



Centre for Health Systems and Safety Research Annual Report 2013-2014

Never Stand Still

UNSWMedicine

Centre for Health Systems and Safety Research

Better Health Care Through Communication



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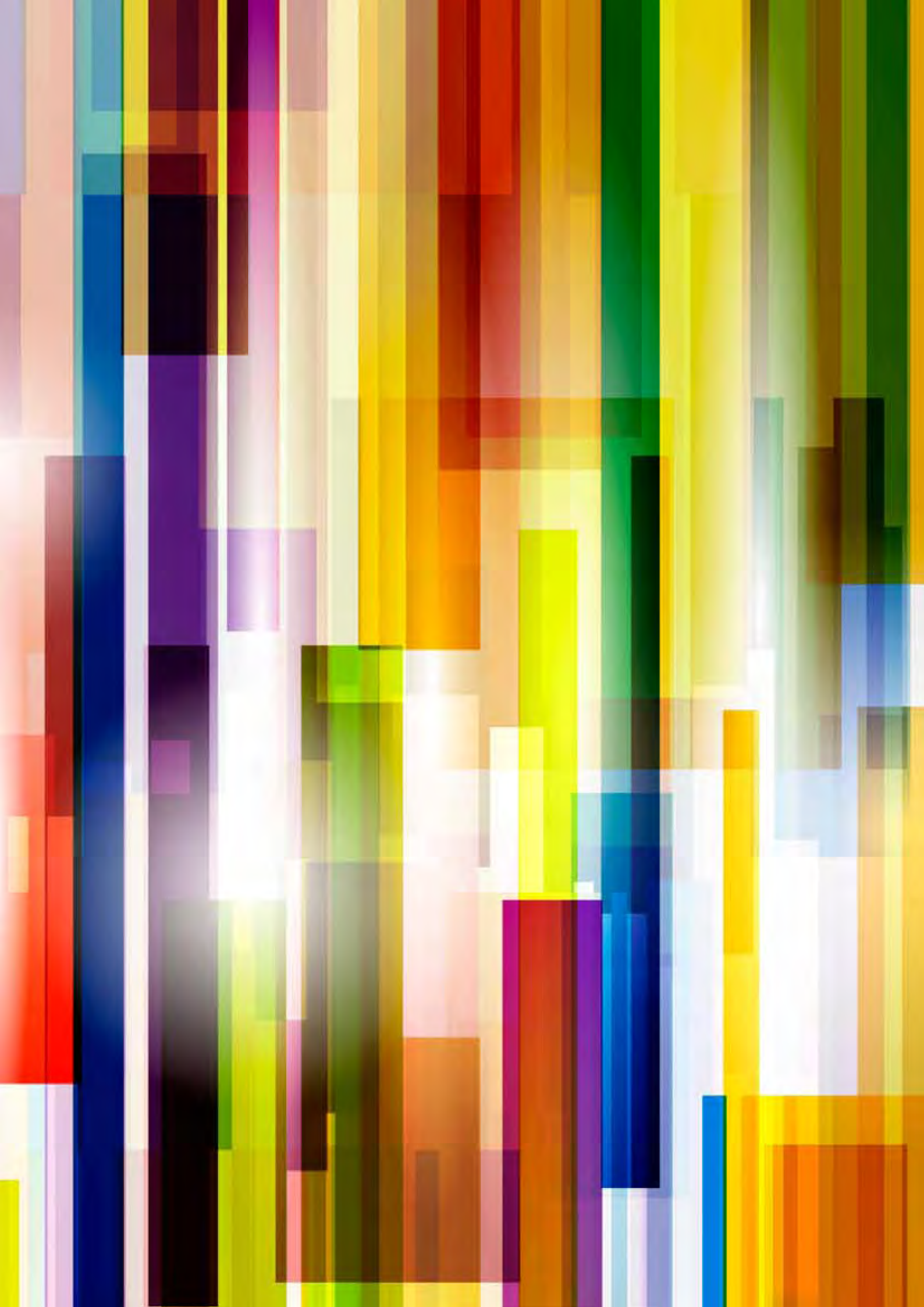
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Mission statement

Vision

To lead in the design and execution of innovative health systems research.

Mission

Our mission is to lead in the design and execution of innovative health systems research focused on patient safety and the evaluation of information and communication technologies in the health sector, to produce a world-class evidence base which informs policy and practice.

Aims

The Centre's research is underpinned by a systems perspective, exploiting highly innovative and wide-ranging research methods. Its research team is characterised by its talent and enthusiasm for working within and across discipline areas and sectors. The Centre has a focus on translational research, aimed at turning research evidence into policy and practice, while also making fundamental contributions to international knowledge.

The Centre's research program has four central aims:

- Produce research evidence of the impact of information and communication technologies (ICT) on the efficiency and effectiveness of health care delivery, on health professionals' work and on patient outcomes
- Develop and test rigorous and innovative tools and approaches for health informatics evaluation
- Design and apply innovative approaches to understand the complex nature of health care delivery systems and make assessments of health care safety
- Disseminate evidence to inform policy, system design, practice change and the integration and safe and effective use of ICT in health care.

Functions and goals

The functions of the Centre are to:

- Build capacity and research capability in health systems research, patient safety and health informatics
- Deliver research output in the form of grants, publications and presentations
- Participate in the development and sharing of infrastructure and research expertise for research across the Centres of the Australian Institute of Health Innovation (AIHI)
- Encourage and support collaboration across the Centres
- Forge relationships between the Institute's Centres and other entities within and external to UNSW Australia
- Continue to build and consolidate an international reputation in health systems and safety research.

This is achieved through:

- Strong collaborative research programs supported by continued peer-reviewed grants and commissioned research
- Extensive linkages with industry, practitioners and policy makers at local, state and national levels to improve the relevance and impact of research
- Increased numbers of skilled researchers undertaking research and evaluation activities in the area of health systems and safety research
- Increased numbers of postgraduate research students
- Exercising influence via dissemination and transfer of research findings through publications, presentations and forums with a focus on academic, industry, practitioner and policy maker audiences.

Highlights

Grant Income

CHSSR researchers are chief investigators on research grants to the value of \$15 million

Program Grant

Five-year, \$10.8 million NHMRC Program Grant in collaboration with AIHI

Outputs

97 peer-reviewed research publications, 32 conference presentations, 17 invited presentations

Media Profile

Professor Westbrook and Associate Professor Georgiou featured in a series of reports on patient safety for ABC Radio's *The World Today* program (www.abc.net.au/worldtoday/content/2013/s3778955.htm)

Awards

Branko Cesnick Award for Best Scientific paper at the National Health Informatics Conference (Georgiou A, Vecellio E, Toouli G, Eigenstetter A, Li L, Wilson R, Westbrook JI. *Monitoring the impact of the electronic medical record on the quality of laboratory test ordering practices*. In: Grain H, Schaper LK, eds. *Studies in Health Technology and Informatics*: IOS Press; 2013. p. 33-8.)

Moya Conick Award for Best Paper at the National Nursing Health Informatics Conference (Li L, Westbrook JI. Do nurses' patterns of work change following the implementation of an electronic medication management system? *Nursing Informatics Australia Conference*; 15 July; Adelaide, Australia. 2013.)

iAwards NSW ICT Professional of the Year - awarded to Professor Johanna Westbrook at a ceremony in Sydney on 26 June 2014. This award recognises outstanding innovation, commitment and achievement in the recipient's field.

PhD Completions

Mirela Prgomet, *An investigation of the selection of mobile computing devices and how they support clinical work practices on hospital wards*

Amina Tariq, *Medication safety in collaborative health care settings: An investigation of the impact of information exchange processes in residential aged care facilities*.



Director's report

As health systems around the world continue to invest in clinical information systems, the need to ensure those systems deliver the benefits their designers promise grows ever more urgent. Unless clinical information systems can be evaluated robustly, opportunities to improve the design and use of e-Health applications will be lost.

The Centre for Health Systems and Safety Research is devoted to delivering new knowledge regarding the safety of health care services, and particularly to investigate ways in which e-Health applications can support effective and safe models of care delivery.

In collaboration with other colleagues within the Australian Institute of Health Innovation (AIHI), we were successful in securing a further five-year NHMRC Program Grant entitled *Creating safe, effective systems of care: The translational challenge*. The \$10.8 million grant, to run from 2014 to 2018, will fund our investigation of e-Health applications focused on medication safety and the use of pathology and imaging services, and of new models for consumer engagement supported by e-Health.

The Centre's outputs continue to grow with 97 peer-reviewed publications, 32 presentations and 17 invited presentations at national and international conferences. Our research programs have delivered new evidence that electronic medication management systems are highly effective at reducing prescribing errors in hospitals, but may also introduce new types of errors which require attention. We have reported on health professionals' failure to follow up test results – an important safety issue – as well as the effectiveness of electronic test management systems in addressing this problem.

The vexed areas of medication safety and information exchange in aged and community care also received attention with a large collaborative project involving industry partners. The Centre investigated how mobile computing supports improved health care delivery in a range of studies observing clinicians' work practices.

Health economic evaluations of information technology in the health sector are rare. In 2013 the Centre created a new stream of research in this important area, which will grow over time and deliver new evidence on the cost effectiveness of these interventions.

The Centre underwent its first formal review with UNSW Australia in September 2013. The review panel was highly complimentary regarding the productivity and outcomes of the Centre's work and culture.

I would like to thank the many health care organisations, collaborators and government and other agencies with whom we have worked so closely throughout the year. Their time, effort and insights have made our work possible.

Professor Johanna Westbrook

Director

Centre for Health Systems and Safety Research

Management board

Role of the Management Board

The Management Board's role is to monitor the Centre's financial performance, assist with development of strategy and ensure that the objectives of the Centre are pursued in accordance with its terms of reference.

Management Board members

Professor Denis Wakefield (Chair)

Associate Dean Research
Director of the Office of Medical Research
UNSW Medicine

Professor Ann Williamson

Professor of Aviation Safety
Department of Aviation
Faculty of Science, UNSW

Professor Ken Hillman

Director
Simpson Centre for Health Services Research
Australian Institute of Health Innovation
Professor of Intensive Care, UNSW

Professor Ric Day

Professor of Clinical Pharmacology
St Vincent's Clinical School, UNSW

Dr George Margelis

Adjunct Associate Professor
TeleHealth Research & Innovation Laboratory
University of Western Sydney

Mr Greg Wells

Chief Information Officer
NSW Health

The Management Board met on three occasions throughout 2013: 18 April; 11 July; and 14 November.

Collaborating organisations

Austin Centre for Applied Clinical Informatics, Melbourne
Austin Hospital, Victoria
Australian Catholic University
Bankstown Hospital, NSW
Campbelltown Hospital, NSW
Cancer Institute of NSW (CINSW)
Concord Repatriation General Hospital, NSW
Department of Health and Ageing / Department of Health, Canberra
Flinders University
Harvard Medical School
HTR Business and Technology Services Pty Ltd
Liverpool Hospital, NSW
Mater Hospital, QLD
National e-Health Transition Authority (NeHTA)
National Health Call Centre Network (NHCCN)
National Health Foundation
National Prescribing Service
NSW Health Ministry
Pathology North
Prince of Wales Hospital, NSW
Royal Adelaide Hospital, SA
Royal College of Pathologists of Australasia Quality Assurance Programs
Royal North Shore Hospital, NSW
Royal Prince Alfred Hospital, NSW
Sir Moses Montefiore, NSW
South Eastern Area Laboratory Service, NSW (SEALS)
Southern Cross Care, NSW & ACT
St Vincent's Hospital, NSW
Sydney Local Health District
Sydney South West Pathology Services
The University of Sydney
UnitingCare Ageing, NSW & ACT
University of Leeds, UK
University of Melbourne
University of Newcastle
University of Southern Queensland
University of Tasmania
University of Technology Sydney
Veteran Affairs Hospital, Houston, Texas, USA
Western Sydney Local Health District

Medication safety and e-Health

Medication error and inappropriate medication therapy are two of the oldest, most costly and least tractable safety problems faced by health systems. Information technology (IT) has the potential to make medication management safer and more effective and, with that expectation, health systems worldwide are making vast investments in IT. In the next decade nearly all prescribing will rely on an electronic system. Our research is investigating the ways in which information technology can reduce medication errors and support improved medication therapy decisions and outcomes.

Clinical decision support for medication safety

An important feature of electronic clinical information systems is their capacity to embed decision support systems to guide decision-making. However, research is vital into when and how alerts should be provided to clinicians. There is a great risk of alert fatigue – where alerts are so frequent that system users start to ignore them.

Following our research into the effect of decision support on prescribing during ward rounds, we completed a study of junior doctors' prescribing decisions after hours (5pm–10pm daily). We found that junior doctors at night read computerised alerts and used online reference material to support their decision-making. This was in contrast to what we observed on ward rounds, when doctors ignored most alerts and rarely used reference material. Decision support was of greater value to less experienced doctors working independently than to those working in formal ward round situations. This clinical context presents a specific focus and user group for designers of decision support. We are currently continuing this work to explore how doctors use decision support in another context: the intensive care unit.

Decision support was of greater value to less experienced doctors working independently than those in formal ward rounds.

To reach consensus among prescribers of different specialties on the usefulness of computerised alerts and strategies for reducing low-value alerts within a commercial electronic medication management system (eMMS), we conducted a two-round Delphi survey. Involving users in customising alerts proved to be a successful approach as we identified several strategies that would stop a large proportion of unnecessary alerts being triggered in the eMMS. We relayed this information to the study site and several changes were made to the computerised alerts within their eMMS.

Involving users in customising alerts proved to be a successful approach for reducing alert numbers.

Clinicians are turning increasingly to electronic information sources rather than traditional hard-copy texts for their reference needs, but research has shown that their reference needs often go unmet. In a research collaboration between our research group and a Sydney hospital's pharmacy department, we examined the electronic medication information needs of clinicians and explored their preferences and views on a new medication information repository to be set up at the study site. We conducted focus groups with doctors, nurses and pharmacists and discovered that clinicians viewed the new information repository as not very useful. We identified clear areas where the electronic information sources need to be redesigned and fed this information back to the pharmacy department to produce more user-friendly and useful medication information.

We identified clear areas where the electronic information sources need to be redesigned to support clinical work better.



Medication information in electronic discharge summaries

Discharge summaries are used to communicate important information about events during care in hospitals. A comprehensive list of medications at discharge, along with the reasoning behind any medication changes, is an important part of discharge summaries. However, delayed or inaccurate discharge summaries can negatively impact patient care and contribute to adverse events. Electronic discharge summaries may improve the quality and accuracy of medication information.

Medication information in electronic discharge summaries is significantly better than in paper discharge summaries.

We reviewed 1352 and 1771 medication orders in paper and electronic discharge summaries respectively, and assessed whether these were complete and accurate in terms of medication strength, dose, route and frequency, and whether any changes in the medication regimen, when compared to medications on admission, were explained. Missing information was rated in terms of its effect on continuity of care.

We found that the dose and route of medication orders were more likely to be recorded in electronic discharge summaries compared with paper discharge summaries. Of changes to medication regimen, only medication additions were more likely to be explained on the electronic compared with paper discharge summaries. There was no significant improvement in the proportion of incomplete medication orders which were rated as likely to impede continuity of care.

Selected publications

Baysari M, Westbrook J, Richardson K, Day R. *Optimising computerised alerts within electronic medication management systems: A synthesis of four years of research*. *Studies in Health Technology and Informatics* 2014. (Accepted 7 May, 2014).

Jaensch SL, **Baysari MT**, Day RO, **Westbrook JI**. Junior doctors' prescribing work after-hours and the impact of computerised decision support. *International Journal of Medical Informatics*. 2013. 82(10): 980-986.

Baysari MT, Lehnбом EC, Richardson K, O'Reilly B, Heywood M, Melocco T. Electronic medication information sources: Understanding the needs and preferences of health professionals. *Journal of Pharmacy Practice and Research*. 2013. 43: 288-91.

Baysari MT, Westbrook JI, Egan B, Day RO. *Identification of strategies to reduce computerised alerts in an electronic prescribing system using a Delphi approach*. In: Lehmann CU, Ammenwerth E, editors. *Medinfo 2013*. Copenhagen, Denmark: IOS Press; 2013. (192) p. 8-12.

Selected publications

Lehnбом EC, Raban MZ, Walter SR, Richardson K, **Westbrook JI**. Do electronic discharge summaries contain more complete medication information? A retrospective analysis of paper versus electronic discharge summaries. *Health Information Management Journal*. 2014; (Accepted 29 April 2014).



Improving antibiotic prescribing in hospitals

Antibiotic resistance resulting from the inappropriate use of antibiotics is a worldwide health problem. Hospitals rely on stewardship guidelines to ensure the most effective use of antibiotics. Our research aims to establish how to ensure such guidelines are effective and to examine strategies to support their easy integration into clinical practice.

In an innovative study designed to investigate ways to improve compliance with antibiotic prescribing policy, we provided individualised weekly feedback to doctors about their recent compliance with an antibiotic policy.

We identified several problems with the antibiotic prescribing policy which were not known before the trial.

We observed no change in compliance with the policy following feedback, but we did identify several practical problems with the policy and the associated approval process which were not known before the trial. These included that the antibiotic policy written into the decision support of the hospital's electronic prescribing system was not consistent with hospital policy, causing confusion. The findings prompted action to address these issues. Many of the problems we identified are generic issues of importance to all organisations seeking to integrate antimicrobial stewardship into electronic prescribing systems.

Selected publications

Baysari MT, Oliver K, Egan B, Li L, Richardson K, Sandaradura I, Westbrook JI, Day RO. Audit and feedback of antibiotic use: Utilising electronic prescription data. *Applied Clinical Informatics*. 2013. 4(4): 583-595.

Interventions to improve medication administration safety

Our previous research has demonstrated that the more nurses are interrupted during medication administration, the greater the number and severity of errors they make. Drawing on the sterile cockpit concept in aviation, which prohibits interruptions to the pilot during the safety-critical tasks of taking off and landing, there have been suggestions that similar interventions should be implemented on hospital

Policy makers should proceed with caution in implementing 'Do not interrupt' interventions during medication administration until controlled trials confirm their value.

wards during medication administration. We reviewed the evidence regarding the effectiveness of such interventions in reducing interruptions to nurses, as well as the evidence that medication errors were reduced as a result. We found that while there is considerable enthusiasm for such interventions, there is very limited evidence that they are effective. A major problem is the poor way in which they have been evaluated. Hospitals should thus proceed with caution in adopting such interventions.

Selected publications

Raban MZ, Westbrook JI. Are interventions to reduce interruptions and errors during medication administration effective? A systematic review. *BMJ Quality & Safety.* 2014; 23(5):414-21.

The value of medication reconciliation and review

Medication safety relies on accurate information about an individual's medication history. Medication reconciliation and medication review are terms for the documenting and evaluation of a patient's current medications at each point of contact with

Medication reconciliation and medication review do not significantly improve clinical outcomes.

the health system. To be effective, these processes require information that is complete and up-to-date. A systematic review was undertaken into the effect of medication reconciliation and review on health outcomes. The evidence shows medication reconciliation and review can identify a high proportion of medication discrepancies and detect inappropriate prescribing, but whether they improve health outcomes is less clear.

Selected publications

Lehnbom EC, Stewart MJ, Manias E, Westbrook JI. The impact of medication reconciliation and review on clinical outcomes: A systematic review. *Annals of Pharmacotherapy.* 2014; (Accepted 24 June 2014)



Patterns of work and communication and their impact on safety

We are investigating patterns of clinicians' work, how best to capture complex work patterns including interruptions, and the extent of multi-tasking undertaken. Through grants from the Australian Research Council and the National Health and Medical Research Council, we are assessing how large-scale interventions such as the implementation of clinical information systems drive changes in patterns of work.

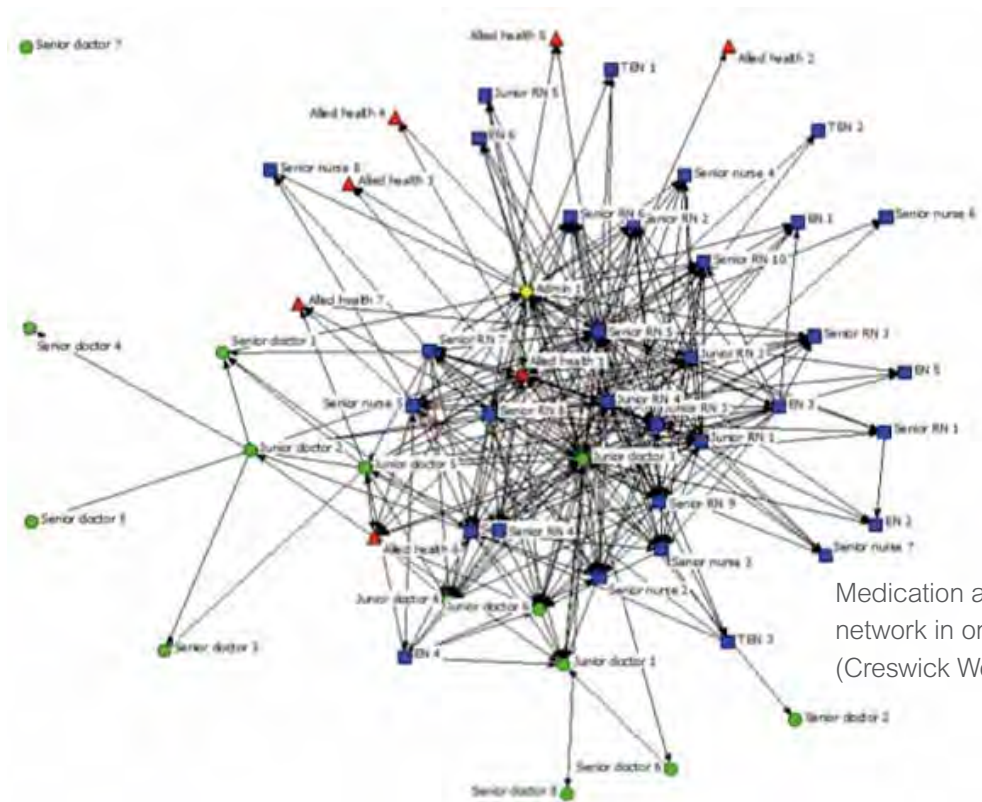
Social networks in hospital and medication safety

Face-to-face communication is central to the provision of clinical care and consumes the majority of health professionals' time. Yet we know surprisingly little about how these communication practices affect patient safety. Social network analyses provide an innovative way of studying communication patterns. Using social network analysis we investigated the extent to which staff on two hospital wards provided medication advice to other staff members, and then we examined these networks in relation to their prescribing error rates.

We found medication advice-seeking networks among staff on hospital wards are limited. Hubs of advice provision include pharmacists, junior doctors and senior nurses, while senior doctors are poorly integrated into medication advice networks. Strategies to improve the advice-giving networks between senior and junior doctors may be a fruitful area for intervention to improve medication safety. We found one ward with stronger medication information networks also had a significantly lower prescribing error rate. This suggests that communication networks may play an important role in medication safety and are a promising area for further investigation.

Selected publications

Creswick NJ, Westbrook JI. Who do hospital doctors and nurses go to for advice about medications? A social network analysis and examination of prescribing error rates. *Journal of Patient Safety*. 2014; doi: 10.1097/PTS.000000000000061 (Epub ahead of print).



Medication advice-seeking network in one hospital ward (Creswick Westbrook 2014)



How do junior doctors spend their time at night?

Understanding patterns of work among clinicians is central to identifying how various interventions may be useful and integrate into work flows. Very little is known about how junior doctors spend their time. We conducted one of the first studies to track how junior doctors spend their time while on night duty. We undertook a time-and-motion study of doctors' work between 10pm and 8am. We found that doctors spent 72% of the night shift alone. Compared with doctors during the day, night-time doctors spent greater proportions of time engaged in social/personal tasks (e.g. sleeping, eating) and indirect care, but a similar proportion of time engaged in direct patient care. Multi-tasking and interruptions were also minimal during the night-shift. We are now continuing this work to track how junior doctors spend their time on weekend shifts.

Compared with doctors during the day, junior doctors at night spent greater proportions of time engaged in social/personal tasks (e.g. sleeping, eating) and indirect care, but a similar proportion of time engaged in direct patient care.

Selected publications

Arabadzhiyska P, **Baysari MT**, **Walter S**, Day RO, **Westbrook J**. Shedding light on junior doctors' work practices after hours. *Internal Medicine Journal* 2013. 82 (10): 980-986.

Use of mobile technology on ward rounds

Previous work has examined the impact of technology on information sharing and communication between doctors and patients in general practice consultations, but very few studies have explored this in hospital settings. To assess if, and how, senior clinicians use an iPad to share information (e.g. patient test results) with

Doctors were not seen to use the iPad to share information with patients on ward rounds.

patients during ward rounds, we shadowed ten senior doctors on ward rounds, interviewed the doctors and administered a short survey to 180 patients. Doctors reported that sharing information with patients is critical to the delivery of high quality health care, but were not seen to use the iPad to share information with patients on ward rounds. Patients did not think the iPad had affected their engagement with doctors on rounds. Although the iPad potentially creates new opportunities for information sharing and patient engagement, the ward round may not present the most appropriate context for its use this way.

Selected publications

Baysari MT, Adams K, **Lehnbom EC**, **Westbrook JI**, Day RO. iPad use at the bedside: A tool for engaging patients in care processes during ward-rounds? *Internal Medicine Journal*. 2014. (Accepted 25 June, 2014)

Lehnbom E, Adams K, Day RO, **Westbrook JI**, **Baysari M**. iPad use during ward rounds: An observational Study. *Studies in Health Technology and Informatics* 2014. (204) p. 67-73.



Pathology and imaging informatics

Pathology and medical imaging services perform a major role in the delivery of patient care by ensuring reliable and accurate results are delivered in a timely fashion to inform clinical management decisions. Over the last three decades, the number of requests for pathology and medical imaging services has grown considerably. This has helped to make the delivery of patient care increasingly complex.

Pathology testing patterns

Our research team, working with pathology laboratory services in NSW, has made major advances in building enriched datasets using sophisticated techniques to link different clinical and administrative data sources. As a result, our researchers can monitor key indicators of hospital performance including test ordering patterns, turnaround times and patient outcome measures such as patient length of stay and mortality. This work has been carried out in close collaboration with the South Eastern Area Laboratory Service and the Royal College of Pathologists of Australasia Quality Assurance Programs, and has attracted grant funding from the Department of Health's Quality Use of Pathology Program.

Research using the enriched datasets to evaluate the effect of the electronic medical records on laboratory services has shown that error rates per 1000 order episodes were significantly lower for electronic medical records than for paper records by a margin of 0.21 for mislabelled, 0.53 for mismatched and 0.18 for unlabelled specimens. Our paper in this area was awarded the Branko Cesnick Award for the Best Scientific Paper at the 2013 National Health Informatics Conference in Adelaide.

ED LOS increased by 9.8% on average for every 60 minutes' increase in TAT.

Our research has also used multilevel linear regression modelling to examine the relationship between length of stay (LOS) in emergency department (ED) and laboratory test turnaround time (TAT). We produced a model (incorporating numerous variables) which accounted for 24% of the variation in emergency department LOS. The model revealed that ED LOS increased by 9.8% on average for every 60 minutes' increase in TAT.

Selected publications

Georgiou A, Vecellio E, Toouli G, Eigenstetter A, Li L, Wilson R, Westbrook JI. The impact of the implementation of electronic ordering on hospital pathology services. *Report to the Commonwealth of Australia, Department of Health and Ageing, Quality Use of Pathology Committee.* 2012; Australian Institute of Health Innovation, University of New South Wales, Sydney. ISBN: 978-0-7334-3194-4.

Georgiou A, Vecellio E, Toouli G, Eigenstetter A, Li L, Wilson R, Westbrook JI. Monitoring the impact of the electronic medical record on the quality of laboratory test ordering practices. *Health Informatics Conference, Adelaide, 15–18 July 2013.* In Grain H, Schaper LK. *Health Informatics: Digital Health Service Delivery – The Future is Now! Selected Papers from the 21st Australian National Health Informatics Conference (HIC 2013)* IOS Press Amsterdam; ISSN 0926-9630: 33-38.

Li L, Georgiou A, Vecellio E, Toouli G, Eigenstetter A, Wilson R, Westbrook JI. The effect of electronic pathology ordering in emergency departments on one aspect of test turnaround time: a failure time analysis. *Health Informatics Conference, Adelaide, 15 -18 July 2013.* In Grain H, Schaper LK. *Health Informatics: Digital Health Service Delivery – The Future is Now! Selected Papers from the 21st Australian National Health Informatics Conference (HIC 2013)* IOS Press Amsterdam; ISSN 0926-9630: 79-85.

Li L, Georgiou A, Vecellio E, Eigenstetter A, Toouli G, Wilson R, Westbrook JI. Impact of the performance of pathology service on patient length of stay in emergency department, using a multilevel regression model [Abstract and Oral presentation]. *Australasian Applied Statistics Conference; 3-7 December; Queenstown, New Zealand.* 2012.

Park S, Parwani A, Aller RD, Lech M, Banach L, Becich MJ, Borkenfeld S, Carter AB, Friedman BA, Rojo MG, **Georgiou A, Kayser G, Kayser K, Legg M, Naugler C, Sawai T, Weiner H, Winsten D, Pantanowitz L.** The history of pathology informatics: A global perspective. *Journal of Pathology Informatics.* 2013; 4(1):7.

Vecellio E, Georgiou A, Toouli G, Westbrook JI. Volume, rates, source and types of add-on pathology test requests across five hospitals. *Clinical Chemistry and Laboratory Medicine.* 2012; 50(6):1041-8.

Vecellio E, Georgiou A, Li L, Toouli G, Eigenstetter A, Wilson R, Westbrook JI. Examination of changes in pathology tests ordered by Diagnosis-Related Group (DRGs) following CPOE introduction. *Health Informatics Conference, Adelaide, 15 -18 July 2013.* In Grain H, Schaper LK. *Health Informatics: Digital Health Service Delivery – The Future is Now! Selected Papers from the 21st Australian National Health Informatics Conference (HIC 2013)* IOS Press Amsterdam; ISSN 0926-9630: 114-120.



Medical imaging

Our work in this area has focused on the effect of medical imaging, including picture archiving communication systems (PACS) on clinical work, communication and organisation, and patient outcomes. In 2012, we published a systematic review of research evidence which showed that PACS are associated with faster access to images and improvements in the availability of images by up to 30 minutes for routine examinations. In 2014 this work featured in an invited chapter in the textbook *Critical Care Ultrasound* which investigated the challenge of delivering health IT-enabled innovation.

A PhD candidate, Dr George Larcos, examined the incidence, type, causes and consequences of incidents of maladministration of nuclear medicine. His work identified 149 incidents of maladministration recorded within the Australian Radiation Incident Register, an estimated incidence of 5.8 per 100,000 nuclear medicine procedures.

Analysis of the Australian Radiation Incident Register revealed an estimated incidence of maladministration errors of 5.8 per 100,000 nuclear medicine procedures.

Our research has also reported on the implementation of a Radiology Notification System (RNS). Using qualitative research methods to examine a test management system in a major Sydney hospital medical imaging department, the research investigated the RNS's role in enhancing safe and effective communications between wards and hospital departments. The study was able to identify a number

of areas where the system might be improved, including the need for a 24-hour service, and enhanced standardisation of result definitions and procedures.

Selected publications

Creswick N, Callen J, Li J, Georgiou A, Isedale G, Robertson L, Paoloni R, Westbrook JI. A qualitative analysis of emergency department nurses' perceptions of the effects of an integrated clinical information system. *Electronic Journal of Health Informatics*. 2012; 7(1):e4.

Dimigen M, Zogovic B, **Georgiou A, Hordern A**, Saks A, Schlaphoff G. Review of the 'Tsunami' radiology notification system: experience after 2 years implementation. *Asian Oceanian Congress of Radiology Sydney*, 31 August 2012.

Georgiou A, Hains IM, Milliss D, Ridley L and **Westbrook JI.** Integrating PACS and CPOE in the ICU – the challenge of delivering health information technology-enabled innovation. In: Lumb P and Karakitsos D, (eds.). *Critical Care Ultrasound*. Philadelphia: Elsevier, 2014, p. 295-7.

Georgiou A. Picture Archiving Communication Systems and their effect on clinical work, communication and organisation in Intensive Care Units – an overview of the evidence. *Diagnostic Imaging Europe* 2013; 29(2):38-39.

Georgiou A, Hordern A, Dimigen M, Zogovic B, 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):291–7.

Hains IM, Georgiou A, Westbrook JI. The impact of PACS on clinician work practices in the intensive care unit: A systematic review of the literature. *Journal of the American Medical Informatics Association*. 2012; 19(4):506-13.

Larcos G, Collins LT, **Georgiou A, Westbrook JI.** Maladministrations in nuclear medicine: revelations from the Australian Radiation Incident Register. *Medical Journal of Australia*. 2014;200:37-40 doi: 10.5694/mja13.10145.

Stewart M, Georgiou A, Hordern A, Dimigen M, **Westbrook JI.** What do radiology incident reports reveal about in-house communication processes and the use of health information technology? In: Maeder AJ, Martin-Sanchez FJ, editors. *Health Informatics: Building a Health care Future Through Trusted Information*. Amsterdam: IOS Press; 2012. (178) p. 213-8.

Failure to follow up test results – a critical patient-safety issue

The World Health Organization's World Alliance for Patient Safety has identified poor test result management as a priority problem area in patient safety. Our own widely-cited research into the problem has shown that test results fail to be followed up in 20% to 62% of inpatients, and in up to 75% of patients treated in the Emergency Department (ED). Poor test result follow-up can have major consequences for the quality of care, including missed diagnoses and suboptimal patient outcomes.

Hospital electronic health records can be made available to consumers on-line through a secure electronic patient portal, which not only gives them access to appointments and personal clinical information, but also lets them communicate directly with health professionals. Nevertheless, major obstacles hinder the involvement of consumers, including a lack of access to clinical information, and a lack of tools and checklists that help consumers to understand and become engaged in their own care. Our survey of 61 Emergency Department physicians in two Sydney EDs showed that their main concerns with direct notification of abnormal results were that patients might be anxious (85.2%), confused (91.8%), or might lack the expertise needed to interpret their results (90.2%), and might seek information that could be unreliable (57.4%).

The Centre has been involved in an ARC Discovery Project led by Associate Professor Joanne Callen to examine whether electronic test management systems produce measurable improvements in the follow-up of test results and communication between clinicians, pathology laboratories and medical imaging departments. The project team is collaborating with researchers in the United States to investigate the factors which impede and those which facilitate the direct notification of significantly abnormal test results to patients.

A 2014 landmark study led by our team investigated the successful implementation of an electronic test management system at a major Australian hospital and received national media coverage. The system provided an electronic safety net based on a test management governance model. This ensures that if the responsible medical officer who orders a test does not acknowledge the receipt of a test result within three days, a notification/escalation process is set in motion so that as each day passes, email or pager alerts are sent, beginning with the clinical unit's designated medical officer (day 4), and then escalating to the clinical unit support supervisor (administration or medical) (day 5), clinical unit director (day 7) and division director (day 10). The process enabled the ongoing monitoring of test results to make sure that delays in test result follow-up were able to be identified and remedied promptly. It led to the acknowledgement of all test results, with 60% of laboratory and 44% of medical imaging results acknowledged within 24 hours of becoming available. This was the first Australian study of the effects of a test acknowledgement system, and one of the few international accounts of such an intervention.

Selected publications

Callen JL, Georgiou A, Li J, Westbrook JI. The safety implications of missed test results for hospitalized patients: A systematic review. *BMJ Quality and Safety*. 2011; 20: 194-199.

Callen J, Georgiou A, Westbrook JI. Evaluation of solutions aimed at reducing the incidence of missed test results: Can technology assist? [Abstract]. *14th Asian Oceanian Congress of Radiology (AOCR)*; 30 August-2 September; Sydney, Australia. 2012.

Callen JL, Westbrook JI, Georgiou A, Li J. Failure to follow up test results for ambulatory patients: A systematic review. *Journal of General Internal Medicine*. 2012; 27(10):1334-48.

Georgiou A, Hordern A, Dimigen M, Zogovic B, 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):291-7.

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 Australia mothers' hospital. *Journal of the American Medical Informatics Association*. 2014; [Epub ahead of print] Mar 5 (Accepted 18 February).



Safety and integration of aged and community care

In 2008, Australians 65 years and over made up 13% of the population. By 2024, this is projected to increase to 20%. For the community, planning for and dealing with this demographic shift safely and effectively are important challenges. Information and communication technologies can help meet these challenges by offering direct assistance (telehealth), by promoting people's engagement and social connection, and by enhancing the integration and coordination of care through the use of large-scale systems.

Integrating services to improve service performance and client experience

Our Centre has been involved in a large-scale Australian Research Council Linkage Grant with UnitingCare Ageing, the largest single provider of aged and community care services in NSW and the ACT, to evaluate an innovative community care service

model underpinned by sophisticated information and communication technology (ICT) infrastructure supporting the delivery of integrated aged care services.

Integrated care is a deceptively simple concept. Understanding and achieving it across multiple organisations and service components is complex and challenging. Our work in this area has highlighted how one of the major barriers to ICT diffusion in aged and community care has been the failure to cater to the sector's complex, interdisciplinary requirements. Our qualitative analysis of work processes established an aged care informatics framework which linked residential, community, clinical and administrative data to the way that these data are collected, stored and communicated through diverse internal and external communication channels. This framework provides a valuable tool for identifying areas of potential communication dysfunction, fragmentation and



disconnection that can adversely affect the continuity and coordination of care.

... falls were the most frequently reported incident making up 40.2% (n=143), followed by medication (19.9%, n=71) and aggression (14.3%, n=51) incidents.

Our investigation of UnitingCare Ageing's Management of Incidents Reports and Actions community care database reviewed reports from November 2012 to August 2013. Of the 521 reports investigated, we found that falls were the most frequently reported incident making up 40.2% (n=143), followed by medication (19.9%, n=71) and aggression (14.3%, n=51) incidents. Clients receiving high-level care and those who attended day therapy centres had the highest rate of incidents with 14–20% of these clients having a reported incident.

Selected publications

Georgiou A, Marks A, Braithwaite J, Westbrook JI. Gaps, disconnections, and discontinuities—the role of information exchange in the delivery of quality long-term care. *The Gerontologist*. 2013; 53(5):770-9.

Georgiou A, Tariq A, Westbrook JI. *The temporal landscape of residential aged care facilities – implications for context-sensitive health technology.* In: Beuscart-Zéphir M-C, Jaspers M, Kuziemycki CE, Nøhr C, Aarts J, editors. *Context Sensitive Health Informatics.* Copenhagen, Denmark: IOS Press; 2013. (194) p. 69-74.

Lyhne S, Georgiou A, Marks A, Tariq A, Westbrook JI. Towards an understanding of the information dynamics of the handover process in aged care settings - a prerequisite for the safe and effective use of ICT. *International Journal of Medical Informatics.* 2012; 81(7):452-60.

Robertson H, Georgiou A, Nicholas N, Johnson J, Travaglia J, Rosenfeld T. A virtual aged care system: When health informatics and spatial science intersect. *Health Informatics Conference, Melbourne 11-14 August 2014.*

Robertson H, Nicholas N, Travaglia J, Georgiou A, Johnson J. Globalising the study and analysis of Alzheimer's disease: A digital earth model. *Twentieth International Association of Gerontology and Geriatrics (IAGG); 23-27 June; Seoul, South Korea.* 2013.

Stewart MJ, Georgiou A, Westbrook JI. Successfully integrating aged care services: A review of the evidence and tools emerging from a long-term care program. *International Journal of Integrated Care.* 2013; 13(Jan-Mar):e003.

Medication safety in residential aged care facilities

Medication safety in residential aged care facilities (RACFs) is a cause of concern, and a major problem for health and aged care services world wide. Studies show that up to 70% of residents have experienced at least one medication error. The most commonly identified problems involve polypharmacy, excessive use of tranquilisers, and the administration of medications by untrained or unqualified staff.

Our research in this area has explored factors that inhibit safe prescribing in RACFs using qualitative data from managers, doctors, pharmacists and RACF carers actively involved in prescribing-related processes across three residential aged care facilities in Sydney. We found that three categories of system factors – communication systems, team and staff management – contributed to prescribing problems. Factors associated with communication systems included

limited point-of-care access to information, inadequate handovers, information storage across different storage mediums (paper, electronic and memory), poor legibility of charts, information double handling, multiple faxing of medication charts, and reliance on manual chart reviews. Team factors included the lack of established lines of responsibility, inadequate team communication, and the limited participation of doctors in multidisciplinary initiatives such as medication advisory committee meetings. Factors related to staff management and workload included doctors' time constraints and accessibility, lack of trained RACF staff, and high RACF staff turnover.

Health IT solutions, such as electronic medication administration records have the potential to improve the prescribing safety, but if they are to do so, they must be aligned with the collaborative team processes they are meant to support.

The most commonly identified problems involve polypharmacy, excessive use of tranquilisers, and the administration of medications by untrained or unqualified staff.



Selected publications

Gaskin S, Georgiou A, Barton D, Westbrook JI. Examining the role of information exchange in residential aged care work practices – A survey of residential aged care facilities. *BMC Geriatrics*. 2012; 12(1):40.

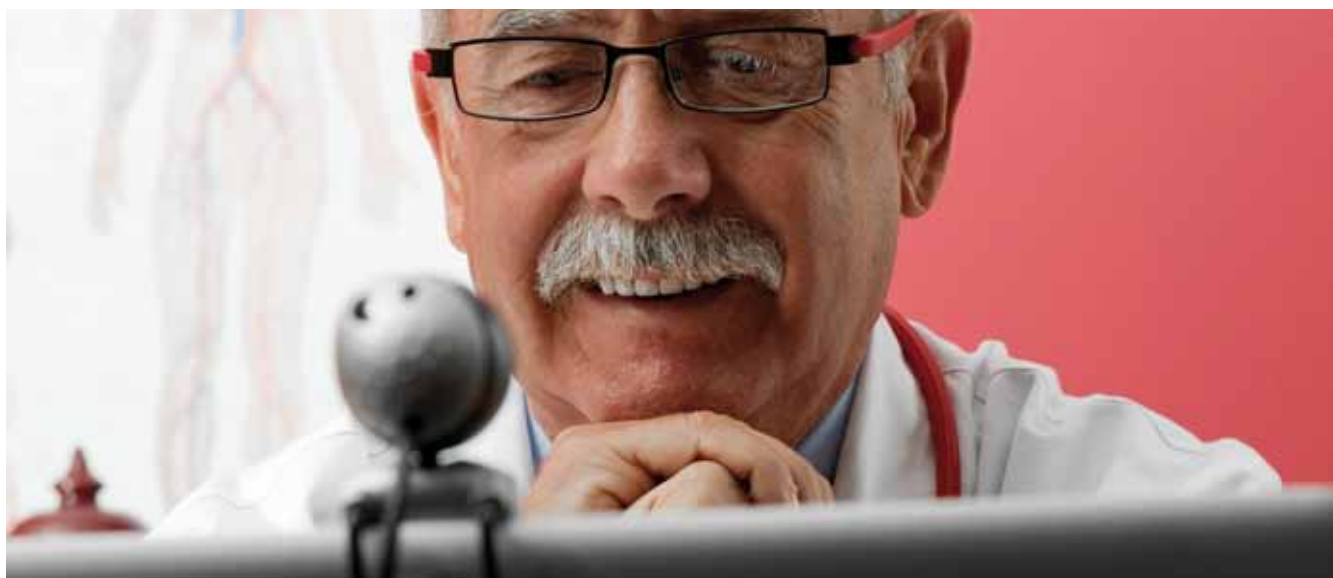
Tariq A, Georgiou A, Westbrook JI. Medication errors in residential aged care facilities: A distributed cognition analysis of the information exchange process. *International Journal of Medical Informatics*. 2013; 82(5):299-312.

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Tariq A, Georgiou A, Westbrook JI. Understanding information dynamics of medication administration in residential aged care facilities (RACFs): A prerequisite for design of effective ICT systems. In: Beuscart-Zépher M-C, Jaspers M, Kuziemsy CE, Nøhr C, Aarts J, editors. *Context Sensitive Health Informatics*. Copenhagen, Denmark: IOS Press; 2013. (194) p. 188-94.

Tariq A, Georgiou A, Westbrook JI. Coping with information silos: An examination of the medication management process in residential aged care facilities (RACFs). In: Grain H, editor. *Studies in Health Technology and Informatics*. 2014. (2014) p. 156-62.

Work innovation and e-Health



Information and communication technologies (ICT) provide an opportunity to reshape the composition of the teams who deliver care, and the processes of care delivery. Telehealth can be defined as the delivery of health care services at a distance through the use of information and communication technologies. It can occur synchronously (in real time) or asynchronously through the use of stored information such as x-rays or photographs.

In 2012, Healthdirect Australia, a national helpline advisory service, jointly funded by federal, state and territory governments, was commissioned to develop and implement a video consultation capability (VCC) service alongside the existing nationwide telephone service they currently offer for the public – a national and international first. Healthdirect Australia identified the need for expertise from health services and implementation science researchers to assist with the evaluation of the service, and partnered with the Australian Institute of Health Innovation (AIHI) at the University of New South Wales (UNSW). The aim of the partnership was to evaluate the implementation, efficiency and effectiveness of the VCC service, to inform decisions about the direction and progress of the VCC service, and to contribute to the international research evidence base.

VCC represents a significant extension of the use of video services for health care in Australia and

internationally. Evidence from these studies will provide new information about the uptake, application and effects of video consulting in this setting. This information should inform decisions about the future use of this technology, monitoring methods, and ways in which such services can be improved for patients, clinicians and health care administrators.

Video Consultation Capability (VCC) represents a significant extension of the use of video services for health care in Australia and internationally.

Selected publications

Byrne M, Vecellio E, Georgiou A, Westbrook JI. Using telephone triage protocols to support nurse video triage. *Guidelines International Network (GIN) conference*, Melbourne 20–23 August 2014.

Georgiou A, Westbrook JI, Braithwaite J. An empirically-derived approach for investigating Health Information Technology: the Elementally Entangled Organisational Communication (EEOC) framework *BMC Medical Informatics and Decision Making* 2012; 12:68.

Stewart MJ, Georgiou A, Westbrook JI. Successfully integrating aged care services: A review of the evidence and tools emerging from a long-term care program. *International Journal of Integrated Care*. 2013; 13(Jan-Mar):e003.

Westbrook JI, Braithwaite J, Gibson K, Paoloni R, Callen J, Georgiou A, Creswick N, Robertson L Use of information and communication technologies to support effective work practice innovation in the health sector: a multi-site study *BMC Health Services Research* 2009, 9:201 doi:10.1186/1472-6963-9-201.



Staff



Staff



Director

Professor Johanna Westbrook

BAppSc (MRA) Distinc. *Cumb*, MHA *UNSW*,
GradDipAppEpid NSW VETAB, PhD *Sydney*, FACHI,
FACMI

Professor Westbrook is Director of the Centre for Health Systems and Safety Research (CHSSR). Her research expertise centres on the design and execution of complex multi-method evaluations in the health

sector with a particular focus on the effective use of information and communication technologies. The CHSSR is the largest health informatics evaluation research team in Australia and the team's work is highly competitive with international groups. Professor Westbrook has undertaken leading research on medication safety, the effectiveness of electronic medication management systems in reducing errors, and safe work and communication practices in hospitals. Before her research in patient safety and informatics, Professor Westbrook undertook and published a body of research reporting large epidemiological studies including population-based surveys, analyses of large administrative datasets, and cohort studies of patients with dyspepsia and reflux disease. This included the first study to demonstrate a birth-cohort effect among Australians with peptic ulcer disease. She has an extensive publication record which includes more than 200 refereed publications, has attracted more than \$26 million in research funding, and has won several awards for her research.



Associate Professor
Joanne Callen



Associate Professor
Andrew Georgiou



Dr Melissa Baysari



Ms Elena Gospodarevskaya

Associate Professor Joanne Callen

BA *UNSW*, DipEd SydTeachColl, MPH (Research) *Sydney*, PhD *UNSW*

Associate Professor Callen's research centres on exploring how information and communication technology (ICT) can improve health outcomes for patients and support health professionals in the delivery of high quality, safe and efficient patient care. Her work encompasses the qualitative exploration of facilitators of and barriers to the implementation of clinical information systems. A particular area of interest is the use of ICT to improve the safety of test result management. This research explores how ICT can improve communication between patients, clinicians and laboratory staff regarding laboratory and radiology test results. Before her role at the CHSSR, Professor Callen was Head of the Health Informatics Discipline at the University of Sydney. She is currently Editor-in-Chief of the *Health Information Management Journal*.

Associate Professor Andrew Georgiou

BA *LaTrobe*, DipArts *Sydney*, MSc *Southampton*, PhD *Sydney*, FCHSM, FACHI

Associate Professor Georgiou was awarded his PhD in 2009 and is currently investigating the effect of electronic ordering systems in acute-care settings and their contribution to innovation in work practices and improvements in the safety and quality of patient care.

Associate Professor Georgiou has worked as a senior researcher in a number of areas including primary care, health informatics and outcomes measurement. He spent eight years (1993–2001) working in the UK National Health Service (NHS) including as the Assistant Director of Classifications for the NHS Centre for Coding and Classifications (1995–97) and as Co-coordinator for the Coronary Heart Disease Programme

for the Royal College of Physicians, London (1999–2002).

He has a broad range of research interests and has published widely in the areas of aged care, pathology and health informatics, evaluation, quality of care and health outcomes measurement. He is currently a member of the Editorial Board of the *Journal of Pathology Informatics* and the *International Journal of Medical Informatics* and the immediate past chair of the Health Informatics Society of Australia (NSW Branch, 2010–11).

Research fellows

Dr Melissa Baysari

BPsych, PhD *Sydney*

Dr Baysari is a human factors researcher with experience in both qualitative and quantitative evaluations of health information technology. In addition to her role at the Centre, she is located within the Department of Clinical Pharmacology and Toxicology at St Vincent's Hospital. Dr Baysari is currently involved in research investigating the decision-making process involved in selecting medicines for prescription. Her research focuses on reducing prescribing errors in hospitals, and in particular on identifying the factors necessary for effective clinical decision support for prescribers.

Ms Elena Gospodarevskaya

MEcon *LMSU*, PostGradDip.Bus (FM&Ec) *Curtin*, PostGradDip.HEcEv *Monash*

Ms Gospodarevskaya is a health economist with 14 years' experience with leading health economics groups in Australia and the United Kingdom. She acquired her professional qualification while working



Dr Ling Li



Dr Sharyn Lymer

at the Centre for Health Economics, Monash University, where she specialised in cost-effectiveness analysis of public health interventions for childhood immunisation, infection control, drug addiction and child mental health. She is experienced in health services research and health technology assessment (pharmaceuticals, diagnostic and surgical procedures). She has conducted economic evaluations alongside clinical trials, including a multi-centre, longitudinal RCT of opioid substitutes which won an award from the Victorian Government, and an international trial of new treatments for multi-drug-resistant tuberculosis. She is currently evaluating the outcomes of health informatics projects. Since 2001 she has published 20 papers in international peer-reviewed journals.

Dr Ling Li

BEcon Beijing Wuzi, MComBus, MComIT Macq, MBIostats Syd, PhD Macq

Dr Li is a biostatistician with extensive experience in dealing with complex health datasets. She has participated in several large-scale studies analysing medication error data and the effects of information technologies on changes in error rates and clinicians' work patterns. Dr Li has led analyses of large epidemiological studies of cardiovascular disease, cancer, sports injury and drinking water. Her research interests include longitudinal and correlated data analysis, survival analysis, and linked data analysis, in both methodology development and application.

Dr Sharyn Lymer

BA Macq, BPhy UQ, MBIostats Sydney, PhD UC

Dr Lymer is a research fellow with the Centre. She is a biostatistician with particular expertise in applying microsimulation modelling to the Australian health system. Currently she is participating in the evaluation

of ICT in aged care, particularly its effects on the integration of care. She was involved in the evaluation of electronic medical ordering and results-reporting systems with a particular interest in imaging, the evaluation of graphical presentation of quality indicators, and the evaluation of test acknowledgement.

She completed her PhD in 2011, a study of the projected costs of health care in an ageing Australia over the next 50 years, using dynamic microsimulation. This research explored beyond the concerns of ageing and considered the impacts of health behaviour changes on future health expenditure. She has participated in the development of various static microsimulation models of the Australian health system including the Medicare Benefit Scheme and Pharmaceutical Benefits Scheme. She also has an interest in spatial microsimulation particularly looking at local level aged care needs in Australia.

Dr Zahra Niazkhani

MD UUMS, MSc, PhD EUR

Dr Niazkhani is a research fellow with the Centre. She is a physician who specialises in health and medical informatics. She received her MD in 1999 and worked as a general practitioner in the public and private sectors for four years, before pursuing her research interest in health and medical informatics. She obtained her Master's degree (2006) and PhD (2009) from Erasmus University Rotterdam (EUR), The Netherlands. Before joining the CHSSR, she worked as an Assistant Professor of Medical Informatics at Urmia University of Medical Sciences. Since January 2010 she has been an associate research fellow at the Institute of Health Policy and Management (iBMG), EUR, The Netherlands.

Dr Niazkhani's main research interests are the deployment of health information technology in health



Dr Heather Douglas



Dr Elin Lehnbom



Dr Mirela Prgomet



Ms Magda Raban

care organisations and the evaluation of its effect on clinical workflow, patient safety, and patient outcomes.

In CHSSR, her research focuses on evaluating the effect of health information technology on the medication process in hospitals and aged care facilities.

Dr Juan Xiong

BSc(InfCompSc) *ECNU China*, MSc PhD *UWO Canada*

Dr Xiong is a research fellow in biostatistics at the Centre. Her research experience includes statistical analyses of several large-cohort studies, as well as gene-expression investigations of cancer and chronic diseases. She also has extensive experience in the design and data management of large-cohort studies and clinical trials concerned with rheumatoid arthritis. Her research interests focus on developing statistical methodology and applications for longitudinal analysis, survival analysis, linked data analysis, incomplete data analysis and gene expression data analysis.

Postdoctoral research fellows

Dr Heather Douglas

BPsych (Hons) *UoN*, PhD *UoN*

Dr Douglas completed her Bachelor of Psychology at the University of Newcastle with Honours Class I in 2009, and her PhD at the University of Newcastle in 2014. In 2010, Dr Douglas was awarded the Australian Psychological Society Prize for ranking first in a psychology honours year, as well as the University of Newcastle Faculty of Science and IT Medal. She has expertise in the design, evaluation, and administration of psychometric tests, behavioral interviews and the conduct of assessment centres, particularly in job

selection. She also has experience in quantitative methods, data analysis, research design, and personality theory/measurement.

Dr Elin Lehnbom

BScPharm *Linköping*, MPharmSc, MCLinPharm *Uppsala*, PhD *Sydney*

Dr Lehnbom trained and worked as a pharmacist in Sweden before moving to Sydney in 2008. For her PhD she investigated and compared Australians' and Swedes' opinions about Personally Controlled Electronic Health Records (PCEHR). After finishing her PhD, Dr Lehnbom joined the Centre as a postdoctoral research fellow. Her research centres on the use of e-Health and its effect on patient outcomes, with a particular focus on PCEHR and quality use of medicines (QUM).

Dr Mirela Prgomet

BAppSc(HIM)(Hons) *Sydney*, PhD *UNSW*

Dr Prgomet is a postdoctoral research fellow in the Centre. She is currently assisting on a number of projects in the Centre, including systematic reviews of literature on the effect of clinical leadership on the adoption of health information technology and the effect of computerised provider order entry on patient outcomes in the ICU.

Dr Prgomet's research interests are in health informatics evaluation. Her honours project investigated information and communication processes in a hospital ancillary setting. Her PhD examined the selection of hardware computing devices and how they support clinical work practices, focusing particularly on mobile computing in hospitals.



Ms Kate Oliver



Mr Scott Walter



Ms Toni Hordern



Ms Yu Jia Julie Li

Ms Magda Raban

PhD candidate (Public Health), MIPH (Honours), BPharm *Sydney*

Ms Raban is a postdoctoral research fellow and PhD candidate with more than four years' experience in public health research. Before working in research, Ms Raban worked as a pharmacist in Australia and overseas. Her research focuses on improving medication safety and quality use of medicines through various interventions.

Senior research officers

Ms Kate Oliver

BPharm *UTAS*, MPH *Sydney*

Ms Oliver is a senior research officer in the Centre. She is a registered pharmacist with clinical experience both in Australia and overseas and has worked on a number of national and state-based projects with a focus on quality use of medicines (QUM). Having completed her Master of Public Health degree recently, Ms Oliver joined the Centre early in 2013 and now combines research interests in QUM and electronic medication management systems.

Mr Scott Walter

BA *Adel*, GradDipEd *Melb*, MBiostat *Sydney*

Mr Walter is a biostatistician and PhD candidate whose current research focuses on the analysis of clinical work practices, in particular examining the patterns and impacts of interruptions and multitasking in the clinical setting. In parallel, he is also developing statistical methods for the analysis of continuous-time observational data to enable enhanced understanding of clinical work. He recently completed the Biostatistical Officer Training Program with NSW Health during which

time he worked in a range of fields including infectious diseases, injury research and spatial epidemiology.

Research assistants

Ms Toni Hordern

BAppSc(HIM), MHLthSc(CDM) *Sydney*

Ms Hordern is a research assistant in the Centre and was previously a research assistant in the Health Informatics Research and Evaluation Unit, University of Sydney. She has been involved in a number of studies, one of which specifically focused on the impact and uptake of a radiology notification system within a medical imaging department in a large Sydney teaching hospital. She has also been involved in a project whereby ICU clinicians' work processes were measured using a hand-held time and motion tool, with a focus on quantifying the type of information that clinicians, specifically registrars, access daily and the time they spend accessing it.

She has successfully completed her Master's degree in health science (clinical data management) at the University of Sydney. Before this, Ms Hordern completed her bachelor's degree in applied science (health information management), also at the University of Sydney.

Ms Yu Jia Julie Li

BAppSc(HIM)(HonsI) *Sydney*

Ms Li is a research assistant and PhD candidate in the Centre, and previously at the Health Informatics Research & Evaluation Unit at the University of Sydney. In addition to providing general research assistance on a number of projects, she is completing a PhD on the role of information communication technology in facilitating the role of nurse practitioners in the Emergency Department.



Mr Michael Stewart



Mr Elia Vecellio



Ms Sheree Crick

Ms Li completed her Bachelor's degree in applied science (health information management) with honours, investigating the effect of computerised provider order entry on clinicians' work practices. She currently occupies a student position on the editorial board of an international informatics journal.

Mr Michael Stewart

BIntS, MIPH Sydney

Mr Stewart works in a number of key research areas within the Centre. He has been involved in the five-year ARC Linkage Project with Sydney and Western Sydney local health districts, specifically focusing on work-practice change in the Emergency Department. He also contributed to research investigating the integration of aged care services, clinical governance challenges facing telehealth providers, and information technology-related errors in radiology. He has also been involved in the Centre's ARC Discovery Project, led by Associate Professor Joanne Callen.

Mr Elia Vecellio

BPsych(Hons), MSc(Research) UNSW

Mr Vecellio is a research assistant at the Centre. Mr Vecellio's research focuses on the monitoring and evaluation of pathology and imaging services, with a particular interest in assessing the effect of systems changes. He is experienced in research methodology, data management, data validity checking, and statistical data analyses. Mr Vecellio has peer-reviewed publications in health systems research and in his previous work doing experimental research in psychology.

Business manager

Ms Sheree Crick

Ms Crick is business manager of the Australian Institute of Health Innovation and the Centre. She is responsible for managing and coordinating the Centre's activities, including the financial management of projects, human resource management, coordination and support of funding proposal submissions, expense management, travel arrangements, resource management, communication and marketing activities and day-to-day support.

In addition, Ms Crick contributes to the goals and activities of the Australian Institute of Health Innovation, supporting the directors and the administrative manager in varied aspects of the Institute's management, including financial management and marketing and communications activities.

PhD candidates

Dr George Larcos

MB BS (Hons) *Sydney*, FRACP, DDU ASUM, MPH
UNSW, ThC (Hons) *MTC*

Supervisor: Professor Johanna Westbrook

Co-supervisor: Associate Professor Andrew Georgiou

PhD topic: An analysis of the Australian Radiation Incident Register (ARIR).

Ms Yu Jia Julie Li

BAppSc(HIM)(Hons1) *Sydney*

Supervisor: Professor Johanna Westbrook

Co-supervisor: Associate Professor Joanne Callen
Associate Professor Andrew Georgiou
Associate Professor Richard Paoloni

PhD topic: Innovation in the ED: An exploration of the impact of Information Communication Technology in facilitating the role of Nurse Practitioners.

Ms Mirela Prgomet

BAppSc(HIM)(Hons) *Sydney*

Supervisor: Professor Johanna Westbrook

Co-supervisors: Associate Professor Joanne Callen
Associate Professor Andrew Georgiou

PhD topic: An investigation of the selection of mobile computing devices and how they support clinical work practices on hospital wards.

Mr Hamish Robertson

BA (Hons) *Otago*

Supervisor: Associate Professor Andrew Georgiou

Co-supervisor: Associate Professor Julie Johnson

PhD topic: The geography of Alzheimer's disease: Using spatial science to investigate social and systemic effects.

Ms Amina Tariq

MSc (BITS) *Strathclyde*, BEng (Software) *NUST*

Supervisor: Professor Johanna Westbrook

Co-supervisor: Associate Professor Andrew Georgiou

PhD topic: Medication safety in collaborative health care settings: An investigation of the impact of information exchange processes in residential aged care facilities.

Mr Scott Walter

BA *Adel*, GradDipEd *Melb*, MBiostat *Sydney*

Co-supervisors: Professor Johanna Westbrook
Professor William Dunsmuir

PhD topic: Understanding work management strategies in the clinical setting.

Research students

2013

Kristian Adams

Supervisor: Dr Melissa Baysari

Co-supervisors:

Professor Ric Day

Dr Elin Lehnbom

Program/course: Bachelor of Advanced Science (Honours)

Topic: The impact of Health Information Technology on the doctor-patient relationship

Natasha Diasinos

Supervisor: Dr Melissa Baysari

Co-supervisor: Professor Ric Day

Program/course: Bachelor of Science (Honours)

Topic: Understanding and improving aminoglycoside use

Bella St. Clair

Supervisor: Dr David Greenfield

Co-supervisor: Associate Professor Andrew Georgiou

Program/course: Masters of Public Health

Topic: Linking accreditation to funding incentives: The impact on organisation performance and attitudes to accreditation

2014

Lauren Richardson

Supervisor: Dr Elin Lehnbom

Co-supervisors:

Dr Melissa Baysari

Professor Ric Day

Program/course: Bachelor of Medical Science

Topic: What do junior doctors do during weekend shifts: A time and motion study

Walter Santucci

Supervisor: Dr Melissa Baysari

Co-supervisor: Professor Ric Day

Program/course: Bachelor of Medical Science (Honours)

Topic: The impact of computerised decision support on prescribing in the ICU

Stefanie Vaccher

Supervisor: Professor Ric Day

Co-supervisor: Dr Melissa Baysari

Program/course: Bachelor of Advanced Science (Honours)

Topic: Understanding the management of gout in the community



Publications and Presentations

Publications and presentations 2013-2014

Refereed journal articles

2014

Baysari M, Adams K, **Lehnbom E**, **Westbrook J**, Day R. iPad use at the bedside: A tool for engaging patients in care processes during ward-rounds? *Internal Medicine Journal*. 2014; (Accepted 25 June 2014).

Callen J. What is the impact of electronic health records on the quality of health data? [Editorial]. *Health Information Management Journal (HIMJ)*. 2014; 43(1).

Creswick NJ, **Westbrook JI**. Who do hospital doctors and nurses go to for advice about medications? A social network analysis and examination of prescribing error rates. *Journal of Patient Safety*. 2014; doi: 10.1097/PTS.0000000000000061(Epub ahead of print).

Georgiou A, Hordern A, Dimigen M, Zogovic B, 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):291-7.

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 Australia mothers' hospital. *Journal of the American Medical Informatics Association*. 2014; [Epub ahead of print] Mar 5 (Accepted 18 February).

Gospodarevskaya E, **Westbrook JI**. Call for discussion about the framework for categorizing economic evaluations of health information systems and assessing their quality. *Journal of the American Medical Informatics Association*. 2014; 21(1):190-1.

Ingebrigtsen T, **Georgiou A**, Clay-Williams R, Magrabi F, **Hordern A**, **Prgomet M**, **Li Y**, **Westbrook JI**, Braithwaite J. The impact of clinical leadership on health information technology adoption: A systematic review. *International Medical Journal of Informatics*. 2014; 83(6):393-405.

Laba T, **Lehnbom E**, Brien J, Jan S. Sustaining medication adherence in chronic disease: a qualitative investigation of intentional non-adherence in an Australian community sample. *Research in Social & Administrative Pharmacy*. 2014; (Accepted 28 June 2014).

Larcos GS, Collins LT, **Georgiou A**, **Westbrook JI**. Maladministrations in nuclear medicine: revelations from the Australian Radiation Incident Register. *Medical Journal of Australia*. 2014; 200(1):37-40.

Lehnbom E, **Stewart M**, Manias E, **Westbrook J**. The impact of medication reconciliation and review on clinical outcomes: A systematic review. *Annals of Pharmacotherapy*. 2014; (Accepted 24 June 2014).

Lehnbom EC, **Raban MZ**, **Walter SR**, Richardson K, **Westbrook JI**. Do electronic discharge summaries contain more complete medication information? A retrospective analysis of paper versus electronic discharge summaries. *Health Information Management Journal*. 2014; (Accepted 29 April).

Raban MZ, Dandona L, Dandona R. The quality of police data on RTC fatalities in India. *Injury Prevention*. 2014; (Accepted 26 March 2014).

Raban MZ, **Westbrook JI**. Are interventions to reduce interruptions and errors during medication administration effective? A systematic review. *BMJ Quality & Safety*. 2014; 23(5):414-21.

Walter SR, **Li L**, Dunsmuir WTM, **Westbrook JI**. Managing competing demands through task-switching and multitasking: A multi-setting observational study of 200 clinicians over 1000 hours. *BMJ Quality & Safety*. 2014; 23:231-41.

2013

Arabadzhiyska P, **Baysari M**, **Walter S**, Day RO, **Westbrook JI**. Shedding light on junior doctors' work practices after hours. *Internal Medicine Journal*. 2013; 82(10):980-6.

Bates DW, **Baysari MT**, Dugas M, Haefeli WE, Kushniruk AW, Lehmann CU, et al. Discussion of "Attitude of physicians towards automatic alerting in computerized physician order entry systems". *Methods of Information in Medicine*. 2013; 52(2):109-27.

Baysari MT, **Lehnbom EC**, Richardson K, O'Reilly B, Heywood M, Melocco T. Electronic medication information sources: Understanding the needs and preferences of health professionals. *Journal of Pharmacy Practice and Research*. 2013; 43:288-91.

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Books and book chapters

2014

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Georgiou A. *The impact of the electronic medical record (EMR) on hospital pathology services - an organisational communication perspective.* In: Moumtzoglou A and Kastania A, (eds.). *Laboratory Management*

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Lehnbom E, Adams K, Day RO, Westbrook JI, Baysari M. *iPad use during ward rounds: An observational Study.* Studies in Health Technology and Informatics 2014. (204) p. 67-73.

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Baysari MT, Westbrook JI, Egan B, Day RO. *Identification of strategies to reduce computerised alerts in an electronic prescribing system using a Delphi approach.* In: Lehmann CU, Ammenwerth E, editors. *Medinfo 2013.* Copenhagen, Denmark: IOS Press; 2013. (192) p. 8-12.

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Georgiou A, Vecellio E, Toouli G, Eigenstetter A, Li L, Wilson R, Westbrook JI. *Monitoring the impact of the electronic medical record on the quality of laboratory test ordering practices.* In: Grain H, Schaper LK,

editors. *Studies in Health Technology and Informatics:* IOS Press; 2013. (188) p. 33-8.

Lehnbom EC, Baysari MT, Westbrook JI. *Quantifying health professionals' patterns of work and communication and the impact of health information technology: A workshop on how to design and use the Work Observation Methods by Activity Timing (WOMBAT) tool.* In: Lehmann CU, Ammenwerth E, Nohr C, editors. *Studies in Health Technology and Informatics.* Online: IOS Press; 2013. (192) p. 1251.

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Li L, Georgiou A, Vecellio E, Toouli G, Eigenstetter A, Wilson R, et al. *The effect of electronic pathology ordering in emergency departments on one aspect of test turnaround time: A failure time analysis.* In: Grain H, Schaper LK, editors. *Studies in Health Technology and Informatics:* IOS Press; 2013. (188) p. 79-85.

Robertson H, Nicholas N, Georgiou A, Johnson J, Travaglia J. *A spatial informatics for aged care.* In: Grain H, Schaper LK, editors. *Studies in Health Technology and Informatics:* IOS Press; 2013. (188) p. 102-7.

Tariq A, Georgiou A, Westbrook JI. *Understanding information dynamics of medication administration in residential aged care facilities (RACFs): A prerequisite for design of effective ICT systems.* In: Beuscart-Zéphir M-C, Jaspers M, Kuziemsky CE, Nøhr C, Aarts J, editors. *Context Sensitive Health Informatics.* Copenhagen, Denmark: IOS Press; 2013. (194) p. 188-94.

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Refereed conference papers (full papers)

2013

Missiakos O, **Baysari MT**, Day RO. Identifying effective strategies to prevent drug-drug interactions in hospital: A user centred approach. *HFESA 49th Annual Conference*; 2-5 December; Perth, Australia. Human Factors and Ergonomics Society of Australia (HFESA); 2013.

Olivier J, Wang JJJ, **Walter SR**, Grzebieta R. On the use of empirical bayes for comparative interrupted time series with an application to mandatory helmet legislation. *Proceedings of the 2013 Australasian Road Safety Research, Policing & Education Conference*; 28-30 August; Brisbane, Australia. 2013.

Robertson H, Nicholas N, Travaglia J, **Georgiou A**, Johnson J. Globalising the study and analysis of Alzheimer's disease: A digital earth model. *Twentieth International Association of Gerontology and Geriatrics (IAGG)*; 23-27 June; Seoul, South Korea. 2013.

Robertson H, Nicholas N, Travaglia J, **Georgiou A**, Johnson J. Vulnerability and change in the global south: A spatially informed approach. In: James P, Hudson C, Barroll-Bell S, Taing A, editors. *People and the Planet 2013: Transforming the Future*; Melbourne, Australia. 2013.

Wang JJJ, **Walter SR**, Grzebieta R, Olivier J. A comparison of statistical methods in interrupted time series analysis to estimate an intervention effect. *Proceedings of the 2013 Australasian Road Safety Research, Policing & Education Conference*; 28-30 August; Brisbane, Australia. 2013.

Published refereed abstracts, posters and letters

2014

Baysari M, Adams K, **Lehnbom E**, **Westbrook J**, Day R. iPad use at the bedside: A tool for sharing information with patients during ward-rounds? [Abstract & Presentation]. *Human Factors Society of Australia 50th Annual Conference*; 17-19 November; Adelaide, Australia. 2014.

Baysari M, Jaensch S, **Westbrook J**, Day R. The impact of computerised decision support on prescribing: Context matters [Abstract & Presentation]. 5th International Conference on Applied Human Factors and Ergonomics (AHFE 2014); 19-23 July; Krakow, Poland. 2014.

Byrne M, **Vecellio E**, **Georgiou A**, **Westbrook J**. Using telephone triage protocols to support nurse video triage [Abstract]. *GIN conference*; 20-23 August; Melbourne, Australia. Guidelines International Network; 2014.

Georgiou A. Improving Health Information and Data Management - the Evidence of e-Health's impact [Abstract]. *15th Annual Health Congress*; 24-25 March; Sydney, Australia. 2014.

Georgiou A, **Vecellio E**, **Li L**, Eigenstetter A, Wilson R, **Toouli G**, **Westbrook JI**. Monitoring health IT integration - the effect of an EMR on laboratory service timeliness across six Australian hospitals [Abstract]. *Medical Informatics Europe 2014*; 31 August-3 September; Istanbul, Turkey. European Federation for Medical Informatics (EFMI) and the Turkish Medical Informatics Association (TurkMIA); 2014.

Hemsley B, Balandin S, **Georgiou A**, Hill S. Patient safety in hospital for adults with cerebral palsy and complex communication needs: Development of a grounded theory [Abstract & Poster]. *Australasian Academy of Cerebral Palsy and Developmental Medicine*

7th Biennial Conference; 11-14 March; Hunter Valley, NSW. 2014.

Lehnbom E, Adams K, Day RO, **Westbrook JI**, **Baysari M**. iPad use during ward rounds: An observational Study [Abstract]. *HIC Conference*; 11-14 August; Melbourne, Australia. Health Informatics Society of Australia (HISA); 2014.

Li L, **Georgiou A**, **Vecellio E**, Eigenstetter A, Wilson R, **Toouli G**, **Westbrook J**. What is the effect of electronic pathology ordering on test re-ordering patterns for paediatric patients? [Abstract]. *Health Informatics Conference*; 11-14 August Melbourne, Australia. 2014.

Robertson H, **Georgiou A**, Nicholas N, Johnson J, Travaglia J, Rosenfeld T. A virtual aged care system: When health informatics and spatial science intersect [Abstract]. *Health Informatics Conference*; 11-14 August; Melbourne, Australia. 2014.

Robertson H, Nicholas N, **Georgiou A**, Johnson J, Travaglia J. Globalising health informatics: The role of GIScience [Abstract]. *Medical Informatics Europe 2014*; 31 August-3 September; Istanbul, Turkey. European Federation for Medical Informatics (EFMI) and the Turkish Medical Informatics Association (TurkMIA); 2014.

Robertson HL, Rosenfeld T, **Georgiou A**, Johnson J, Travaglia J, Nicholas N. Virtual, augmented or real? Ageing research in an era of spatial technologies [Abstract]. XVIII ISA World Congress of Sociology; Visual Methods in Ageing Research: *Methodological Issues*; 13-19 July; Yokohama, Japan. International Sociological Association (ISA); 2014.

Scott PJ, Brown AW, Friedman CP, Wyatt CP, **Georgiou A**, Eisenstein EL. Improving the science of health informatics by using validated instruments and outcome measures [Abstract & Workshop]. *Medical Informatics Europe 2014*; 31 August-3 September; Istanbul, Turkey. European Federation for Medical Informatics (EFMI) and the Turkish Medical Informatics Association (TurkMIA); 2014.

St Clair B, Greenfield D, **Georgiou A**. Dental field and the promotion of quality and safety and evaluation of practice [Abstract & Poster]. *31st International Safety and Quality Conference: Quality and safety along the health and social care continuum*; 5-8 October; Rio de Janeiro, Brazil. International Society for Quality in Health Care (ISQua); 2014.

2013

Baysari MT, Oliver K, **Westbrook JI**, Day RO. Integrating policy into electronic systems: The identification of challenges following an 'audit and feedback' trial [Abstract]. *2nd Annual NHMRC Research Translation Faculty Symposium*; 2-3 October; Sydney, Australia. 2013.

Bennett A, **Lehnbom E**, Clark R, Davidson P, Brien J, McLachlan A. Medication support services (MSS) in Australian outreach cardiovascular programs [Abstract & Poster]. *The 61st Annual Scientific Meeting of the Cardiac Society of Australia and New Zealand*; 8-11 August; Gold Coast, Australia. 2013.

Georgiou A, Lang S, **Toouli G**, Timmins W, Robertson L, Gibson K, **Westbrook JI**. Health information technology and work practice innovation in hospital pathology services. *Cerner Regional User Group and Leadership Forum*; 22-24 May; Sydney, Australia. 2013.

Greenfield D, Donnison A, Pike S, Bolger-Harris H, Hinchcliff R, Pawsey M, **Westbrook JI** et al. Revising accreditation standards for general practice: an analysis of the resources consumed, expertise required and outcomes produced [Abstract & Poster]. *ISQua's 30th International Conference: Quality and Safety in Population Health and Health care*; 13-16 October; Edinburgh, Scotland. 2013.

Hemsley B, Balandin S, **Georgiou A**, Hill S. A qualitative metasynthesis of patient safety, patient communication, and health information exchange for patients with communication disabilities in hospital. *Australasian Cochrane Symposium 2013*; 20-21 November; Melbourne, Australia. Australasian Cochrane Centre; 2013.

Li L, **Westbrook JI**. Do nurses' patterns of work change following the implementation of an electronic medication management system? [Abstract & Presentation]. *Nursing Informatics Australia Conference*; 15 July; Adelaide, Australia. 2013.

Robertson H. Dementia in Africa: A spatial approach to chronic disease modelling [Abstract & Presentation]. *International Istanbul Initiative on Ageing, International Federation on Ageing (IFA)*; 4-6 October; Istanbul, Turkey. 2013.

Robertson H, Nicholas N, Rosenfeld T, **Georgiou A**, Johnson J, Travaglia J. The virtual aged care system: System integration in an age of big data [Abstract & Poster]. *8th Health Services and Policy Research Conference (HSRAANZ)*; 2-4 December; Wellington, New Zealand. 2013.

Robertson H, Nicholas N, Rosenfeld T, **Georgiou A**, Johnson J, Travaglia J. Spatial literacy for the health sciences: Capacity building for the 21st Century [Abstract & Presentation]. *8th Health Services and Policy Research Conference, HSRAANZ*; 2-4 December; Wellington, New Zealand. 2013.

Robertson H, Nicholas N, Travaglia J, **Georgiou A**, Johnson J. Vulnerability and change in the global south: A spatially informed approach [Abstract & Presentation]. *People and the Planet 2013: Transforming the Future*; 6 September; Melbourne, Australia. 2013.

Robertson H, Nicholas N, Travaglia J, **Georgiou A**, Johnson J. A global model of dementia prevalence: A virtual earth approach [Abstract & Presentation]. *International Istanbul Initiative on Ageing, International Federation on Ageing (IFA)*; 4-6 October; Istanbul, Turkey. 2013.

Robertson H, Nicholas N, Travaglia J, **Georgiou A**, Johnson J, Rosenfeld T. Zones of Vulnerability II: A virtual spatial model for ageing policy analysis [Abstract & Presentation]. *Australian Social Policy Conference*; 16-18 September; University of New South Wales. 2013.

Westbrook JI, **Li L**. Changes in medication administration errors following the implementation of electronic medication management systems in hospitals [Abstract & Presentation]. *ISQua's 30th International Conference: Quality and Safety in Population Health and Health care*; 13-16 October; Edinburgh, Scotland. 2013.

Invited presentations

2014

Baysari MT. Evaluation of eMMS: Demonstrating effectiveness and improving system design [Invited Presentation]. *Medication Safety: Shaping Systems & Measuring Success Against the National Standards*; 12-13 February; Sydney, Australia. 2014.

Baysari MT. Optimising decision support within electronic medication management systems - An ongoing challenge [Invited Presentation]. *3rd Annual Electronic Medication Management Conference*; 25-26 March; Sydney, Australia. 2014.

Georgiou A. Laboratory services and e-Health - the research evidence [Invited Presentation]. *South Eastern Area Laboratory Services research workshop*; 14 April; Sydney, Australia. 2014.

Georgiou A. Health information technology. "Translation, Transformation and Technology" [Invited Presentation]. *AIHI Research Symposium*; 15 May; University of New South Wales, Sydney Australian Institute of Health Innovation; 2014.

Georgiou A. Improving Health Information and Data Management – the Evidence of e-Health's impact [Invited Presentation]. *15th Annual Health Congress*; 24-25 March; Sydney, Australia. 2014.

Georgiou A. The safety implications of missed test results for hospital patients and what is being done about it [Invited Presentation]. *St Vincent Hospital, Clinical Pharmacology & Toxicology, Therapeutics*

Centre Weekly Seminar, 28 March Sydney, Australia. 2014.

Greenfield D, Hogden A, Debono D, Mumford V, Pawsey M, **Westbrook J**, Braithwaite J. Tell us what you really think - how accredited organisations view accreditation and how it impacts on quality [Invited Presentation]. *The Quantum Leap - Health Innovation: Making Quality Count AHHA / ACHS Conference*; 8-10 September; Sydney, Australia. Australian Health care and Hospitals Association and the Australian Council on Health care Standards; 2014.

2013

Callen J, Georgiou A. Missed test results: Can technology assist the process of test result follow-up? *Clinical Excellence Commission - Diagnostic Test Management Showcase*; 11 September; Sydney, Australia. 2013.

Georgiou A. Critical test results: Test result follow-up and the clinical impact on patients and staff [Keynote Presentation]. *How Effective Communications Improve Clinical Outcomes? Health Care Seminar*; 19 April; Sydney, Australia. 2013.

Georgiou A. The impact of the EMR on the efficiency and effectiveness of pathology test services – what is the evidence? [Invited Presentation]. *4th Annual National Pathology Forum*; 14-15 October; Sydney, Australia. 2013.

Greenfield D, Hinchcliff R, Clark S, Dyer K, Mumford V, Hogden A, **Westbrook JI** et al. Truths, myths and questions: the ACCREDIT project investigating if health service accreditation makes a difference to quality in general practice. *The International Health Care Conference*; 25-28 September; Sydney, Australia. 2013.

Greenfield D, Hinchcliff R, Hogden A, Mumford V, Pawsey M, **Westbrook J**, et al. Accreditation workshop: Consumer participation in accreditation programs. *30th International Safety and Quality Conference:*

Quality and safety in population health and health care, International Society for Quality in Health Care; 13-16 October; Edinburgh, Scotland. 2013.

Vecellio E, Georgiou A, Toouli G, Eigenstetter A, Li L, Wilson R, Westbrook JI. A benchmark audit of the types of frequency of pathology errors in Central Specimen Reception. *Australian Association of Clinical Biochemists NSW/ACT Branch Meeting*; 21 May; Sydney, Australia. 2013.

Westbrook JI. The effectiveness of electronic medication management systems and their impact on the work of doctors and nurses [Keynote presentation]. *2nd Annual Electronic Medication Management Conference*; 25-26 March; Melbourne, Australia. 2013.

Westbrook JI. The Benefits and Pitfalls of eMMS. *39th Society for Hospital Pharmacists Conference*; 19-22 September; Cairns, Australia. 2013.

Westbrook JI. Measuring how e-Health is transforming health care delivery and safety [Keynote Address]. *30th Health Information Management Association Conference*; 21-23 October; Adelaide, Australia. 2013.

Westbrook JI. Clinical decision support in an era of electronic medical records. *HARC Forum*; 13 November; Sydney, Australia. 2013.

Grants and Finance



Grants 2013-2014

2012-2016	\$914,043	2009-2013	\$8,400,000
CIs: Westbrook JI, Georgiou A		CIs: Braithwaite J, Westbrook JI, Coiera E, Runciman W, Day R	
Title: Development of an evaluation model for assessing the effectiveness of ICT to integrate services and improve service performance and the experience of clients		Title: Patient safety: enabling and supporting change for a safer and more effective health system	
ARC Linkage LP120200814 Uniting Care Ageing		NHMRC Program Grant 568612	
2011-2013	\$512,051	2009-2013	\$1,580,000
CIs: Westbrook JI, Dunsmuir WT, Duffield CM		CIs: Braithwaite J, Westbrook JI	
Title: Advancing understanding of health professionals' work and communication patterns and the effectiveness of work reform initiatives		Title: Evaluating communities of practice and social-professional networks: the development, design, testing, refinement, simulation and application of an evaluation framework	
ARC Discovery DP110100090		ARC Discovery DP0986493	
2012-2014	\$260,000	2013	\$7,300
CIs: Callen J, Georgiou A, Runciman W		CI: Baysari M	
Title: Can technology make communication in complex systems safer and more efficient? Evaluation of an electronic test management system in health care		Title: The impact of portable tablets on doctors' use of information technology on ward-rounds	
ARC Discovery DP120100297		Curran Foundation Annual grant	
2010-2015	\$2,350,000	2013-2014	\$60,000
CIs: Braithwaite J, Westbrook JI		CI: Westbrook JI	
Title: Strengthening organisational performance through accreditation research: the ACCREDIT project		Title: Centre for Research Excellence bid support	
ARC Linkage LP100200586		UNSW Research Strategy Office	
Aged Care and Standards Accreditation Agency, Australian Commission on Safety and Quality in Health Care, Australian Council on Healthcare Standards, Australian General Practice Accreditation Limited, The Clinical Excellence Commission		2014	\$153,759
		CIs: Georgiou A, Li L, Mackay M, Westbrook JI	
		Title: A benchmark study of the frequency and variability of haemolysis reporting across pathology laboratories – the implications for quality use of pathology and safe and effective patient care	
		RCPA Quality Assurance Programs Pty Limited/ DoHA Subcontract	

2014-2016	\$396,853	2014	\$30,000
Cls: Hemsley B, Balandin S, Georgiou A , Hill S		Cls: Baysari M, Li L , Day R, Richardson K	
Title: Personally Controlled Electronic Health Records for young adults with communication disabilities: charting the course for successful child to adult health service transition		Title: Exploiting new opportunities with an electronic prescribing system to identify prescribers at risk of making prescribing errors	
NHMRC Project Grant APP1058094		St Vincent's Clinic Foundation Research Grant	
2014	\$40,000	2014-2018	\$10,900,000
CI: Westbrook JI		Cls: Braithwaite J, Westbrook JI , Coiera E, Runciman W, Day R, Hillman K	
Title: A cluster randomised controlled trial to measure the effectiveness of an intervention bundle to reduce interruptions to nurses and medication administration errors		Title: Creating safe, effective systems of care: the translational challenge	
UNSW Goldstar Award		NHMRC Program APP1054146	
2014-2015	\$300,657	2013-2014	\$95,752
Cls: Georgiou A, Westbrook JI		Cls: Georgiou A, Westbrook JI, Li L	
Title: Video Consultation Capability Project - After Hours GP Helpline & the Pregnancy, Birth and Baby Helpline Research Engagement		Title: Examination of variation in hospital pathology investigations by Diagnosis-Related Groups and associations with outcomes and costs	
Healthdirect Contract research		Department of Health and Ageing Quality Use of Pathology Program	
2014	\$52,795	2013-2015	\$341,111
Cls: Westbrook JI, Georgiou A		Cls: Hemsley B, Georgiou A , Hill S	
Title: Assessment of the impact of four innovative technologies on the effectiveness and efficiency of the hospital workforce		Title: Keeping people with communication disabilities safe in hospital Department of Health and Ageing	
Mater Misericordiae Health Services Brisbane Ltd Contract research		NHMRC Project Grant APP1042635	

Financials

Centre for Health Systems and Safety Research - CHSSR Statement of Financial Performance for the Period Ending 31 December 2013

	2013 \$	2012 \$
Funds		
Research Revenue ¹	\$706,415	\$1,268,494
Faculty Funds		\$20,868
UNSW Operating Funds	\$575,379	\$610,186
Sundry Other Revenue ¹	\$872,025	\$146,231
Total Funds	\$2,153,819	\$2,045,778
Costs		
People Costs	\$936,783	\$1,329,611
Scholarship Stipends	\$25,575	\$28,782
Contract & Consulting Services	\$24,857	\$37,477
Consumables	\$13,521	\$15,769
Travel	\$61,867	\$41,430
Equipment	\$22,868	\$3,290
Other Expenses	\$5,182	\$7,875
Contract Research Overheads	\$21,695	\$23,665
Internal Expenses	\$854,681	\$2,953
Total Costs	\$1,967,030	\$1,490,852
Operating result	\$186,789	\$554,926
Operating Balance	\$997,595	\$442,669
Closing Balance	\$1,184,384	\$997,595

Notes to the Statement of Financial Performance

1. Debtors

Unpaid invoices	\$52,253	
Movement in outstanding invoices		\$291,406

