agreement and reliability assessment for observational studies of clinical work.</td>
<td><em>Journal of Medical Bioinformatics</em>. 2019; Published Online First: 22 October 2019.</td>
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**FULL CONFERENCE PAPER (11)**


## AIHI grants awarded or under management in 2019

<table>
<thead>
<tr>
<th>Title</th>
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<td>NHMRC Partnership Centre in Health Systems</td>
<td>NHMRC</td>
<td>Braithwaite J, Coiera E, Westbrook J, Glasziou P,</td>
<td>$8,750,000.00</td>
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<td>Sustainability (Includes partner funds from WA Health, Bupa, NSW Health)</td>
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<td>Karnon J, Scott A, Buchbinder R</td>
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<td>NHMRC Centre of Research Excellence in Digital Health</td>
<td>NHMRC</td>
<td>Coiera E, Glasziou P, Runciman W, Hansen D, Liaw S</td>
<td>$2,498,649.00</td>
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<td>Magrabi F, Sintchenko V, Verspoor K, Gallego Luxan B, Lau A</td>
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<td>NHMRC Centre of Research Excellence in Implementation Science in Oncology (CRE-ISO)</td>
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<td>Braithwaite J, Ward R, Currow D, Delaney G,</td>
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<td>Kefford R, Olver I, Karnon J, Liauw W, Westbrook J</td>
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<td>NHMRC Partnership Project: A dashboard of predictive analytics and decision support to drive care quality and person-centred outcomes in aged care (Includes partner funds from Anglicare and Sydney North PHN)</td>
<td>NHMRC</td>
<td>Westbrook J, Georgiou A, Lord S, Gray L, Day R,</td>
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<td>NHMRC Partnership Project: Creating a culture of safety and respect: a controlled, mixed methods study of the effectiveness of a behavioural accountability intervention to reduce unprofessional behaviours (Includes partner funds from St Vincent’s Health Australia)</td>
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<td>Westbrook J, Braithwaite J, Day R, Middleton S, Scott D, Rapport F, Mitchell R, Baysari M, Li L, Taylor N</td>
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<td>NHMRC Project Grant: CareTrack Aged: appropriate care delivered to Australian living in residential aged care</td>
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<td>NHMRC Partnership Project: Delivering safe and effective test result communication, management and follow-up (Including partners funds from South Eastern Area Laboratory Service)*</td>
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<td>Georgiou A, Westbrook J, Greenfield D, Horvath A, Wakefield D, Li L, Hillman K</td>
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<td>Coupling Results Data from ClinicalTrials.gov and Bibliographic Databases to Accelerate Evidence Synthesis</td>
<td>National Library of Medicine</td>
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<td>Person, tumor and system-focused knowledge to drive better outcomes in melanoma</td>
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<td>Enhancing patient outcomes through evaluation of the appropriateness and quality use of pathology in general practice</td>
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<td>Health implementation research strategy/Towards understanding complexity</td>
<td>Australian Genomics Health Alliance</td>
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<td>Using a life course approach to examine the influence of individual and psychosocial characteristics on individual trajectories though the health and aged care systems</td>
<td>NSW Health</td>
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<td>Productive safety in the Emergency Department (ED): developing ED safety capacity when responding to high patient demand and unexpected events</td>
<td>NSW Health</td>
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<td>Redesigning patient experience in health service navigation using digital technology</td>
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<td>PSRACS participation in the CareTrack Aged research, a NHMRC-funded Project Grant</td>
<td>Victoria Department of Health and Human Services</td>
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<td>Pediatric Precision Oncology Implementation Science</td>
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<td>Evaluation of the Delirium Clinical Care Standard</td>
<td>NSW Health</td>
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<td>Developments that support innovation in aged care: Ageing well - A social participation and engagement tool to enhance consumer choice and the delivery of quality, person-centred community aged care services.</td>
<td>Commonwealth Department of Health</td>
<td>Georgiou A Westbrook J Jorgensen M Siette J</td>
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<td>Mackenzie's Mission</td>
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<td>Active Implementation of Australian Consensus Guidelines for the effective delivery of ethical services to patients with Mitochondrial Disorders</td>
<td>Mitochondrial Foundation Board</td>
<td>Christodoulou J Braithwaite J Long J Best S</td>
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<td>Independent file review to monitor the minor injury definition and threshold in the new CTP scheme</td>
<td>State Insurance Regulatory Authority</td>
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<td>The impact of electronic clinical systems on medication safety and</td>
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<td>Westbrook J, Baysari M, Koyama A, Nguyen A</td>
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<td>Impact of chronic illness and injury on school performance</td>
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<td>Comparison of outcomes with hearing aids and cochlear implants in</td>
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<td>hearing loss (COACH study): Qualitative arm.</td>
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<td>Perceived improvement in quality of care</td>
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<td>Epidemiology of sepsis in Australian hospitals</td>
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<td>Evaluating social engagement services for older adults in community care: Role of social networks in cognitive decline</td>
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<td>Macquarie MINDS: Monitoring of injury and psychosocial health outcomes, career trajectories and continuing educationN, LiveD experiences and Social connectedness</td>
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<td>Townsville Hospital and Health Service</td>
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<td>Trialling the revised Macquarie surgical innovation identification tool (MSIIT) in five Australian Hospitals: Phase One</td>
<td>Macquarie University</td>
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<td>Understanding the impact of dementia on rehabilitation following hip fractures to improve health outcome for older people</td>
<td>Macquarie University</td>
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<td>Tran Y Ellis L Churruca K</td>
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<td>Review of the Child Death Register</td>
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<td>Evaluation of a family support collaborative using a social network approach</td>
<td>The University of New South Wales</td>
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<td>Investigating a new and innovative approach to using the Work Observation Method By Activity Timing (WOMBAT) tool: a proof of concept study in paediatric oncology</td>
<td>Macquarie University</td>
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<td>CMCRC Supervisors Research Support Allowance-Gallego Luxan, B</td>
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<td>Establishing the role of social networks in older adults in residential aged care</td>
<td>Macquarie University</td>
<td>Siette J</td>
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<td>Patient work conducted by individuals with type 2 diabetes and chronic co-morbidities: a mixed-method, multi-staged, observational study</td>
<td>Macquarie University</td>
<td>Lau A</td>
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<td>Title</td>
<td>Funding source</td>
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<td>Social factors associated with the intention and use of e-cigarettes</td>
<td>Macquarie University</td>
<td>Amin S</td>
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<td>A framework for evaluating and improving the efficiency of the systematic review endeavour</td>
<td>Macquarie University</td>
<td>Bashir R</td>
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</table>
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