



Centre For Health Informatics 2013

& NHMRC Centre of Research Excellence in Informatics and e-Health (CRE)

Never Stand Still

Medicine

Centre For Health Informatics

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What we do



The Centre for Health Informatics (CHI) is Australia's oldest and largest academic research group in e-health and informatics. **CHI conducts fundamental and applied research in the design, evaluation and application of information and communication technologies for healthcare and the biosciences.** Building a sustainable health system for the 21st Century will require the reinvention of much of the present day system and require the intelligent use of these technologies to deliver high quality, safe, efficient and affordable healthcare.

The Centre's work is internationally recognised for its ground-breaking contributions in a number of areas including clinical communication, the impact of information technology (IT) on patient safety, evidence-based decision support technologies for consumers, clinicians and translational bioinformatics.

A research centre of the University of New South Wales and part of the Australian Institute of Health Innovation, CHI is supported by the UNSW Medicine and we have partnered with major healthcare providers, research institutions and government.

CHI aims to drive change in healthcare and biomedicine by making contributions to:

Science

Break-through discoveries in information, communication, cognitive and organisational science needed to support health service innovation at a systems level.

Policy

Providing expert input and leadership into government, shaping policy priorities and goals.

Innovation

Invention of novel technologies and methods that can be transferred into industry and health services.

Education

Training future researchers through research degree programs to educate clinicians, technologists and policy makers in health informatics.

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Director's Report

BY PROF ENRICO COIERA

Founded in 1999, the Centre for Health Informatics is now in its 15th year.

In 1999, Google was only 1 year old. The dot com bubble still had another year to run. No one had ever seen an iPhone or Facebook and Twitter were unimaginable. The idea that one could have an online encyclopaedia like Wikipedia created through an open collaborative process would have been seen as fantasy. Only Amazon.com had been around for any length of time, founded presciently in 1994.

In 1999, health informatics was little understood as a discipline and little recognized as a term. Researchers in informatics still focused almost exclusively on technology, and the idea that informatics was a socio-technical rather than technical discipline was an extreme view. Health services research was focussed more on the economics of care, than the invention and transformation of models of care.

Looking back from 2014, I think we can be proud of the influence that the research from the Centre for Health Informatics has had in shaping the direction of our academic discipline internationally – a discipline that is increasingly becoming front of stage as we grapple with the major challenges facing health services.

In 2003 we published the first major paper on the safety risks of IT in the now famous “unintended consequences” paper that appeared in JAMIA. CHI researchers have been responsible for the first comprehensive and international study of IT incident reports, and created what is probably the international defacto standard for measuring and categorizing IT related events – used by agencies in the US and in Europe. We have not been shy in advocating for strong governance for IT safety, and are proud that we were influential in triggering the formation of a governance group within the Commission for Safety and Quality – although much more needs to be done to minimize the risks of IT related errors harming patients.



Prof Enrico Coiera, Director

Our pioneering work on clinical communication raised the importance of communication risks in healthcare delivery – emphasising the problems that can arise from interruption and multitasking. These informatics issues quickly mainstreamed and managing interruptions and cognitive load through multitasking are now a core issue for patient safety.

Looking back from 2014, I think we can be proud of the influence that the research from the Centre for Health Informatics has had in shaping the direction of our academic discipline internationally – a discipline that is increasingly becoming front of stage as we grapple with the major challenges facing health services.

Director's Report

We have made strong contributions to the development of consumer informatics, with our early work about social influence on consumer decisions and on improving Internet search interfaces for consumers seeking information. The Healthy.me platform at creation was a highly innovative design aimed at meeting the needs of consumers as they looked after themselves. It exists only because we were very fortunate to be supported by the HCF Foundation in undertaking this exploratory system design – something not possible through more traditional grant funding. We think our first major randomised trial, which showed significant improvements for vaccination rates, was the first study to demonstrate the benefit of this class of technology. UNSW licenced the technology to a new start-up company – myhealthjourney – which launched in 2013.

Within the pages of this report you will see that the research we do continues to innovate, and explore the frontiers of the discipline. Through the NHMRC Centre for Research Excellence in E-health we continue our work on IT safety and consumer informatics. We have a strong and established health analytics team that are exploring the measurement of social networks to track evidence uptake, and are engaged in a major new challenge – the automation of the process of systematic review.

If there is one lesson from the last 15 years, it is that things change and sometimes change quickly. Our view is that it is better to be a change maker than have change thrust upon you.



From left to right: Denise Tsiros, Dr Blanca Gallego Luxan, A/Prof Farah Magrabi, Dr Adam Dunn, Prof Enrico Coiera, Dr Filippo Galgani, Dr Ying Wang, Dr Oscar Perez Concha, Dr Xujuan Zhou, Angus Liu, Jackie Mullins, Dr Guy Tsafnat, Dr Miew Keen Choong, Dr Arael Arguel, Agam Misra.

Key Performance Indicators

Workshops

In 2013, the Centre for Health Informatics and NHMRC Centre for Research Excellence in e-Health hosted two workshops.

DYNAMIC MODELLING; WHAT, WHY & HOW?

Hosted by Dr Geoff McDonnell, the Dynamic Modelling Workshop was held in Sydney in February 2013. Guest presenters were Prof Nathaniel Osgood, a leader in multi-method health care modelling from the University of Saskatchewan in Canada, and Dr Andrei Borshchev, the CEO and developer of AnyLogic from Russia. The workshop was well attended with more than forty participants from across Australia, Europe and North America.

The first part was devoted to discussing the current status and potential of hybrid system dynamics, agent-based and process-centric discrete event models. The second part was devoted to hands-on training in using AnyLogic software working with examples from health care, infectious diseases and technology modelling. Guest presenters included Dr Rosemarie Sadsad (hospital infection control), Terry Flynn (choice modelling), David Keith from MIT (hybrid electric car adoption), Jim Rogers from the Mayo Clinic (treatment of anaemia) and Mark Heffernan from Dynamic Operations (project management).

A rerun of the workshop was held in Melbourne in 2014.

MAKING E-HEALTH SAFE

A/Prof Farah Magrabi convened and chaired this national workshop at UNSW in July 2013 to highlight the urgent need to address the safety of e-health in Australia. It was well received and greatly discussed by the fifty-three attendees, from various health jurisdictions, consumer groups and other stakeholders. Some of the organizations represented were the Australian Commission on Safety and Quality in Health Care, the National e-health Transition Authority, the Royal Australian College of Physicians, the Royal Australian College of General Practitioners and the Medical Software Industry Association of Australia.

The keynote address, *The Dangerous Decade*, was presented by Prof Enrico Coiera. A highlight of the workshop was the review of national strategies presented by the Commission on Safety and Quality in Health Care. Other sessions included a review of the latest international data on the risks that e-health poses to patient safety and examined governance models for e-health safety. There were two panel discussions. The first showcased stories from the frontline, including contributions from the e-health Transition Authority, St. Vincent's Hospital Sydney, Barwon Health, and the UNSW Centre for Health Systems Safety Research. The second discussed future directions in the improvement of safety governance of e-health in Australia.

Key Performance Indicators

Publications

In 2013, our research generated 39 publications, which included 25 peer-reviewed journal articles, 3 book chapters, 8 conference and abstracts peer reviewed publications, 3 conference papers, peer reviewed and 23 invited/keynote speakers and/or presentations, which included Dr Filippo Galgani who was chosen to represent UNSW in the Universitas21 ECR conference in Mexico City December 2013. A well-deserved selection!

Three papers appeared in the prestigious British Medical Journal, and several papers attracted significant media attention, including our paper explaining the origin of the 'weekend' effect, which was the cover story in the journal BMJ Quality and Safety, and attracted a favourable editorial.

PRESENTATIONS

2013 CHI's research staff were invited and performed over 23 keynote presentations: including

- › **Coiera E.** Social networks, social media, social diseases [Keynote Plenary]. *Second Annual Symposium on Long Term conditions*, 16 April, London, 2013.
- › **Coiera E.** Can technology save us? [Plenary]. *International Forum on Quality and Safety in Health Care*, 17 April, London, 2013.
- › **Coiera E.** Stasis and adaptation [Keynote Address]. *Context Sensitive Health Informatics*, 17-18 August, Copenhagen, Denmark, 2013.
- › **Coiera E.** A little E-health heresy [Plenary]. *ANZCA 2013 Annual Scientific Meeting*, 4 May, Melbourne, Australia, 2013.
- › **Coiera E.** Can social networks and social media change healthcare? [Keynote Address]. *International Conference of Emergency Nursing*, 12 October, Melbourne, Australia, 2013.
- › **Coiera E.** Stasis and adaption in health organisations. *NSW Agency for Clinical Innovation [ACI] Research Think Tank*, 28 October, Sydney, Australia, 2013.
- › **Concha O:** Mortality patterns across patient groups following weekend admissions: Reduced quality of care or different patient mix Carlos III University, Madrid, Spain: 12 September 2013
- › **Dunn AG**, Tsafnat G, Coiera E. Preventing harmful translations: an informatics approach to clinical evidence surveillance [Abstract & Presentation]. NHMRC Research Translation Faculty Symposium, 2-3 October, Sydney, 2013.
- › **Gallego B.** BI, Performance Measurement & Data Quality: how do we ask the right questions? [Invited speaker]. Healthy e Nation Summit CHIK, 2 December, Melbourne, 2013.
- › **Galgani F.** Innovative Technologies: From Research to Impact on Society [represented UNSW Australia] in the Universitas21 ECR conference. 2-3 December, Mexico City, 2013.
- › **Galgani F**, Dunn AG, Williamson M, Giles M, Tsafnat G. Understanding patient experiences from mining primary care data [Abstract]. Big Data 2013 [HISA], 18-19 April, Melbourne, Australia, 2013.
- › **Gallego B, Magrabi F, Perez-Concha O, Wang Y, Coiera E.** Insights into patterns of healthcare delivery from hospital Electronic Medical Records [Abstract]. Big Data 2013 [HISA], 18-19 April, Melbourne, 2013.
- › **Magrabi F.** IT-related adverse events reported to the US Food and Drug Administration [invited]. *WHO, Reporting and Learning Systems workgroup*, 29 April, international webinar, 2013.
- › **Magrabi F.** Review of e-health incident management. *The Clinical Governance Advisory Group for the Personally Controlled Electronic Health Record [PCEHR]*, 14 June, Sydney, 2013.
- › **Magrabi F.** Patient safety risks associated with e-health. *NHMRC Centre of Research Excellence in Patient Safety: the PCEHR: heralding a new era in patient care seminar*, 28 June, Melbourne, 2013.

- › **Magrabi F.** The TechWatch Study: monitoring e-health incidents in general practice. *RACGP National Standing Committee – Information Technology in Clinical Practice*, 26 July, Melbourne, 2013.
- › **Magrabi F.** What could go wrong? Building safety into health IT implementations[Workshop]. *Health Informatics Society of Australia*, 15-18 July, Adelaide, 2013.
- › **Magrabi F.** Problems with IT in healthcare: examining their nature and methods for early detection of risks to patient safety. National University of Singapore, 12 September, Singapore, 2013.
- › **Ong MS,** Umetsu DT, Mandl KD. Antibiotic use is associated with childhood asthma. Paediatric Academic Annual Meeting, 4 – 7 May, Washington DC, 2013.
- › **Tsafnat G.** Decision Support Systems for Evidence Based Medicine [invited keynote]. Developing Mobile Health using Web Resources, 14-15 June, Beijing, 2013.
- › **Tsafnat G.** LexiVar: Abstraction of Short Text Fields from Primary Care Electronic Medical Records, [invited Seminar]. Computer Science Department, Ben Gurion University of the Negev, 4 October, Israel, 2013.
- › **Tsafnat G.** Evidence Based Medicine Informatics, [invited Seminar]. Department of Information Systems Engineering, Ben Gurion University of the Negev, 10 December, Israel, 2013.

Media

In 2013 CHI researchers again featured heavily in the press and media including:

PRESS

Casualty death rates higher on weekends, *Sydney Morning Herald*

Hospital patients admitted on weekends have 15pc higher death rate, UNSW study shows *ABC News*

NSW patients more likely to die on weekend *AAP, SBS News, Herald Sun, News.com, NineMSN, Yahoo7* 26/10/13

Harnessing the power of social networks, *Australian Doctor*, 4/6/13

Skillful analysis of big data adds to the bottom line *Financial Review* 19/2/13

The future of health *Medical Observer* 26 March 2013

Dunn AG: Why Science doesn't belong to everyone [yet]! *Crikey*, 11 February 2013

Dunn AG: 'the power of no'! *Guardian's Higher Education Network* on "the power of no" 5 April 2013

RADIO AND TELEVISION

Interview: Prof Coiera. Health Report on ABC Radio National 26 August 2013

The use of social media in healthcare

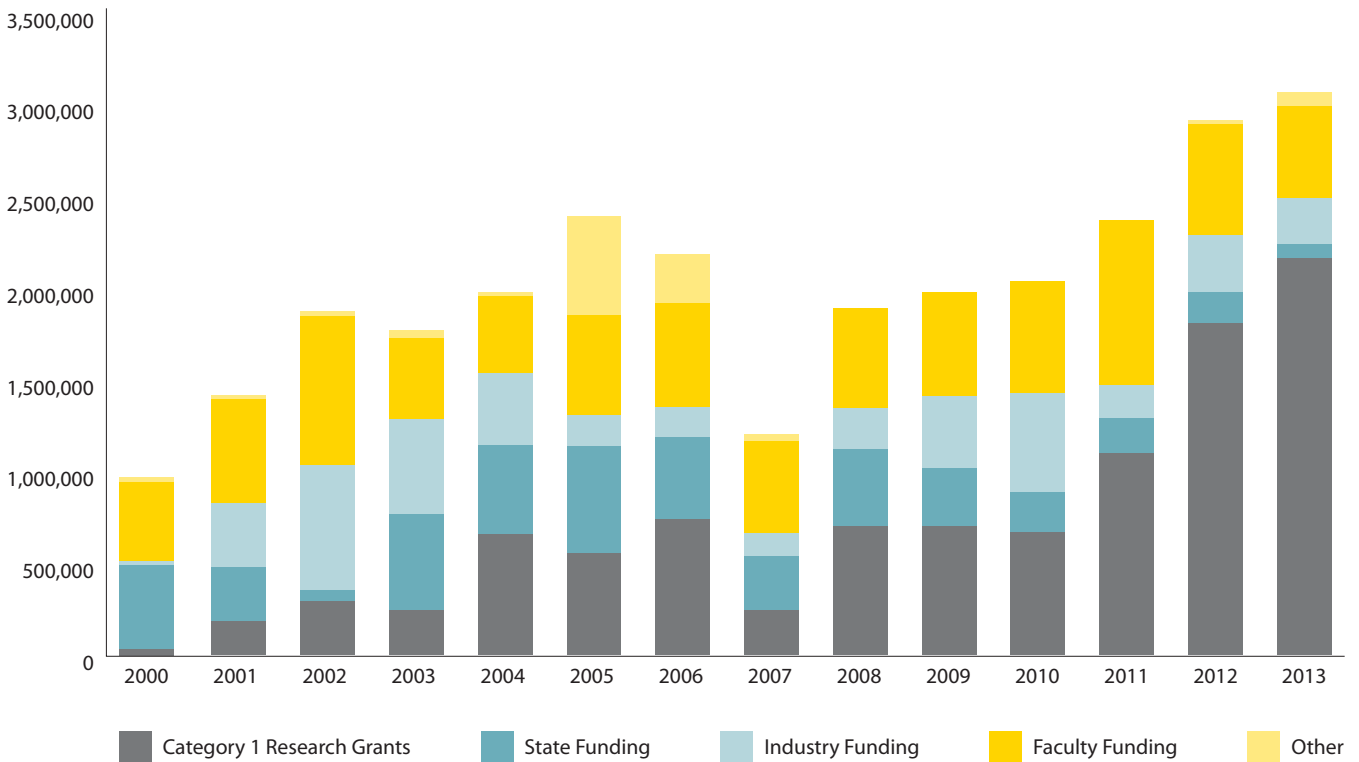
Interviews: Prof Coiera. ABC News radio and ABC radio AM 26 October 2013

Health warning for weekend hospital treatment – Commentary on our 'weekend effect' paper in *BMJ Quality and Safety* (<http://www.abc.net.au/am/content/2013/s3877620.htm>)

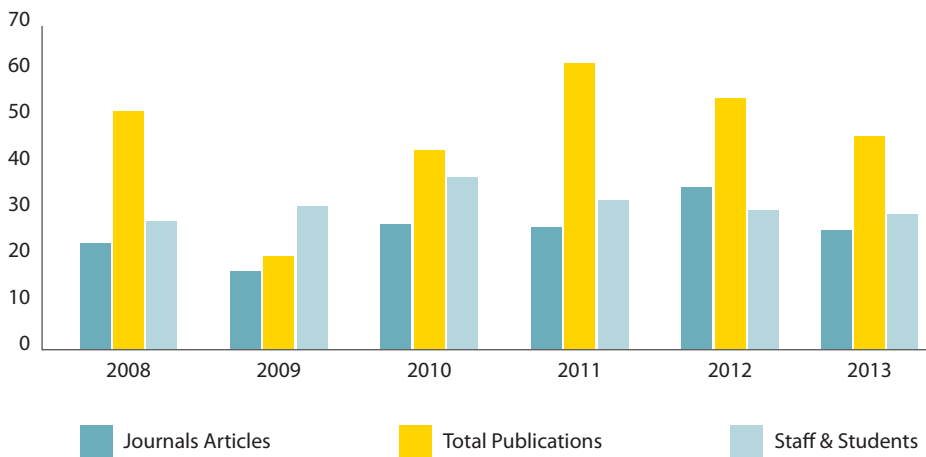
Interviews: Prof Coiera Channel 9 TV news, Prime7 TV News, Radio 2GB, Radio 2SM 26 October 2013
 Commentary on our 'weekend effect' paper

Key Performance Indicators

2000-2013 FUNDING BY GRANTING BODY & FUNDING SOURCE



PUBLICATION OUTPUT AND STAFF STUDENT HEAD COUNT 2008-2013



RESEARCH FUNDERS

We are grateful to our partners and funders for their ongoing support of our research programs, CHI's research is supported by the following organisations and we are also grateful to the UNSW Australia Medicine for their ongoing support.

- › National Health and Medical Research Council (NHMRC)
- › NSW Ministry of Health

Collaborators

THE CENTRE'S NATIONAL AND INTERNATIONAL COLLABORATORS INCLUDE:

National

Australian Commission on Safety and Quality in Health Care

Australian Patient Safety Foundation, South Australia

Black Dog Institute, UNSW Australia

Centre for Clinical Governance Research in Health, UNSW Australia

Centre for Infectious Diseases and Microbiology, Westmead Hospital, NSW

Centre for Health Systems and Safety Research, UNSW Australia

Centre for Research on Evidence Based Evidence, Bond University, Queensland

Clinical Excellence Commission, NSW

Flinders University, South Australia

The George Institute, Sydney

The Kirby Institute, UNSW Australia

Prince of Wales Hospital, Sydney

Royal Hospital for Women, Sydney

St Vincent's Hospital, Sydney

School of Computer Science and Engineering, UNSW Australia

Simpson Centre for the Health Services Research, UNSW Australia

South Australia Health

South Western Sydney Local Health Network, Cancer Services Sydney South West Area Health Service General Practice Unit

University of Adelaide, SA

University of Melbourne, VIC

University of Sydney, Sydney

University of Technology, Sydney (UTS)

University of Western Sydney, NSW

UNSW Counselling and Psychological Services, UNSW Australia

UNSW Health Service Clinical Research Unit for Anxiety and Depression (CRUfAD), UNSW

Westmead Hospital, Sydney

Spokade Pty Ltd

Clinical Research Centre, University of Sydney

International

Aalborg University, Denmark

Harvard Medical School, USA

Indraprastha Institute of Information Technology (IIIT), Delhi, India

Johns Hopkins University, USA

University of Applied Sciences Weihenstephan-Triesdorf, Bavaria

University of Tromso, Norway

Ben Gurion University of the Negev, Israel

Nottingham University, UK

Enhance Reviews Ltd, UK

Research Programs

Patient Safety Informatics

TEAM LEADER: A/PROF FARAH MAGRABI

The risks which e-health poses to patient safety are widely acknowledged but largely unexplored. Our program monitors e-health safety using reports of critical incidents and is developing automated methods for surveillance of IT systems. We are also investigating models for the safety governance of e-health.

INCIDENT MONITORING AND CLASSIFICATION

The systematic analysis of patient safety incidents is well-established in medical practice. Incidents can trigger root-cause analyses in health services, or provide early warnings of unexpected drug reactions or infectious outbreaks. Our research extends these methods to incidents associated with e-health (e.g. patient harm due to a software error or difficulty in using software), and we have pioneered this approach to develop methods internationally. The goal of this work is to:

- › detect IT-related incidents
- › develop a robust classification for these IT incidents
- › use our classifications to track the evolving causes of IT-related harm in Australia
- › promulgate the classification internationally

We are currently working with state health departments in New South Wales and South Australia, and we plan to extend our work to the other states and territories to track IT incidents in hospitals nationwide. For general practice, we have developed and completed a 12-month trial of a new incident-monitoring system called TechWatch in partnership with Flinders University. Incidents can be reported to TechWatch either online or over the phone to trained operators.

Since 2009 we have analysed 1,385 IT incidents in Australia, the United States and the United Kingdom. The resulting classification system has become the de facto international standard to detect and classify e-health incidents. By mid-2014 our classification had been used to examine 4,166 incidents, including by governments in the US, UK and the Netherlands.

AUTOMATED IDENTIFICATION OF INCIDENT REPORTS

Ten percent of admissions to Australian acute-care hospitals are associated with harm to patients (adverse events). The reporting of incidents (near misses and adverse events) by health professionals is now well established and the rate of reporting continues to increase. Current methods, which rely on retrospective manual review of incident reports, do not permit timely detection of safety problems and can no longer keep up with this growing volume of data. In New South Wales alone, more than 120,000 patient-safety incidents are reported annually. As part of an NHMRC Project we are evaluating automated text classification methods to capture incident reports by type and risk rating in partnership with the Australian Patient Safety Foundation. Our goal is to track ten types of patient safety problems nationally in collaboration with St Vincent's Hospital, Sydney, the NSW Clinical Excellence Commission and South Australia Health.

AUTOMATED SURVEILLANCE OF IT SYSTEMS

Currently, most safety problems are detected when health professionals report incidents. Since they are not expert in technology, many software problems either go undetected, or are detected only after an adverse event. Moreover, clinical IT systems are made up of multiple disparate components which interact to produce new emergent behaviours that only become evident after they are deployed in the real world. Based on syndromic surveillance methods used for the early



detection of disease outbreaks, our research monitors IT systems in real time to detect early any software or user generated errors in clinical information that might lead to an adverse event. Our goal is to develop a surveillance framework for the early detection of e-health-related adverse events to minimise risks to patient safety. Specifically, the research aims to develop:

- › fault-detection methodologies to facilitate automated detection of e-health-related adverse events in real time
- › intelligent predictive models to forecast potential future e-health-related adverse events

E-HEALTH SAFETY GOVERNANCE

Historically e-health or clinical software systems have not been subject to regulation – unlike software embedded in medical devices (an ECG system, for example). Moreover, little evidence is available that would shape regulations and governance strategies for e-health. The goals of this part of our research are to investigate models for the governance of e-health. Most recently we were engaged by the Australian Commission on Safety and Quality in Health Care

(ACSQHC) to review processes for managing IT-related patient safety incidents. We examined 18 national level programs, as well as specific centres of excellence in Australia, England, the USA, Canada, Denmark, Singapore and Hong Kong. The goals of this review were to identify specific best practice strategies for consideration by the ACSQHC Executive and the Clinical Governance Advisory Group for the Personally Controlled Electronic Health Record.

We led and participated in panel presentations and tutorials at the *World Congress for Medical Informatics* in Copenhagen and the *Annual Symposium of the American Medical Informatics Association* in Washington DC. Our staff also contributed to teaching the *American Medical Informatics Association's* professional development course on patient safety

- › We gave invited presentations to patient safety agencies, professional bodies and at the national health informatics conference.

Consumer Informatics

TEAM LEADER: DR ANNIE LAU

Focusing on those with the highest stake in our healthcare system, our research program investigates the impact, design, and science of e-health on consumers, patients and their carers. Using our innovative e-health research platform Healthy.me, we continue to provide rigorous empirical evidence of how our health is affected by information communication technologies (ICT), and how can these be best utilised to improve our overall health.

Healthy.me is a personal health management system developed by the Centre for Health Informatics, UNSW Australia. In 2013, Healthy.me was commercialised by UNSW Australia and NSi and has been launched into the marketplace through a new start-up venture company.

Over the past 5 years, Healthy.me has been trialled across 6 clinical settings and has demonstrated significant efficacy and user acceptance. More than 2000 consumers were recruited to use the web-based version ranging from 8 weeks to 12 months, across six different trials. These trials examined conditions including asthma, breast cancer, mental wellbeing, influenza vaccination, sexual health and in-vitro fertilisation (IVF). Recruited consumers participated in either a randomised controlled trial, a prospective cohort study, or a usability study. They were encouraged to manage their chronic condition, uptake preventative health actions, or improve their health understanding and literacy. Improved health outcomes were found across most of the trials, with important user acceptance insights across other settings:

Consumer informatics focuses on those with the highest stake in our healthcare system – citizens, patients and their carers.

- › Influenza vaccination: Vaccination rates more than doubled among a sample of 700 participants. (control: 4.9% vs. Healthy.me: 11.6%) (P=.008).
- › Sexual health: The number of people being tested for STI's more than doubled in a sample of 300 young adults. (control: 7.6% vs. Healthy.me: 15.3%) (P=.017)
- › Mental wellbeing: established online community for 1985 participants at UNSW Australia with healthcare professionals for their wellbeing concerns
- › Breast cancer: supported 50 survivors of early stage breast cancer post-treatment.
- › IVF: supported 14 women over 8 weeks to complete their IVF cycle.
- › Asthma: A trial with 300 asthma sufferers is currently underway.



Healthy.me is evolving and continually under development. The newest development is the addition of a mobile version of Healthy.me, which is now available for the iOS and Android platforms. New social networking features will also be added, offering consumers a socially-enabled personal health management system in both the mobile and web-based platforms. Trials examining the efficacy of this mobile app and new social networking features are currently underway. We have made the platform available on a research only basis to our research partners.

In collaboration with the International Medical Informatics Association (IMIA), literature reviews examining the role of social media and self-tracking applications on patients and consumers were published in the annual IMIA Yearbook. In particular, we selected YouTube, whose safety and quality aspects for patients and consumers were examined in collaboration with researchers from Norway and Spain. An empirical study examining the content of videos on YouTube related to varicose veins was also conducted.

In 2013-2014, our medical student Nathan Mortimer was awarded First Class Honours for his study in STI testing using Healthy.me. Our Masters student Ruth Kaplan has been awarded a \$200K grant from South Eastern Sydney Local Health District to develop a mobile app for women diagnosed with gestational diabetes mellitus. Marleen Biederer, a former visiting student from Germany, has returned to spend six months with us, designing new social networking features for the mobile version of Healthy.me.

Having developed our mobile app, our plans for 2014-2015 include testing the feasibility of using social network interventions to help those who are overweight or obese to achieve a healthy body mass index. Studies providing rigorous empirical evidence on how e-health, mobile applications, social media and social network interventions affect our health decisions, behaviours and outcomes will be conducted throughout the year.



Healthcare Analytics

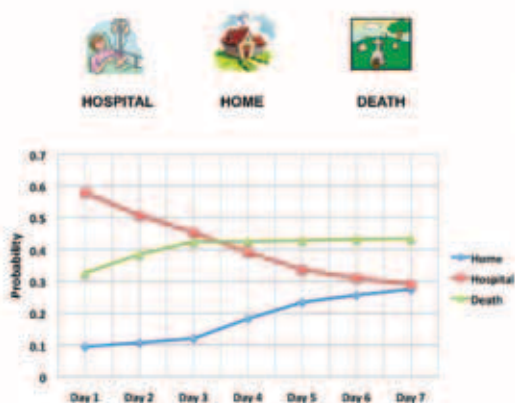
TEAM LEADER: DR BLANCA GALLEGO LUXAN

Healthcare systems are under increasing pressure to improve the appropriateness and efficacy of current patterns of care. The rapid growth in Electronic Health Record data, together with our ability to store, share, query, analyse and visualise such complex data, has generated an unprecedented source of information. Appropriate use of this information has the potential to improve healthcare delivery by making it safer and more cost-effective.

Our research focuses on the use of patient records as predictors of healthcare delivery quality and patient outcomes. We model patient trajectories contained in temporal health data to analyse patterns of healthcare delivery at a population level, as well as to answer specific questions about individual patients.

TEMPORAL PATTERNS OF PATIENT SAFETY IN HOSPITAL

When patients go to hospital, they expect to receive high levels of safe and effective care at all times. However, it is well known that a hospital stay is sometimes associated with harm. Analyses of routinely collected clinical and administrative data have revealed the existence of temporal patterns related to hospital workflow, for example, we know that risk of death is associated with weekend admission, known as the 'weekend effect'. In this research project, we are using administrative datasets and electronic patient records to identify which groups of patients are at higher risk of harm.

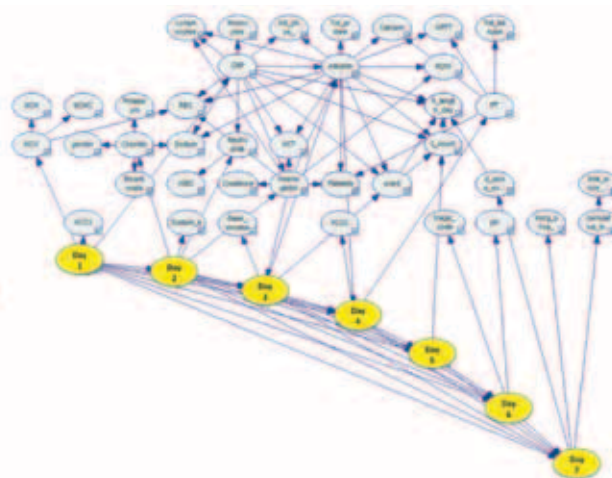


DYNAMIC PREDICTION OF HOSPITAL LENGTH OF STAY, RE-ADMISSION AND DEATH

We are developing a predictive method that calculates days expected to be in hospital, days expected to live and days expected until next hospitalisation, in real time during a hospital admission. For each patient admitted to hospital, our model delivers an initial baseline prediction (and corresponding uncertainty) at the time of admission, followed by a series of updated predictions as new information becomes available, up to a final prediction of post-discharge mortality and readmission at discharge. See below figure.

QUERYING ELECTRONIC HEALTH RECORDS TO SUPPORT CLINICAL DECISION MAKING

Querying electronic health records at the point-of-care for information on treatment choices and outcomes from past patients can help in the tailoring of medical treatment to the individual characteristics of each patient. These virtual cohorts are more likely to represent realistic populations with comorbidities than those assembled for clinical trials. If the limitations of observational analysis are acknowledged they may serve as an important adjunct tool in clinical decision-making. We are working on new methods to support real-time decision-making at the point-of-care, to understand when these methods may provide valid results, and to validate and integrate these findings with those from clinical trials.



For each hospitalised patient, this network calculates real-time predictions of days expected to be in hospital, days expected until next hospitalisation and days expected to live.

Decision Support & Translational Bioinformatics

TEAM LEADER: DR GUY TSAFNAT

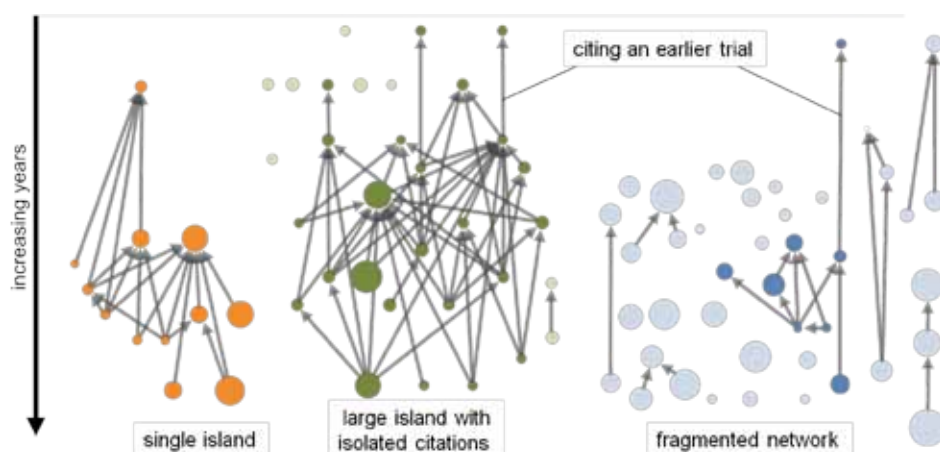
Our program aims to help scientists and clinicians make better and timelier decisions. We are developing algorithms to automate some of the decision tasks typically performed by scientists and clinicians on a daily basis. Our long term goal is to develop a toolkit that can help automate a significant part of the process of systematic review, enhancing the rate at which evidence is created and updated.

In collaboration with the Centre for Research on Evidence Based Practice at Bond University and Johns Hopkins University we have studied citation networks of clinical trial literature. Results from this study will serve as the foundation for an innovative approach to finding research literature without using keyword-based searches. The latter is a method which often produces too many erroneous results to be useful. This constitutes the first step towards automating the retrieval and synthesis of research evidence.

We have established a relationship with Therapeutic Guidelines Australia (TGA), the premier producer of clinical practice guidelines who will be one of the first evidence-support systems EBM organisations to trial our retrieval and automation technologies. TGA will share data with CHI and help us test a range of technologies for automation and the support of evidence review.

The year has also seen the completion of a project funded by the National Prescribing Service which resulted in a novel tool to extract information from de-identified electronic medical records in primary care. Such records only include short text fields which are non-standard, often typed in haste and lack the contextual narrative which would normally be used by computers to extract meaning. The project developed the natural language processing tool LexiVar to group events in the data after correcting for typing mistakes, expanding acronyms and identifying synonyms. LexiVar enhances the internal consistency of large primary care datasets with millions of consultation, prescription and test orders and enables population-level analysis of such events.

Mr Agam Misra has been awarded a Master of Philosophy degree from UNSW for his work on linking biomedical concepts with human genes to find novel associations between genes and diseases. Gene-disease association studies are at the core of biomedical research into human genetic diseases such as cancer, Alzheimer's disease, and diabetes. Agam was supervised by Dr Guy Tsafnat and Dr Miew Keen Choong.



Three archetypes of citation networks found in the evidence literature: one where all clinical trials cite each other directly or indirectly (left) make up 54% of the trials, networks where most of the trials cite each other, but not all (centre) and rare networks with only very few trials cite each other (right) which make up only 4% of the literature.

Clinical Evidence Surveillance

TEAM LEADER: DR ADAM DUNN

The production and translation of clinical evidence are profoundly affected by a set of systematic biases, from study conception through to evidence uptake. The priority-setting mechanisms that decide which studies need to be performed globally are not aligned with the burden of disease. Biases and delays in publication, reporting, and citation also shape the way trial data are translated into recommendations. In the past, the biases in evidence have led to slow recognition of 'evidence reversals' where practices that are believed to be safe and effective are eventually revealed as harmful or of little value.

The aims of our research are to develop and evaluate a new platform for data-driven surveillance geared towards identifying risky evidence bases earlier, enhancing the transparency of clinical evidence and improving its flow into practice. In 2013, we were invited to write an editorial for the *Journal of Epidemiology and Community Health* describing this new area of research, which we call clinical evidence surveillance.

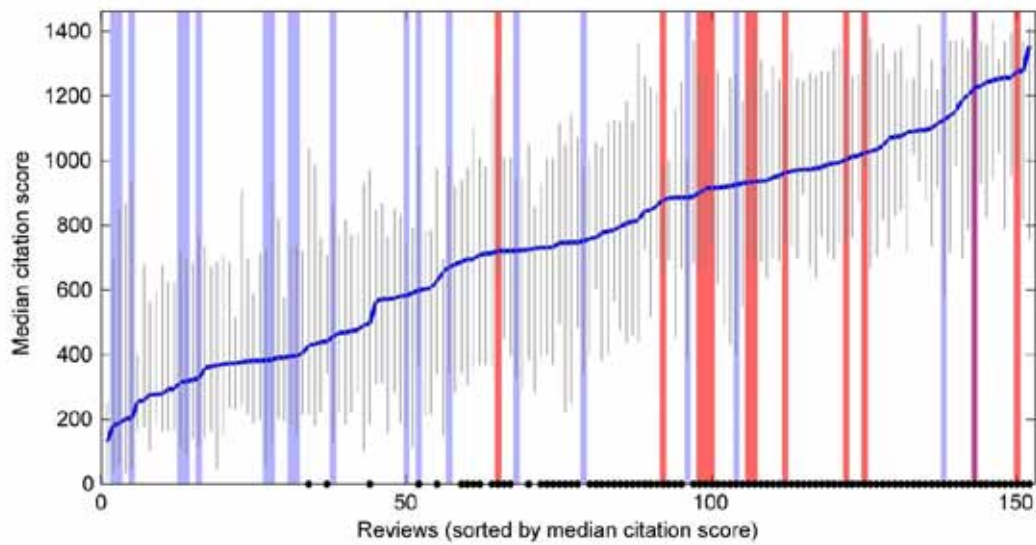
Using data mining and network science methods applied to the ClinicalTrials.gov register of clinical trials, we developed a new way of examining the differential contributions of industry and non-industry research agendas to the current and future production of clinical evidence for antihyperlipidemics (*Clinical Pharmacology & Therapeutics*) and for neuropsychiatric conditions in children (*PLOS ONE*).

By visualising and measuring the networks comprising the designs of past and continuing trials, we were able to ascertain how industry and non-industry research agendas contributed to the lack of comparative effectiveness research in these areas.

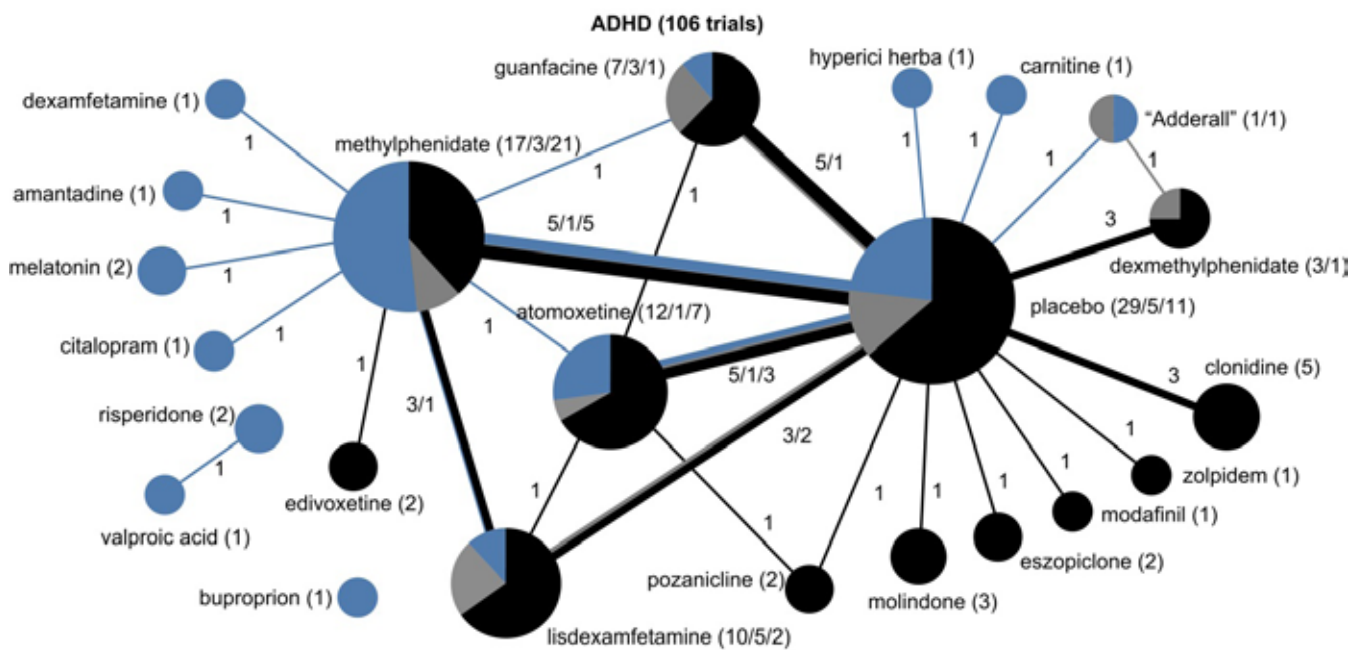
The aims of our research are to develop and evaluate a new platform for data-driven surveillance geared towards identifying risky evidence bases earlier, enhancing the transparency of clinical evidence and improving its flow of into practice.

Through the support of an NHMRC Project (2013-2014, \$214,181), we began work on new forms of evidence surveillance that examine how collaboration and citation practices sometimes introduce biases and undermine the quality of clinical evidence in reports of trials, systematic reviews, and guidelines. Before starting this project, we had already demonstrated the citation advantage of industry authors by using an analysis of co-authorship networks which employed data from PubMed (*Journal of Clinical Epidemiology*). Starting in 2013, we started a set of projects examining how the conclusions of primary articles and reviews might be associated with the structure of citation networks (also in the *Journal of Clinical Epidemiology*), co-authorship networks, and financial conflicts of interest.

The methods we developed in 2013 are now being used to examine the biases introduced into the systematic reviews on neuraminidase inhibitors, and we have started looking at publication and co-authorship information on a much broader scale, aiming to capture signals that could automatically identify the risk of a faulty evidence base, and predict the threat of an evidence reversal.



Systematic and narrative reviews about neuraminidase inhibitors, ranked by the reliance on citations used predominantly in favourable reviews. Systematic reviews are in blue, and reviews with industry authors are in red, demonstrating how citation practices differ across the groups.



A network of clinical trial designs representing the ways industry and non-industry groups design trials differently when examining the role of drugs in treating ADHD in children.

Financials

CHI Financials are reported in two tables. Table 1 reports revenue from external research as well as UNSW contributions. Table 2 reports additional research revenue representing CHI's portion of our shared NHMRC Program Grant.

Table 1 – Centre for Health Informatics

STATEMENT OF FINANCIAL PERFORMANCE 2013

	2013	2012	Notes
	\$	\$	
Funds			
Research Revenue	1,130,819	793,595	1
Contribution from DVCR (Deputy Vice Cancellor of Research)	83,203	64,266	2
UNSW Operating Funds	439,583	532,249	3,4
Sundry Other Revenue	140,398	288,046	
Total Funds	1,794,003	1,678,156	
Costs			
People Costs	1,183,984	1,117,331	
Scholarship Stipends	14,284	0	5
Contract & Consulting Services	45,972	102,656	
Repairs and Maintenance	727	0	
Consumables	23,144	25,052	
Travel	55,729	61,234	
Equipment	9,786	21,296	
Other Expenses	15,171	4,674	
Internal Expense	59,743	38,686	
Total Costs	1,408,541	1,370,929	
Operating Result	385,462	307,227	
Opening Balance	454,675	147,449	
Closing Balance	840,138	454,675	

Notes to the Statement of Financial Performance

1. Research Revenue includes NHMRC CRE revenue
2. DVCR funds: EB gap support for 3 x NHMRC projects and 1 NHMRC Fellowship
3. UNSW Aus operating 2012 includes salary support for one academic and one general administration
4. UNSW Aus operating 2013 includes salary support for one academic
5. CRE 1 x PhD candidate

Table 2 – Australian Institute of Health Innovation funds

STATEMENT OF FINANCIAL PERFORMANCE 2013

	2013	2012	Notes
	\$	\$	
Funds			
Research Revenue	1,053,722	1,196,310	1
Total Funds	1,053,722	1,196,310	
Costs			
People Costs	1,006,908	1,148,785	2
Scholarship Stipends	23,131	38,073	3
Consumables	9,218		
Travel	6,622		
Equipment	7,843	9,452	
Total Costs	1,053,722	1,196,310	
Operating Result	0	0	
Opening Balance			
Closing Balance			

Notes to the Statement of Financial Performance

1. Research Revenue 2012 & 2013 includes, NHMRC Patient Safety Program and NSW Dept of Health grants
2. People costs include 3 x Senior Research Fellows 2012 & 2.5 Senior Research Fellows in 2013, 3 x Research Fellows, 3 x Postdocs and 1 x s/ware engineer in 2012&13
3. Stipends for 1.5 PhD candidates in 2012 & 1 x PhD candidate in 2013

Management Committee

COMMITTEE ROLE

The management committee's role is to monitor the financial performance of the centre and ensure that the business objectives of the centre are pursued. The committee meets at least three times a year and meetings are minuted and distributed appropriately.

MANAGEMENT COMMITTEE

Prof Denis Wakefield (Chair)
Associate Dean of Research, Faculty of Medicine,
UNSW

Prof Gavin Andrews
Director, Clinical Research Unit for Anxiety and
Depression (CRUfAD), St Vincent's Hospital UNSW

Prof Nigel Lovell
Scientia Prof Graduate School of Biomedical
Engineering, UNSW

A/Prof Maurice Pagnucco
Head of School, Computer Science and Engineering,
UNSW

COMMITTEE MEETINGS IN 2013

28 March 2013
11 July 2013
14 November 2013

Future Australasian Researchers

The PhD (Doctor of Philosophy) program at the Centre for Health Informatics brings together an internationally recognised pool of experts and academics to support candidates. The candidates themselves come from a diverse background, with either clinical or technology training. The program places a strong emphasis on academic and professional development, with training in advanced methods and mentoring this future generation of researchers. Past doctoral candidates have moved on to senior roles in academia, health services and the corporate world. Many have established fruitful research careers in health informatics both locally and internationally.

Doctoral candidates work with two experienced supervisors, and have support from our technical and administrative staff, as well as the opportunity for rich interaction with all the research staff at the Centre. We encourage candidates to participate in the life and work of the four different Centres within AIHI. Candidates are invited to attend regular staff research seminars at which research staff and visiting scholars present their work. Our fortnightly 'Research Clinics' provide a supportive and informal environment in which candidates are invited to present their research findings and benefit from team-based brainstorming sessions to aid with research bottlenecks.

PHD CANDIDATES (ENROLLED 2013)



Tom Bowden

MBA, Dip BIA

PhD Title:

What is the role and benefit of accessing Primary Care and Pharmacy Patient Records during Unscheduled Care?

Research Supervisors:

Prof Enrico Coiera, Prof Jim Warren, Prof Dennis Protti

Tom's goal is to learn more about the benefits of accessing a patient's medical record. In particular, we are trying to understand how important/relevant existing medical records are, in the event when a patient needs unexpected medical treatment. Tom has set up and currently runs a company that provides electronic communications to more than 11,000 medical organisations across New Zealand, Australia and Canada.



Janine McIlwraith

B Med Rad Sci (R/T), LLB (Hons), LLM (Syd), GDLP

PhD Title:

Regulating Health Information Technology to Enhance Patient Safety.

Research Supervisors:

Prof Enrico Coiera, A/Prof Farah Magrabi

Janine's thesis explores the current regulatory framework for HIT in Australia and identifies gaps in the system that may contribute to adverse events. It then moves on to look at available data as to the point in the software lifecycle at which adverse events most frequently occur, the severity of the resultant harm. Drawing on international experience in the health arena and the experience in other safety critical industries Janine's thesis aims to develop a viable regulatory framework for HIT in Australia in an effort to ensure that the benefits of HIT are harnessed without compromising patient outcomes. Janine is a lawyer in private practice and has worked almost exclusively in the health and medical law since 2001. Janine has co-authored three prominent health law texts: Health Care & the Law (4th, 5th & 6th editions), Australian Medical Liability and The National Disability Insurance Scheme Handbook. Janine already is an established journal writer and presents at conferences within health law. Before commencing her law career Janine worked as a radiation therapist in Australia and abroad. Janine is passionate about patient safety and open transparency with adverse events to investigation and reporting.

In 2013, CHI had 8 new or continuing students working directly with researchers in the centre to advance health informatics. Our students come from diverse disciplinary backgrounds that include computer science, medicine, mathematics, law, business, and engineering.



Diana Arachi
 MPH (UNSW), MA (Lund),
 BBA Hons (York), WHO
 Cert (WHO), Change Mgt
 (SAC), PMP (PMP Aust)

PhD Title:
*Measuring social network
 influence: an analysis of
 relative rank and network
 alteration to better health
 outcomes.*

Research Supervisors:

Prof Enrico Coiera, A/Prof Farah Magrabi

Diana's research focuses on social network driven health outcome change and looks in particular at the efficacy of relative rank and decision by sampling. The role of networks is further investigated to understand the feasibility and efficacy of manipulating perceived health risks and benefits via network alteration and relative comparison. Diana has worked across several international organisations in Europe and North America and has been engaged in project management and research-oriented jobs since 2000. Diana attained prior qualifications in Public Health, Epidemiology, Development Economics, Project Management, International Business and Energy Efficiency across six countries including Austria, Canada, Hong Kong, Sweden, Malaysia and Australia. Prior to commencing work and doctoral research in Australia, Diana's former professional chapters included work with the United Nations, the Organisation for Petroleum Exporting Countries and the Austrian Chamber of Commerce.



David Lyell
 MBA, BA (Sociology
 and Psychology)

PhD Title:
*Investigation of the Risks
 of Automation Bias in
 Electronic Prescribing.*

Research Supervisors:
**Prof Enrico Coiera, A/Prof
 Farah Magrabi**

Automation Bias is the risk that decision support becomes a heuristic shortcut in place of vigilant information seeking and processing. To date the majority of research into Automation Bias comes from

the Aviation field. Taking a different perspective, David's doctoral research investigates the risks of automation bias within the healthcare domain, including how these may be addressed. He is particularly concerned with the medical errors that may ensue when decision support fails or is less than 100% accurate. David holds a BA and MBA from Deakin University and his research interests include the Human-Automation Interaction and application of System Dynamics and System Simulation methodologies to health system problems.



Werner van Huffel
 BSc (Math, Comp Sci)
 UNSW, MHIM (HI) USyD

MPhil Title:
*Characterising CIO and
 CMO assessments of IT
 value in hospitals, and the
 impact of value dissonance
 on project success:
 Cultural Dissonance.*

Research Supervisor:
Prof Enrico Coiera

Information communications technology (ICT) has been present within the healthcare system since the 1960's. Over that period ICT implementation into a healthcare setting has been ongoing, yet the industry has only had a few projects which can be regarded as successful by most clinical users. The research being undertaken is to investigate various possibilities that has caused this low success rate. Werner's research investigates the cultural differences between the IT and clinical parties, as represented by the characteristics of CIO and CMO leaders respectively.

Werner has a background in Mathematics and Computing Science and a Masters Degree in Health Information Management - Health Informatics. He has been working in the field of Healthcare ICT for over 20 years. Over this time he has had various roles, starting out as a developer of clinical information systems software and training general practitioners in the use of ICT, managing the healthcare ICT business for a large multinational corporation and selling into healthcare environments, through to providing architectural consulting into large scale public health systems in Australia, Singapore and Korea. His current research focus is to understand the metrics which would permit the highest level of clinical use of ICT systems in healthcare implementations.

Future Australasian Researchers

MASTER BY RESEARCH (ENROLLED S1 2014)

Our 2014 newly created Masters of Science by Research has proven to be extremely popular with CHI, and offers an ideal platform from which candidates can embark into further doctoral studies in health informatics. CHI currently has two candidates enrolled with further intakes in the coming semester.



Ruth Kaplan
RM DE IBCLC

Masters Title:
A customised mobile application to enhance self-management, education and support for women with gestational diabetes mellitus: feasibility and acceptability for patients, clinicians and the clinical environment.

Research Supervisors:

Dr Annie Lau, Prof Leo Leader

Ruth is undergoing masters by research designing a customised mobile application to enhance self-management, education and support for women with gestational diabetes mellitus at the Royal Hospital for Women. The 'proof of concept' study will result in a product ready for clinical roll-out and further evaluation.

Ruth is passionate about the potential of mHealth to alleviate some of the constraints faced by patients, clinicians and health systems in an environment of escalating chronic disease. Ruth advocates an agile user-centred design approach inclusive of all stakeholders in an effort to bridge the design-reality gap, maximise existing resources and promote the principles of participatory medicine. Ruth is also exploring ways to optimise timely uptake of medical apps through rapid evaluation methodologies. Ruth is enrolled in the School of Women and Children UNSW Australia and is a midwife, diabetes educator and lactation consultant working in high-risk pregnancy care. Ruth holds a Bachelor of Midwifery (Distinction) and a Graduate Certificate in Diabetes Education and Management.



Sasa Popovic

**B.Sc. (Engineering),
Gr.Cert. (Programming)**

Masters Title:
Optimisation of Clinical Data Capture programming, development, validation and management.

Research Supervisors:
Dr Adam Dunn, Dr Guy Tsafnat, Prof Enrico Coiera

Cost of undertaking clinical trials is significant. Industry data show that a significant proportion of time and resources are spent on developing clinical data capture systems. These systems implicitly influence entire data management process and as such are significant part of bringing new formulations to the market. This research will model the data management development processes, and identify new ways to improve the efficiency in the development of the clinical trial data management. Sasa holds a B.Sc. (Engineering) degree from Indiana University, Purdue University at Indianapolis. His career includes eighteen years of developing efficient ways to create the clinical data capture systems for clinical trials.

ILP CANDIDATE



Nathan Mortimer

(Medical Honours ILP student 2013)

Masters Title:
Investigating the application of eHealth interventions for improving the sexual health of young people.

Research Supervisor:
Dr Annie Lau

Nathan is currently undertaking his 5th year of study as an undergraduate Medicine student at UNSW. In 2013, he undertook a research project at the Centre as part of an Honours research year. Nathan's research investigates if a web-based personally-controlled health management system (PCHMS) can increase the uptake of STI screening among a university population.

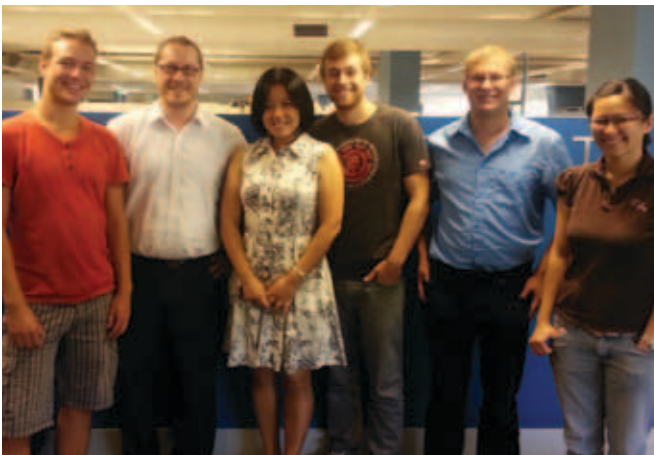
EXCHANGE CANDIDATES (VISITING 2013-2014)

CHI has hosted a 6-month exchange internship program with Universities in Germany and Denmark for over eight years. This year CHI's Academics have supervised exceptional candidates from the University of Applied Sciences Weihenstephan-Triesdorf, Germany.

Jeremias Trapp & Maximilian Norgell

**Research Supervisors:
Dr Guy Tsafnat, Dr Miew Keen Choong**

We are all familiar with the long list of results we receive from search engines such as Google. To examine all relevant clinical evidence in such a list is an arduous and time consuming task. Jeremias and Maximilian have examined alternative ways in which such results can be interrogated, classified, and visualised quickly and effectively. The result is an interactive development environment for classification rules that are applied in real time, called Dixel. Dixel is a part of the clinical decision support group's arsenal of tools for clinical evidence gathering and synthesis and is part of the group's strategy of evidence-based decision support.



from left to right: Jeremias Trapp, Dr Adam Dunn, Dr Xujuan (Susan) Zhou, Tobias Rimmele, Maximilian Norgell, Dr Miew Keen Choong

Tobias Rimmele

**Research Supervisor:
Dr Guy Tsafnat, Dr Adam Dunn, Dr Xujuan Zhou**

Tobias Rimmele is an exchange student, working on Vaccination Sentiment analysis through social media. He successfully developed models to classify the anti-HPV (Human papillomavirus) vaccine sentiment in linked websites on Twitter using supervised machine learning methods and the results from his experiments demonstrate that machine learning approach can be used to automatically classify sentiment in websites that discuss HPV vaccines.

Marleen Petra Biederer

**Research Supervisor:
Dr Annie Lau**

Marleen developed a mobile application for an existing research platform called healthy.me, the Centre-developed personal health management system. This year we developed new social features for healthy.me, as seen below examples of 'the team' and 'my goal'.

Marleen is in the process of completing her BSc. in Bioprocess informatics. Marleen research interests include mobile applications, computational design, bioinformatics, consumer informatics and e-Health.



Staff



Prof Enrico Coiera
Director



Dr Farah Magrabi
A/Prof



Denise Tsiros
Manager Finance &
Administration



Dr Blanca Gallego
Research Stream
Leader



Dr Guy Tsafnat
Research Stream
Leader



Dr Adam Dunn
Senior Research Fellow



Dr Annie Lau
Research Fellow



Dr Geoff McDonnell
Research Fellow



Dr Xiongcai (Peter) Chi
Research Fellow



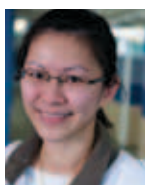
Dr Ying Wang
Research Fellow



Dr Amael Arguel
Research Fellow



Dr Kevin Chai
Postdoctoral
Research Fellow



Dr Miew Keen Choong
Postdoctoral
Research Fellow



Oscar Perez Concha
Postdoctoral
Research Fellow



Dr Xujuan (Susan) Zhou
Postdoctoral
Research Fellow



Dr Filippo Galgani
Postdoctoral
Research Fellow



Mei-Sing Ong
Postdoctoral
Research Fellow



Angus Liu
Research Assistant



Dr Tatjana Zrimec
Conjoint Academic



Dr Vitali Sintchenko
Conjoint Academic



Dr Frank Lin
Conjoint Academic



Jackie Mullins
Administrative &
Executive Assistant



Dr Habibollah Pirnejad
Visiting Fellow



Jingbo Liu
Programmer



Vitaliy Kim
Java/Jee Programmer



Agam Misra
Masters Student

2013 Teaching

Centre for Health Informatics' senior research staff participate in various teaching capacities.

DR ADAM DUNN

Dr Adam Dunn contributed as a guest lecture for the Evidence-Informed Decision Making on how biases are formed in the production and translation of clinical evidence.

- › Masters of Health Administration (PHCM2960)

DR GUY TSAFNAT

Dr Guy Tsafnat contributed lectures on Bioinformatics:

- › UNSW Australia, Computer Science and Engineering (2011-present)
- › Introduction to Bioinformatics (BINF1001)

A/PROF FARAH MAGRABI

A/Prof Farah Magrabi contributed lectures on Health Informatics and Patient Safety:

- › UNSW Australia, Graduate School of Biomedical Engineering (2010-present)
- › Clinical Information Systems (BIOM9450)
- › UNSWA Australia, School of Public Health and Community Medicine (2011-present)
- › Clinical Governance and Risk Management (PHCM9748)

Grants

PATIENT SAFETY: ENABLING AND SUPPORTING CHANGE FOR A SAFER AND MORE EFFECTIVE HEALTH SYSTEM

Funding Source: National Health & Medical Research Council (NHMRC)

Investigators: Prof Jeffrey Braithwaite, Prof Johanna Westbrook, Prof Enrico Coiera, Prof William Runciman, Prof Richard Day

Total Funds: \$8,400,000

CHI Funds:	2009	\$630,914
	2010	\$788,352
	2011	\$995,285
	2012	\$1,162,804
	2013	\$1,194,643

NEAR REAL-TIME IDENTIFICATION OF PATIENT SAFETY INCIDENTS REPORTED BY HEALTH PROFESSIONALS

Funding Source: NHMRC

Investigator: A/Prof Farah Magrabi
Prof William Runciman

CHI Funds:	2012	\$130,767
	2013	\$114,771
	2014	\$ 68,725

CENTRE FOR RESEARCH EXCELLENCE IN E-HEALTH

Funding Source: NHMRC

Investigators: Prof Enrico Coiera, Prof Paul Glasziou, Prof Siaw-Teng Liaw, A/ Prof Vitali Sintchenko, Prof William Runciman, Dr Farah Magrabi

Funds:	2012	\$493,380
	2013	\$553,425
	2014	\$553,425
	2015	\$466,337
	2016	\$433,303

CAPACITY BUILDING INFRASTRUCTURE GRANTS PROGRAM NO 2

Funding Source: NSW Health

CHI Funds:	2010	\$205,541
	2011	\$192,216
	2012	\$155,057
	2013	\$80,312

Funding Source: UNSW Career Advancement Fund

Investigator: Dr Miew Keen Choong

Funds: 2014 \$ 5,000

USING COLLABORATION NETWORKS TO MEASURE BIAS AND INEFFICIENCY IN THE PRODUCTION AND TRANSLATION OF EVIDENCE ABOUT CARDIOVASCULAR RISK

Funding Source: NHMRC

Investigator: Dr Adam Dunn

Funds: 2013 \$111,966

2014 \$102,216

REAL-TIME SURVEILLANCE FOR THE EARLY DETECTION OF E-HEALTH RELATED EVENTS

Funding source: NHMRC

Investigator: Dr Mei-Sing Ong

Funds: 2013 \$74,891

2014 \$74,891

2015 \$74,891

DYNAMIC PREDICTION OF HOSPITAL LENGTH OF STAY, READMISSION AND DEATH

Funding Source: NHMRC

Investigator: Dr Blanca Gallego Luxan

Prof Fernando Martin-Sanchez

Prof Ken Hillman

Funds: 2013 \$102,273

2014 \$119,434

2015 \$85,362

Publications

JOURNAL ARTICLES – PEER REVIEWED:

1. **Arguel A, Lau AYS**, Dennis S, Liaw ST, **Coiera E**. Protocol for a randomized controlled trial of an internet intervention to improve asthma management. *JMIR Research Protocols*. 2013; 2(2):e28.
2. **Biederer M, Arguel A, Liu J, Lau AYS**. From web-based to mobile: Experience of developing a personal health management system. *electronic Journal of Health Informatics* 2013; (Accepted 4 September).
3. **Bowden T, Coiera E**. Comparing New Zealand's 'Middle Out' health information technology strategy with other OECD nations. *International Journal of Medical Informatics*. 2013; 82(5):e87-e95.
4. **Chai KEK, Anthony S, Coiera E, Magrabi F**. Using statistical text classification to identify health information technology incidents. *Journal of American Medical Informatics Association*. 2013; 20(5):980-5.
5. **Coiera E**. Why E-health is so hard. *Medical Journal of Australia*. 2013; 198(4):178-9.
6. **Coiera E**. Social networks, social media, and social diseases [Analysis]. *BMJ*. 2013; 346:f3007.
7. **Coiera E**. Communication spaces. *Journal of American Medical Informatics Association*. 2013; (doi:10.1136/amiajnl-2012-001520).
8. **Coiera E**, Collins S, Kuziemsy C. A unified model of patient safety (or who froze my cheese?). *British Medical Journal*. 2013; 347:f7273.
9. **Dunn AG**, Bourgeois FT, **Coiera E**. Industry influence in evidence production. *Journal of Epidemiology and Community Health*. 2013; 67:537-8.
10. **Dunn AG**, Mandl KD, **Coiera E**, Bourgeois FT. The effects of industry sponsorship on comparator selection in trial registrations for neuropsychiatric conditions in children. *PLoS ONE*. 2013; 8(12):e84951.
11. Gabarron E, Fernandez-Luque L, Armayones M, **Lau AYS**. Identifying measures used for assessing quality of YouTube videos with patient health information: A review of current literature. *Interactive Journal of Medical Research*. 2013; 2(1):e6.
12. **Gallego B, Dunn AG, Coiera E**. The role of electronic medical records in comparative effectiveness research. *Journal of Comparative Effectiveness Research*. 2013; 2(6):529-32.
13. **Gallego B**, Runciman W, **Perez-Concha O**, Liaw S, Day RO, **Dunn AG**, et al. The management of severe hypertension in Australian general practice. *BMC Health Services Research*. 2013; 13(1):414.
14. Hannaford N, Mandel C, Crock C, Buckley K, **Magrabi F, Ong MS**, et al. Learning from incident reports in the Australian medical imaging setting: Handover and communication errors. *British Journal of Radiology*. 2013; 86(1022):20120336.
15. Kivuti-Bitok LW, **McDonnell G**, Pokhariyal GP, Roudsari AV. Self-reported use of internet by cervical cancer clients in two National Referral Hospitals in Kenya. *BMC Research Notes*. 2013; 5:559.
16. **Lau AYS, Dunn AG, Mortimer N**, Gallagher A, Proudfoot J, Andrews A, et al. Social and self-reflective use of a web-based personally controlled health management system. *Journal of Medical Internet Research*. 2013; 15(9):e211.
17. **Lau AYS**, Proudfoot J, Andrews A, Liaw ST, Crimmins J, **Arguel A**, et al. Which bundles of features in a web-based personally controlled health management system are associated with consumer help-seeking behaviours for physical and emotional wellbeing? *Journal of Medical Internet Research*. 2013; 15(5):e79.
18. **Magrabi F**, Aarts J, Nohr C, Baker M, Harrison S, Pelayo S, et al. A comparative review of safety initiatives for national health information technology. *International Journal of Medical Informatics*. 2013; 82(5):e139-48.

19. Majer J, **Dunn AG**, Orsini J-P. Computer Modelling as an Aid to Forest and Woodland Restoration. *Open Journal of Forestry*. 2014; 4(2):112-23.
20. Norberg MM, Rooke SE, Albertella L, Copeland J, Kavanagh DJ, **Lau AYS**. The first mHealth app for managing cannabis use: Gauging its potential helpfulness. *Journal of Addictive Behaviors, Therapy and Rehabilitation*. 2013; S1:001.
21. **Ong MS, Magrabi F, Coiera E**. Syndromic surveillance for health information system failures: A feasibility study. *Journal of the American Medical Informatics Association*. 2013; 20(3):506-12.
22. **Perez Concha O, Gallego B, Hillman K**, Delaney G, **Coiera E**. Do variations in hospital mortality patterns after weekend admission reflect reduced quality of care or different patient cohorts? A population-based study. *BMJ Quality & Safety*. 2013; (Published online first: 25 October).
23. Robinson K, **Dunn AG, Tsafnat G**, Glasziou P. Citation networks of trials: Feasibility of iterative bidirectional citation searching. *Journal of Clinical Epidemiology*. 2014; (accepted 27 November 2013).
24. **Sadsad R**, Sintchenko V, **McDonnell G**, Gilbert GL. Effectiveness of hospital-wide Methicillin-resistant Staphylococcus aureus (MRSA) infection control policies differs by ward specialty. *PLoS ONE*. 2013; Published on line 10 December 2013(Accepted October).
25. **Tsafnat G, Dunn AG**, Glasziou P, **Coiera E**. The automation of systematic reviews. *BMJ*. 2013; 346:f139.
2. **Ong MS, Coiera E**. *Handoff communication*. In: Agrawal A, editor. Patient safety: A case-based, comprehensive guide. New York, USA: Springer Science and Business Media; 2013.
3. Sturmberg JP, Churilov L, **McDonnell GD**. *Modelling*. In: Sturmberg JP, Martin CM, editors. Handbook of Systems and Complexity in Health. Germany: Springer; 2013. p. 81-112.

CONFERENCE ABSTRACTS – PEER REVIEWED – PUBLISHED:

1. **Dunn AG, Tsafnat G, Coiera E**. Preventing harmful translations: an informatics approach to clinical evidence surveillance [Abstract & Presentation]. *NHMRC Research Translation Faculty Symposium*; 2-3 October; Sydney, Australia. 2013.
2. **Forero R, Hillman K, Gallego B, McDonnell G, McCarthy S**, Murray M, et al. End-of-life status of patients who died in hospital in New South Wales, Australia: Implications for emergency care [Poster]. *13th European Congress of Psychology*; 9-12 July; Stockholm, Sweden. 2013.
3. **Galgani F, Dunn AG**, Williamson M, Giles M, **Tsafnat G**. Understanding patient experiences from mining primary care data [Abstract]. *Big Data 2013 (HISA)*; 18-19 April; Melbourne, Australia. 2013.
4. **Gallego B, Magrabi F, Perez-Concha O, Wang Y, Coiera E**. Insights into patterns of healthcare delivery from hospital Electronic Medical Records [Abstract]. *Big Data 2013 (HISA)*; 18-19 April; Melbourne, Australia. 2013.
5. Gillies MB, **Galgani F, Tsafnat G, Dunn AG**, Huang N, Williamson M. Feasibility of using Australian GP prescribing data for pharmacovigilance [Abstract]. *29th International Conference on Pharmacoepidemiology & Therapeutic Risk Management*; 25-28 August; Montreal, Canada. 2013.
1. **Coiera E, Ong MS**. *Systemwide communication*. In: Martin LR, DiMatteo MR, editors. The Oxford handbook of health communication, behaviour change, and treatment adherence. New York, USA: Oxford University Press; 2013.

BOOKS / BOOK CHAPTERS:

Publications

6. Kwok TMY, Singla A, Phang K, **Lau AYS**. YouTube as a source of patient information for varicose vein treatment options [Abstract]. *Annual Scientific Meeting of the Australian and New Zealand Society for Vascular Surgery*; 12-15 October; Hobart, Australia. 2013.
7. **Lau AYS**. How e-health affects the way consumers make decisions and manage their health – results from multiple empirical studies [Abstract]. *The Influenza Specialist Group (ISG) Annual Scientific Meeting*; 3 February; Melbourne, Australia. 2013.
5. **Coiera E**. Can social networks and social media change healthcare? [Keynote Address]. *International Conference of Emergency Nursing*; 12 October; Melbourne, Australia. 2013.
6. **Coiera E**. Stasis and adaption in health organisations [Keynote address]. *NSW Agency for Clinical Innovation (ACI) Research Think Tank*; 28 October; Sydney, Australia. 2013.
7. **Concha O**: Mortality patterns across patient groups following weekend admissions: Reduced quality of care or different patient mix **Carlos III University, Madrid, Spain: 12 September 2013**

CONFERENCE PAPERS – PUBLISHED:

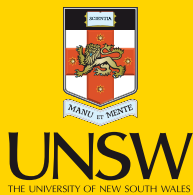
1. **Coiera E**. Stasis and adaptation. *Context Sensitive Health Informatics*; 17-18 August; Copenhagen, Denmark. 2013.
2. Fernandez-Luque L, **Lau AYS**, Bond CS, Denecke K, Martin Sanchez FJ. New trends in health social media: Hype or evidence-based medicine. *Medinfo 2013*; 20-23 August; Copenhagen, Denmark. IOS Press; 2013. p.1240.
3. **Lau AYS**, **Dunn AG**, Mortimer N, Proudfoot J, Andrews A, Liaw ST, et al. Consumers' online social network topologies and health behaviours. *Medinfo 2013*; 20-23 August; Copenhagen, Denmark. *Studies in Health Technology and Informatics*; 2013. p.77.
8. **Dunn AG**, Tsafnat G, Coiera E. Preventing harmful translations: an informatics approach to clinical evidence surveillance [Abstract & Presentation]. *NHMRC Research Translation Faculty Symposium*, 2-3 October, Sydney, 2013
9. **Galgani F**. Innovative Technologies: From Research to Impact on Society' [represented UNSW Australia] in the Universitas21 ECR conference. 2-3 December, Mexico City, 2013
10. **Galgani F**, **Dunn AG**, Williamson M, Giles M, Tsafnat G. Understanding patient experiences from mining primary care data [Abstract]. *Big Data 2013 [HISA]*, 18-19 April, Melbourne, Australia, 2013.

INVITED PRESENTATIONS / KEYNOTE ADDRESS / PLENARY SESSION:

1. **Coiera E**. Social networks, social media, social diseases [Keynote Plenary]. *Second Annual Symposium on Long Term conditions*; 16 April; London, UK. 2013.
2. **Coiera E**. Can technology save us? [Plenary]. *International Forum on Quality and Safety in Health Care*; 17 April; London, UK. 2013.
3. **Coiera E**. Stasis and adaptation [Keynote Address]. *Context Sensitive Health Informatics*; 17-18 August; Copenhagen, Denmark. 2013.
4. **Coiera E**. A little e-health heresy [Plenary]. *ANZCA 2013 Annual Scientific Meeting*; 4 May; Melbourne, Australia. 2013.
11. **Gallego B**. BI, Performance Measurement & Data Quality: How do we ask the right questions? [invited speaker]. *Healthy e Nation Summit CHIK*; 2 December; Melbourne, Australia. 2013.
12. **Gallego B**. BI, Performance Measurement & Data Quality: how do we ask the right questions? [invited speaker]. *Healthy e Nation Summit CHIK*, 2 December, Melbourne, 2013.
13. **Magrabi F**. IT-related adverse events reported to the US Food and Drug Administration [invited speaker]. *WHO, Reporting and Learning Systems workgroup*; 29 April; (international webinar). 2013.
14. **Magrabi F**. Review of e-health incident management [invited speaker]. *Clinical Governance Advisory Group for the Personally Controlled Electronic Health Record [PCEHR]*; 14 June; Sydney, Australia. 2013.

15. **Magrabi F.** Patient safety risks associated with e-health [invited speaker]. *Centre of Research Excellence in Patient Safety: the PCEHR: heralding a new era in patient care seminar*; 28 June; Melbourne, Australia. National Health & Medical Research Council (NHMRC); 2013.
16. **Magrabi F.** The TechWatch Study: monitoring e-health incidents in general practice. *RACGP National Standing Committee - Information Technology in Clinical Practice*; 26 July; Melbourne, Australia. Royal Australian College of General Practitioners; 2013.
17. **Magrabi F.** What could go wrong? Building safety into health IT implementations [invited speaker]. *Health Informatics Society of Australia [workshop]*; 15-18 July; Adelaide, Australia. 2013.
18. **Magrabi F.** Problems with IT in healthcare: Examining their nature and methods for early detection of risks to patient safety [invited speaker]. *National University of Singapore*; 12 September; Singapore. 2013.
19. **Ong MS, Umetsu DT, Mandl KD.** Antibiotic use is associated with childhood asthma. Paediatric Academic Annual Meeting, 4-7 May, Washington DC, 2013.
20. **Tsafnat G.** Decision support systems for evidence based medicine [Keynote Presentation]. *Developing Mobile Health using Web Resources*; 14-15 June; Beijing, China. 2013.
21. **Tsafnat G.** LexiVar: Abstraction of short text fields from primary care Electronic Medical Records [Invited Seminar]. *Ben Gurion University of the Negev, Computer Science Department*; 4 October; Israel. 2013.
22. **Tsafnat G.** Evidence Based Medicine Informatics [Invited Seminar]. *Ben Gurion University of the Negev, Department of Information Systems Engineering*; 10 December; Israel. 2013.





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