

Program

Annual Collaborators' Meeting

 #45andUp16

6 September 2016 | Powerhouse Museum | Haymarket



Meeting objectives

- To provide a comprehensive update on the 45 and Up Study
- To promote and share high quality research findings using 45 and Up Study data
- To provide researchers, partners and other interested parties with an opportunity to meet and exchange ideas.

Study materials & publications

- With permission, presentation material and papers from the event will be made available on our website:

www.saxinstitute.org.au

- **Please note:** photos taken at the meeting may be used for promotional purposes.

Acknowledgements



The 45 and Up Study is managed by the Sax Institute in collaboration with major partner Cancer Council NSW; and partners: The National Heart Foundation of Australia (NSW Division); NSW Ministry of Health; NSW Government Family & Community Services – Carers, Ageing and Disability Inclusion; and the Australian Red Cross Blood Service.

We thank the many thousands of people participating in the 45 and Up Study.

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Launched in 2012, the Secure Unified Research Environment (SURE) is Australia's only remote-access data research laboratory for analysing routinely collected data.

Live demonstrations of the SURE facility will be available, along with the Medical Genome Reference Bank (MGRB) Portal and a geocoding demonstration including spatial datasets.

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Annual 45 and Up Study Collaborators' Meeting 2016: Data, evidence and decision making for a better future

PROGRAM

9:00am	REGISTRATION		
Plenary 1			
9:30am	Welcome Professor Sally Redman , CEO, Sax Institute		
9:35am	Welcome to Country Uncle Ray Davison , Gadigal Elder		
9:45am	Official opening The Hon. Jillian Skinner MP , NSW Minister for Health		
9:55am	Study update Professor Emily Banks , Scientific Director, 45 and Up Study, Sax Institute		
10:05am	Keynote address Dr Diane Watson (Health performance reporting expert and former CEO, National Health Performance Authority) – What makes evidence and data useful for policy and action?		
10:45am	MORNING TEA		
11:05am	Plenary presentations:		
11:05	Mr Paul Grogan (Public Policy and Knowledge Management, Cancer Council Australia) – Using evidence to drive health policy reform		
11:45	Mr Darren Mayne (Illawarra Shoalhaven Local Health District) – The contribution of area-level walkability to geographic variation in physical activity: a spatial analysis		
12:00	Associate Professor Marcel Dinger (Garvan Institute) – Medical Genome Reference Bank – An integrated genome/phenome resource generated from a disease deplete, elderly population		
12:20	Mr Adam Rowland (National Centre for Longitudinal Data, Department of Social Services) – Findings of the Australian Government Longitudinal Data Review Longitudinal Data Conference		
12:30pm	LUNCH Demonstrations of Secure Unified Research Environment (SURE), the Medical Genome Reference Bank (MGRB) Portal and geocoding will be available		
Parallel sessions			
1:30pm	Cancer and risk factor epidemiology Facilitator: Dr Maarit Laaksonen University of NSW	Cardiovascular disease and diabetes Facilitator: Dr Klaus Gebel James Cook University	Health services research and methods Facilitator: Dr Stephen Wright Australian Red Cross Blood Service
2:30pm	AFTERNOON TEA		
Plenary 2			
2:50pm	Plenary presentations:		
2:50	Associate Professor Elizabeth Comino (University of NSW) – Case study: transition of healthcare from hospital to community settings		
3:05	Professor Stephen Jan (George Institute) – Potential savings to government from the prevention of lifestyle illness and risks		
3:20	Mr Stuart Purdie (Cancer Institute NSW) – Pathways to lung cancer diagnosis		
3:35	Mr Brian Beckor (Callpoint Spatial Pty Ltd) introduced by Ms Margo Barr (Sax Institute) – Geocoder and spatial resources: under the hood		
3:50	Professor Emily Banks/Ms Margo Barr (Sax Institute) – Summary of the day and opportunities for the 45 and Up Study into the future		
4:00pm	CLOSE		

KEYNOTE AND PLENARY SPEAKERS

Official opening

The Hon. Jillian Skinner MP has more experience in the health field than any other politician in Australia, having first been appointed Shadow Minister for Health in 1995. She has been NSW Minister for Health since April 2011 and was the first dedicated Minister for Medical Research in the state or nation. As Minister for Health she has overseen greater engagement in decision making by clinicians and staff to encourage innovation and new models of care, and has overseen record health spending to deliver tens of thousands more emergency department treatments, hospital admissions and elective surgeries. She previously held the role of Director of the NSW Office of Youth Affairs and has served on bodies such as the NSW Women's Advisory Council and the NSW Youth Advisory Council.

Keynote

Dr Diane Watson was the inaugural and only chief executive of the National Health Performance Authority. The Authority was established in 2012 to monitor and report on more than 1000 public and private hospitals and primary health care areas across Australia. By 2016 there were more than 400 measures of health and care on MyHospitals and MyHealthCommunities and these websites hosted more than 200,000 page views per month. In 2009 Diane was appointed the inaugural chief executive of the Bureau of Health Information in NSW. Prior to working in Australia, she held management and senior scientist positions in health information and research organisations in Canada.

Plenary 1

Mr Paul Grogan is Director of Public Policy and Knowledge Management at Cancer Council Australia, a position he has held for more than 12 years. A former government media and policy adviser and health academic, Paul oversees the development and promotion of Cancer Council Australia's federal public policy recommendations and the production and dissemination of cancer clinical practice guidelines.

Mr Darren Mayne is an epidemiologist with the Illawarra Shoalhaven Local Health District; honorary research fellow in the School of Medicine, University of Wollongong; and affiliated researcher with Illawarra Health and Medical Research Institute. He has an (increasingly) broad range of research interests that are unified through applications of geospatial methods to address problems of public, population and primary health care significance. His PhD is investigating the contribution of walkability to geographic variation in health outcomes using the 45 and Up Study under the supervision of Associate Professor Geoff Morgan and Professor Adrian Bauman within the Sydney School of Public Health.

Associate Professor Marcel Dinger is the Head of the Kinghorn Centre for Clinical Genomics, Garvan Institute and conjoint Associate Professor at the University of NSW, Australia. The Kinghorn Centre was one of the first sites in the world to implement the HiSeq X Ten genome sequencing platform, which has capacity to sequence 18,000 whole human genomes per year. The aims of the Kinghorn Centre are to establish genomic medicine in routine healthcare and to leverage clinical genomic data for research. Marcel also leads the Genome Informatics research laboratory, which is focused on understanding the function of noncoding genomic regions that are associated with human disease and development.

Mr Adam Rowland has been the Executive Manager of the National Centre for Longitudinal Data (NCLD) within the Australian Government Department of Social Services (DSS) since late 2015. Most of Adam's experience was gained in the private sector where he spent almost 15 years in consulting and management roles in market and social research, primarily working on behalf of Australian Government departments and agencies. Immediately prior to joining the NCLD Adam worked at the Department of Health for over three years undertaking significant organisational reform in relation to grant administration.

Plenary 2

Associate Professor Elizabeth Comino is a senior research leader with the Centre for Primary Health Care and Equity, University of NSW. She leads two research programs:

- The Gudaga study: A cohort study of health, development, educational attainment and service use of Aboriginal children in an urban community and;
- An innovative study using linked administrative data including the 45 and Up Study to explore integration of hospital and community care in Central and Eastern Sydney.

The latter work builds on her extensive experience with administrative data collections to inform policy and practice and a commitment to using these data to build research capacity among health practitioners.

Professor Stephen Jan is the Head of the Health Economics and Process Evaluation program at the George Institute for Global Health, Professor of Health Economics at the Sydney Medical School, University of Sydney. He is an Associate at the Menzies Centre for Health Policy and the Poche Centre for Indigenous Health. He was awarded his PhD at Sydney University and has previously held positions at the London School of Hygiene and Tropical Medicine and the Centre for Health Economics Research and Evaluation, Sydney.

Mr Stuart Purdie is an epidemiologist with the Cancer Institute NSW. He works predominantly in the analysis of linked health datasets to examine health system performance. Stuart started his career as a data analyst for the National Health Service in Scotland before moving to Sydney in 2009. He completed a Master of Public Health degree and the NSW Ministry of Health's biostatistics training program before taking up his post at the Cancer Institute NSW.

Mr Brian Beckor is the founder of Callpoint Spatial, an Australian company with a history of expertise and innovation in the geospatial arena. Brian's career started at the Overseas Telecommunications Commission where he held engineering and product management roles. His digital product Skystream carried Australia's early direct internet traffic. In 1993 he founded Callpoint and took on various consultancy projects. A market modelling project for startup RequestDSL led to the creation of software centred on broadband service deliverability. In recent years Callpoint has also delivered spatial resources including geocoding to other sectors including covering enterprise, research and government. Brian holds a Bachelor of Engineering from the University of NSW and a Master of Business Administration from Macquarie University.

KEYNOTE AND PLENARY PRESENTATIONS

Keynote: What makes evidence and data useful for policy and action?

Dr Diane Watson

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Over the last number of years, there has been rapid growth in demand for research evidence and meaningful information derived from analyses of health data. The demand is so high that governments, health insurers and providers are building more in-house capacity than ever before to inform and monitor their efforts to improve health, policy and care. Governments are increasingly adopting 'open government' initiatives to release their data and create more opportunities for citizens and businesses. Health insurers are increasingly using evidence and data for planning and policy, to inform financing and funding decisions, and to better fulfill their oversight and risk management responsibilities. Health managers and clinicians are increasingly using evidence and data to assess their performance and learn about opportunities to improve. Accordingly, to provoke discussion about future opportunities for researchers and research collaborations the presenter will draw on 'real life' experiences to speculate about the characteristics of research most likely to catalyse positive change in Australia's health system.

Plenary 1

Using evidence to drive health policy reform

Mr Paul Grogan, Cancer Council Australia

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Although policy and practice improvement is assumed to follow naturally from high quality research, only a small proportion of independently published health and medical research translates into health policy reform. Inter-related factors such as funding constraints, politics, ideology, the interests of multiple stakeholders and a bias towards short-term returns conspire to make "research" only one of many forms of "evidence" considered by governments when prioritising health reform. How can studies be designed to help ensure that the work of researchers produces evidence that effects policy change? How can researchers frame their results in a way that best supports policy reform?

The contribution of area-level walkability to geographic variation in physical activity: a spatial analysis of 45 and Up Study participants living in Sydney

Mr Darren Mayne, Illawarra Shoalhaven Local Health District

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1 Illawarra Shoalhaven Local Health District 2 University Centre for Rural Health, University of Sydney 3 School of Public Health, University of Sydney

Background: Walkability describes the capacity of the built environment to facilitate walking and may provide useful information for urban design, transport, and health policy and planning. The aim of this study was to explore contributions of area level walkability to spatial variation in health-benefiting moderate and vigorous physical activity (MVPA) behaviours in Sydney residents of the 45 and Up Study.

Methods: Data on sufficient walking and total MVPA to benefit health, and high MVPA were obtained for 95,837 Sydney respondents to the baseline survey of the 45 and Up Study. We used Bayesian conditional auto-regressive (CAR) Poisson models fit at the postcode-level to obtain smoothed disease maps of MVPA outcomes and assess relationships between prevalence of MVPA outcomes and walkability after adjusting for individual- and area-level demographic, socioeconomic and health factors.

Results: The within-cohort prevalence of sufficient walking and MVPA, and high MVPA were 31.7 (31.4-32.0), 69.4 (69.1-69.7), and 56.1 (55.8-56.4) per cent. In fully adjusted spatial regressions the prevalence of attaining sufficient walking and total MVPA to benefit health were increased by factors of 1.18 (1.09-1.27) and 1.04 (1.01-1.08) for high compared to low walkability postcodes; walkability was unrelated to high MVPA to benefit health. Area-level walkability explained 8.2% and 22.7% of residual spatial variation in prevalence of sufficient walking and MVPA to benefit health not attributable individual-level factors.

Conclusions: Systematic spatial variation exists in the distribution of MVPA outcomes across Sydney. Differences in the walkability of Sydney postcodes explain a small but not insignificant amount of this variation. Walkability indexes may help to inform and target plans to increase opportunities for physical activity such as the Sydney metropolitan plan.

Medical Genome Reference Bank – An integrated genome/phenome resource generated from a disease deplete, elderly population

Associate Professor Marcel Dinger, Garvan Institute

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The Medical Genome Reference Bank (MGRB) will house whole genome sequencing (WGS) data and rich phenotypic information from 4000 healthy Australians over 70 years of age. The reference bank will act as a powerful filter to distinguish between causal and passenger genetic variation, and will be a resource to maximise the efficiency of disease-specific genomic analyses in both the research and clinical setting. Curated data will be openly accessible to the international research community through an MGRB website. Preliminary features will include a data Beacon, extensive variant annotation, complex population-based clustering queries, visualisation of variant data (e.g. genome viewer/ gene networks) and analysis tools for assessing the genetic burden of individual variants and variant subsets.

While basic demographic and phenotypic information will be incorporated into the MGRB data portal, researchers are invited to apply for access to comprehensive genotypic and clinical information to support high-level integrative analysis.

Findings of the Australian Government Longitudinal Data Review | Longitudinal Data Conference

Mr Adam Rowland, National Centre for Longitudinal Data, Department of Social Services
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Australian Government Review of Longitudinal Data Architecture – the Review

The Australian Government commissioned a review of longitudinal data architecture as part of the “Investment Approach to Welfare” measure in the 2015-16 Budget. The key objective of the review is to inform Australia’s future longitudinal data needs. The Review is consistent with the recommendations of the McClure Review of Australia’s Welfare System which stated that longitudinal data is vital to a better understanding of life course transitions for policy development and service design. The Review has been undertaken by the National Centre for Longitudinal Data (NCLD) within the Department of Social Services and has been assisted by a whole-of-government Steering Committee. The Review is now complete and the key findings and recommendations of the Review will be discussed in this presentation. (NCLD website - <https://www.dss.gov.au/NCLD>)

Longitudinal Data Conference – Powerful data | Strong evidence | Informed policy

The NCLD is coordinating the Longitudinal Data Conference being held at the National Convention Centre, Canberra, from 25–27 October 2016. This is Australia’s first major public event to focus on survey and administrative longitudinal data, the ways in which it can inform Australia’s social policy and the key policy questions that should be driving the research agenda. The conference will bring together leading Australian and international researchers, policy-makers, policy influencers, leaders in data technologies, data modellers and analysts from across the public, private and not-for-profit sectors. Information about the keynote speakers and panellists can be found at: <http://nclconference2016.dss.gov.au/speakers.html>. Conference website - <http://nclconference2016.dss.gov.au> (early bird registration open until Thursday 15 September 2016).

Plenary 2

Case study: transition of health care from hospital to community settings

Associate Professor Elizabeth Comino, Centre for Primary Health Care and Equity, University of NSW
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1 Centre for Primary Health Care and Equity, University of NSW 2 SE Sydney Local Health District 3 Central and Eastern Sydney Primary Health Network 4 Sydney Local Health District

Background: A key goal of health services is to better predict the care needs of their population, and ensure that those with chronic conditions receive timely well-integrated care. This case study in Central and Eastern Sydney (CES) exploring transition to community care for hospitalised patients aimed to demonstrate the utility of the Sax Institute’s 45 and Up Study locally.

Methods: Eligible subjects were 45 and Up Study participants who resided in CES and had a hospital admission during the year following recruitment (n=7235). Their baseline data were linked to the NSW Admitted Patients Data Collection and claims for general medical care from the Department of Human Services Medicare Benefits Schedule. The study outcome was ‘time to General Practitioner (GP) follow-up following discharge’; timely GP follow-up was a claim for GP care within 2 weeks of discharge. Associations between participant characteristics, primary diagnosis (admission) and timely GP follow-up were explored.

Results: Mean time to GP follow-up was 35 (SD:46) days; timely GP follow-up was observed for 39% of subjects. Age (older), health status (poor), and low socioeconomic status were associated with timely follow-up, suggesting GP return according to health care need. Significant variation in timely GP follow-up according to primary diagnosis was observed: 31% for musculoskeletal; 35% for neoplastic; 57% for endocrine and circulatory; and 63% for respiratory conditions. Subjects with timely follow-up were less likely to be readmitted when health status was taken into account.

Conclusion: This exploratory analysis suggests that, although GP follow-up is occurring for 'at risk' patients, follow-up by GPs could be timelier. These results have implications for discharge communication and handover, particularly for those with complex care needs. This information on timely GP follow-up, not previously available to health planners, challenges assumptions about discharge planning processes. Funding has been received to develop a 45 and Up Primary and Community Health Cohort to further develop this work.

Potential savings to government from the prevention of lifestyle illness and risks

Professor Stephen Jan, The George Institute for Global Health

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1 The George Institute for Global Health, affiliated with The University of Sydney 2 NSW Office of Preventive Health 3 Sax Institute 4 University of Technology Sydney

Background: Chronic diseases and related lifestyle risk factors lead to significant morbidity and associated health service usage and cost. The workplace is acknowledged as an important setting for health promoting interventions. This study sought to identify health care costs to government, and potential savings from primary or secondary prevention, from people in the workforce with lifestyle-related illness or risk.

Methods: Self-reported incident lifestyle illness or risk (Cardiovascular disease, diabetes, obesity), in participants who were working, were identified from 45 and Up Study baseline and follow-up data. Participant records were linked with deaths and service data from the Department of Human Services Medicare Benefits Schedule (MBS) and NSW hospitalisations. Statistical models of service costs, adjusted for a range of demographic and lifestyle variables, employed ordinary least squares methods with log transformed cost data and generalised linear modelling (GLM).

Results: 43,626 Study participants, re-surveyed at follow-up, reported working full or part time at baseline survey and were included in the study. 10.7% (n=4660) reported newly diagnosed CVD, 2.2% (n=937) diabetes and 5.6% (n=2436) now had a Body Mass Index (BMI) greater than 29 kg/m² (obese). The association between illness and combined hospitalisation and MBS costs in the 24 months following 'diagnosis' varied substantially by illness/ risk group. Heart disease, hypertension, blood clot, stroke and obesity were associated with 2% – 10% increased costs, equating to a total additional annual cost to government of \$39–\$330 million.

Conclusion: Modelled combined costs for participants within each of the illness groups showed some variability. All illness groups, except for diabetes, showed 2% to 10% higher services costs. Combined costs were not significantly influenced by age, holding a Department of Veteran's Affairs card, or family income, but were, for most illnesses, influenced by hospital type (public/ private), and health insurance status and regional and remote area of residence. In conclusion, reducing individual and population risk of lifestyle illnesses is likely to lead to observable reductions in costs associated with hospitalisation and MBS services.

Pathways to lung cancer diagnosis in 45 and Up Study participants: preliminary results

Mr Stuart Purdie, The Cancer Institute NSW

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Background: Lung cancer kills more people in Australia than any other cancer. Optimal cancer care pathways facilitate timely diagnosis and access to evidence-based care to improve outcomes. Interaction with primary care and non-admitted patient care in the cancer care pathway is a gap in our knowledge. This study quantifies the use of health services leading up to diagnosis of lung cancer for 45 and Up Study participants.

Methods: We identified 45 and Up Study participants diagnosed with non-small cell lung cancer (NSCLC) through linkage with the NSW Cancer Registry. Linked admitted patient data and Department of Human Services Medicare Benefits Schedule (MBS) claims were used to identify hospital admissions, physician attendances and outpatient imaging (x-ray or computed tomography of the chest). Linkage was performed by the Centre for Health Record Linkage. We defined a pathway to diagnosis by the presence/absence of General Practitioner (GP)-ordered imaging, lung specialist attendance (thoracic physician or cardiothoracic surgeon) and the status of the first hospital admission for lung cancer (planned/emergency/none) in the month of diagnosis or preceding three months.

Results: Of the 363 participants diagnosed with NSCLC between enrolment and the end of 2009: 82 (23%) had an emergency first admission; 71 (20%) had GP-ordered imaging without lung specialist attendance or emergency first admission; 41 (11%) had lung specialist attendance without GP-ordered imaging or emergency admission; 29 (8%) had no events of interest; and 14 (4%) had a planned admission without GP-ordered imaging or lung specialist attendance.

Conclusion: Preliminary results suggest a quarter of people with NSCLC were diagnosed as emergencies while a third of people attended a lung specialist and had initial investigations in an outpatient setting. These results can inform actions to maximise the number of people following an optimal pathway to diagnosis of non-small cell lung cancer.

Geocoder and spatial resources: under the hood

Mr Brian Beckor, Callpoint Spatial Pty Limited

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1 Callpoint Spatial Pty Limited 2 Sax Institute

Public health datasets increasingly use geographic identifiers such as an individual's address. Geocoding these addresses often provides new insights since it becomes possible to examine spatial patterns and associations. Address information is typically considered confidential and is therefore not released or shared with others. However through the use of the Sax Institute's Secure Unified Research Environment (SURE) facility it is possible to 'have your cake and eat it too' by having 45 and Up Study geocoded addresses available to researchers in a separate secure location to the cohort's health data. This then allows researchers to be able to produce spatial measures such as distance from or densities of particular items of interest, which can be used in the health data analysis.

All of the 45 and Up Study baseline, Social, Economic and Environmental Factors (SEEF) and 2012 and 2013 follow-up years have now been geocoded. All geocoding is currently being undertaken using the Callpoint Spatial geocoder portal, which has end-to-end data encryption. The geocoder operates using the Geocoded National Address File (G-NAF) augmented with the PSMA Australia Ltd (PSMA) Transport & Topography data that enables street intersections such as "cnr King & George Sydney" to be validated, and the coordinates of the intersecting street polylines to be returned. The geocoder delivers a set of result codes to identify the accuracy of the coding based on the address information provided as well as Australian Bureau of Statistics (ABS) Mesh Block, SA1, SA2, SA3, SA4, Remoteness Index and Socio Economic Indexes for Areas (SEIFA).

Geocoding is not error-free. Typically, a certain number of records do not geocode due to incomplete or incorrect information so gaining a better understanding of how it works is important. An overview of the geocoder and how it handles a diverse range of address scenarios will be provided. Also spatial datasets such as Transport & Topography and Features of Interest that can be used for spatial analysis will be reviewed including current strengths and limitations.

PARALLEL SESSION PROGRAM

Parallel sessions			
	ROOM A Powerhouse Learning Centre	ROOM C Powerhouse Learning Centre	THEATRETTE
1:30PM	Cancer and risk factor epidemiology Facilitator: Dr Maarit Laaksonen	Cardiovascular disease and diabetes Facilitator: Dr Klaus Gebel	Health services research and methods Facilitator: Dr Stephen Wright
1:30pm	Identifying incident colorectal and lung cancer cases in the 45 and Up Study without cancer registry data Mr David Goldsbury , Cancer Council NSW	A prospective study of psychological distress, functional limitations, self-rated health and incidence of ischaemic heart disease Ms Jennifer Welsh , Australian National University	Using weighted hospital service area networks to explore variation in preventable hospitalisation Mr Michael Falster , University of NSW
1:42pm	Burden of lung cancer in Australia attributable to modifiable lifestyle-related risk factors Dr Maarit Laaksonen , University of NSW	Tobacco smoking and incidence of cardiovascular disease in 187,324 participants from the 45 and Up Study Dr Grace Joshy , Australian National University	Health service use in the older person with complex health needs Mr Glen Pang , Agency for Clinical Innovation Mr Mark Bartlett , Sax Institute
1:54pm	Fruit and vegetable consumption and prevalence and incidence of psychological distress in a large cohort of middle-aged and older Australians Ms Binh Nguyen , University of Sydney	Is the relationship of diabetes to psychological distress modified by physical functional limitations? Findings from the 45 and Up Study Dr Grace Joshy , Australian National University	Ascertainment of self-reported prescription medication use compared with pharmaceutical claims data Dr Wei Du , Australian National University
2:01pm	Identifying individuals at high risk for lung cancer in Australia using a validated risk prediction tool Dr Marianne Weber , Cancer Council NSW	Association of neighbourhood attributes with change in physical activity, weight, mental health, physical function and type 2 diabetes Dr Klaus Gebel , James Cook University	An evaluation of nonresponse at follow-up in the 45 and Up Study Dr Joanna Wang , University of Technology Sydney
2:13pm		Incident type 2 diabetes in a large Australian cohort study: does physical activity or sitting time alter the risk associated with body mass index? Ms Binh Nguyen , University of Sydney	Extended Donor Vigilance: a data linkage study to evaluate health outcomes in older blood donors Dr Stephen Wright , Australian Red Cross Blood Service
2:30PM	AFTERNOON TEA		

CANCER AND RISK FACTOR EPIDEMIOLOGY

Identifying incident colorectal and lung cancer cases in the 45 and Up Study without cancer registry data

Mr David Goldsbury, Cancer Council NSW
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Background: For researchers, records from centralised, population-based statutory cancer registries are the preferred source of confirmed cancer cases. When these are not available, hospital and other medical records may be feasible alternative sources. We aimed to determine the accuracy of various routinely collected administrative health data for ascertaining incident cases of colorectal cancer or lung cancer for participants in the 45 and Up Study, to potentially allow more up-to-date coverage of incident cancers.

Methods: For 266,844 participants in the 45 and Up Study (recruited 2006–2009), colorectal and lung cancer cases ascertained from diagnosis and treatment records in linked administrative health datasets (hospital, emergency department, claims from the Department of Human Services Medicare Benefits Schedule [MBS] and death records) were compared with cases identified from the NSW Central Cancer Registry (CCR) to December 2010.

Results: 2253 colorectal and 1019 lung cancers were recorded in the CCR in 2006–2010. Diagnoses of primary cancer in the hospital data identified the majority of CCR cancers, with sensitivity and positive predictive value (PPV) of 95% and 91% for colorectal cancer and 81% and 85% for lung cancer respectively. The addition of lung cancer deaths from death records increased sensitivity to 84% (PPV 83%) for lung cancer. All specificities were close to 100%. Hospital surgical records for colorectal cancer identified cases with sensitivity 81% and PPV 54%. No other individual indicator had sensitivity >50% or PPV >65% for either cancer type and no combination of indicators increased both the sensitivity and PPV above that achieved using diagnoses of primary cancer in hospital records.

Conclusion: In NSW, identifying new cases of colorectal and lung cancer from administrative health datasets, such as hospital records, is a feasible alternative when cancer registry data are not available. However these alternative data sources do not include more detailed information about the cancer such as diagnosis date or disease stage.

Burden of lung cancer in Australia attributable to modifiable lifestyle-related risk factors

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Background: The cancer burden avoidable through risk factor modification can be quantified using the Population Attributable Fraction (PAF) which combines estimates of the prevalence of the risk factor exposure in the population and the strength of the exposure-cancer association. PAF is most accurately estimated from cohort studies, using analytical approaches that account for death as a competing risk. No such Australian estimates of the lifestyle-related avoidable lung cancer burden currently exist.

Methods: Seven contemporary Australian cohort studies (N=367,772), with comprehensive data on exposure to lifestyle-related risk factors, were linked to the Australian Cancer Database and National Death Index, to identify lung cancers and deaths from any cause. The risk factors were harmonised across the studies and the data pooled. The strength of the exposure-cancer association was estimated using a proportional hazards model, adjusting for age, sex and the other lifestyle exposures. Age- and sex-specific exposure prevalence was estimated from the representative Australian National Health Survey 2011–2012. These estimates were then combined to calculate the PAFs and their 95% confidence intervals (CI) using a newly developed method accounting for competing risk of death.

Results: During the first 5 years follow-up, 7612 deaths and 1103 incident lung cancers were ascertained. Most of the lung cancer burden was attributable to current or past smoking (PAF = 70%, CI = 64%, 75%). Low body fatness (Body Mass Index (BMI) <25 kg/m²) explained 12% (CI = 3%, 19%), fruit intake below Australian recommendations (<2 daily serves) 8% (CI = 2%, 14%), and physical activity below Australian recommendations (<150 minutes of moderate or 75 minutes of vigorous exercise per week) 3% (CI = 0%, 6%) of the lung cancer cases.

Conclusion: PAF estimates allow us to rank the main preventable causes of cancer, essential in prioritising cancer interventions and public health policies in Australia and internationally.

Fruit and vegetable consumption and prevalence and incidence of psychological distress in a large cohort of middle aged and older Australians

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Background: There is growing evidence for a link between diet and mental health. This study aimed to investigate the association between fruit and vegetable consumption and psychological distress in middle-aged and older Australians.

Methods: A subsample of the 45 and Up Study was followed-up in 2010 (the Social, Economic, and Environmental Factor [SEEF] Study). The analytic sample included 60,412 participants (100% of SEEF respondents) for cross-sectional analyses and 47,658 (79% of respondents) for longitudinal analyses. Psychological distress was assessed using the validated Kessler psychological distress (K10) scale, a 10-item questionnaire measuring anxiety and depression symptoms experienced in the last four weeks. Psychological distress was defined as the presence of moderate-to-very high levels of distress (K10 score ≥ 16). Usual fruit and vegetable consumption was assessed using short validated questions. The association between fruit and vegetable consumption and the prevalence/incidence of psychological distress was examined using logistic regression models.

Results: At baseline, 19.9% reported psychological distress (prevalence). During an average of 2.7 years of follow-up, 11.4% of those who did not report distress at baseline reported distress at follow-up (incidence). Eating the recommended ≥ 2 serves/day of fruit, ≥ 5 serves/day of vegetables, or both, were associated with a lower prevalence of psychological distress even after adjustment for age, sex, education level, marital status, household annual income, BMI, alcohol intake, smoking status, physical activity levels and a history of chronic disease (OR=0.80 [95% CI=0.75, 0.85]; $P < 0.001$). Eating the recommended amounts of fruit and vegetables was associated with a lower incidence of psychological distress in minimally-adjusted but not fully-adjusted models.

Conclusion: Increasing fruit and vegetable consumption may help reduce the prevalence of psychological distress in middle-aged and older adults. However, the association of fruit and vegetables with the incidence of psychological distress requires further investigation and possibly, a longer follow-up time.

Identifying individuals at high risk for lung cancer in Australia using a validated risk prediction tool

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Background: Evidence on the harms and benefits of lung cancer screening has highlighted the importance of optimising the target population at risk. PLCO_{m2012} is a logistic regression model that predicts 6-year lung cancer risk among ever smokers, developed using US data incorporating sociodemographic and health factors, and thus could better predict those who might benefit from screening than criteria based solely on age and smoking history. This study validated the performance of PLCO_{m2012} among Australian smokers in a population-based cohort study.

Methods: Future risk of lung cancer was calculated using the PLCO_{m2012} tool and data from the recruitment phase of the NSW 45 and Up Study cohort (2006–2008), for 95882 ever-smokers. A total of 1035 subsequent lung cancer diagnoses were captured to June 2014 via data linkage to population-wide health databases.

Results: Compared to observed cancer outcomes, PLCO_{m2012} had high discrimination (area under the receiver-operating-characteristic-curve; AUC 0.80, 95%CI, 0.78–0.81) and high predictive accuracy (mean and 90th percentile absolute difference between observed and predicted: 0.005 and 0.004, respectively). Age comparisons demonstrated that the PLCO_{m2012} performed best for ages 55–74 years, and had high predictive accuracy even when individual factors, such as chronic obstructive pulmonary disease, were omitted. Sensitivity (69.4%, 65.6–73.0%) of the PLCO_{m2012} threshold ≥ 0.0151 in the 55–74 year age group was greater than eligibility criteria based on ≥ 30 pack-years smoking and ≤ 15 years quit (57.5%, 53.3–61.3%), but specificity was slightly lower (72.0%, 71.7–72.4% vs. 75.2%, 74.8–75.6%).

Conclusions: PLCO_{m2012} had high predictive performance in an Australian sample of ever smokers and the PLCO_{m2012} ≥ 0.0151 threshold was better at classifying individuals at high risk of lung cancer than criteria based on age and smoking alone. These findings imply that targeting individuals based on risk assessment tools could improve the balance of benefits, harms and cost-effectiveness of lung cancer screening.

CARDIOVASCULAR DISEASE AND DIABETES

A prospective study of psychological distress, functional limitations, self-rated health and incidence of ischaemic heart disease

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Background: High psychological distress has been associated with increased risk of ischaemic heart disease (IHD). However, whether this association is attributable to pre-clinical disease leading to psychological distress is currently unknown. Aim: To investigate the extent to which the association between psychological distress and incident IHD can be explained by measures of pre-clinical disease.

Method: Questionnaire data (2006–2009) from 45 and Up Study participants without previous cardiovascular disease and valid Kessler-10 data on psychological distress were linked to hospitalisation and mortality data (to Dec 2013). Hazard ratios (HRs) for incident IHD (hospital admission with IHD primary diagnosis or IHD death) were estimated in relation to psychological distress, comparing low (10–<12), mild (12–<16), moderate (16–<22) and high distress (22–50), adjusting for sociodemographic and health characteristics. HRs were estimated for the total sample and then separately for those without indicators of pre-clinical disease (no functional limitations and 'very good' or 'excellent' health).

Results: Among 176,241 eligible respondents, there were 6356 incident IHD events 992,261 person years (rate: 6.41/1000py). Similar to published data, when the whole sample was included, IHD risk was elevated in those with mild, moderate and high distress, compared to those with low distress, in a linear manner. This work in progress will explore the impact on findings of greater control for potential confounding and reverse causality, using dataset restriction and adjustment.

Conclusions: Large-scale population-based studies able to account for potential confounding factors, particularly sub-clinical factors that may affect exposures are well as outcomes are likely to be of value in elucidating the relationship of psychological distress to cardiovascular disease.

Tobacco smoking and incidence of cardiovascular disease in 187,324 participants from the 45 and Up Study

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Background: Tobacco smoking is a leading cause of cardiovascular disease (CVD) morbidity and mortality. Robust quantitative evidence on the relationship of smoking to the incidence of a range of CVD subtypes is limited, especially in Australia. This study aimed to investigate the relationship between tobacco smoking and incidence of different types of CVD.

Method: Prospective study of 187,324 individuals aged ≥45 years joining the 45 and Up Study from 2006–2009, with linked questionnaire, hospitalisation, and death data to end-2013 and with no history of cancer or CVD at baseline. Hazard ratios (HRs) for incident CVD among current, past and never smokers were estimated, using Cox regression, adjusting for age, sex, region of residence, alcohol consumption, income and education.

Results: At baseline, 7.8% of participants were current and 33.6% were past smokers. During a mean of 5.5 years follow up (1.03 million person-years), there were 15,630 major CVD events: 7098 ischaemic heart disease (IHD); 2145 cerebrovascular disease; 1045 heart failure (HF); 1057 peripheral vascular disease (PVD); and 918 ischaemic stroke. Compared to never-smokers, the adjusted HRs in current smokers were significantly elevated for all CVD subtypes; HR(95%CI): 1.64(1.55–1.74) for major CVD; 1.67(1.53–1.82) for IHD; 2.06(1.76–2.40) for cerebrovascular disease; 2.23(1.74–2.85) for HF; 6.43(5.37–7.71) for PVD; and 2.09(1.66–2.65) for ischaemic stroke. Risks were substantially lower in past smokers. Detailed data on CVD incidence and smoking intensity, duration and cessation will be presented.

Conclusions: Current smoking increases CVD incidence by at least 60%, ranging from a 67% excess for IHD to 500% for PVD. Cessation reduces risk substantially.

Is the relationship of diabetes to psychological distress modified by physical functional limitations? Findings from the 45 and Up Study

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Background: People with diabetes are more likely to experience psychological distress than those without diabetes. Psychological distress is influenced by other risk factors such as physical functional limitations (PFL), socio-demographic factors and behavioural characteristics. This study examined how the relationship of diabetes to psychological distress is modified by PFL.

Methods: Self report data from the 45 and Up Study baseline questionnaire was used. Modified Poisson regression with robust error variance was used to estimate prevalence ratios (PRs), comparing the prevalence of high psychological distress (Kessler-10 > 22) among those with and without diabetes and across PFL levels, adjusting for potential confounders.

Results: 19,803 (8.4%) of 236,441 participants reported diabetes; high psychological distress was observed in 11.8% (2339) of those with diabetes and 7.2% (15,664) of those without diabetes. Adjusting for age and sex, the prevalence of psychological distress was significantly higher among those with compared to those without diabetes; PR 1.89 (95%CI 1.81–1.97). The association was attenuated by additional adjustments for socio-demographic factors, health behaviours and PFL, but remained significantly elevated (1.18, 1.13–1.22). Compared to individuals without diabetes or PFL, the adjusted PRs for high psychological distress were, 1.37(1.17–1.60) in those with diabetes and without PFL, 7.33(7.00–7.67) with severe PFL without diabetes and 8.89(8.36–9.46) with both severe PFL and diabetes.

Conclusions: The prevalence of psychological distress is moderately elevated in people with diabetes; part but not all of this elevation is attributable to higher levels of PFL in those with diabetes. Among 45 and Up Study participants, psychological distress is strongly related to PFL.

Association of neighbourhood attributes with change in physical activity, weight, mental health, physical function and type 2 diabetes

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Background: Few studies have examined prospective relationships between environmental perceptions and changes in physical activity and health outcomes.

Methods: We used three-year longitudinal data (2006/07–2009/10) of adults 45 and older living in metropolitan areas (n=24,341; 62.9±11.3 years) in NSW. The outcome variables were measured using the following validated items: Environmental attributes with the Physical Activity Neighborhood Environment Survey, physical activity with the Active Australia Survey, mental health with the Kessler-10 scale, and physical function with the MOSPF scale. Type 2 diabetes was physician diagnosed. General linear regression was used with each individual neighbourhood attribute as the exposure and change in the continuous outcomes, adjusted for covariates and baseline levels. Logistic regression was used for diabetes incidence.

Results: During the follow-up period (3.4±0.95 years), the average changes for the whole sample were +7 min/week (SD=1.4, 95%CI: 1.5–12.4) for physical activity (vigorous physical activity weighted by 2), -0.01 (95%CI: -0.06, 0.04) for mental health, -3.57 (95%CI: -3.76, -3.38) for physical function, and there were 594 new cases of diabetes (increase in prevalence from 7.6% to 9.7%). There were significant differences in changes in outcomes by perceptions of the environment. Safety from crime at night was associated with changes in all outcomes and access to recreation facilities with all outcomes apart from physical activity. Access to shops, public transport and having footpaths on most of the streets was associated with change in mental health and physical function and shops as well with physical activity. All associations were in the expected direction.

Conclusions: All environmental attributes were related to change in some or all outcome measures. Results provide large-scale and longitudinal support of findings from previous cross-sectional studies. Access to shops, public transport stops, and recreation facilities, footpaths and safety from crime may help with maintenance of physical activity and population health.

Incident type 2 diabetes in a large Australian cohort study: does physical activity or sitting time alter the risk associated with body mass index?

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Background: Body mass index (BMI) and physical activity (PA) are independently associated with incident type 2 diabetes mellitus (T2DM); the association between sitting and T2DM is unclear. The joint effects of BMI, PA and sitting time have rarely been studied. This study aimed to examine the combined effects of: a) BMI and PA; b) BMI, PA and sitting on incident T2DM among Australian adults.

Methods: A sample of 37,481 men and women aged ≥ 45 years from New South Wales, Australia, completed baseline (2006–2008) and follow-up (2010) questionnaires. Incident T2DM was based on validated, self-reported physician diagnosis of T2DM at follow-up. BMI was derived from validated self-reported height and weight, and categorised as normal/overweight/obese. PA, based on validated Active Australia questions, was tertiled as low/medium/high. Sitting time was dichotomised as lower/higher sitting ($<$ or ≥ 8 hours/day) based on meta-analytic evidence. Logistics regression was used for individual and combined risk factors and for stratified analysis by BMI categories.

Results: During a mean 2.7 (SD: 0.9) years of follow-up, 845 (2.3%) participants developed T2DM. In fully adjusted models, only BMI was independently associated with incident T2DM. In stratified analyses, ORs for sitting/PA and T2DM did not differ significantly across BMI categories. Compared with normal weight-low PA participants, the ORs (95% confidence interval) were 2.24 (1.59, 3.16) for overweight-high PA, 1.99 (1.39, 2.84) for overweight-medium PA, 2.43 (1.73, 3.42) for overweight-low PA, 4.77 (3.29, 6.92) for obese-high PA, 5.55 (3.88, 7.95) for obese-medium PA, and 6.63 (4.76, 9.24) for obese-low PA participants. Overweight/obese individuals with high PA (and lower sitting) had higher odds of incident T2DM than normal-weight counterparts with low PA (and higher sitting).

Conclusions: High PA/low sitting did not attenuate the risk of T2DM associated with overweight/obesity. Maintaining a healthy weight, by adopting healthy lifestyle behaviours, is critical for T2DM prevention.

HEALTH SERVICES RESEARCH AND METHODS

Using weighted hospital service area networks to explore variation in preventable hospitalisation

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Background: Synthetic markets of health care are created in health services research to attribute variation in patient outcomes to characteristics of the health system. Analysing patient catchments which capture hospital-level variation poses particular difficulties, because many factors drive choice of hospital. Further, discrete geographic catchments often have poor "patient loyalty", because in practice patients receive care from a variety of sources. This study sought to demonstrate the use of multiple membership multilevel models, which cluster patients in a weighted network of hospitals, for exploring between-hospital variation in preventable hospitalisations.

Methods: This study used linked hospital data for 267,014 participants in the 45 and Up Study, NSW Australia, with data linkage by the NSW Centre for Health Record Linkage (CHeReL). Geographic patterns of hospital patient flow were used to create weighted hospital service area networks (weighted-HSANs) for 79 large public hospitals of admission. Multiple membership multilevel models on rates of preventable hospitalization clustering participants on weighted-HSANs were used to explore associations with hospital bed occupancy, and contrasted with models clustering on 72 hospital service areas (HSAs) that assigned participants to a discrete geographic region.

Results: Between-hospital variation in rates of preventable hospitalization was more than two times greater when modelled using weighted-HSANs rather than HSAs, and the use of weighted-HSANs permitted identification of small hospitals with particularly high rates of admission. However between-hospital variation was smaller than variation between other geographic regions, such as SLAs, and there was no association with hospital bed occupancy.

Conclusion: Multiple membership multilevel models can capture information that is lost when patients are attributed to discrete health care catchments, and have potential to be used across various methods for constructing HSAs. The use of weighted-HSANs in this study showed that hospital bed occupancy may play a relatively minor role in driving variation in preventable hospitalization in Australia.

Using the 45 and Up Study to develop outcome and process indicators for enhanced reporting of NSW public healthcare system performance

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Background: People with complex health needs typically have multiple chronic conditions, frequent hospitalisations, and limitations on their ability to perform basic daily function. Effective healthcare for this group requires a diverse range of health care professionals working together. The NSW Agency for Clinical Innovation's (ACI) 'Framework for Integrating Care for Older People with Complex Health Needs' promotes collaboration and integration among health care professionals and volunteers involved in providing care for older people with complex needs. This study sought to inform implementation and evaluation of the Framework by describing and comparing the health service use of older people with complex health needs.

Methods: Survey data from the 45 and Up Study was linked with deaths and service data from the Department of Human Services Medicare Benefits Schedule (MBS) and NSW hospitalisations. Study and comparator groups were identified from participants' hospitalisation records, the study group having an admission for one or more of the conditions representing 'geriatric syndrome'. Admissions and MBS services use were modelled using log-linear Poisson regression. Demographic, health and lifestyle characteristics were included as covariates.

Results: Analyses were conducted on 2497 participants with complex needs. Multivariate analysis for hospital admissions showed that, after adjusting for covariates, the rate of admission in the two years following index admission for the complex needs group was 18% (95% CI: 1.12–1.24) greater than the comparator group. The rate of GP attendances was a non-significant 2% (95% CI: 0.97–1.07) greater for the complex needs group, and specialist physician attendance was 13% (95% CI: 1.06–1.21) greater.

Conclusion: Both rates of hospitalisation and specialist physician attendance are significantly greater in people with a complex health need. This underscores the importance of specialist physician participation in any effort to promote collaboration and integration between service sectors and is consistent with the prominence of specialist services in the 'The Framework for Integrating Care for Older People with Complex Health Needs'.

Ascertainment of self-reported prescription medication use compared with pharmaceutical claims data

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Background: Evidence on the comparative validity of self-reported medication use in large-scale studies is limited. This study compared self-reported medication use of prescription-only medications to "gold standard" pharmaceutical dispensing data.

Methods: We selected a random sample of 500 participants from the 45 and Up Study, with complete ascertainment of Department of Human Services Pharmaceutical Benefits Scheme (PBS) dispensing records. Self-reported medicine use was ascertained by questionnaire requesting data on medications used "for most of the last 4 weeks". In dispensing data we determined exposure to specific medications in same 4-week window as the survey response if we observed a dispensing record ≤ 90 days prior to start of the window. We calculated sensitivity and positive predictive values (PPVs) at the Anatomical Therapeutic Classification (ATC) 3- and 7-digit code levels.

Results: PPVs were $\geq 75\%$ for 79% of the medications examined at 3-digit ATC level. The sensitivity/PPV of self-reported versus claims data at the 3-digit level was highest for chronic medications, including cardiovascular medications: 94.4%(95%CI 90.6–97.0%)/96.9%(95%CI 93.7–98.7%), respectively for lipid-lowering agents; 92.5%(88.5–95.4%)/97.5%(94.6–99.1%) for angiotensin agents; 88.8%(81.2–94.1%)/93.1%(86.4–97.2%) for beta-blockers; and 88.0%(80.3–93.4%)/96.9%(91.3–99.4%) for calcium-channel blockers. PPVs were $\geq 65\%$ and sensitivity was 78.9%(69.0–86.8%) for psychoanaleptics, 42.1%(26.3–59.2%) for analgesics, 26.0%(16.5–37.6%) for psycholeptics and 4.8%(95%CI 2.0–9.7%) for antibacterial agents. PPVs for individual medications were $\geq 75\%$ for 81% of the individual medications examined at 7-digit level. The highest sensitivity/PPV for self-reported individual medications versus claims data was 96.9%(95%CI 83.8–99.9%)/96.9% (95%CI 83.8–99.9%) for warfarin, 94.5%(88.4–98.5%)/92.0%(85.3–96.3%) for atorvastatin, 94.3%(80.8–99.3%)/84.6%(69.5–94.1%) for pantoprazole, and 93.3% (81.7–98.6%)/95.5%(84.5–99.4%) for atenolol. The lowest sensitivity was 16.7%(95%CI 5.6–34.7%) for temazepam, 11.1%(1.4–34.7%) for oxazepam, and 3.3%(0.1–17.2%) for amoxicillin.

Conclusions: Self-reported data of this type are useful for identifying exposure to prescription medications, particularly those for chronic use. However, they are likely to be of lesser validity for ascertaining short-term and/or intermittent medication exposure.

An evaluation of nonresponse at follow-up in the 45 and Up Study

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Background: One of the major methodological challenges of longitudinal survey research is missing data and nonresponse. A rigorous evaluation of possible impact of nonresponse in the 45 and Up Study is still lacking. The current study aims to fill this research gap by identifying sociodemographic, general health and wellbeing characteristics associated with nonresponse to the follow-up questionnaire and assessing the extent and effect of nonresponse on statistical inference drawn from estimates based on the 45 and Up Study data.

Methods: Data are from the baseline and first follow-up questionnaire of the 45 and Up Study. Statistically principled methods including inverse propensity score weighting and Bayesian selection models approaches for handling nonresponse were used.

Results: This study identified key factors associated with nonresponse and results showed nonresponse to the follow-up questionnaire did not result in substantial bias.

Conclusion: Our results showed nonresponse did not result in substantial bias and certainly did not alter in the interpretation of the results for the outcome of interest in general.

Extended Donor Vigilance: a data linkage study to evaluate health outcomes in older blood donors

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Background: As the Australian population ages, there will be an expected increase in morbidities associated with ageing. Consequently, the demand for blood and blood products in Australia will rise. Without expanding the current donor pool, reliance on existing donors to meet the demands for blood products can only be achieved through increasing the overall frequency of an individual's donation intensity. However, the long-term health impacts of frequent blood donation are not well understood. Therefore it is timely for a thorough investigation into the health, wellbeing and safety of long-term frequent donors. While the Australian Red Cross Blood Service (Blood Service) captures some health incident information, the completeness and robustness of these data are unknown. Therefore, this project aims to facilitate access to large, world-class, health datasets and explore the long-term health of frequent blood donors.

Methods: The data linkage study has two phases. The first phase, a feasibility study, links the Blood Service's Donor Registry with the 45 and Up Study cohort and the NSW Admitted Patients Data Collection. The primary analysis reports on the linkage results across a gradient of blood donation frequency, and establishes endpoint suitability for future studies of health outcomes. Conditional on linkage results, phase-two research protocols will be developed. For example, evaluating reduced iron stores and cardiovascular risk from frequent blood donation.

Results: Data linkage is ongoing. However, based on the 45 and Up Study follow-up survey (N=77,237), there were 35,874 (46%) participants who responded 'Yes' to previously donating blood. Of these responses 8213 indicated a recent donation in 2010–2015. Following data linkage, we are expecting an increase in numbers by linking to non-responders also.

Conclusion: This linkage study provides an exciting opportunity to examine health outcomes in older blood donors. Findings will inform the safety of blood donation policies for our highly engaged older blood donors.

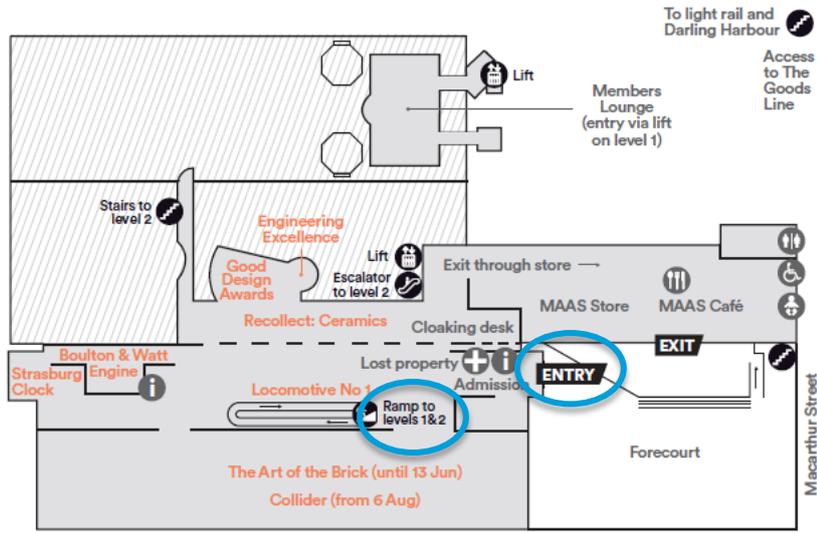
LOCATION AND ACCESS

The main entry to the Powerhouse Museum is via the Forecourt on the corner of Harris and Macarthur Streets. From the main entrance on Level 3, please proceed to Level 2 (down the access ramps or via the lift or escalator). Registration will be in the foyer outside the Powerhouse Theatre. Plenary sessions will be held in the Powerhouse Theatre, and parallel sessions in the Theatre and Powerhouse Learning Centre. The entry point on Level 1, at the end of the Goods Line, is only available after 10:00am. Before this time, please walk up Macarthur Street to the Level 3 main entrance.

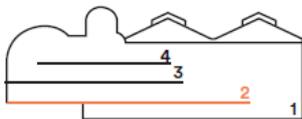
Level 3 ENTRY & EXIT



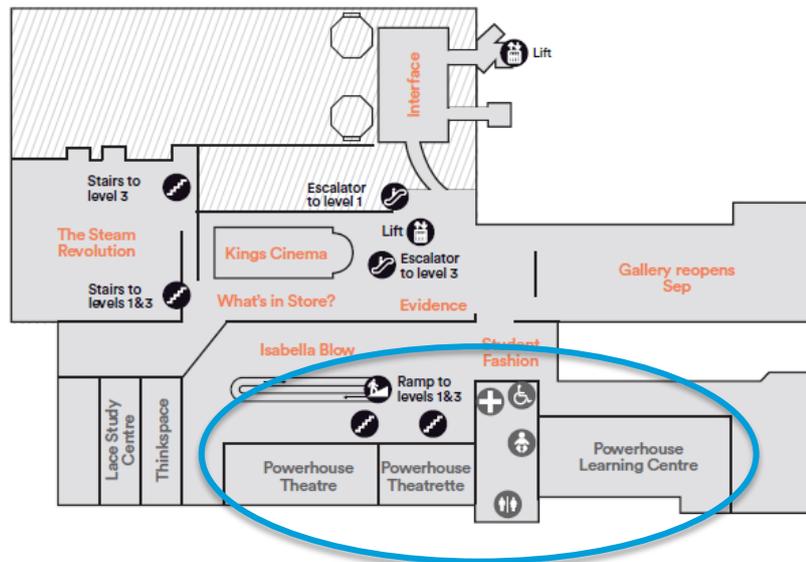
- Facilities
- Toilets
- Admission
- Cloaking desk
- Members Lounge
- Information
- Shop
- Café
- Lost property



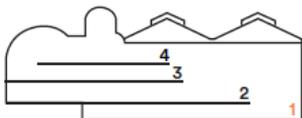
Level 2



- Facilities
- Toilets
- Parents room
- Theatres



Level 1 ENTRY & EXIT



- Facilities
- Toilets
- Pram parking
- Courtyard café
- Playground
- Lost property

