

**AUSTRALIAN INSTITUTE
OF HEALTH INNOVATION**

*Faculty of Medicine and
Health Sciences*



**MACQUARIE
University**

Innovation

EMERGING IDEAS FOR BETTER HEALTHCARE




Much of the medical and health systems research of the future will be carried out in real time as clinicians work – using electronic systems that constantly learn.

Medical and health systems research of the future

Vast electronic data banks are already transforming research in all fields. In health care, data banks offer an unprecedented opportunity to optimise care and planning. Clinicians will work with 'bedside' electronic support systems that enable them to instantly match a patient's personalised data to the latest evidence-based guidelines for care. At the same time, such support systems will double as invaluable research tools. As new patient data is added while clinicians work the knowledge base will be continuously updated. This will enable accurate analyses, feed improvements for treatment and care back into the system and identify trends as they emerge. Such new approaches will transform traditional research models, bridging the gap between clinicians and academics.



Press a green button for better healthcare



One such innovation now in development is the so-called ‘green button’ that promises to revolutionise care at the clinical coalface. When a patient arrives at a clinic, doctors will be able to search stored patient records for similar combinations of symptoms and indicators, and, if appropriate, seek guidance based on the trajectories and outcomes of similar patients. As data banks grow – and as more information is shared across health systems – information about even rare conditions and complex combinations of symptoms and conditions will be instantly accessible to clinicians as they work. ‘The green button would be built into the healthcare system – it is the interface between clinical care and the evidence,’ says AIHI’s data analysis and modelling expert, Dr Blanca Gallego-Luxan. Advances in text processing will eventually allow for automated queries and the easy retrieval of meaningful visualisations of related evidence from published clinical trials. ‘If these capabilities are combined, both clinicians and patients will be able to visualise the effects of selected treatments on similar patients at the press of a button,’ according to Dr Gallego-Luxan.

Such frontline real-time data mining and analysis tools will not only support treatment decisions but assist the management of healthcare systems. Predictions will, for example, indicate when a hospitalised patient can expect to be discharged and what care they will need over various time frames. ‘This will help clinicians with important discharge planning strategies for their patients, which are likely to improve continuity of care, preventing readmissions and post-discharge adverse events.’ Dr Gallego-Luxan says the tools will also help ‘in initiating important discussions on end-of-life care.’



Tackling missed test results

The AIHI is also designing and testing electronic acknowledgement systems to help overcome the potential for harm caused by missed test results. An AIHI systematic review of the best evidence available internationally, led by Associate Professor Joanne Callen, found up to 62 per cent of laboratory tests and up to 36 per cent of radiology tests for patients attending GPs, clinics or hospital outpatient departments are never reviewed by doctors. Unread reports included tests which had returned positive findings for cancer. In Australia alone about one billion dollars a year is spent on medical tests and for every hospital admission in Australia over 100 tests are ordered. One key question is how technology can help alert clinicians to test results to prevent them being overlooked. Another emerging option is to provide test results directly to patients – a solution being investigated by AIHI.



DATA MINING TO PERSONALISE AND IMPROVE HEALTHCARE

The increasing demand for personalised care plus the growing availability of large electronic biomedical patient datasets is revolutionising the role that data can play in healthcare delivery. AIHI's work pushes the boundaries of e-health research by combining advanced, innovative methods in epidemiology and machine learning to answer specific questions for specific patients in real time. Our work will extend the power of health analytics beyond the research lab into clinical practice.





Who are we?

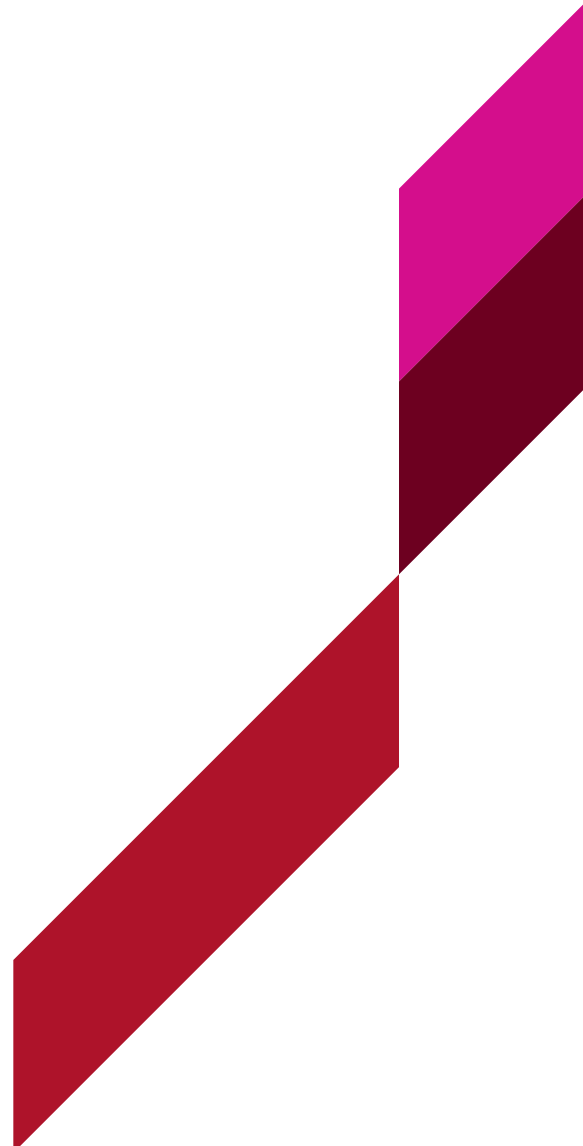


DR BLANCA GALLEGO LUXAN

Is a Senior Research Fellow at AIHI where she leads the Health Analytics Lab. Trained as a physicist, she has extensive international research experience in data analysis and computational modelling and has made significant and innovative contributions to the design, analysis and development of models derived from complex empirical data for a wide range of applications such as patient safety, bio-surveillance, corporate sustainability reporting, ecological footprint analysis and climate variability.

ASSOCIATE PROFESSOR JOANNE CALLEN

Is a Senior Research Fellow at AIHI in the Centre for Health Systems and Safety Research. Her research centres on exploring how information and communication technologies can improve health outcomes for patients and support health professionals in the delivery of high quality, safe, and efficient patient care.



**EXAMPLES OF WHAT WE'VE PUBLISHED**

1. **Callen J**, Giardina TD, Singh H, Li L, Paoloni R, **Georgiou A**, **Runciman WB**, **Westbrook JI**. Emergency physicians' views of direct notification of laboratory and radiology results to patients using the internet: A multisite survey. *Journal of Medical Internet Research* 2015;17(3):e60.
2. **Coiera E**, Wang Y, **Magrabi F**, **Perez Concha O**, **Gallego B**, **Runciman W**. Predicting the cumulative risk of death during hospitalization by modeling weekend, weekday and diurnal mortality risks. *BMC Health Services Research* 2014;14(226).
3. Forster M, Dennison K, **Callen J**, **Georgiou A**, **Westbrook JI**. Maternity patients' access to their electronic medical records: Use and perspectives of a patient portal. *Health Information Management Journal* 2014;44(1):4-11.
4. **Gallego B**, **Dunn AG**, **Coiera E**. Role of electronic health records in comparative effectiveness research. *Journal of Comparative Effectiveness Research* 2013;2(6):529-32.
5. **Gallego B**, **Magrabi F**, **Perez Concha O**, Wang Y, **Coiera E**. Insights into temporal patterns of hospital patient safety from routinely collected electronic data. *Health Information Science and Systems* 2015;3(Suppl 1):S2.
6. **Gallego B**, **Runciman WB**, **Perez Concha O**, **Siaw-Teng L**, **Day RO**, **Dunn AG**, **Coiera E**. The management of severe hypertension in Australian general practice. *BMC Health Services Research* 2013;13(414).
7. **Gallego B**, Walter SR, Day RO, Sivaraman V, Shah NH, Longhurst CA. Bringing cohort studies to the bedside: Framework of a 'green button' to support clinical decision-making. *Journal of Comparative Effectiveness Research* 2015;4(3):191-97.
8. **Georgiou A**, Hordern A, Dimigen M, Zogovic B, **Callen J**, Schlaphoff G, **Westbrook JI**. Effective notification of important non-urgent radiology results: A qualitative study of challenges and potential solutions. *Journal of Medical Imaging and Radiology Oncology* 2014;58(3):291-97.
9. **Georgiou A**, Lymer S, Forster M, Strachan M, Graham S, Hirst G, **Callen J**, **Westbrook JI**. Lessons learned from the introduction of an electronic safety net to enhance test result management in an Australian mothers' hospital. *Journal of the American Medical Informatics Association* 2014;21(6):1104-08.
10. **Perez Concha O**, **Gallego B**, Hillman K, Delaney G, **Coiera E**. Do variations in hospital mortality patterns after weekend admission reflect reduced quality of care of different patient cohorts? A population-based study. *BMJ Quality and Safety* 2013;23:215-22.



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