1

Multipurpose use of national health databases – surveillance, natural experiments and linkage with cohort studies

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Health registries and national health data bases can serve several purposes, including surveillance, evaluations of policy changes and "natural experiments" like pandemics and other outbreaks. Another useful approach is to combine analyses based on national databases with analyses from sub populations participating in cohort studies with questionnaire data and biological samples. Norway has the longest running birth registry in the world, and the possibility to link data from several national sources on an individual level. This allows for long term follow up of perinatal outcomes and birth characteristics, and the availability of IDs from parents enables use of family designs. Several examples will be presented.

2

Big data meet epidemiology

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Health and medical big data come from a variety of sources, including administrative databases, clinical trials, electronic health records (EHRs), patient registries, genomic, and other 'omic measurements and medical imaging. More recently, data are being integrated from social media, wearable and implantable devices, mobile applications, occupational and retail information and environmental monitoring. These data are 'big' in volume because they include large numbers of records (e.g. administrative data), large numbers of variables (e.g. 'omics data), or both (e.g. EHRs). They are also characterised by great variety (including both structured data and unstructured data such as free text and images) and high velocity (generated in or near real-time). Health and medical big data present vast potential for the discovery of relationships among pieces of information that would not previously have been possible. This requires integrating data-driven and hypothesis-driven approaches, and deductive and inductive reasoning, and applying new and up-scaled analytic methods that draw on both statistics and computer science. It is time for epidemiologists to embrace this challenge!

3

Using linked data to determine outcomes for young people who have experienced out-of-home care

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Background: Young people who experience out-of-home care due to maltreatment are much more likely to experience adverse outcomes. However, studies are often not able to follow-up young people after they leave care when they turn 18.

Methods: This study utilises linked government data to investigate the outcomes of young people (born 1990-1995) who have experienced out-of-home care and followed-up until 2013 (aged 18-23 years). Outcomes of this care group are compared to: a maltreatment group who experienced maltreatment but did not enter out-of-home care; and a control group matched on age, gender, Aboriginality and socioeconomic status who had no child protection contact.

Results: Overall the care group had poorer outcomes in most areas compared to the maltreatment and control group. They had a greater likelihood of hospitalisations, mental health contact, pregnancies, community-based sentences and imprisonment, and less likely to achieve a high school certificate and be university bound. Aboriginal young people from the care group had an even greater risk of adverse outcomes.

Conclusions: Young people who experience maltreatment and been in care are an at-risk group who are more likely to have adverse outcomes in physical health, mental health, education and justice. This was true when compared to a matched group with no child protection contact, and also for most outcomes compared to young people who had experienced maltreatment but not entered care. The challenges faced by these young people are complex and multifactorial, and cannot be solved by one sector alone, nor at a single point of contact.

4

Benefit of cross-jurisdictional data linkage for enumerating cardiac procedures.

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Background
Ischaemic heart disease is the leading cause of death in Australia. After an acute myocardial infarction (AMI), timely assessment and revascularisation with percutaneous coronary intervention (PCI) or coronary artery bypass graft (CABG) is critical to optimise patient outcomes. In rural and regional NSW, information on cross-border health care is necessary to assess the effectiveness of cardiac care pathways.

Aim
To estimate the contribution of linked cross-jurisdictional hospital and Medicare Benefits Schedule (MBS) data to the enumeration of AMI hospitalisations and cardiac procedures in NSW residents.

Methods
Data source: Linked NSW/ACT hospital and MBS records, July 2010 to June 2014.

Data analysis: Hospitalisations were defined using linked records for each incident AMI case. We estimated AMI hospitalisations and 7-day rates of angiography, PCI and CABG, and compared estimates obtained from linked NSW and NSW/ACT/MBS data.

Results
Linked NSW/ACT/MBS records increased ascertainment of AMI hospitalisations and cardiac procedures. While the increase in ascertainment was relatively small for NSW overall, there were marked increases for areas bordering other jurisdictions, particularly Southern NSW Local Health District where AMI hospitalisations increased by one third and angiography rates by 46 percentage points.

Conclusions
Linked cross-jurisdictional data is essential to understand pathways of cardiac care for NSW residents living in areas bordering other jurisdictions, and to evaluate adherence to AMI treatment guidelines for the population. Linked MBS data is useful where hospital data are not available, and for procedures performed in non-admitted settings

5

Methods for identifying Indigenous children in linked data: comparing differences.

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Publish consent withheld

6

Quantifying inequalities in mortality in Australia: insights from linking Census with mortality data

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Background

Addressing inequalities in mortality is a key public health issue, requiring accurate quantification and monitoring. Our ability to do this in Australia has to date been limited by the available data. The Australian Bureau of Statistics has recently created a new resource by linking Death Registrations data to the Census, enabling quantification of mortality by individual-level socioeconomic measures.

Methods

We present the first analysis of linked Deaths Registrations to Census data, containing deaths within 13 months of the 2011 Census date, linked probabilistically to 2011 Census data. We used negative binomial regression to quantify inequalities in relation to education, weighted to adjust for linkage bias. We compared these inequality estimates with those from area-based measures.

Results

Men with no educational qualifications had age-adjusted mortality rates 1.84 (95% CI: 1.75–1.93) times those of men with a bachelor degree or higher, among women the corresponding relative rate (RR) was 1.45 (1.38–1.53). For younger people (aged 25-44), these inequalities were substantially higher (men: RR=3.69 [3.16–4.31]; women: 2.36 [1.97–2.82]). Total excess deaths associated with less than bachelor education was around 26,000. Socioeconomic gradients in education remained apparent among individuals within each area-SEP quintile, highlighting the socioeconomic variation among individuals within these area-based socioeconomic groups.

Conclusion/Implications

The newly-created linked Deaths Registrations to Census data file, accessible through the virtual ABS Datalab, is a rich resource for generating evidence, including on the contributions of a large range of social and demographic characteristics to variation in mortality. We show area-based measured are inadequate for capturing inequality.

7

Assessing enhanced reporting of Aboriginality using linked patient survey data

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Background

Accurate recording of Aboriginality on health data collections is essential to measuring the effectiveness of government policies and programs aimed at reducing the health gap. Using record linkage, the Enhanced Reporting of Aboriginality (ERA) algorithm was developed in 2012 to assess the weight of evidence as to whether a person would be reported as Aboriginal or Torres Strait Islander for statistical purposes. Record linkage with the NSW Patient Survey Program (PSP) provides an opportunity to validate and improve the ERA algorithm.

Aim

To evaluate and assess possible improvements to the ERA algorithm using self-reported Aboriginality derived from the PSP.

Methods

Data source: Linked records from Hospital, Emergency Department (ED), Birth and death Registrations, and Perinatal Data from 2011 to 2017 for participants in the BHI patient survey for admitted patient and ED from 2013 to 2015

Data Analysis: Self-reported Aboriginality in the PSP was compared with 1) the ERA value calculated from the linked dataset, 2) Aboriginality as reported on the recorded associated with the survey, 3) alternative algorithms.

Results

Of the 133,510 people in the linked dataset, 5102 reported themselves to be Aboriginal or Torres Strait Islander on the PSP, compared to 4732 on the linked administrative data. Sensitivity, specificity, positive and negative predictive values of the original ERA algorithm were high. Accuracy measures varied by age, and sub-group analysis informed improvements to the ERA algorithm.

Conclusion

Record linkage with the PSP has allowed validation of the ERA algorithm and informed improvements.

8

The link between male genital anomalies and adult male reproductive disorders: a population-based data linkage study spanning over 40 years

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Aims: To investigate the association between male genital anomalies hypospadias and undescended testis (UDT) and adult reproductive disorders; and the impact of timing of UDT surgery (orchidopexy) on outcomes.

Methods: We conducted a population-based cohort study of all liveborn males in Western Australia (1970-1999), followed-up until 2016 via data-linkage to hospitalizations, congenital anomaly, cancer and assisted reproductive technology (ART) registries. Study factors were hypospadias or UDT and study outcomes were testicular cancer (TC), paternity and use of ART for male factor infertility.

Results: The cohort comprised 350,835 males, 2,484 (0.7%) had hypospadias and 7,499 (2.1%) UDT. There were 530 (0.1%) TC cases, 109,544 (31%) men fathered children and 2,680 (0.8%) men had ART treatment. UDT was associated with a 2.4-fold increase in TC (Hazards Ratio (HR) 2.43; 95%CI 1.65-3.58), and hypospadias with a small increase in TC (HR 1.37; 95%CI 0.51-3.67). Both hypospadias and UDT were associated with a 21% reduction in paternity (adjusted HR (aHR): 0.79; 95%CI 0.71-0.89 and aHR 0.79; 95%CI 0.74-0.85, respectively). UDT was associated with a 2-fold increased ART use (Relative Risk, RR 2.26; 95%CI 1.58-3.25). For every 6-months of increasing age at orchidopexy, there was a 6% increase in risk of TC (HR 1.06; 95%CI: 1.03-1.08), 5% increase in ART use (aHR 1.05; 95%CI 1.03-1.08); and 1% reduction in paternity (RR 0.99; 95%CI: 0.98-0.99).

Conclusion: UDT is associated with increased risk of TC, infertility and decreased paternity. We provide new evidence to support international guidelines for orchidopexy before 18 months in boys with UDT.

9

Development and validation of alternative cardiovascular risk prediction equations for population health planning: a routine health data linkage study of 1.7 million New Zealanders

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Background

Cardiovascular disease (CVD) risk models are primarily used in clinical settings to inform individual risk management decisions. We sought to develop and validate alternative equations derived solely from linked routinely-collected national health data, that could be applied country-wide to inform population health planning.

Methods

Individual-level linkage of eight administrative health datasets identified all New Zealand residents aged 30-74 years in contact with publicly-funded health services during 2006 with no previous CVD or heart failure hospitalisations, and with complete data on eight pre-specified predictors. Sex-specific Cox models were developed to estimate risk of CVD death or hospitalisation within five years and included sex, age, ethnicity, level of deprivation, diabetes, previous hospitalisation for atrial fibrillation, and baseline preventive pharmacotherapy as predictors. Calibration and discrimination were assessed in the whole cohort and in 15-year age bands, different ethnic groups, quintiles of deprivation, regional sub-populations and according to baseline dispensing of pharmacotherapy.

Results

First CVD events occurred in 62,031 of the 1,746,695 people during 8,526,024 person-years of follow-up (mean=4.8 years). Median five-year CVD risk was 1.1% in women and 2.6% in men. In both sexes, the risk equations were well calibrated throughout the risk range and had good risk discrimination in the national, regional and ethnic populations, within 15-year age bands, in deprivation quintiles and according to baseline medication dispensing.

Conclusions

Robust policy-focussed CVD risk equations can be developed solely from administrative health data to inform population health planning, and will complement CVD primary prevention at the individual level using clinical risk tools.

10

Use of cross-sectoral data linkage to predict high-rate offenders in Western Australia

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High-rate, persistent (so-called 'prolific') offenders have a major impact on crime rates and public perceptions of safety, and place a large burden on communities.

Using population-level data, we identified 'prolific' offenders in WA. Official criminal records of all offenders born 1980-1995 were linked to administrative health, education and child protection records. Data on families (parents & siblings) were also included. The study identified factors that distinguish between prolific & non-prolific offenders. We also compared a) male & female offenders, and b) Indigenous & non-Indigenous offenders.

Prolific males (3%) accounted for 21% of CJS contacts. For male Indigenous offenders (e.g.), being the subject of a maltreatment allegation and/or having a serious mental health condition before the age of 18 increased the odds of being a prolific offender. Being placed in out of home care and becoming a teenage father also increased the likelihood of being a prolific offender. Two criminogenic factors - early onset of offending (formal contact before age 12) and early violence - emerged as the most significant risk factors associated with prolific offending.

Crime prevention has long been the remit of criminal justice agencies; yet, other agencies such as child protection and mental health services have much of the (early) information needed to target prevention. Criminal justice agencies are well-placed to administer *crime reduction* strategies through the targeting of early-onset and early-violent offenders. A combined approach is likely to have the greatest effect on reducing the burden on individuals and society.

11

Identifying prehospital fatal injuries in New Zealand using data linkage

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Background: Trauma-related injuries are a common cause of mortality globally. There has been little examination of prehospital fatalities (deaths occurring either at the scene of the injury event or en route to hospital) and the identification of prevention opportunities in the prehospital setting to prevent trauma-related fatalities in New Zealand.

Aims: To determine the patterns of prehospital injury deaths in New Zealand for the period 2008-2012.

Methods: All deaths registered in 2008-2012 with an underlying cause of death International Classification of Injury (ICD-10) external cause code within V01-Y36 were selected from the Mortality Collection and linked to both hospital discharge data and Coronial case files extracted from National Coronial Information System (NCIS). Hospital discharge data and Coronial case files were used to identify if cases died either in the hospital or prehospital setting. Information regarding the demographic characteristics of the decedents, and the injury circumstances was extracted.

Results: 7004 injury deaths were identified from the Mortality Collection and had Coronial case files available on NCIS. Linkage identified the majority of deaths occurred in the pre-hospital setting (n=5791, 82%). The highest rates of pre-hospital fatal injury occurred in adolescents (16-24 yrs), males, Indigenous Maori and caused by suffocation or transport-related injury mechanisms.

Discussion & conclusions: Linkage identified the major burden of fatal injury in New Zealand occur in the prehospital setting. Understanding the distribution of prehospital mortality key step in identifying opportunities for primary prevention and possible secondary previous including improved care in advanced trauma system & bystander interventions.

12

Analysing complex linked administrative data in health services research: Issues and solutions

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Introduction

Linked administrative data are increasingly being used to evaluate health-service use because they comprehensively capture interactions with the health system. However analysis of these data are complex and require advanced strategies.

Methods

We evaluated the impact of changes in regularity of general practitioner contact on diabetes related hospitalisation using whole of population, person-level linked primary care, hospital, Electoral Roll and death records. The data were unbalanced (individuals could exit and enter multiple times), over-dispersed and contained a high proportion of zeros. Other challenges included changes in availability of tests (ascertainment bias), the likelihood of prior health service use influencing the dependent variable (initial conditions, simultaneity/reverse causality bias) and likely correlation of observed and unobserved variables.

Results

Models which included separate components for zero and non-zero outcomes, were required for these data. Mundlak variables (group-means of time-varying variables) were used to relax the assumption in the random-effects estimator that the observed variables were uncorrelated with the unobserved ones. Prior health service use was adjusted for using 4-year lags of GP contact and one-year lag of hospitalisation. Ascertainment bias was addressed using the number of years available for identification for each person as a covariate. AIC/BIC values were used to identify the best model.

Conclusion

Availability of linked data, together with increases in computing power, has vastly increased its potential for use. This has also increased the complexity of analyses being undertaken necessitating recognizing and addressing problems, such as endogeneity, that arise due to the observational nature of the studies undertaken.

13

Data linkage exploring morbidity/mortality associated with viral hepatitis in Victoria

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Background

Viral hepatitis affects more than 300 million people worldwide and is a leading cause of liver cancer and premature death. Liver cancer is the sixth most common cause of cancer death in Australia. Little is known about the burden of disease attributable to hepatitis B and C in Victoria.

Aim

To explore morbidity/mortality associated with hepatitis B (HBV) and/or C virus (HCV) infection in Victoria using data linkage.

Methods

All HBV and HCV notifications in Victoria (1991-2016) were linked with liver cancer records in the Victorian Cancer Registry (1991-2016), deaths in the National Death Index (1991-August 2017), and Emergency Department presentations/hospitalisations recorded by the Victorian Department of Health (1999-2016 and 1993-2016, respectively), and the number of notified individuals experiencing each of these adverse outcomes was assessed.

Results

Of the 115,709 individuals with notified viral hepatitis there were 36.3% with HBV, 60.8% with HCV and 2.9% with both HBV/HCV infections. At first notification, the majority of individuals resided in metropolitan Melbourne (82.7%), were infected with HCV (60.8%) and were male (59.8%). Of all individuals with notified viral hepatitis 2% developed liver cancer and 13.6% were deceased.

Conclusion

This study is the first to ascertain the burden of adverse outcomes of viral hepatitis in Victoria, and demonstrates the substantial number of liver cancer cases and deaths in people affected. The planned examination of clinical and population health strategies

related to chronic viral hepatitis and liver cancer prevention and the subsequent findings of this study will inform future targeted interventions.

14

A total population sibling linkage study of infection-related hospitalisation

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Background

All children are exposed to pathogens, but only a minority develop severe infection. This differential susceptibility partly reflects shared heritable and environmental factors.

Aim

We aimed to estimate the sibling risk ratios of infection-related hospitalisations (IRHs) in children.

Methods

We analysed all live-born births from population-based Western Australian registries 1980-2014. Hospitalisations within families were linked with the Family Connections Project. We estimated sibling risk ratios; the ratio of risk of IRHs (overall and specific, defined by discharge ICD coding) in children (the proband) whose siblings had IRHs to the risk in probands whose siblings did not have IRHs. Adjusted RRs were estimated by Cox regression models. Children were followed from when they became a sibling until an IRH diagnosis (up to three diagnoses), death, 18th birthday, or end-2014.

Results

Among 536,117 probands, 155,885 had at least one IRH. 141,167 probands had a sibling with a previous IRH. The median time between sibling and proband IRHs was 1.4 years. Overall IRH risk increased with sibling IRHs: 1 sibling IRH (adjusted RR: 1.41, 95%CI: 1.39-1.43); 2 IRHs (1.65, 1.61-1.69) or 3+ IRHs (1.83, 1.77-1.90). Varying infection-specific effects were observed.

Conclusions

Having a sibling with a previous IRH was associated in a dose-response manner with a higher risk of IRH in the proband. Shared heritable and environmental factors are likely mechanisms. Sibling analyses measure associations from exposures at different ages, providing robust estimates of shared heritable determinants of infection that do not reflect seasonal variation in pathogen epidemiology and virulence.

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Emergency department burden of acute respiratory infections and risk factors

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Introduction Studies examining Acute Respiratory Infections (ARIs) in Emergency Departments (EDs), particularly in rural and remote areas, are rare. This study aimed to examine the burden of ARIs among Aboriginal and non-Aboriginal children presenting to Western Australian (WA) EDs from 2002 to 2012.

Method Using a retrospective population-based cohort study linking ED records to birth and perinatal records, we examined presentation rates for metropolitan, rural and remote Aboriginal and non-Aboriginal children from 469,589 births. We used ED diagnosis information to categorise presentations into ARI groups and calculated age-specific rates. Negative binomial regression was used to investigate association between risk factors and frequency of ARI presentation.

Results Overall 26% of presentations were for ARIs. For Aboriginal children, the highest rates were for those aged <12 months in the Great Southern (1,233 per 1,000 child-years) and Pilbara regions (1,088 per 1,000 child-years). Rates for non-Aboriginal children were highest in children <12 months in the Southwest and Kimberley (400 and 375 per 1,000 child-years respectively). Presentation rates for ARI in children from rural and remote WA significantly increased over time in children aged <5 years. Risk factors for presenting to ED with ARI in Aboriginal and non-Aboriginal children were: male, prematurity, Caesarean delivery, and residence in the Kimberley and lower socio-economic areas.

Conclusion One-in-four ED presentations in WA children are for ARIs, representing a significant out-of-hospital burden with some evidence of geographical disparity. Planned linkages with hospital discharge diagnosis data will aid in assessing the sensitivity and specificity of ARI diagnoses in EDs.

16

Do first-line hepatitis B treatments prevent liver cancer and mortality?

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Introduction: Chronic hepatitis B (CHB) is a significant global health problem, being a predominant cause of liver cancer and death. Evidence is required to assess the long-term impact of antiviral treatment for CHB on these adverse outcomes. However, much of the existing evidence relies on observational data subject to bias in the provision of treatment to at-risk individuals.

Methods: A systematic review was conducted. Studies were identified on people living with CHB, comparing first-line treatment (entecavir or tenofovir) to no treatment. The main outcomes were hepatocellular carcinoma (HCC) and all-cause mortality. Crude and propensity/risk score adjusted estimates were used to conduct random effects meta-analyses on this association.

Results: 10 cohort studies were included in the meta-analysis. All studies used entecavir treatment. Meta-analysis of crude results showed no impact of treatment on adverse outcomes. However, using adjusted estimates, entecavir substantially reduced the risk of HCC (hazard ratio: 0.48 95% CI (0.32, 0.64)) and all-cause mortality (hazard ratio: 0.42 95% CI (0.23,0.61)).

Conclusions: This analysis provides evidence that treatment with entecavir reduces the risk of both HCC and all-cause mortality in people living with CHB, and supports increased use of treatment to prevent adverse outcomes. The disparity between crude and adjusted rates demonstrates the importance of these methods in analysis of cohort studies where bias is unavoidable.The increased use of adjustment techniques and data from registry/linkage-based systems is essential for future research on tenofovir treatment on the outcomes of HCC and all-cause mortality.

PROSPERO Trial registration: CRD42018088356

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Factors associated with uptake of rotavirus vaccines in Australian children

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Background/Aims

Rotavirus vaccines were included in Australia's national immunisation program in mid-July 2007. Despite being administered at the same time as other vaccines on the childhood immunisation schedule, uptake of this vaccine has been reported to be lower than other vaccines in Australia. We aimed to report on the coverage and determinants of rotavirus vaccine uptake among Australian Aboriginal and non-Aboriginal children.

Methods

We conducted a retrospective population-based cohort study of children born in New South Wales and Western Australia (WA) from 2007-2012. Birth and perinatal records for 682,849 children were probabilistically linked to Commonwealth-held immunisation records. To assess the determinants of vaccine uptake, multivariate logistic regression modelling was used to obtain adjusted odds ratios (aOR) with 95% confidence intervals (CI).

Results

The proportion of children deemed to be fully immunised by 12 months for rotavirus vaccine was 73.8% in Aboriginal children and 85.8% in non-Aboriginal children. Compared to first-born children, the aOR of receiving ≥1 dose(s) of the vaccine for infants born to mothers with ≥3 previous pregnancies was 0.30 (95%CI:0.27-0.34) among Aboriginal and 0.53 (95%CI:0.51-0.55) among non-Aboriginal children. The aOR for children with low birthweight (<1500g) compared to birthweight >3500g was 0.46 (95%CI:0.30-0.70) among Aboriginal and non-Aboriginal children. Gestational age <33 weeks, younger maternal age, maternal smoking during pregnancy, socio-economic disadvantage and birth in WA were some of the other independent risk factors associated with decreased vaccine uptake.

Conclusion

The key population groups identified in this study are likely to benefit from targeted programs for improving vaccine coverage.

18

Epidemiology of otitis media hospitalisations in Western Australia 1996-2012

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Introduction

Otitis media (OM) is a common childhood infection and the most common reason for paediatric surgery. Australian Aboriginal children have higher rates of OM than non-Aboriginal children; however, there is a paucity of data comparing OM hospitalisations and procedures at the population level.

Aim

We report rates for OM hospitalisation and myringotomy with ventilation tube insertion (MVTI) in a cohort of 469,589 Western Australian children, 1996-2012.

Methods

We used International Classification of Diseases diagnosis codes to identify hospitalisations for OM or MVTI surgical procedures for children aged <15 years. We calculated age-specific hospitalization rates per 1,000 child-years in Aboriginal and non-Aboriginal children by year of admission and area level socio-economic status.

Results

There were 534,674 hospitalisations among 221,588 children. Aboriginal children had higher rates for OM than non-Aboriginal children (23.3/1,000 [95% Confidence Interval (CI) 22.8,24.0] vs 2.4/1,000 [95% CI 2.3,2.4] child-years) with no change in disparity over time. Conversely non-Aboriginal children had higher rates of MVTI than Aboriginal children (13.5/1000 [13.2,13.8] vs 10.1 [8.9,11.4]). OM hospitalisation rates were higher among children from lower socio-economic areas while MVTI was more common among those from higher socio-economic areas. There was a decline in OM hospitalisation rates between 1998 and 2005 and remained stable thereafter.

Conclusions

Aboriginal children and those from lower socio-economic areas had more OM-related hospitalisations but fewer MVTIs. Despite a decrease in rates of OM and MVTI hospitalisations during the initial years of the study, the disparity between groups remained. A renewed focus on prevention is needed.

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International comparisons of socio-economic disparities in paediatric respiratory infection hospitalisations

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Background: Acute respiratory infections (ARI) are an important cause of childhood morbidity globally with socio-economically deprived children at a higher risk.

Aim: Using population-based administrative data in Western Australia, England and Scotland, we compared socio-economic disparities for hospitalisations for ARI in young children.

Methods: Separate retrospective cohort studies using linked population-based birth, death and hospitalisation data were conducted in each jurisdiction; data were available on births in Western Australia and Scotland, 2000-2012 and in England, 2003-2012. ARI hospitalisations in infants (<12 months old) and young children (1-4 years) were identified through a selection of ICD-10 diagnosis codes. We calculated admission rates per 1000 child-years by ARI diagnosis and socio-economic deprivation using jurisdiction specific socio-economic deprivation scores.

Results: The overall infant ARI admission rate was 44.3/1000 child-years in Western Australia, 40.7/1000 in Scotland and 40.1/1000 in England. Equivalent rates in children aged 1-4 years were 9.0, 7.6 and 7.6. Bronchiolitis was the most common diagnosis for infant admissions in all jurisdictions. Compared with infants from the least deprived socio-economic areas, those from the most deprived areas had a higher risk of ARI admissions, more so in Western Australia (incidence rate ratio 3.9 [95% confidence interval 3.5, 4.2]) than in England (1.9 [1.7, 2.1]) or Scotland (1.3 [1.1, 1.4]).

Conclusions: Admissions for ARI were higher in Western Australia and displayed greater socio-economic disparities than England and Scotland. Prevention programs focusing on disadvantaged populations in all three countries are likely to translate into real improvements in the burden of ARI in children.

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Self-Controlled Case Series Investigating the Association between Influenza Vaccination and Miscarriage

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Background: Despite national recommendations and the availability of free vaccine, just 40% of pregnant women receive inactivated influenza vaccine (IIV) each year. Safety concerns are commonly cited as a barrier, and one concern is the risk of miscarriage. Some previous studies have suggested there is an association between IIV and miscarriage, although these have been subject to bias, questioning whether IIV is associated with miscarriage.

Aim: We aimed to assess the risk of miscarriage associated with IIV during pregnancy using a self-controlled method.

Methods: Pregnancies ending in miscarriage were identified from hospital separation and emergency department (ED) presentation records in Western Australia from 2012 to 2015. Women admitted to hospital or presenting to ED with a spontaneous abortion (O03) or missed miscarriage (O02.1) were included. We used an adapted self-controlled case series which allowed for an exposure with an occurrence which may be influenced by the event. The incidence rate ratio (IRR) was estimated based on a pseudo-likelihood to compare the risk of miscarriage in the exposure period (0-28 days post-vaccination) to non-exposure periods.

Results: We identified 46 women with a pregnancy ending in miscarriage and with complete IIV exposure information; 36 women received IIV prior to eight weeks of pregnancy, 7 women between 8-12 weeks, and 3 women between 13-20 weeks. Based on a self-controlled analysis, we observed no association between IIV and risk of miscarriage (IRR: 0.99; 95% CI: 0.72-1.36).

Conclusions: These findings support the safety of vaccination during pregnancy and may support vaccine confidence.

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Gastrointestinal surveillance system evaluation during the 2018 Commonwealth Games

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Background: Syndromic surveillance for real-time disease monitoring during mass gathering events is rapidly evolving due to availability of data and new analytical tools. We established an enhanced surveillance system during the 2018 Commonwealth Games, including the introduction of the Emergency Department Syndromic Surveillance System (EDSSS) and an SMS electronic questionnaire.

Aim: To examine the role of the EDSSS and questionnaire in identifying potential gastrointestinal (GI) outbreaks during the enhanced surveillance period, 20 March–18 April 2018.

Methods: Selected and validated ICD-10 diagnosis codes were used to classify the GI syndrome. A dashboard that provided real-time data on these GI presentations was monitored daily. The questionnaire requesting food and water exposure information prior to symptom onset was sent upon ED discharge. Alert thresholds were based on historical ED GI presentation data. EDSSS and questionnaire data were extracted and analysed using Epi Info™ software.

Results: 338 people with GI were identified through EDSSS; daily presentations exceeded the alert threshold on one occasion. There were 307 (90.8%) SMS messages were sent and 88 (28.6%) questionnaires completed. Ten signals identified through the questionnaires based on common exposures were further investigated; none were established true outbreaks.

Conclusion: EDSSS and electronic questionnaire for GI surveillance was beneficial in monitoring outbreaks with little demand on staff time. Much of this work is ongoing post Games as a direct legacy. A key recommendation for mass gathering events is to have these surveillance systems to allow early identification of the presence or absence of outbreaks.

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Modelling antibiotics prescription: comparison of different statistical models in analysis of count data from otitis media clinical trial

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Background:

Otitis media is one of the leading causes of antibiotic prescriptions in children. In our trial comparing pneumococcal conjugate vaccines, antibiotics prescribing is a problem. Poisson regression is a commonly applied method in the analysis of count outcome data. However, many real-life data violate the Poisson assumption. We examined different statistical models for count data using a preliminary dataset of antibiotic prescriptions for acute otitis media (AOM) and chronic suppurative otitis media (CSOM) to ascertain model fit of Poisson-based models in relation to others.

Methods:

Antibiotic prescriptions in children attending the health clinics for parent-driven presentation and active research examinations with a diagnosis of any AOM and CSOM was compared using different Poisson-based and negative binomial-based models for count data. Empirical model selection was assessed using log-likelihood test (LL), Akaike information criterion (AIC), Bayesian Information criterion (BIC) and the difference between observed and predicted probabilities of each model.

Results:

Over first 2 years of life ~ 1300 antibiotic prescriptions were made following ~ 1410 diagnosis of any AOM and CSOM. The variance was greater than the mean indicating potential over dispersion. The goodness-of-fit statistics based on LL, AIC and BIC gave varying results for different models, but the difference between the observed and predicted probabilities best fit the data for NB-based models.

Conclusion:

Comprehensive study specific model selection is essential to ensure appropriate reporting and inferences that are a true representation of sample data are made. However, in RCTs, its important to specify the model prior to data analysis.

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Q fever exposure and risk factors in Australia

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Background: There continue to be ~500 Q fever (*Coxiella burnetii*) notifications annually in Australia and it is unclear whether current recommendations for vaccination are adequate. To estimate the risk of exposure in different population groups we conducted a cross sectional study (serosurvey and questionnaire) among blood donors in non-metropolitan regions with high Q fever notification rates (Hunter New England in New South Wales and Toowoomba in Queensland) and in Sydney and Brisbane.

Methods: Seroprevalence of phase II IgG antibody against *C. burnetii* was measured by indirect immunofluorescence (screening at 1/50 dilution). Age/sex standardised seroprevalence was calculated for metropolitan and non-metropolitan regions of each state. Independent risk factors for seropositivity were identified using logistic regression.

Results: Of 2740 donors, 99 were seropositive (3.6%). Standardised seroprevalence was higher in non-metropolitan than metropolitan regions in New South Wales (3.7% v 2.8%; p=0.156) and Queensland (4.9% v 1.6%; p=0.002). Independent predictors of seropositvity were regular contact with sheep, cattle or goats (OR 5.3; 95% CI: 2.1-13.5), working in an abattoir (OR 2.2; 95% CI: 1.2-3.9), and assisting at the birth of an animal (OR 2.1; 95% CI: 1.2-3.6). Reassuringly, these risk groups are recommended for vaccination. However, having lived in a rural area was also an independent risk (OR 2.5; 95% CI: 1.1-5.9). Among groups recommended for vaccination, only 40% had heard of the Q fever vaccine and 10% were vaccinated.

Conclusion: Due to the higher risk of Q fever and multiplicity of exposures among rural residents, community-based awareness and vaccination programs are recommended.

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Improving understandings of Victorian influenza epidemiology: Inter-seasonal standardisation of laboratory-confirmed notifications

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Background

The value of notifiable laboratory-confirmed influenza surveillance is currently limited in Victoria because it does not account for increases in testing. Disproportionate increases in laboratory-confirmed influenza notifications since 2009 are likely driven by expanded PCR testing[1,2]. However, with insufficient access to negative or total testing data, there is currently no statistical method to account for testing increases.

Aim

The study aimed to determine whether utilising an inter-seasonal standardisation model could account for increases in testing and therefore provide greater understanding of Victoria's influenza epidemiology.

Methods

Standardisation of Victorian Notifiable Disease Surveillance System notification data from 2010 to 2017 was explored with two models of inter-seasonal testing multipliers. Models were established by identifying inter-seasonal periods and deriving variations in average notifications from reference indicator periods (2010-2011, 2011-2012). Models were applied to seasonal notifications with fit determined against observed annual influenza-like-illness trends as per Victorian Sentinel Practice Influenza Network and National Home Doctor Service data.

Results

Standardised notifications using the 2010-2011 baseline were discordant with trends for all years except 2013. Standardisations utilising the 2011-2012 baseline approximately reflected trends for 2013, 2014 and 2016. Neither standardisation produced comparable results for 2015 and 2017.

Conclusion

As a method inter-seasonal standardisation has limited ability to account for substantial between and within season changes. Total testing or negative test result data remain crucial to restoring the value of Victorian notifications data. However, inter-seasonal standardisation can somewhat account for increases in testing and provided useful insights into increases in testing and inter-seasonal periods.

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Offending rates in severe mental illness: impact of substance use

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Background: Previous studies have shown an increased risk of criminal offending by persons with severe mental illness (SMI). Some suggest other risk factors such as substance abuse, victimisation and parental history of offending may be associated with the increased risk.

Aim: To assess the impact of substance abuse and other risk factors on offending rates in people with SMI compared to those with no mental illness (NMI).

Methods: This is part of a longitudinal record-linked whole-population study of 467,945 children born in Western Australia (WA) between 1980 and 2001. It includes linkages between the WA psychiatric case register, WA Corrective Services data and other statewide registers. This analysis created a cohort of 184,147 people born 1983 to 1991 to explore the impact of exposure to a variety of risk factors on rates of offending.

Results: People with SMI had a higher rate of offending than those with no mental illness with an unadjusted incidence rate ratio (IRR) of 3.91 (95% CI 3.61-4.24). Adjusting for substance abuse reduced the rate ratio by 60%: IRR 1.57 (95% CI 1.44-1.72). Minimal change was seen when adjusting for other factors (e.g. sociodemographics, victimisation, parental offending history): adjusted IRR 1.55 (95% CI 1.42-1.70).

Conclusion: Our analysis shows people with SMI have a higher rate of offending than those with no mental illness. Substance abuse has a major impact on this rate. Results suggest the need for a greater focus addressing the issue of substance abuse to reduce the rate of offending in this population.

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Differential childhood mortality risks mediated by obstetric complications, early environment.

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Background:

Offspring of mothers with severe mental illness (case offspring) have higher risk of perinatal and infant mortality compared to those born to unaffected mothers (comparison offspring). The mechanisms underlying these increased risks are unclear.

Aims: Our aims were to assess whether: i) the distribution of mortality outcomes varied between case and comparison offspring; ii)case offspring were more likely than comparison offspring to be exposed to severe obstetric complications; and iii) mortality is associated with maternal severe mental illness after adjustment for obstetric complications.

Methods:

We identified a whole-population cohort of 15,486 case and 452,229 comparison children born in Western Australia 1980-2001. Record linkage across State psychiatric, inpatient, mortality, birth and midwives registers provided mortality outcomes and measures of exposure to obstetric complications and other relevant covariates.

Results:

A higher rate of mortality was observed amongst case children (2.4%) than comparison children (1.5%) (unadjusted OR= 1.6, 95%CI=1.4-1.8). Case children also experienced higher rates of severe obstetric complications and were more often exposed to other sub-optimal early life environments. After adjustment for exposure to obstetric complications, the effect of maternal severe mental illness on mortality was substantially reduced (OR=1.3, 95%CI=1.2-1.5). Further reductions were observed after adjustment for other adverse exposures (OR=1.1, 95%CI=1.0-1.3).

Conclusion:

We observed substantial reductions in the influence of maternal severe mental illness on perinatal and infant mortality rates after accounting for exposure to obstetric complications and other environmental exposures. This highlights the importance of good antenatal care, and continuing social support for all vulnerable child-bearing women.

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Mental health in adolescence: the role of gender role attitudes in shaping outcomes

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Background: Adolescence is a key life-stage when gendered behaviours and attitudes are trialled and crystallised. There is some evidence that traditional gender role attitudes (beliefs about behaviours and responsibilities appropriate for women and men) are associated with poor mental health outcomes, however few studies have examined such associations among adolescents.

Aim: To test associations between gender role attitudes and mental health outcomes among Australian adolescents.

Methods: Data was drawn from the Longitudinal Study of Australian Children, a nationally representative Australian study. Participants were 3059 adolescents with complete data for Waves 5-6 (years 2012-2014), aged 14-15 years. Parent-reported mental health was measured using subscales of the Strengths and Difficulties Questionnaire(SDQ). Gender role attitudes were self-reported in Wave 6. Analyses were stratified by gender and controlled for parental education, household income, area disadvantage, ethnicity, religiousness and household type (measured in 2012). Multivariable linear regression analyses were conducted to test associations.

Results: Egalitarian gender role attitudes were associated with less conduct problems and hyperactivity, and better prosocial behaviour for both males and females, and better overall mental health for females. There were no associations between gender role attitudes and peer problems or emotional problems. Associations were typically greater for females than for males and sensitivity analysis with parent- and teacher-reported mental health supported main findings.

Conclusions: Traditional gender role attitudes are associated with some dimensions of adolescent mental health. Adolescents with egalitarian gender role attitudes have better prosocial behaviour, and lower hyperactivity and conduct problems than adolescents with traditional gender role attitudes.

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Factors influencing developmental vulnerability in Aboriginal and Torres Strait Islander children

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Background: The Australian Early Developmental Census (AEDC) provides a measure of early child health and development. Understanding the factors that influence child development among Aboriginal children is important to inform policy and practice.

Aim: To investigate factors that are associated with developmental vulnerability at school-entry among Western Australian (WA) Aboriginal children.

Method: This is a prospective population-based birth cohort study using linked datasets with information on cohort children, and their mothers and siblings. The 2009 and 2012 AEDC was used to assess developmental vulnerability in Aboriginal children born in WA across five domains of development. Adjusted logistic regression models were used to determine salient risks.

Results: 49.3% of Aboriginal children were vulnerable on at least one developmental domain and 30.4% were vulnerable on two or more. Children developmentally vulnerable on one or more domains were more likely to have at least one contact with child protection services compared to those with no contacts (aOR 1.47, 95% CI 1.21-1.78). Developmentally vulnerable children were also more likely to have a mother with at least one mental health admission compared to mothers with no admissions (aOR 1.51, 95% CI 1.28-1.78). Aboriginal children with at least one developmental vulnerability experienced a range of adverse health and social outcomes. Similar risks were evident for children with two or more vulnerabilities.

Conclusions: Many Aboriginal children in WA are entering school with at least one developmental vulnerability. Addressing child protection issues and supporting maternal mental health are important for improving the early development of young Aboriginal children.

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Incidence of suicide in Australian Defence Force Personnel 2001

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Background: The study is the first to take a population-based approach to the analysis of suicide in ADF personnel.

Aim: The study quantifies incidence of suicide among serving and ex-serving ADF personnel with at least one day of service from 2001; identifies factors that may be associated with suicide; and establishes measures for population suicide monitoring.

Methods: A population-based study design with linked administrative data from the Department of Defence and mortality data from the Australian Institute of Health and Welfare were used to identify suicides. Linking existing administrative data cost-effectively maximises the use of data while enabling population-based analysis. Standardised mortality ratios and crude rates were used to estimate suicide risk in the study population and changes in risk over time. Logistic regression was used to model service-related suicide risk factors for ex-serving personnel.

Results: In 2001–2015, 325 suicides were identified in the study population. Across all age groups combined, and compared with Australian men, men serving in the ADF had lower suicide risk; ex-serving men had similar risk. In those aged 18–29, ex-serving men had higher suicide risk than Australian men. Ex-serving men of all ages who were medically discharged or discharged in ranks other than commissioned officer had higher suicide risk than their peers.

Conclusion: Suicide risk in serving and ex-serving ADF personnel varied from the Australian population. In ex-serving personnel, there was some variation by service-related characteristics. Updated analysis to 2016 will be released in 2018. Annual updates will inform policy development and evaluation.

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Poor physical health in people with psychotic illness

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Introduction

Data from Australia's second national prevalence survey of psychotic illness (Survey of High Impact Psychosis—SHIP) provide a comprehensive snapshot of multiple facets of the lives of people living with severe mental illness, extending and deepening our understanding of their clinical presentation, living circumstances, social participation and needs. This presentation focuses on their poor physical health profile, including contributing factors.

Methods

The survey used a two-phase design to draw a representative sample of 1,825 adults aged 18–64 years with psychotic disorders and in contact with public treatment services from a population of 1,464,923 adults. The survey included items on: psychopathology; physical health including physical activity, nutrition and fasting blood tests; cognition; disability; at-risk behaviours; education; employment and income; accommodation; service utilisation and need.

Results

The prevalence of the metabolic syndrome was high, affecting 57.9% of participants: on average, risk factor thresholds were exceeded at an early age. Rates for other physical health conditions were markedly higher compared to the general population. Two-thirds (65.9%) of participants were current smokers, 47.4% were obese and 32.4% were sedentary. Half (49.8%) had a lifetime history of alcohol abuse/dependence and 50.8% a history of lifetime cannabis abuse/dependence. Poor social circumstances relative to the general community, especially with respect to employment, education and housing, exacerbate the physical and mental health profile of this group.

Discussion

These data emphasise the multiple health challenges that people with psychotic illness face and highlight the importance of a holistic and integrated approach to service provision.

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Cancer screening in Australians with severe mental illness

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Background

People with severe mental illness have similar cancer incidence but higher mortality compared with the general population. Lower participation in cancer screening may be a contributing factor but existing studies are conflicting.

Methods

We used de-identified Pharmaceutical Benefits Scheme (PBS) and Medicare Benefits Scheme data from a random 10% sample of Australians registered for Medicare to investigate cancer screening frequency (colorectal, prostate, cervical) among people with and without severe mental illness (SMI) between 1/1/2004 and 31/12/2014. Three age and sex-specific cohorts were defined: those aged 50-69 years (n=760,058); women aged 18-69 years (n=918,140): and men aged 50-69 years (n=380,238). SMI was defined by recurrent records of atypical antipsychotic prescription in PBS data. Poisson Regression was used to estimate incidence rate ratios (IRR) and 95% confidence intervals (CIs) for the association between SMI and rates of faecal occult blood testing, pap smears and prostate specific antigen testing.

Outcomes

Having severe mental illness was associated with lower rates of pap smears (IRR=0·83, 95% CI: 0·82-0·84) and prostate specific antigen testing (IRR=0·83, 95% CI: 0·81-0·85), compared to people without SMI. For faecal occult blood testing, rates in those with SMI were lower (IRR=0·83, 95% CI: 0·73-0·94) only among people who visited their general practitioner less frequently (< 5visits/year on average).

Conclusion

Our results suggest that differences in screening frequency may explain some of the mismatch between cancer incidence and mortality in people with severe mental illness and indicate that action is required to improve preventative screening in this very disadvantaged group.

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How accurate is dementia coding in hospital and mortality data?

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Background

Administrative data are commonly used for surveillance, assessment of health care utilisation and evaluation of health outcomes for people with dementia. However, the accuracy of ICD-10 coded hospital and mortality data in identifying mild cognitive impairment (MCI) and dementia is largely unknown.

Aim

To calculate the sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of MCI and dementia coding.

Methods

Participants of the population-based Sydney Memory and Ageing (MAS) study underwent 2-yearly neuropsychological testing. Cognitive status was classified into normal, MCI and dementia at each assessment by a consensus panel of clinicians providing a robust diagnosis. MAS records were probabilistically linked to NSW hospitalisation and death records for 2001-2014. MCI (ICD-10: F06.7, G31.84) and dementia (ICD-10: F00, F01, F02, F03, F05.1, G30, G31.1) were identified from the administrative data.

Results

There were 14,467 hospitalisations for the 1,026 participants and 273 deaths. Over the study period 553 (53.9%) participants had a diagnosis of MCI and 105 (10.2%) of dementia. MCI was not recorded on any hospital or death record. For dementia, sensitivity was low (29.1%) but specificity high (99.4%) for hospital records. PPV was 59.4% and NPV 97.9%. Only 5 (6.2%) of participants with dementia, had dementia recorded on every hospitalisation following their diagnosis. Similarly, sensitivity was very low (17.0%) and specificity high (96.5%) for death records. PPV was 50.0% and NPV 84.8%.

Conclusion

MCI is not recorded and dementia is under-recorded in administrative data. To maximise identification of dementia an 'ever-identified' approach is recommended.

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Estimating dementia incidence and prevalence with multiple linked datasets

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Background

Dementia represents a significant burden on healthcare systems and prevalence is expected to increase rapidly due to population ageing. Australia is lacking up-to-date information on dementia prevalence and incidence, challenging health service planners.

Aim

This study uses multiple-linked administrative datasets to measure dementia in a large cohort of older people.

Methods

The 45 and Up Study collected baseline survey data (2006-2009) for 266,028 participants aged 45 years and over in New South Wales[1]. These data were linked with: deaths, hospitalisations[2], Pharmaceutical Benefits Scheme (PBS) claims[3] and Aged Care data[4] for the period 2006-2014. Dementia was estimated from diagnosis codes within hospitalisations/ aged care assessments and dementia-specific medication claims. Age-specific incidence and prevalence were calculated.

Results

9110 cases of dementia were identified in the cohort. Age-specific incidence rates ranged from 0.3 per 1000 person-years in those 55-59 years old to 72.6 per 1000 person-years in those 90+ years old. Estimated prevalence of dementia was 0.1% and 18.9% in persons aged 55-59 and 90+ years, respectively. Incidence and prevalence were lower than published estimates, for example in people aged 85-89 years, the calculated crude incidence was about 80% of the global estimate.[5] Pharmaceutical data were important for detecting younger-onset dementia (under 65 years).

Conclusions

This study demonstrates the feasibility of using linked administrative data to measure dementia across a range of ages. The relative importance of different linked datasets varied by age. Further linkages, for example with GP medical records, could improve estimates particularly in younger age groups.

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Associations between time-of-day eating patterns and mood disorders

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Background: Meal timing may influence food choices, and affect neurobiology and psychological states. However, the relation between timing of food intake and mental health is not well known.

Aim: To determine if eating patterns that reflect timing of daily eating occasions, are associated with mood disorders among Australian adults.

Methods: During 2004-06 (aged 26-36 years) and 2009-11 (follow-up, aged 31-41 years), 906 participants reported 24-hour meal, snack, and beverage intake. The Composite International Diagnostic Interview measured lifetime mood disorder (depression or dysthymia). Eating patterns were determined using principal components analysis on proportions of participant's daily intake over seven time intervals: 6-9am, 9am-12pm, 12-3pm, 3-6pm, 6-9pm, 9-11pm, and 11pm-6am. Log binomial regression estimated prevalence ratios (PR). Covariates included sex, age, marital status, parental status, occupation, BMI, leisure-time physical activity, and smoking.

Results: Three eating patterns were derived: Traditional (highest proportions reflect breakfast, lunch and dinner), Afternoon (smaller proportions during morning and evening, highest in afternoon), and Late (low proportions in the morning, higher during the evening). After adjustment, participants with scores in the highest third of the Late pattern at both baseline and follow-up had a higher prevalence of lifetime mood disorder compared to those who scored in the lowest third at both time-points (PR: 1.7, 95% confidence interval: 1.1, 2.7). Lifetime mood disorder was not significantly associated ($p<0.005$) with the other patterns.

Conclusion: The timing of daily eating occasions, particularly skipped or delayed breakfast and proportionally higher intake later in the day, requires further examination in relation to mood disorders.

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An individual participant data meta-analysis of going-to-sleep position, interactions with fetal vulnerability and the risk of late stillbirth

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Background: In individual studies maternal supine going-to-sleep position is reported to increase the risk of late stillbirth (>28 weeks') 2.5 to 6 fold compared to left side position. We aimed to: 1) confirm the relationship between going-to-sleep position and late stillbirth risk and 2) test for interactions between sleep position and indicators of fetal vulnerability (small for gestational age [SGA], maternal smoking, and obesity).

Method: We searched publications identified by systematic bibliographic searches for studies that collected data on: women with late stillbirth and pregnant controls at similar gestation to cases, and late pregnancy sleep position with no sleep position intervention. One-step meta-analysis of individual participant data using mixed-effects models was performed.

Results: We identified data from four case-control studies (cases, n=713 late stillbirths; controls, n=1804). Pooled adjusted odds ratio [aOR] for supine going-to-sleep position compared to left side was 3.35 95% confidence interval [CI] 2.29 to 4.9, and for right side, 1.11 95% CI 0.89 to 1.38, compared to left side. There was no significant interaction between supine going-to-sleep position and maternal obesity (p=0.10), smoking (p=0.52), or SGA (0.21).

Conclusion: Our analysis found no difference between left or right side going-to-sleep position for women in the third trimester for fetal outcomes. As there was no interaction with measures of vulnerability, supine going-to-sleep position can be considered a risk factor for late stillbirth in all pregnancies.

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Growing up in Australia: BMI trajectories and risk factors in children of Australian immigrants aged 2-11 years

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Objectives: Children of immigrants have higher risk of overweight/obesity. The study objectives were to identify BMI-trajectories and their predictors in children of Australian immigrants from low-and-middle-income-countries.

Methods: Data of 4349 children aged 2-3 years were drawn from the Birth cohort of the "Longitudinal Study of Australian Children". Trained interviewers measured height and weight of children at 2-yearly intervals until they were 10–11 years. BMI

was calculated according to the International Obesity Taskforce cut-off-points. Maternal immigrant status was determined by Australian Bureau of Statistics and Human Development Index criteria. Latent Class Growth Analysis was used to estimate distinct BMI-trajectories. Multinominal logistic regression analysis was used to identify risk-factors with each BMI-trajectory.

Results: Six BMI-trajectories were identified: persistent high-risk (10%; n=394); persistent moderate-risk (5%; n=223); persistent low-risk (68%; n=3002); delayed-risk (6%; n=248); gradual-risk (8%; n=336); and declining-risk (3%; n=146) BMI-trajectories. Children of mothers from low-and-middle-income-countries were more likely to have persistent moderate-risk, persistent high-risk or gradual-risk BMI-trajectory and less likely to have low-risk BMI-trajectory. High birth weight was associated with persistent moderate-risk and persistent high-risk; low family socio-economic-position with persistent high-risk and gradual-risk; non-participation in organized sports with persistent moderate-risk; and high screen-time with gradual-risk BMI-trajectory. We found that 4-7 years was a critical period for developing overweight/obesity in these children.

Conclusion: Disparities in child weight by maternal immigrant status were present from an early age. Promoting physical activities from an early age may lower excess overweight/obesity and associated cardio-metabolic risks in children of immigrants from low-and-middle-income-countries.

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Soft drink consumption and risk of cancers unrelated to obesity

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Background

We previously reported a positive association between sugar-sweetened beverage (SSB) consumption and obesity-related cancers; this association was not fully attributable to obesity and we hypothesised that there could be an underlying mechanism related to sugar that might be relevant to other cancers.

Aim

To investigate prospectively the association between SSB consumption and cancers not related to obesity, using data from the Melbourne Collaborative Cohort Study (MCCS). The association for artificially-sweetened beverages (ASB) was included for comparison.

Methods

Using the MCCS, which recruited men and women aged 40 to 69 years, we investigated associations between soft drink consumption (separately for SSB and ASB) at study entry and risk of all cancers other than the 13 identified by IARC as related to obesity. Hazard ratios (HR) and 95% confidence intervals were estimated using Cox regression.

Results

During 19 years follow-up of 35,202 participants, we ascertained 4,936 cancers unrelated to obesity (and 3,219 obesity-related). There was no association between consumption of SSB and non-obesity-related cancers. However, for those who consumed at least one ASB per day there was an increased risk of non-obesity related cancer, which was slightly stronger for younger participants (for >1 ASB/day: HR=1.29 (1.05, 1.59) for 63 years old vs HR=1.17 (0.91, 1.50) for 76 years old). There was a positive association between obesity-related cancers and frequency of SSB, but not ASB consumption.

Conclusion

Overall, there was no association between SSB consumption and risk of non-obesity-related cancers. There was a positive association between ASBs and non-obesity-related cancers, that was stronger for younger participants.

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The influence of waist and hip circumference on mortality risk

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Background Although visceral obesity has been shown to be associated with mortality and cardiovascular disease (CVD), the joint use of waist and hip in prediction models has been little investigated.

Aim We investigated whether waist circumference (WC) and hip circumference (HC) are better joint predictors of all-cause and CVD mortality than individual measures of WC, HC, waist hip ratio (WHR) and body mass index (BMI).

Methods We used data from 95,892 individuals, 25-74 years of age with no history of CVD at baseline, from the MOnica Risk, Genetics, Archiving and Monogram (MORGAM) project. Sex-specific multivariable Cox regression models stratified by cohort with age as the time scale were used to assess associations between the obesity measures and all-cause and CVD mortality. We then assessed the performance of the joint inclusion of WC and HC compared to BMI in a Framingham Risk Score (FRS) type model.

Results

During a mean follow-up of 11 years, 9190 all-cause and 2586 CVD deaths were recorded. We found statistical evidence that WC and HC jointly and BMI, WHR, WC individually were all associated with all-cause and CVD mortality for both males and females after controlling for age at baseline, total cholesterol, HDL cholesterol, systolic blood pressure, antihypertensive drugs, smoking and diabetes. In FRS type models, we found that WC and HC jointly had better predictive ability and discrimination than BMI.

Conclusion Waist and hip circumference as measures of obesity in prediction models could improve the identification of those at risk of death.

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Trajectories of body mass index in adulthood and all-cause mortality in the Melbourne Collaborative Cohort Study

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Background

Obesity is a risk factor for numerous chronic diseases and all-cause mortality. However, limited research on body mass index (BMI) and mortality has assessed patterns of BMI change across adulthood.

Methods

Group-based trajectories in BMI were estimated for 33,430 adults aged 40 to 70 years in the Melbourne Collaborative Cohort Study, using data collected on three occasions and recalled data for age 18 to 21 years. We used Cox regression to estimate hazard ratios (HR) of trajectories for all-cause mortality.

Results

We identified six BMI trajectories: lower-normal stable (TR1), higher-normal stable (TR2), normal to overweight (TR3), borderline obesity chronic (TR4), normal to class I obesity (TR5), and overweight to class II obesity (TR6). Compared with stable lower-normal BMI, chronic borderline obesity (TR4) and midlife obesity (TR5 and TR6) were associated with slightly higher mortality (HR=1.15, 1.01 to 1.30; HR=1.13, 1.02 to 1.24; HR=1.27, 1.09 to 1.48, respectively). In never-smokers, the HRs for TR4 to TR6 were higher than for all participants and the HRs for TR4 and TR6 were closer to each other.

Conclusion

Midlife obesity was associated with higher all-cause mortality even when BMI was normal in early adulthood, highlighting the importance of weight management throughout adulthood. Prolonged borderline obesity and changing from overweight to class II obesity in later life had similar associations with mortality. Therefore, policies and prevention programs should target obesity starting early in life if we are to mitigate the effects of current trends of increasing obesity in children, adolescents and young adults.

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Biologic utilisation for psoriasis associated with latitude in Australia

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Publish consent withheld

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Routinely-collected data in New Zealand: opportunities for clinically-relevant pharmacoepidemiological research

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The New Zealand Ministry of Health holds several national administrative data collections which can be used for pharmacoepidemiological research. These include the Mortality Collection (registered deaths and stillbirths), the National Minimum Dataset (hospital discharges), the New Zealand Cancer Registry (all cancers, except non-melanoma skin cancers), the National Maternity Collection (publicly funded maternity and new-born services), the National Immunisation Register (immunisation records of all children born since 2005), the Laboratory Claims Collection (types of laboratory tests undertaken, but not the results), and the Pharmaceutical Collection (claims by community-based pharmacists for the dispensing of prescription medicines and devices which are publicly funded). The Ministry has also developed a Virtual Diabetes Register. Patient records in the data collections are indexed to a unique identifier, the National Health Index (NHI), which enables the linkage of patient-level health and pharmaceutical dispensing data, along with demographic data held in the NHI Collection.

This presentation will provide examples of national studies which used data from these collections to explore medicine and medical device safety and utilisation issues which were of direct clinical interest at the time – including disparities in insulin pump utilisation, the use of prescription medicines during pregnancy, off-label use of proton pump inhibitors (PPIs) in infants, the extent of co-prescribing of contraindicated and use-with-caution medicines among simvastatin users, whether patterns of use of long-acting bronchodilators in people with chronic obstructive pulmonary disease (COPD) are consistent with international COPD treatment guidelines, and various safety concerns related to PPI use and to simvastatin dose.

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Measuring the effectiveness of RSV immunoprophylaxis using a case series

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Background: Respiratory Syncytial Virus (RSV) causes considerable paediatric morbidity. Prevention is limited to passive immunisation with monthly doses of Palivizumab for high risk infants fulfilling certain eligibility criteria.

Aim: To determine if monthly Palivizumab prophylaxis on the relative incidence of RSV in infants graduating from Neonatal Intensive Care Units (NICU) using a self-controlled case series approach.

Methods: Palivizumab dispensing, routine respiratory viral testing, perinatal and death data were probabilistically linked for a cohort of NICU births, 2002-2013. To account for non-independence of recurring events, cases were restricted to their first RSV detection before age 2 years. The exposure (benefit) period for each Palivizumab dose was 0-28 days from the dispensing date. RSV relative incidence in benefit periods versus control periods was estimated using conditional Poisson regression.

Results: The case-only dataset consisted of 1505 RSV positive cases with 37 (2.5%) having at least 1 Palivizumab dose (62% had ≤3 doses). RSV incidence was 69% reduced with 1 dose (IRR 0.31, 95% CI: 0.11, 0.87) and 43% reduced with 2 doses (IRR 0.57; 95% CI: 0.13,2.41). No beneficial effect was seen with ≥3 doses.

Conclusions: This is the first time a self-controlled case series has been used to determine beneficial effects of a time-dependent exposure on a disease outcome. Controlling for individual-level confounding factors is an advantage of this method and results indicate a beneficial effect of 1-2 Palivizumab doses. Subsequent analyses will explore the impact of Palivizumab eligibility throughout the RSV season and the effect within the first 12 months.

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Prevalence and safety of acamprosate use in pregnant women

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Background: Despite the increasing prevalence of fetal alcohol spectrum disorders, very little is known about the prevalence and safety of pharmacotherapies for alcohol dependence during pregnancy.

Aims: To determine the prevalence of exposure to acamprosate in pregnancy in New South Wales (NSW), Australia, and to assess maternal and neonatal outcomes associated with the use of acamprosate during pregnancy.

Methods: Pharmaceutical dispensing data were linked with NSW perinatal records to identify pregnancies between 2003 and 2012 in which neonates were exposed to acamprosate (n=52). Exposed pregnancies were matched with two comparison groups; women with a recent history of problematic alcohol use (alcohol control group) and women from the general community (community control group). Perinatal records of identified women and their children were linked to NSW hospital, mortality and birth anomaly records to examine health events during pregnancy, labour and delivery, and infancy.

Results: Exposure to acamprosate occurred in 7.7 in every 100,000 pregnancies. Rates of hospital admissions during pregnancy and 42 days post-partum in acamprosate treated women were not significantly different to women in the community control group, but was significantly lower compared with the alcohol control group. Acamprosate-exposed neonates were not significantly different from the alcohol control group or the community control group in terms of birth weight. The incidence of congenital abnormalities were not significantly different to the two control groups.

Conclusion: The prevalence of acamprosate use in pregnancy in NSW is low. Acamprosate exposure in utero was not associated with poor maternal or neonatal health outcomes.

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Regular General Practitioner contact – methods for measurement using administrative data

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Background

A small body of literature examines the relationship between “regularity” of contact with General Practitioners (GPs), i.e. the pattern of visits over time, and health outcomes. Methods previously used to may be conflated with the number of GP visits (frequency) which may impact on effect estimates.

Aim

Two published regularity measures, one derived from the variance in the days between GP visits and the second a categorical indicator, were assessed alongside a new measure designed to be uncorrelated with frequency.

Methods

A West Australian cohort at risk of diabetes-related hospitalisation was identified from primary care and hospitalisation data. Associations between regularity and frequency were assessed for each measure. Hospitalisation outcomes were regressed on regularity scores using negative binomial models, with and without frequency included, to assess whether associations between regularity and frequency biased estimates.

Results

The new index showed a weaker association between regularity and frequency than the previously published indices. According to the new measure, more regular GP contact was associated with a reduction in hospitalisation and this relationship was unchanged by the inclusion of frequency as a covariate. Under the existing measures regular contact was also associated with reduced hospitalisation, but this changed depending on the inclusion of frequency, suggesting that associations between regularity and frequency may confound relationships with health outcomes if uncontrolled.

Conclusion

This is the first work to compare measures of regularity and represents an important methodological advancement. Researchers should consider regularity of contact as a dimension of continuity of care when designing studies.

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Variation in cost for pathology tests among provider practice communities

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Background: Pathology testing in Australia accounts for over $2.7 billion of annual Medicare benefits paid. While there is evidence of over-testing for some services, there is little understanding of what drives this variation.

Aim: To explore how costs of claims for pathology services vary according to the characteristics of general practices.

Methods: We used Medicare claims data for all pathology tests performed for a random 10% sample of Australian residents in 2014, who had ≥1 visit to a general practitioner (GP) (n=2,015,717). Mean cost per patient was calculated for provider practice communities (PPCs): groups of GPs analogous to practices, constructed using network analysis of shared patient care. Generalised linear models, adjusting for patient age and sex, were used to explore relationships between pathology costs and PPC characteristics including number of GPs, continuity of care to the PPC ('patient loyalty') and bulk-billing.

Results: Annual Medicare benefit costs for pathology tests ordered by each PPC ranged from $1.17 to $2,580.63 per patient (median $89.80, IQR $72.70-$111.98). In fully adjusted models, PPCs where patients had higher patient loyalty had significantly lower average Medicare expenditure for pathology tests, both overall and for common over-tested items (e.g. Vitamin D tests and full blood counts). Larger PPCs, and those that bulk-billed a greater proportion of services, also tended to have lower pathology costs per patient.

Conclusions: There was substantial variation in costs of pathology claims ordered according to PPC. Our findings suggest that greater coordination of care has the potential to reduce duplicate and unnecessary testing.

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Association of general practitioner service utilisation and potentially preventable hospitalisations

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Background

In Australia and internationally, rates of potentially preventable hospitalisations (PPH) are used as a proxy measure of accessibility and effectiveness of primary healthcare. However recent research has questioned the validity of this indicator within an Australian context.

Aim

The aim of the study was to explore the association between general practitioner (GP) service utilisation with PPH at the local government area (LGA) level in Western Australia (WA) and whether PPH is a valid indicator of access to primary healthcare. A secondary aim is to identify priorities for targeted policy interventions.

Methods

GP service utilisation was measured using Medicare claims for GP attendance. PPH was measured using hospitalisation data. Age-standardised rates and multiple linear regressions were used to assess the association of GP service utilisation and PPH. Potential confounders adjusted for included sociodemographic characteristics (gender, Indigenous status, socio-economic disadvantage and geographic remoteness) as well as health needs characteristics (proportion of chronic conditions, composite health risk factor and self-assessed health). Additionally, spatial analysis was undertaken to identify LGAs that had significantly different rates of GP service utilisation/PPH compared to the state rate.

Results

GP service utilisation was positively associated with PPH at the LGA level (p=0.0326). Significant confounders included Aboriginal status and geographic remoteness. Spatial analysis outcomes identified LGAs where there are different GP service utilisation and PPH relationship patterns.

Conclusion

This study found a positive relationship between GP service utilisation and PPH instead of the expected inverse association. The study has also potentially identified priorities for targeted policy interventions.

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Geospatial examination of access to advanced hospital services in New Zealand

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Background: Timely advanced hospital level care gives patients the best chance of survival from time critical injury and medical conditions. Little is known about the coverage and accessibility of emergency ambulance services (EAS) in New Zealand despite its long travel distances and dispersed population present many challenges to the delivery of timely access to EAS and healthcare.

Aims: To determine the geographical and population coverage of EAS and advanced hospital-level care providers in New Zealand.

Methods: EAS (road and air) response times from meshblocks (small geographical areas) was estimated using the location of: 1) the nearest EAS stations and 2) the nearest advanced hospital service. Physical addresses of EAS stations and advanced hospital services were converted to geographic coordinates and estimates of driving and flying response times (sum of despatch time, travel time from ambulance base location, on-scene time and hospital travel time) for each meshblock were calculated. Meshblocks covered by existing EAS within the "golden-hour" were identified.

Results: The majority (84%) of the NZ population have EAS access to advanced hospital services within 60 minutes. Sub-populations with poor emergency coverage include older residents, Indigenous Maori and those living in regions with low to moderate population density.

Discussion & conclusions: Over 694,000 New Zealanders do not have timely access within 60 minutes to advanced hospital care with areas of disparities in access found, suggesting opportunities exist to maximise access to these services to increase the chances of survival from time critical injury and medical conditions in New Zealand.

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Undiagnosed diabetes and the use of primary care provider (PCP) services by rurality and area socioeconomic status

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Publish consent withheld

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Economic evaluation of an innovative model of care for chronic wounds patients

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Background

Chronic wounds are a silent epidemic in Australia. They are under-recognised as a public health issue, and their health and economic effects are poorly understood. In this study, we have evaluated whether utilising a specialist transdisciplinary wounds service is a cost-effective approach to managing wounds, compared to using routine healthcare services.

Methods

Cost, quality of life, healing outcomes and health service utilisation data was prospectively collected over a 3 month period from participants receiving services at a specialist clinic. To characterise routine services, the same variables have been estimated for the 12 months prior to enrolment in the clinic. All data was collected to inform a Markov model, where the expected changes to cost and quality of life associated with using the specialist service are compared to routine services for a hypothetical cohort of patients in the Australian setting.

Results

Patients accessing treatment at the specialist clinic show larger improvements in quality of life and achieve more complete healing of their wound compared to those utilising routine services. Increased costs associated with the specialist clinic are offset by savings that are realised as a result of faster healing, decreased recurrence and fewer complications requiring hospitalisation. Overall, utilising a specialist service is a cost-effective approach to wound management.

Conclusion

Utilising expert wound management services delivers improvements to health, quality of life and economic outcomes when compared with routine services. Investment in expert, targeted services represents good value for money in the Australian setting and should be prioritised by decision makers.

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Paediatric admissions that include intensive care

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Background: Paediatric admissions to an intensive care unit (ICU) outside of a children's hospital are generally not included in studies based on paediatric intensive care unit (PICU) registry data. Furthermore, PICU registry studies rarely include outcome data beyond discharge from the PICU or hospital.

Objective: To compare paediatric admission to specialist paediatric intensive care units (PICU) with paediatric admission to intensive care units (ICU) in general hospitals in an Australian population.

Methods: We undertook a population-based record linkage cohort study utilising longitudinally-linked hospital and mortality data for paediatric hospitalisations in New South Wales, Australia from 2010-2013. The study population included all new paediatric post-neonatal hospital admissions that included time in ICU (excluding neonatal ICU).

Results: Of 498,466 paediatric hospitalisations, 7525 (1.5%) included time in an intensive care unit [93.7% to PICU and 6.3% to ICU in a general (non-PICU) hospital]. Non-PICU admissions were of older children, in rural areas, with shorter stays in ICU, more likely admitted for acute conditions such as asthma, injury or diabetes, and less likely to have chronic conditions, receive continuous ventilatory support, blood transfusion, parenteral nutrition or die.

Conclusion: A substantial proportion of children are admitted to ICUs in general hospitals. A comprehensive overview of paediatric ICU admissions includes these admissions and the context of the total hospitalisation.

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Emergency Department presentations by newly diagnosed ACT cancer patients

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Background: Emergency Department (ED) visits are increasing in the ACT. ED visits by cancer patients are not well understood. This is the first study to describe ED use associated with newly diagnosed cancer in the ACT in a population-based cohort.

Aim: To describe ED use in ACT residents diagnosed with a primary cancer in the previous year.

Methods: ACT Cancer Registry (ACTCR) records were linked to ACT Emergency Department Information System (EDIS) records at the Centre for Health Record Linkage. The frequency and reason for ED visits by cancer type was described for people diagnosed in the previous 30 days, 180 days and 360 days, using data from the ACTCR (2007-2014) and EDIS (2006/07-2015/16).

Results: During 2007-2014, 11,759 ACT residents were diagnosed with a new cancer. Of the ACTCR linkage cohort, 5,016 (43%) people had at least one ED visit within one year after diagnosis. The majority (69%) were within 180 days of diagnosis with 19% within 30 days. The cancers most commonly associated with ED visits were bowel, breast, lung and prostate. Timing of ED visits varied by cancer type. The most common reasons for ED visits over all cancers were abdominal and pelvic pain, pain in the throat and chest, and agranulocytosis, however this varied by cancer type.

Conclusion: ED use by cancer patients in the ACT is considerable. These findings could inform efforts to detect potentially preventable ED visits and investigate alternative forms of acute care and admission to hospital for cancer patients resulting in improved care.

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Combining measures of childhood adversity exposure to form a clinically relevant scale, predictive of later developing severe mental illness.

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Background:

Exposure to adversity in childhood has been linked with later onset of severe mental illness. To date, quantification of exposure risk has been limited to relative ratios, derived from simple outcome-exposure analyses, using linear combinations of, at most, a few measures of exposure. In contrast, adverse environments often manifest as combinations of inter-related dimensions. A scale which better incorporates this complexity will help disentangle contributions to the risk of severe mental illness from genetic, familial and environmental sources.

Context: We have access to a large population cohort of children born in WA between 1980 and 2001 (N=467,945). Measures of their exposure to adversity covering: i) parental separation, ii) family functioning, iii) family structure, iv) family stressors, v) ecological level measures and vi) socioeconomic indicators have been determined from their birth records linked with several

state health and social registers. Where relevant, the timing of exposures was recorded. Outcomes of severe mental illness were noted in June 2011 (children aged between 9.5 and 31.5 years).

Methodological implications: The large number of measurements for each child from the six dimensions above include categorical to continuous types. Correlation of measures is expected: i) within families, ii) longitudinally for a given child and iii) within geographical proximity for ecological level measures. It is likely that similar exposure at different ages will have differing impacts. Some missing and censoring of measurements exists. There is considerable censoring of the outcome.

Intent: We recognise the need for simplifying assumptions to enable the construction of our adversity scale. Initially, we propose to develop the scale based on exposure before 10 years of age. In the first of two stages, exposure profiles within each dimension will be categorised according to their associated risk of severe mental illness. This will be determined using logistic regression (ignoring outcome censoring as an approximation) and a training sample of N=200,000. The risk of severe mental illness will be modeled as a combination of many exposures to adversity within a given dimension, allowing for interactions between component measures, with the aim of summarising each dimension as a single ordinal metric. Secondly, the influence of each dimension on the risk of severe mental illness will be assessed in the presence of other dimensions. We will again use logistic regression to model the risk of severe mental illness as a function of a child's risk profile across six dimensions. Important interactions between dimensions will be included. A final categorisation of the resultant multi-dimensional exposure profiles will produce a scale which nominates a risk of developing severe mental illness based on adversity exposure history. Assessment of the scale's ability to predict the relative risk of developing a severe mental illness can be undertaken on a separate sample of N=200,000, by comparing the actual proportion of children noted with severe mental illness within each risk profile category, to the proportions predicted by the scale.

Request: Constructive observations on the proposed approach are sought as we strive for optimal use of this unique dataset.

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Occupational epidemiology – why it matters

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Occupational epidemiology has a long and proud history, dating back to the early 1700s. Many of the core techniques and methods we use in epidemiology were originally developed to solve methodological problems arising during studies of the health of workers. Since the 1970s however, there has been less and less interest and activity in the field of occupational epidemiology. I will discuss reasons why this might be, and talk about why the work-health connection still matters to you and your research and how it will matter even more beyond 2018.

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Nordic registers for research – opportunities and challenges

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All the five Nordic countries have comprehensive population-based health information systems based on individual-focused health registers. Unique identification numbers makes data linkages technically very easy. Registers on cancers have operated since the 1940s, registers on infectious diseases since the 1950s, hospital discharge registers, cause-of-death registers and birth and malformation registers since the 1960s, and health care quality registers and prescription registers since the 1990s. All countries have a register-based census since the 1990s: information on education, income, socioeconomic position, family background and relatives can be linked to the various registers. The current national and European legislations allow the collection of sensitive health and social welfare data without informed consent, and enable the use of such data in scientific research and in for statistical purposes. The main obstacles for Nordic science are differences in register contents, classifications, definitions and data coverages – the harmonisation process may take long time. Also the process to get permissions to combine data from multiple Nordic countries may be complex and time-consuming. The collection of new data sources, such as primary health care data and electronic patient records opens new possibilities for the Nordic countries.

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How working with Aboriginal communities towards health improvements will close the gap in health outcomes: Evidence based research done Mob way

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Historically, Indigenous Australian are largely obliged to rely on a health system and services that they have not developed and that they do not control. Through successful collaboration with local Indigenous community leaders and stakeholders over the past 5 years, developing co-designed evidenced based programs that translate into best practice are becoming the norm for Indigenous health research and in South West and Central Queensland. I will present 3 NHMRC funded projects that demonstrate Participatory Action research shows great efficacy and translates into data that leads to better outcomes. Emphasis and resourcing of targeted, evidence-based community engagement at the front end of research, to increase health literacy and knowledge ultimately enhances input into research and improvements of service delivery in the catchment area of these projects

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Appropriate use of the test-negative design for administrative data

Sheena Sullivan

The test-negative design is a variant of the case-control study, which has been widely used to estimate influenza vaccine effectiveness and is increasingly being applied to other interventions. In these studies, patients meeting a particular clinical case definition are recruited and tested for the condition of interest. Vaccine effectiveness is estimated from the odds ratio comparing the odds of vaccination among those testing positive versus those testing negative. The design is purported to reduce bias associated with healthcare seeking behaviour and misclassification of outcome status. However, validation of the design has largely been done on simulated datasets that mimic a surveillance system rather than using administrative data, where clinical case definitions may be missing and testing practices may vary. Absent a common case definition, assumptions about the similarity of cases and controls may be violated. Similarly, when testing is performed by multiple laboratories that do not use a single unifying protocol, outcome misclassification may be both dependent and differential. In this paper, we use causal graph theory to explore the biases associated with leveraging administrative data versus collecting data through a controlled surveillance system. The models were tested in simulations to examine the direction of potential biases. This study underscores the importance of carefully considering the assumptions inherent in a study design, particularly with respect to control selection, before applying it to administrative data.

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Agreement between constructs derived from register records and clinical summaries

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Background:

Childhood exposure to adversity has been linked with later onset of severe mental illness. Obtaining good measures of exposure is made difficult by often poor recall quality, and the high cost, both in terms of clinical resources and time, required to collect information in quantities sufficient for valid scientific interrogation. Harvesting prospectively collected information stored on relevant state administrative registers (for example, mortality, morbidity, child protection and corrective services) offers an alternative means to assembling adversity constructs. Knowledge of the correspondence between register derived constructs and clinically derived ones is important to help assess the robustness of the former.

Aim:

To compare the values of 30 childhood adversity constructs derived from i) register records and ii) clinical note summaries.

Methods: For 189 children who were identified as having developed a severe mental illness, constructs of childhood adversity were derived using their: i) register records and ii) clinical case note summaries. Descriptive statistics summarized rates of identification and levels of agreement.

Results:

Rates of recording of adversities varied with generally higher rates identified in registers than clinical summaries. Constructs with the highest rates of clinical identification had the highest rates of agreement. Very few instances of contradiction between register and clinically derived constructs were observed.

Conclusion:

Constructs of childhood adversity derived from register records were observed to provide good agreement and little contradiction with corresponding constructs derived from clinical information. This supports confidence in the ability of register records to provide useful epidemiological measures of childhood adversity.

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Practical guidance for handling convergence issues in multiple imputation

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Multiple imputation is a recommended method for handling missing data problems. One of the barriers to the successful use of multiple imputation is the non-convergence of estimation algorithms that are used to produce the imputations. In particular, problems with model failure are common with the popular approach of fully conditional specification or "chained equations".

This presentation will provide an overview of methods for handling problems with imputation model failure. We will describe approaches for diagnosing problems with imputation models, including checks for collinearity and sparse data. Strategies for overcoming these issues include data reduction methods and augmented regression for perfect prediction. These strategies will be reviewed and compared using a case-study evaluation based on data from the Longitudinal Study of Australian Children. Given that non-convergence of imputation algorithms is a common issue that hampers the implementation of multiple imputation, these proposed strategies will provide practical guidance for users of multiple imputation.

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Doubly robust mediation analysis.

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Typically there is a twofold aim in the conduct of epidemiological analysis; (i) to estimate the average total causal effect and (ii) to disentangle the pathways which link the exposure and the outcome. When the causal effect is separated into the effect of the exposure through the mediator, it is referred to as indirect effect and the effect of the exposure that is not explained by the mediator is referred to as the direct effect. Traditionally, product and difference methods are used for estimating the direct and indirect effects. Methods using counterfactual framework have been proposed to accommodate interactions as well as extend the analysis for different types of variables (e.g. binary mediator, multinomial exposure). Under certain assumptions of confounding the direct and indirect effects estimated using counterfactual theory have causal interpretations. Traditional and modern methods allow estimation of path specific effects upon combining arbitrary models for mediator and outcome. Alternatively, methods have been proposed to estimate these effects using a single model, referred to as natural effect models. The aim of this study is to show applications of the natural effect models and demonstrate how the estimates from these models are doubly robust.

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Accuracy of coded data: Post-procedural complications coding in Western Australia

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Background

A specific use of coded inpatient data is the identification of hospital acquired complications (HACs), among them procedural (surgical) complications.1 The accuracy of coded data is contentious where funding mechanisms reduce hospital reimbursement when HACs occur.2

Aims

The aim is to assess conceptual aspects of coding accuracy, specifically the impact on accuracy of clinical coding guidelines: the Australian Coding Standards (ACS) 1904 (Procedural Complications) and 0048 (Condition Onset Flag [COF]).

Methodology

All clinical coders in Western Australian (WA) were invited to participate in a voluntary anonymous survey where they were asked to translate diagnostic statements into code: the statements focus on concepts in ACS 1904/ 0048. Answers were scored against benchmark answers provided by the WA Clinical Coding Authority (WACCA).

Results

The response rate was approximately 30.0%, final sample size (N)=59. Mean accuracy is significantly lower than a hypothesised benchmark of 90.0% (M=62.7%, SD=16.2, 95% CI=58.5%, 66.9%, $p < .001$). Diagnosis coding accuracy, governed by ACS 1904, is lower still (M=48.4%, SD=22.0, 95% CI=42.7%, 54.1%). Misconceptions of ACS 1904 are evident. On a single common complication, postoperative haemorrhage, clinical coding practice is significantly divided (63% to 37%). Similarly high rates of divergence were observed for other complications.

Conclusion

Clinical coders have different understandings of the rules for interpreting common diagnostic terms. These conceptual issues emanate from interpretations of ACS 1904 and intrinsic ambiguities in national coding advice. Resulting coding practices are strikingly divergent. The underlying conceptual issues require resolution at national, state jurisdictional, and local hospital levels.

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Using PHREDSS to monitor codeine-related emergency department presentations

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Background

In February 2018, over-the-counter codeine medicines were up-scheduled across Australia to prescription only due to health risks of long-term use. How this policy has affected emergency departments (EDs) is unknown; however, it was suggested to have potentially increased ED presentations for pain and codeine withdrawal.

The NSW Public Health Rapid, Emergency, Disease and Syndromic Surveillance (PHREDSS) system monitors ED presentations for headaches and some illicit drugs in near-real time. However, monitoring the use and misuse of licit drugs, including codeine, is challenging.

Aim

Develop and test strategies for monitoring codeine-related ED presentations using PHREDSS.

Methods

Keyword searches on triage text and diagnosis description fields were used to identify ED presentations (a) mentioning codeine, including appropriate use, and (b) related to codeine addiction, withdrawal, and overdose. Codeine allergies were excluded. Using random sampling of presentations from 2017-2018, results of the keyword searches were reviewed and false positive rates

calculated. Temporal trends for headaches (proxy for pain) and codeine-related ED presentations were examined for 60 EDs using Rapid Emergency Department Data.

Results

A minor initial increase in headache and codeine-related ED presentations following the up-scheduling was not sustained. The all codeine search (a) mostly identified the use (75%) and administration (14%) of codeine, with a false positive rate of 4%. The specific search (b) identified overdoses (74%), codeine withdrawal (7%) and addiction (5%), with a false positive rate of 13%.

Conclusion

PHREDSS in combination with text analytics has limitations but is timely and can be used to monitor codeine-related ED presentations.

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Statistical methods for estimating legacy effects: A simulation study

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Background: There is growing interest in possible legacy-effects of drugs, but methods of analysis are underexplored.

Methods: A simulation study was conducted to assess three methods of estimating legacy effects, which differed in terms of the selection of participants and period of data analyzed:

1. All trial participants. Data from start of the RCT to end of post-RCT follow-up used.
2. Participants surviving post-RCT and who were followed up. Post-RCT data used.
3. Participants surviving post-RCT, who were followed up, and who took the drug post-RCT. Post-RCT data used.

Independent datasets were generated for scenarios where there was, and alternatively was not, a legacy effect for the drug. We estimated the legacy effect using the intention-to-treat principle (analysis according to randomized group) and Cox proportional hazard models. The three methods' performances were compared in term of bias, mean square error, coverage and power.

Results: Under the condition that the legacy effect of taking the drug during the RCT was the same irrespective of whether or not the drug was taken post-RCT, estimations using post-RCT data had best performance (methods 2 and 3). When the size of the legacy effect differed according to whether or not drugs were taken post-RCT, estimations using post-RCT data for participants taking the drug post-RCT had best performance (method 3).

Conclusion: The most common method for estimating legacy effects, which combines initial trial and post-trial follow-up data had the worst performance. A better approach may be to use post-trial follow-up data and adjustment for post-trial drug use.

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Brain cancers after CT scans: Using the 95th percentile of the pre-diagnostic symptomatic interval (PSI) to assess the possibility of reverse causation

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Introduction: Reverse causation is a major bias potentially affecting the association of CT scan radiation with brain cancer. To minimize the effect of reverse causation bias, the pre-diagnostic symptomatic interval (PSI) can be used to inform the choice of exclusion periods.

Methods: We describe a method to calculate the percentiles of the PSI using the cumulative distribution function of the exponential distribution. We then present illustrative examples of the method.

Results: In twenty studies reporting PSIs for children diagnosed with brain cancers (total of 3,223 children), the sample-size weighted mean of the 95th percentile is 10.1 months. Benign or low grade astrocytomas had a of 21 months.

Conclusion: A one year exclusion period for brain cancer should correctly separate the majority of those patients who are causally exposed from those who appear to be exposed because of reverse causation. For slow-growing tumors such as low-grade gliomas, an exclusion period of at least two years is warranted.

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Correlates of Objectively Measured Personal Sun Exposure in Australians

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Background: Ultraviolet radiation (UVR) exposure is the major environmental cause of skin cancer. Better understanding of the factors associated with UVR exposure may help improve skin cancer prevention programs by enabling interventions to be tailored to specific groups.

Aim: To determine the factors associated with personal UVR exposure.

Methods: In Spring/Summer 2017-18, baseline UVR exposure data from the first 250 participants recruited to the Australia-wide NHMRC-funded "Managing Your Risk" Study were collected using wrist-worn time-stamped electronic dosimeters. We conducted cross-sectional analyses of personal standard erythemal doses (SED; a measure of UVR exposure) with participant characteristics including age (18-44, 45-69 years), sex, location of residence (States and Territories), traditional risk factor score (high, low), and socioeconomic index (SEIFA score: high, low). SED values were log transformed and geometric means were compared using ANOVA.

Results: Older age was associated with increased total personal UVR exposure (mean = 0.8 SEDs for ≥45 years vs. 0.5 SEDs for <45 years, P = 0.0003). Overall, men had higher total personal UVR exposure than women (0.8 vs. 0.6, P = 0.01), however, stratified by age the sex difference was only apparent in the older age group (P interaction = 0.03). There was no evidence that personal UVR exposure differed by state/territory, socioeconomic status, or traditional risk factor score.

Conclusion: Age and sex, but not other characteristics, were associated with personal sun exposure in our population-based sample. The higher UVR doses observed in men 45-69 years is consistent with their higher melanoma incidence rates.

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Using capture-recapture methodology to assess completeness of a surveillance system

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Background: An enhanced surveillance system that aimed to capture all births, perinatal and maternal deaths in a rural district of Pakistan was established for 12 months in 2015, capturing 7,580 pregnancies and 7,273 live births.

Aim: To assess the completeness of this enhanced surveillance system and to calculate corrected rates by adjusting for missing births and deaths, using capture-recapture methodology.

Methods: A stratified random cross-sectional survey was conducted six months after the start of the enhanced surveillance. Births and deaths collected from this were matched with data from the enhanced surveillance system. The Petersen–Lincoln equation was used to estimate the total number of births and deaths. Mortality rates were adjusted for the estimated missed births and deaths, and mortality rate ratios and 95%CIs calculated.

Results: Of the 175 births enumerated in the survey, 173 (99%) were captured by the enhanced surveillance system. Nine of ten neonatal deaths and six of seven (86%) early neonatal deaths were matched with data from the enhanced surveillance system, as were all five stillbirths and the one maternal death. Rates calculated from the enhanced surveillance system underestimated neonatal mortality by 5% (40 vs 42 per 1,000 livebirths) and perinatal mortality by 7% (60 vs 63 per 1,000 live births), but these differences were not statistically significant.

Conclusion: The completeness of birth and death recording in the enhanced surveillance system was high. Capture-recapture methodology is useful for assessing completeness of existing surveillance systems and for correcting any under-counts in births and deaths in the population.

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HealthStats NSW: Automated quality assurance essential for scalable, timely reporting.

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2. Biostatistical Officer Training Program, NSW Ministry of Health

Background: HealthStats NSW http://www.healthstats.nsw.gov.au/ is a public-facing website providing summarised statistics from more than 10 routinely collected, administrative data sources encompassing the breadth of topics in the health care continuum. Currently, close to 20,000 summarised data sets are available in a searchable database for a variety of conditions. These data sets are updated cyclically, and at each update changes in definitions, coding standards, data collection standards and mechanisms pose challenges to existing manual quality assurance (QA) methods.

Aim: To develop automated QA processes to enhance the scalability of public reporting from administrative data sources while ensuring that data are correct, consistent, and satisfy NSW privacy legislation.

Methods: Point-on-point comparisons were implemented for historic, "stable", data. Poisson regression and ARIMA forecasting techniques were developed to predict expected values for future estimates. These techniques were evaluated against three common types of changes (coding, standards and source data attributes) to determine success criteria for automated QA.

Results: Appropriate tolerance bands are required for both "stable" data and future projections. Tolerance bands depend upon the type of change, as well as the rarity of the condition. Exception reporting provides a suitable mechanism to scale QA to the large volumes of data sets derived.

Conclusion: Automated quality assurance is necessary to ensure timely and scalable reporting from administrative data sources. With a number of changeable components, automated quality assurance processes must be specific enough to detect multiple types of errors, and sensitive enough to detect changes where conditions are rare.

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Why sample selection matters in exploratory factor analysis: implications for the 12-item World Health Organisation Disability Assessment Schedule 2.0

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Background Sample selection can substantially affect the number of factors generated using exploratory factor analysis (EFA). The 12-item World Health Organization (WHO) Disability Assessment Schedule 2.0 (WHODAS-2.0) measures disability across six life domains (cognition, mobility, self-care, getting along, life activities, and participation in society). We investigated the influence of the sampling strategy on EFA results for the WHODAS-2.0.

Methods Data from adults aged 50+ from the six countries in Wave 1 WHO SAGE study were used to repeatedly select 1000 samples (n = 750) using two strategies: (1) simple random sampling reproducing the WHODAS-2.0 summary score country distribution (i.e., positively skewed distributions (PSD) with many zero scores indicating low prevalence of disability); and (2) stratified random sampling including people with varying degrees of disability (approximately symmetric distributions, ASD). Number of factors was determined using principal components analysis, polychoric correlations, parallel analysis and mean eigenvalue criterion.

Results PSD samples typically produced one-factor solutions, except for the two countries with low percentages of zero scores. ASD samples generally produced two-factor solutions (factor 1: getting along domain items, factor 2: all the rest) or three-factor solutions (factor 1: getting along, factor 2: self-care, factor 3: mobility, life activities, and participation in society).

Conclusions Samples with high prevalence of no disability (i.e., zero scores) produce heavily censored data (i.e., floor effects), limiting data heterogeneity and reducing the numbers of factors retained in EFA. Samples of convenience or collected for other purposes (e.g., general population surveys) would usually be inadequate for validating measures using EFA.

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Survival after breast conserving surgery (BCS) compared to mastectomy (MTX) in early stage breast cancer

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Abstract

Background

Earlier randomised control trials illustrate equal survival outcomes after breast conserving surgery plus radiotherapy (BCS+RT) and mastectomy (MTX) in women with early stage breast cancer (ESBC) whereas more recent observational studies suggest BCS+RT is better or at least equal to MTX.

Aims:

To compare breast cancer specific mortality and overall mortality after BCS, BCS+RT, MTX and MTX+RT in New Zealand women with early stage breast cancer.

Methods

This population-based study involves all women who were diagnosed with ESBC (Stage I-IIb) in the four health regions between 1st January 2000 and 30th June 2014 and had undergone one of: BCS, BCS+RT, MTX or MTX+RT as their primary treatment. Kaplan Meier estimator and Cox proportional hazard modelling were used to compare hazards of breast cancer specific and overall mortality across the four types of surgical treatment, and demographic, clinical and systemic treatment factors were adjusted.

Results

10,289 women were analysed: 5154 (50.1%) received BCS+RT, 1042 (10.1%) BCS, 3069 (29.8%) MTX and 1024 (10.0%) MTX+RT.

Compared to women who received BCS+RT, those who received other types of surgical treatment had a higher DSS risk (adjusted HR: 1.78 (95%CI: 1.47-2.14) for BCS; 1.49 (95%CI: 1.20-1.83) for MTX; 1.50 (95% CI: 1.16-1.94) for MTX+RT) as well as OS (adjusted HR: 1.47 (95% CI: 1.47-2.14) for BCS; 1.59 (95% CI: 1.38-1.83) for MTX; 1.49 (95% CI: 1.22-1.82) for MTX+RT.

Conclusion

BCS+RT is associated with better survival outcomes in New Zealand women with early breast cancer. The findings could be assessed in future randomised trials.

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Temporally changing loss of life expectancy for people with cancer in WA

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Background: Cancer survival has improved in Western Australia (WA) over recent decades. This improvement has been in the context of increasing general population life expectancy. Estimated loss of life expectancy is a useful cancer survival measure.

Aim: To estimate the absolute and proportionate loss of life expectancy at the median age of diagnosis for cancer overall, female breast, colorectal, prostate and lung cancers, and melanoma in WA, in 1990, 2000 and 2010.

Methods: Person-level linked cancer registry and mortality data for first invasive cancer diagnoses (age 15 to 89 years) between 1983 and 2011, with follow-up to 31/12/2011, were used to estimate loss of life expectancy. Estimates were obtained using flexible parametric survival models, adjusted for sex (where relevant), age at diagnosis and year of diagnosis. Life expectancy of the general population was used as the reference, by constructing sex, age and year-specific life tables for WA.

Results: Marked reductions in loss of life expectancy were observed for cancer overall, female breast, colorectal and prostate cancers, and for melanoma. There was no such reduction for lung cancer. The median age at diagnosis was reasonably stable, except for prostate cancer, which had a reduction in median age at diagnosis from 74 years in 1990, to 66 years in 2010. The proportionate loss of life expectancy decreased from 33% to 7%.

Conclusion: These estimates facilitate assessment of population-level changes in loss of life expectancy following a cancer diagnosis. Stratifying by cancer stage would make these estimates more useful at an individual level.

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Fraction of cancer attributable to high body-mass index in Australia

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High body mass index (BMI >25kg/m^2) has been found to be associated with an increased risk of many cancers, including cancers of the colon and rectum, liver, and pancreas. This study aimed to estimate the future burden of cancer resulting from current levels of overweight and obesity in Australia.

The future excess fraction method was used to estimate the future burden of cancer among the proportion of the Australian adult population who were overweight or obese in 2016. Calculations were conducted for 13 cancer types, including cancers of the colon, rectum, kidney, and liver.

The cohort of 18.7 million adult Australians in 2016 will develop approximately 402,500 cancers attributable to high body mass index over their lifetime. The majority of these will be postmenopausal breast cancers (n=72,300), kidney cancers (n=59,200), and colon cancers (n=55,100). More than a quarter of future endometrial cancers (30.3%) and oesophageal adenocarcinomas (35.8%) will be attributable to high body mass index.

A significant proportion of future cancers will result from current levels of high body mass index. Our estimates are not directly comparable to past estimates of the burden from overweight and obesity because they describe different quantities – future cancers in currently exposed versus current cancers due to past exposures. The results of this study provide us with relevant up-to-date information about how many cancers in Australia could be prevented.

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Influences on oesophageal cancer mortality in China: a multilevel analysis

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Background: Oesophageal cancer (OC) is a major cause of death in China. This study aims to detect the independent contributions of area- and individual-level factors on OC mortality within a Chinese province.

Methods: Multilevel negative binomial models were used to analyse 45,646 OC deaths out of 135,752,484 person-years extracted from the Shandong Death Registration System. This covered the Shandong population aged 40+ years who died between 2011-2013 across 140 county-level areas in Shandong Province. Area-level SES variables were chosen from Shandong Yearbooks.

Results: Preliminary multilevel regression results indicated that males were 4.5 (95% CI: 4.2-4.9) times more likely to die from OC than females. Compared to younger age group (40-49), the risk ratios were 5.2 (4.8-5.6), 15.5 (14.3-16.8), 35.3 (32.3-38.7), and 59.4 (53.6-65.9) in age groups 50-59, 60-69, 70-79, and 80+ years, respectively. Rural residents had a 1.2 (1.1-1.3) times increased risk of dying from OC. Area-level factors including GDP per capita, average years of school education, and number of hospital beds per capita were not significantly associated with the risk of OC death. Residents living in high-risk areas were 4.0 (2.7-5.9) times more likely to die from OC. There was no evidence to suggest area-level SES factors explained the higher OC mortality in those areas.

Conclusion: The risk of dying of OC is related to individual-level factors, rather than the socioeconomic characteristics of the area where they live. Further investigations are needed to identify the key risk factors of OC death on both an area- and individual-level basis.

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A quantitative bias analysis to estimate measurement error-related attenuation of the association between self-reported physical activity and colorectal cancer risk

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Background

Self-reported physical activity is inaccurate, yet few investigators attempt to adjust for measurement error when estimating risks for health outcomes. We estimated what the association between self-reported physical activity and colorectal cancer risk would be if physical activity had been assessed using accelerometry instead.

Methods

Altogether, 235 Australian adults completed a telephone-administered International Physical Activity Questionnaire (IPAQ), and wore an accelerometer (Actigraph GTX3+) for seven days. We calculated a validity coefficient and an attenuation factor using a

structural equation model adjusted for age, sex, education and body mass index. The attenuation factor was applied to data from Melbourne Collaborative Cohort Study (MCCS) to compute bias-adjusted hazard ratios (HR) and 95% confidence intervals (CI).

Results

Average daily minutes of physical activity from the IPAQ-short were considerably higher than accelerometer-measured duration (55 versus 32 minutes). The validity coefficient (0.32; 95% CI: 0.20-0.43) and attenuation factor (0.20; 95% CI: 0.12-0.28) were low, suggesting substantial measurement error from the IPAQ-short. To quantify the attenuation of risk due to measurement error, we estimated the HRs for colorectal cancer risk for high (75^{th} percentile; 411 minutes/week) versus low (25^{th} percentile; 62 minutes/week) levels of self-reported physical activity before (HR=0.95; 95% CI: 0.87-1.05) and after bias adjustment (HR=0.78; 95% CI: 0.47-1.28).

Conclusions

Over-estimation of physical activity by the IPAQ-short substantially attenuates the association between physical activity and colorectal cancer risk, suggesting that the protective effect of physical activity has been previously under-estimated.

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Developing a comorbidity index for comparing survival from cancer in Aboriginal and non-Aboriginal Australians.

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Background: Comorbidity is known to increase risk of mortality in cancer patients, both Aboriginal and non-Aboriginal, and particularly at an older age. The best means of measuring comorbidity when comparing survival by Aboriginal status have received limited attention.

Aim: To develop a comorbidity index to test whether comorbidity explains survival differences by Aboriginal status.

Methods: A retrospective cohort study using linked population-based South Australian Cancer Registry and hospital inpatient data for 777 Aboriginal people diagnosed with primary cancer during 1990 – 2010 and 777 randomly selected non-Aboriginal controls matched by sex, birth year, diagnosis year and tumour type. The index was developed by examining statistical associations of comorbid conditions with 1-year all-cause mortality separately for Aboriginal and non-Aboriginal cancer cases,repectively, using Cox proportional hazard model, adjusting for age, stage, sex and primary site. The adjusted hazard ratios were used as weights for these conditions in index development. The comorbidity index score was the sum of the weights for each person across the two groups. Performance of the new index was compared to commonly used indices.

Results: The new index performed as well as, or marginally better than, other generic indices. Irrespective of the index, comorbidity did not explain the increased risk of mortality in Aboriginal people.

Conclusions: Generic comorbidity indices may be sufficient for comparing comorbidity effects by Aboriginal status. This study showed lower survival for Aboriginal than other patients after adjusting for stage and comorbidity.

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The utility of incorporating competing risk theory into evaluations of changes in cancer survival to more accurately capture progress against cancer

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Background: Relative survival is the most common method used for measuring survival from population-based registries. However relative survival relies on comparability of the reference population and independence in the cause of death in the cancer and general population. Both of these requirements are frequently violated. We propose Fine and Gray multivariable regression is a superior method.

Methods: We used whole of population, person-level linked Western Australian cancer registry data to evaluate changes in survival from cancer overall, female breast, colorectal, prostate, lung and pancreatic cancers, and grade IV glioma using Fine and Gray competing risks regression.

Results: We observed substantial decreases in the probability of death from cancer overall, female breast, prostate and colorectal cancers over the study period. In contrast, improvements in pancreatic and lung cancers, and grade IV glioma were less pronounced and the cumulative incidence of death from these cancer diagnoses remain high. Changes were consistent with known changes in diagnosis and management over the study period.

Conclusion: The ability to adjust for both competing events and confounding makes the Fine and Gray competing risks model useful for population-based assessment of the impact of cancer programs, removing bias and limitation inherent in measures such as relative survival.

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Regular use of non-steroidal anti-inflammatory drugs (NSAIDs) and risk of renal cell carcinoma

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Background

Use of aspirin and other nonsteroidal anti-inflammatory drugs (NSAIDs) is known to affect renal function, however their association with renal cell carcinoma (RCC) is unclear. Given the widespread use of these medications, clarification of the relationship with RCCs is needed.

Aim

To investigate the association between NSAIDs (including aspirin) use and risk of renal cell carcinoma.

Method

The CONFIRM study used a case-control design to investigate risk factors for RCC. Incident cases were recruited via population-based cancer registries in two Australian states; controls were siblings or partners of cases. Unconditional logistic regression was used to examine the association adjusting for age, sex, BMI, smoking and alcohol use.

Results

After excluding missing data, 1,071 cases and 754 controls were included in the final analysis. Regular non-aspirin NSAID use (at least 5 times per month for >= 6 months) was associated with an increased odds of RCC (OR 1.33, 95% CI 1.04-1.70); this association persisted after adjusting for age, sex, BMI, smoking and alcohol use (OR 1.30, 95%CI 1.01 – 1.68). The adjusted OR for regular use of full-strength aspirin was 1.34 (95% CI 0.81-2.22) and that for regular use of aspirin and/or other NSAIDs was 1.20 (95% CI 0.94-1.52). A conditional logistic regression analysis was undertaken, analysing sets with sibling controls and partner controls separately. The results were consistent, although with wider confidence intervals.

Conclusion

This large population-based study suggests that regular use of NSAIDs is associated with an increased risk of renal cell carcinoma.

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Spatial analysis of oesophageal cancer mortality in China

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Background: Oesophageal cancer (OC) is the fourth leading cause of cancer death in China. This study aims to examine the geographic spread of OC mortality in two periods in a large Chinese population.

Methods: Age-standardised mortality rates (ASMRs) for 140 county-level units in Shandong Province during the periods 1970-1974 and 2011-2013 were calculated using death data from the First National Cause-of-Death Survey and the Shandong Death Registration System, respectively. Mortality estimates were smoothed using Area-to-Area Poisson kriging techniques, and spatial clusters in each time period were detected using spatial scan statistics method.

Results: The provincial average ASMR decreased from 13.0 per 100,000 in 1970-1974 to 5.8 per 100,000 in 2010-2013. Almost all the areas have experienced a decrease in OC mortality, while the reduction was particularly pronounced in the mid-west region. This study has identified a geographical cluster with very high EC mortality in each period. Residents living in the cluster during 1970-74 were 2.7 (95% CI: 2.2-3.4) times more likely to die from EC than the rest of the province. The corresponding risk ratio for the 2011-13 cluster was 3.7 (95% CI: 2.8-5.0). The clustering pattern has largely unchanged over the past 40 years.

Conclusions: This study detected a geographically defined subpopulation in Shandong, China with much higher risk of dying from OC. This spatial pattern was consistently observed in two time periods about 40 years apart. The results suggest the key drivers for geographic variation in esophageal cancer may not have changed.

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Aging-associated changes in blood DNA methylation and cancer risk and survival

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Background: Aging is associated with widespread changes in DNA methylation. We aimed to investigate whether these are associated with cancer risk and survival.

Methods: Blood DNA methylation was measured using the Illumina HM450 assay at 485,512 cytosine-guanine sites (CpGs). We used linear mixed models to assess cross-sectional associations between age and DNA methylation using samples from 2,775 controls in case-control studies (of colorectal, kidney, lung, prostate and urothelial cancers, and mature B-cell lymphomas) nested in the Melbourne Collaborative Cohort Study. We then included data for 3,046 cases and used conditional logistic regression to assess associations of age-associated CpGs with cancer risk. We applied Cox regression on case data only to assess associations with cancer survival. All analyses were adjusted for age and other potential confounders. The Bonferroni correction was used to account for multiple testing.

Results: We identified 45,070 CpGs associated with age ($P<10^{-7}$). Of these, two were associated ($P<1.1x10^{-6}=0.05/45070$) with overall cancer risk (one near gene *GPR68*: OR=-0.55, $P=2x10^{-8}$; one in *MGMT*: OR=1.51, $P=3x10^{-7}$); associations were consistent across cancer sites for *MGMT* but not *GPR68* (P-homogeneity=0.69 and 0.04, respectively). We found 91 CpGs associated with overall cancer survival, with strongest associations near genes *ATP10A* (HR=1.35, $P=3x10^{-10}$), *CUTA* (HR=0.66, $P=2x10^{-9}$), and *FAM107A* (gene body: HR=0.65, $P=9x10^{-9}$).

Conclusion: Our study expands the list of age-associated CpGs and suggests that some age-associated methylation changes are associated with cancer risk and survival, independently of age. We are investigating what biological pathways are enriched in the genes identified and refining findings by cancer site.

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The who and where of skin cancer treatment

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Background

Treatment for keratinocyte cancers (KC) places a huge burden on the Australian healthcare system. Little is known about the relative proportions of patients receiving treatment from primary care practitioners (PCP) versus specialists; nor about the proportion treated in hospital.

Aim

To describe the settings in which KC are excised and the practitioners who excise them, and examine costs and determinants of hospital treatment.

Method

We used linked data for participants from the QSkin study (n=43,764), including data from Medicare and Queensland hospital admissions relating to treatment episodes for first incident KC. We used multinomial logistic regression to measure the association between demographic and clinical characteristics and the treatment setting.

Results

6933 patients (17%) had at least one KC excised during follow-up. Of first excisions, 89.8% were treated in private clinical rooms, the remainder were treated in hospitals (8.3% private; 1.9% public). KC on the nose, eyelid, ear, lip, finger or genitalia were more likely to be treated in public (OR 6.6; 95%CI 4.4-9.8) or private hospitals (OR 7.3; 95%CI 6.0-8.9) than in private rooms. PCP excised 83% of all KC, followed by plastic surgeons (9%) and dermatologists (6%). The median Medicare benefit paid for each excision was $255 in private rooms and $395 in private hospitals. Patient out-of-pocket costs were 5-fold higher in private hospital compared with private rooms ($453 vs $80).

Conclusions

Our findings are important for future planning and resource allocation given the ageing population and rising rates of excisions for KC among older Australians.

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Application of Scan statistics for spatial aspects of breast cancer

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Background: There is some evidence that there are variations across geographical areas in breast cancer incidence rates in Western Australia.

Aim: To investigate the breast cancer incidence distribution over WA and if there was any observed incidence greater than expected.

Method:A spatial scan statistic using SaTScan was selected to complement descriptive statistical methods to identify areas (approximate locations) with apparently increased incidence of breast cancer in WA. This technique addressed the limitations of small numbers of breast cancer cases and low populations, accounted for the pre-selection bias and multiple testing inherent in a cancer cluster investigation, and adjusted for confounding factors such as age, race, and accessibility/remoteness. Demographic data and age-specific breast cancer incidence rates for women for 5,508 locations (Statistical Area Level 1) for 2011-2013 were obtained from the Australian Bureau of Statistics and WA Cancer Registry.

Results: The total number of cases for 3 years was 4,326 cases with annual cases 159.9 /100,000 women. Two significant female breast cancer clusters identified: i) the most likely cluster (5 SA1 locations) with 4.42 times (P value of <0.008) higher incidence ratethan the rest of the State; ii) the secondary cluster (9 SA1 locations) with 3.5 times (P value of <0.02) higher incidence rate that the rest of State. There were also 20 non-significant clusters.

Conclusions/Implications: The scan statistic is an important addition to the public health toolbox as a screening tool for evaluating which disease cluster is probably a chance occurrence and which cluster merits further investigation.

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Healthy migrant phenomenon in pregnancy

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Background

Evidence suggests women of certain ethnicity may be more vulnerable to non-communicable diseases (NCDs) which may affect their health, pregnancy outcomes and health of their offspring. In contrast, a “healthy migrant phenomenon” has also been reported indicating better outcomes among foreign-born groups. We studied selected conditions in pregnant women according to ethnicity and migrant status in Western Australia.

Methods

A whole-population retrospective cohort study using linked-data (2005-2013) and multivariable logistic regression analysis was undertaken to estimate adjusted odds ratios of selected conditions (diabetes, hypertension, asthma) and pregnancy complications (gestational diabetes (GDM), preeclampsia) comparing non-Caucasian (Asian, Indian, African, Maori, Other) with Caucasian ethnicity, stratified by Australian-born or foreign-born (migrant) status.

Results

From 260,997 births in WA (2005-2013), 34% were to migrants. Migrant Asians were protected for all conditions other than GDM (Adj.OR: 2.51*,95%CI:1.41-2.17), Indians for all conditions other than diabetes (Adj.OR:1.90*,95%CI:1.41-2.56) and GDM (Adj.OR: 3.66*,95%CI:3.36-3.98) and the “Other” group for hypertension and asthma. Maoris had increased risk of asthma (Adj.OR:1.40*,95%CI:1.25-1.58) and preeclampsia (Adj.OR:1.40*,95%CI:1.10-1.78) compared to Caucasians. Substantial reduction of risk of Asthma (Adj.OR:0.22*,95%CI:0.17-0.27), and increased risk of preeclampsia (Adj.OR:1.54*,95%CI:1.26-1.87) was observed in Africans compared with Caucasians. No protective effect of ethnicity was observed among Australian-born ethnic groups except for Asthma in Asians(Adj.OR:0.83,P:0.04,95%CI:0.70-0.99). (*p<0.001)

Conclusions

In Australia, there is convincing evidence of a healthy migrant phenomenon for asthma, hypertension and preeclampsia, that is lost in next generation, as well as ethnic-specific risk of some NCDs. This knowledge offers unique opportunity for NCDs prevention especially in future generations.

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Pregnancy outcomes and risk of endometrial cancer

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Background:

A woman’s risk of developing endometrial cancer (EC) decreases as her parity increases however the effects of grand multiparity (>5 full-term births), incomplete pregnancies and other birth outcomes are less clear.

Aims:

To assess risk of EC in relation to pregnancy outcomes.

Methods:

We conducted a meta-analysis with individual-level data from 29 studies (10 cohort, 19 case-control) in the Epidemiology of Endometrial Cancer Consortium including 16958 women with endometrial cancer and 39457 controls. Odds ratios (OR) and 95% confidence intervals (CI) were estimated from mixed-effects logistic regression considering study as a random effect, adjusted for potential confounders including age, parity, body-mass index (BMI), smoking and oral contraceptive (OC) use.

Results:

Preliminary analyses show the risk of EC decreases by 16% (OR=0.84, 95%CI 0.83-0.85) per full-term pregnancy, with progressive reductions in risk seen for up to seven full-term pregnancies (OR=0.22, 95%CI 0.18-0.28 vs. nulliparous women). This association was stronger among women aged <50 and for type 1 cancers, but did not differ by BMI or OC use. Risk also decreased by 7% per incomplete pregnancy, with a slightly stronger association seen among parous women (adjusted-OR=0.93, 95%CI 0.90-0.95) than nulliparous women (adjusted-OR=0.94, 0.87-1.02). We did not find any association between stillbirths, twinning and sex of offspring and endometrial cancer risk.

Conclusion: Full-term pregnancy is associated with a 16% reduction in EC risk, with benefits seen up to seven births. An independent and more modest reduction in risk is seen for incomplete pregnancies. Other pregnancy-related characteristics do not appear to influence risk.

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Long term outcomes of early term induction for large-for-gestational age

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Background: There is much debate about the optimal management of pregnancies with a large-for-gestational age baby (LGA, birthweight >90th population percentile). A recent French randomised controlled trial reported that early term induction of labour reduced caesarean delivery rates and infant morbidity. However, long term child outcomes have not been assessed.

Objective: To assess maternal, neonatal and child health and education outcomes for LGA infants induced at 37-38 weeks.

Methods: Record-linkage study of term (37+ weeks), cephalic-presenting singleton pregnancies with an LGA baby in New South Wales, 2002- 2006. Linked birth, hospital, mortality and education data were used; with at least nine years follow-up. Exposure was induction of labour at 37-38 weeks, compared to expectant management (spontaneous birth at ≥37 weeks and planned births at ≥39 weeks). Relative risks and 95% confidence intervals were estimated.

Results: Among 11,774 pregnancies, 423 (3.6%) had an induction at 37-38 weeks. Women in the induction group were less likely to have a caesarean delivery (RR 0.44, 95% CI 0.35-0.56). Infants in the induction group were born earlier and weighed less, had higher rates of low Apgar scores, birth trauma, neonatal jaundice and phototherapy use than their expectantly managed counterparts. As children, they had higher rates of hospital admission and special needs. However, there was no difference in literacy and numeracy achievement by Year 3.

Conclusion: While the lack of long term harm is encouraging, the increased risk of neonatal morbidities and additional healthcare utilisation suggests the need for caution in early induction of LGA infants.

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Vaginal delivery is associated with pneumococcal carriage in Fijian infants

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Introduction Pneumococcal disease is a leading cause of morbidity and mortality in infants <3 months. Asymptomatic pneumococcal carriage is common, yet carriage is a pneumococcal disease prerequisite. Case reports suggest pneumococci may occupy maternal vaginal flora. Data documenting vertical transmission are limited. Pneumococcal carriage prevalence has been higher in indigenous Fijians (iTaukei) compared with Fijians of Indian Descent (FID). Fiji introduced ten-valent pneumococcal conjugate vaccine (PCV10) in 2012. Reported here is the association between vaginal delivery, ethnicity, and pneumococcal carriage in Fijian infants, pre- and three years post-PCV10.

Methods Annual cross-sectional carriage surveys including 5-8 week old Fijian infants were conducted, 2012-2015. Caregivers responded to demographic surveys. Nasopharyngeal swabs were taken and processed using standard methods. Multivariable logistic regression was used to investigate associations between delivery method, ethnicity, and overall, vaccine type (VT), and non-vaccine type (NVT) carriage, adjusting for demographics.

Results There were n=2,006 infants. Prevalence of overall, VT, and NVT pneumococcal carriage was 26.1% (95%CI 24.2-28.1), 6.2% (95%CI 5.2–7.3), and 20.1% (95%CI 18.3-22.0), respectively. Vaginal delivery was associated with overall (aOR 1.61, 95%CI 1.12–2.32; p=0.011) and NVT carriage (aOR 1.50, 95%CI 1.00–2.23; p=0.048), but not VT carriage (aOR 1.70, 95%CI 0.81–3.57; p=0.160). There was no association between ethnicity and carriage.

Conclusion Early pneumococcal acquisition may be associated with vaginal delivery. Mode of delivery may affect the infant microbiome. Universal prescription of antibiotics to women delivering via Caesarean section may reduce infant carriage. iTaukei ethnicity was not associated with infant pneumococcal carriage in Fiji three years post-PCV10.

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Caesarean section and Type-1 diabetes risk among South Australian children

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Background

There is conflicting evidence that caesarean births are linked to type 1 diabetes (T1D). It is hypothesized that lack of exposure to the birth-canal microbiome may influence the risk of T1D. Children born by prelabor caesarean are not exposed to the birth-canal microbiome, and births by caesarean during labor (intrapartum caesarean) may be exposed.

The study aims to estimate risk of T1D among children delivered by caesarean compared with normal vaginal delivery (NVD), and whether the risk of T1D differs by caesarean type (prelabor caesarean, intrapartum caesarean).

Materials and Methods

This population-based study linked routinely-collected, de-identified perinatal, birth, and hospitalization data from the South Australian Early Childhood Data Project for all births from 1999 to 2013 (n=286,054). T1D cases were identified using inpatient hospitalizations ICD-10-AM diagnosis codes (E10-E109). Risks of T1D according to 1) all caesareans, and 2) stratified into prelabor or intrapartum caesarean, compared to NVD, were assessed by Cox proportional hazard regression. Analyses were adjusted for confounders identified a priori and involved multiple imputation to address missing information.

Results

There were 541 children with T1D diagnosed from 2001-2014. In this cohort, 31.7% children were delivered by caesarean and 68.3% had vaginal birth. Compared to NVD, the hazard ratio for all caesareans was 1.03 (95% CI 0.79, 1.34), for prelabor caesarean 1.00 (0.73, 1.37), and for intrapartum caesarean 1.06 (0.78, 1.43).

Conclusion

In this large whole-of-population study, no association was found between caesarean section and T1D, regardless of whether the neonate/fetus was exposed to the birth-canal microbiome.

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Female reproductive history and risk of type 2 diabetes

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Background

Age at menarche, a reproductive marker, is associated with risk of type 2 diabetes in later life. The aim of this study was to investigate the association between other female reproductive markers and the risk of incident diabetes, and to examine whether any associations can be explained by excess body weight in midlife.

Methods

We pooled individual-level data from 126,721 mid-aged women from eight cohort studies participating in the International Collaboration for a Life Course Approach to Reproductive Health and Chronic Disease Events (InterLACE) consortium. We used generalised linear mixed models to quantify the associations between age at menarche, age at first birth, parity, menopausal status, and incident diabetes. We stratified by body mass index (BMI) when there was an evidence of an interaction with BMI.

Results

Over a median follow-up of 9 years, 4,073 cases of diabetes were reported. Women with menarche by age 10 years were at higher risk of incident diabetes after adjusting for BMI (RR 1.18, 95%CI 1.02-1.37), compared with those with menarche at 13 years; however, the increased risk was only apparent among women with a BMI ≥25 kg/m^2. A U-shaped relationship was observed between parity and risk of diabetes. Women with a hysterectomy/oophorectomy had an increased risk of diabetes (RR 1.17, 95%CI 1.07-1.29), compared with pre-/peri-menopausal women.

Conclusion

Several markers of a woman's reproductive history appear to be modestly associated with incident diabetes in later life. Maintaining a normal weight in adult life may ameliorate any increase in risk conferred by early menarche.

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Preventing alcohol consumption during pregnancy in Fitzroy Valley: AUDIT-C update

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Background

Fetal Alcohol Spectrum Disorder (FASD) encompasses lifelong neurodevelopmental disability caused by prenatal alcohol exposure (PAE). Aboriginal community leaders in the remote Fitzroy Valley, Western Australia, requested evaluation of the community-led FASD Prevention Strategy (2010-2016).

Aim

1. Evaluate PAE prevention using self-reported Alcohol Use Disorders Identification Test–Consumption (AUDIT-C) data during pregnancy
2. Compare AUDIT-C data collection, as an automated computerised alert, with standard practice

Methods

Midwives recorded first and third trimester alcohol consumption risk level in pregnant women from 2009-2016. From 2009-2014 standard practice was for midwives to enter PAE data in clinical notes. AUDIT-C responses were recorded in 2015/16 for the periods before and after pregnancy recognition. The proportion of women consuming alcohol by year were examined.

Results

Alcohol consumption was recorded for 524 pregnancies. The proportion of women reporting first trimester alcohol consumption decreased from 60% in 2011 to 16% in 2016. Third trimester consumption decreased from 28% in 2011 to <10% in 2016. The greatest decrease was in the proportion of women reporting low-risk consumption. In 2015/2016 the mean proportion of high-risk consumption was 6-7%. Consumption recorded using AUDIT-C before pregnancy recognition (n=101, 22%-92%) was higher than after recognition (n=204, 9%-40%) with less missing data. There were no significant differences between proportions by data collection method.

Conclusion

Community-led FASD prevention efforts appear to have reduced PAE and could be translated to other community settings. Future prevention could focus on high-risk alcohol consumption and investigate risk reduction before pregnancy. Automated computer-based questionnaires may help decrease missing data.

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Multigenerational low birthweights among Aboriginal Western Australians and fetal programming

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Low birthweight has been common among Aboriginal infants for generations. Birthweight is correlated within families due to the transmission of genetic and environmental factors. Another cause may be fetal programming, where a fetus' response to a hostile uterine environment leads to poorer adult health and, in turn, a poorer uterine environment for her offspring.

Identifying a causal relationship between maternal and offspring birthweight is complex. However, we can gain insights using family-based approaches and Western Australia (WA) has a database of family relationships.

We used linked birth, hospital, and mental health records of 12,865 WA Aboriginal singletons born 1998-2011 whose mother linked to a WA birth record from 1980 onwards, and their parents' records.

17% of births were small for gestational age. Using a linear regression model with a generalised estimating equation approach for offspring birthweight z-score (BWZ), the coefficient for maternal BWZ was 0.17, compared to 0.13 for paternal BWZ. The difference (0.03 [95% CI: -0.01, 0.08]) provides only limited support for the fetal programming hypothesis, particularly when issues such as non-paternity are considered. Other associations with offspring BWZ were much larger, including maternal smoking (-0.39 [95% CI: -0.45, -0.34]). In analysis of cousins with shared maternal grandparents (fixed-effects model), the mother-offspring association was fully attenuated (0.00 [95% CI: -0.05, 0.06]), suggesting transmission of maternal genetic and environmental factors alone may explain the association.

Compared to other risks, fetal programming appears to have a limited or no role in the persistence of low birthweights among Aboriginal infants.

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Effect of inter pregnancy interval on pre-eclampsia in a high-income country

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Background: Interpregnancy interval (IPI) is a potentially modifiable risk factor for pregnancy outcomes, and short and long IPI may be associated with increased risk of pregnancy complications. Record linkage provides the only practicable means to investigate IPI effects, which requires large generalisable sample sizes and long follow-up time.

Aim: This study examined the effect of IPI on pre-eclampsia in Western Australia, with the aim to inform the evidence-base for IPI recommendations in high-income countries.

Methods: A longitudinal retrospective cohort study was conducted using linked records for all births from the WA Midwives Notification System and Hospital Morbidity Data Collection. Conditional logistic regression was used by matching 96,501 women with three consecutive singleton births at 20-44 weeks of gestation (two IPI per mother) between 1980 to 2015(inclusive).

Results: Among the included cohort 17,047(6%) had a diagnosis of pre-eclampsia. Additional 2818 pre-eclampsia cases were identified through linkage to hospital records. A between mother analysis estimated (AOR:0.90, 95% CI 0.82-0.97), (AOR:1.74, 95% CI 1.58-1.91) for IPI of 6-11 months and ≥ 60 months respectively (as compared to 18-23 months) for pre-eclampsia. Both unmatched and matched models estimated high odds of pre-eclampsia for long IPI. However, the matched model showed a much weaker effect of long IPI (≥60 months) on pre-eclampsia (AOR:1.38, 95% CI 1.14-1.67).

Conclusion: Our study does not support the existence of a causal effect of short IPI on pre-eclampsia. Data linkage improved ascertainment of the outcome measure. Results suggest 18-23 months may be optimal for avoiding complications in future pregnancies.

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Association between early pregnancy haemoglobin levels and transfusion in the birth admission.

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Background: Postpartum haemorrhage and blood transfusion are increasing. Antenatal detection and correction of anaemia is an effective strategy to reduce the significance of blood loss at birth.

Aim: To use routinely collected data for obstetric patients to ascertain whether levels of haemoglobin (Hb) at ≤20 weeks of gestation are associated with blood transfusion and other adverse pregnancy outcomes at birth.

Methods: Clinical data cohort of all singleton births 20 to 42 weeks of gestation at Royal North Shore and Westmead hospitals between 2011 and 2015. The lowest Hb result in the first 20 weeks of pregnancy was ascertained from ObstetriX maternity data or hospital pathology results. The outcomes were blood transfusion in the birth admission and adverse maternal and neonatal outcomes.

Results: There were n=32,479 singletons births with a valid Hb result and without a history of blood disorder. Of these, n=29 (0.1%) had a Hb <80g/L, n=1557 (4.8%) had a Hb 80-110g/L, and n=30,893 (95.1%) had a Hb >110g/L at ≤20 weeks. Women with a Hb ≤110g/L were more likely to have a blood transfusion in the birth admission and more likely to have severe morbidity than women with a Hb of >110 g/L, and their babies were more likely to be born preterm, be small for gestational age, and be transferred to higher care after birth.

Conclusion: Initial unadjusted analyses suggest that lower haemoglobin levels in the first half of pregnancy are associated with higher rates of blood transfusion and poorer outcomes for mother and baby.

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How does the community food environment change over time? Examining spatial exposure to food outlets in Perth, Western Australia

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Introduction: The community food environment (CFE) (i.e., the location, type and number of food outlets) has been linked to dietary behaviours, suggesting a possible role in the rising prevalence of obesity. In Australia, little is known about how the CFE differs between established residential areas and new residential developments, or how it evolves over time. **Methods:** 3,275 addresses from the Western Australian RESIDential Environments (RESIDE) project were stratified by stage of urban development (i.e., established or new development). RESIDE is a quasi-experimental, longitudinal study involving a cohort of adults who moved residential address from an established area into one of 73 new housing developments. Food outlet locations (i.e., supermarkets, greengrocers, convenience stores, cafes/restaurants and takeaways/fast food) were sourced from commercial database listings (SENSIS Pty. Ltd.) in 2004, 2006, 2007 and 2011. Measures of spatial exposure to food outlets were generated for each address at each time point. **Results:** Established areas had a greater density and proximity to all food outlet types compared with new developments. Density and proximity of food outlets increased over time within established and new developments. Established areas had a greater relative percentage of healthy food outlets compared with new developments. **Conclusions:** Compared with established areas, people living in new residential developments may be disadvantaged with fewer opportunities to purchase healthy food and greater relative exposure to unhealthy food. Public health policy aimed at increasing the "healthiness" of the CFE in new residential developments, may be an important step towards improving nutrition-related health outcomes.

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Young pedestrians and cyclists: how safe are they?

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Background: There is a push to encourage active transportation among children and adolescents, to improve physical fitness and reduce obesity. A major barrier to active transportation to school is parents' concern about traffic safety.

Aim: This study aimed to explore crashes in Western Australia (WA) from 2006-2016 involving child and adolescent pedestrians and cyclists at varying distances from the closest school.

Methods: Data were obtained from Main Roads Western Australia, Department of Education WA and the Australian Bureau of Statistics. Distance between each crash and the closest school was calculated using a geographic information system. Age and gender of the crash victims, postcode-level socio-demographic factors and remoteness were included in the logistic regression models.

Results: The results found that crashes within 500m of the closest school were more likely to occur during school zone operating hours (Monday to Friday, 7:30-9am, and 2:30-4pm – OR=3.287; 95% CI=1.584-6.820). Child and adolescent pedestrian and cyclist crashes nearer to the closest school were more likely to occur in regional and remote areas than in Perth (Inner regional WA: OR=3.154; 95% CI=1.061-9.380). The location of crashes relative to schools varied according to socio-economic status of the postcode of the crash.

Conclusion: Continuing interventions are needed develop infrastructure to support children and adolescents travelling safely, such as in high pedestrian and cyclist areas, and selectively reduce speed limits at times and in areas where large volumes of young people travel on foot or by bicycle, such as close to schools, and in regional and remote areas.

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Rate of recovery following injury: the role of comorbidity

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Background Understanding the role of comorbidity in recovery following injury is an important challenge given known associations between comorbidity and poor outcomes, more complex clinical management, and increased healthcare costs.

Aim To compare rates of recovery over 24 months following injury for those with no pre-existing comorbid conditions, one comorbidity and two or more comorbidities.

Methods The Prospective Outcomes of Injury Study recruited 2856 injured New Zealanders aged 18-64 years. Data sources included participant surveys and administrative data from New Zealand's no-fault injury compensation insurer, the Accident Compensation Corporation, and the National Minimum Dataset of hospital discharges. Recovery, or lack of, was measured using the WHO Disability Assessment Schedule at 3, 12 and 24 months post-injury. Twenty-one pre-existing chronic conditions were used to identify comorbidity. Analysis involved Generalised Estimating Equations.

Results The distribution reporting none, one comorbidity, or multimorbidity pre-injury was 51%, 27%, and 21% respectively. We estimated no difference (log odds per year 0.05, 95% CI -0.17 to 0.27) between the rate of change of disability for those with one pre-injury comorbidity compared to those with none. Those with pre-injury multimorbidity had significantly slower reduction in disability over time than those with no pre-injury comorbidity (log odds per year 0.27, 95% CI 0.05 to 0.48).

Conclusion This longitudinal analysis of disability outcomes following injury indicates those with pre-existing multimorbidity have significantly slower recovery rates. Given the increasing prevalence of multimorbidity in many countries, greater understanding of the opportunities for intervention to better support injured people with multimorbidity are required.

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Vertebral fractures and Ankylosing Spondylitis patients in Western Australia.

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Background

Ankylosing Spondylitis (AS) causes spinal osteoporosis and rigidity leading to increased risk of vertebral fractures. Large scale studies on vertebral fractures in AS patients are scarce, particularly in the southern hemisphere, with rates reported between 0.4% and 32%.

Aim

Longitudinally investigate population wide spinal fracture rates in AS patients and compare the prevalence, disease burden and survival rates between AS and AS-free controls.

Methods

Whole-population observational case-control study analysed data extracted between 1980 and 2015, from the Western Australian Linkage System. AS patients were identified using International Classification of Diseases, 9th (720) and Australian 10th (M45, M08) revision. AS patients were matched with up to 5 controls for age, gender, Indigenous status and event date. Kaplan-Meier was used to estimate survival rates and conditional cox regression for age-gender adjusted hazard ratios.

Results

We identified 1285 AS patients (70% males, average 70 ±14.65 years) and 6177 controls, followed up for a median of 21 years. Vertebral fractures occurred in 91 (7%) AS patients and 135 (2%) controls, unadjusted OR: 3.41 (95%CI: 2.60, 4.48), remaining stable after stratified by decade. Life expectancy following first vertebral fracture event was 5 years shorter for AS-patients than controls at 10, 20 and 30 years with 45% vs 65%, 22% vs. 50% and 20% vs. 45%, respectively, $P < 0.001$ (age-gender adjusted HR = 1.54, 95%CI: 1.08, 2.20).

Conclusion

Vertebral fractures remain significantly more frequent in AS patients than controls in the anti-TNF era, and lead to a 5-years shortened lifespan.

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Maternal assault admissions and the risk of child protection involvement

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While previous research has highlighted a link between children's exposure to violence and maltreatment allegations, robust estimates of association have been difficult to confirm due to the limitation of small sample sizes.

Linked-administrative data were obtained for all live births in Western Australia from 1990 to 2009 (N=524,534) and their parents, with follow up to 2013. Multivariate Cox regression was used to measure the risk of maltreatment allegation associated with maternal assault admission. Adjustments were made for characteristics known to increase the risk of maltreatment allegation.

One in five children whose mother had an assault admission had a subsequent maltreatment allegation, increasing to more than one in three children when restricted to assault admissions in the prenatal period. More than half of the children who had a maltreatment allegation following a maternal assault admission were Aboriginal. After adjusting for covariates, children whose mother had an assault admission had two-fold increased risk of having a maltreatment allegation. The risk of maltreatment allegation was greatest in young children, 5.5-year-old (SD=4.6), when restricted to maternal assault admissions in the prenatal period the children were younger at 4-year-old (SD=4.1). The time from maternal assault admission to maltreatment allegation was around 12-months longer for Aboriginal children than for non-Aboriginal children.

Maltreatment allegation is common in children following a maternal assault admission. Targeted early intervention is required for families with young children, and pregnant women experiencing violence. Time to maltreatment allegation for Aboriginal children warrants community developed culturally-safe partnerships between Aboriginal communities and government services.

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Impact of alcohol and illicit drug use on Australian disease burden

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The Australian Burden of Disease Study (ABDS) 2011 quantified the health impact of alcohol and illicit drug use in Australia and showed they are two of the leading risk factors for ill health and death.

To update and extend estimates of disease burden due to alcohol and illicit drug use in the ABDS 2011 to include: estimates by drug type, analysis by subnational groups, and assess the potential impact on future health burden.

Comparative risk assessment methodology was used to estimate disease and injury burden attributable to alcohol and illicit drug use. A literature review identified causally linked diseases and corresponding effect sizes. Exposure was obtained from the National Drug Strategy Household Survey. Projections of burden in 2020 and 2025 were estimated on the assumption of current trends continuing.

Of the total health burden in Australia in 2011, 6.7% was due to alcohol and illicit drug use (9.1% for males and 3.8% for females). Of illicit drug use burden, 41% was due to opioid use, followed by amphetamines 18%, unsafe injecting practices 18%, cocaine 8% and cannabis 7%. The lowest socioeconomic group experienced rates of alcohol and illicit drug use burden that were 1.9 and 2.6 times those of the highest socioeconomic group, respectively.

This study demonstrates the impact of alcohol and illicit drug use on disease burden in the Australian population and highlights that health inequalities exist, with lower socioeconomic groups and more remote areas generally experiencing higher rates of disease burden due to alcohol and illicit drug use.

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Associations between electronic cigarettes, tobacco smoking and health behaviours .

Suzanne Schindeler, Tim Harrold

Aim: To determine if associations exist between electronic cigarette (E-cigarette) use and various health behaviours after adjusting for current tobacco smoking status.

Background: E-cigarettes are battery powered devices that heat a liquid to a vapour so it can be inhaled. The liquid may contain nicotine. The prevalence of e-cigarette use in NSW has previously been reported to higher in current tobacco smokers compared to non-smokers[1].

Method: E-cigarette use amongst adults aged 16 years and over was captured in the NSW Population Health Survey from 2014 to 2017. Methods for the survey have been described elsewhere (Barr et al, 2012). Odds ratios were calculated using the Proc Surveylogistic procedure in SAS 9.4. The following health behaviours were studied: alcohol consumption, adequate fruit intake, lifetime cannabis use, and overweight or obesity.

Results: In NSW, across 2014-2017, the prevalence of current smoking was 14.8% (95%CI: 14.3%-15.4%) and the prevalence of current e-cigarette use was 1.01% (95%CI: 0.87% - 1.16%). Amongst current e-cigarette users, 52% were current smokers. Significant crude associations were found between current e-cigarette use and alcohol consumption, inadequate fruit consumption, overweight or obesity, and lifetime cannabis use. However, when the models were adjusted for current smoking, significant associations remained only for cannabis use (OR: 2.61, 95%CI: 1.39-4.88) and overweight or obesity (OR: 1.58, 95%CI: 1.15-2.18). No significant interactions were found between current smoking and current e-cigarette use.

Conclusion: Due to high rates of tobacco use among electronic cigarette users, it is prudent to adjust for tobacco use in e-cigarette association studies.

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Prevalence of racism exposure in a longitudinal study of Aboriginal and Torres Strait Islander children

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Racial discrimination is a central social determinant of health in Aboriginal and Torres Strait Islander (hereafter referred to as Aboriginal) populations, and is associated with health inequities within these populations. This study sought to estimate the prevalence of racism in a longitudinal study of Aboriginal children.

This study examined direct and vicarious racism within the Footprints in Time: The Longitudinal Study of Indigenous Children (LSIC) dataset, providing descriptive analysis of direct and vicarious forms of racism exposure experienced between the ages of 6 months to 12 years. Reported statistics include overall prevalence, accumulation of exposure and age of first exposure across key sociodemographic factors over time; the study population comprised 1,759 children in total.

One in five (20.4%) study children had direct experience of racial discrimination by age 11 years, with the majority of these children (73.5%) experiencing first exposure to direct racism by age 7, while vicarious racism through the primary carer was experienced by 44.5% of study children and half (50.5%) of children experienced vicarious racism via family members. Children living in areas of high/extreme remoteness, in the most disadvantaged regions and children who spoke an Indigenous language were at increased risk of experiencing direct racism by age 11.

Direct and vicarious racism is commonly experienced by Aboriginal children and exposure often occurs within the first years of life. This study is one of the first studies internationally to characterise the prevalence of both direct and vicarious forms of racism among a cohort of children using longitudinal data.

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Next generation evidence synthesis – prospective meta-analyses in health research

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Background

Prospective meta-analysis (PMA) is an approach to synthesising evidence that has the potential to address the limitations and sources of bias associated with traditional retrospective systematic reviews and meta-analyses.[1,2] In a PMA, research efforts are coordinated to maximise the use of data to find answers to important research questions.[1,3] However, the terminology and definitions used to date have resulted in some confusion and inconsistency. This threatens successful implementation and interpretation of PMA.

Objective

The aim of this project was to clarify PMA terminology, definition, and classification.

Methods

PubMed, Embase, Cochrane Database of Systematic Reviews and PROSPERO were systematically searched, and experts were contacted, to identify all planned, published, or ongoing PMA. The search results were then grouped and the different terminologies, definitions, and study types described. Cochrane PMA Methods group members engaged in a structured expert workshop to refine the definition of PMA and develop classifications, based on the findings of the search.

Results

We identified 1,056 entries for title and abstract screening, 274 of those were included for full-text screening. There was great variation in the terminology, reporting, and definitions of the identified PMA. The structured expert discussion resulted in a revised definition of PMA and its subcategories, and will inform the future development of guidelines on how to conduct and report PMA.

Discussion

PMA are adaptive, efficient, and collaborative. This work will improve understanding of PMA in the research community and enable more researchers to conduct successful PMA, thereby maximising data use and reducing research waste.

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The NSW Population Health Survey: informing health policy since 1997

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The NSW Population Health Survey is a telephone survey on the health and wellbeing of the NSW population, and serves as a primary source of information on a range of fundamental measures of public health.

The survey provides critical data to Government, the public and media on topics ranging from childhood obesity, smoking and alcohol consumption, through to issues like mental illness, illicit drug use and electronic cigarette use. Data from the Survey is published via HealthStats NSW, and where relevant, via the NSW Report of the Chief Health Officer Series, with reporting infrastructure created using methods that follow a reproducible research design philosophy. Data is made available in unit record form to individuals within the NSW Health System who have access to a state wide data warehouse called SAPHaRI, with data routinely disclosed in de-identified unit record format to researchers for their own projects.

This presentation describes key design, methodological and operational changes to the survey, their impact on the data and how those changes have affected the use of data and long term trends in health behaviours. Further, the presentation will also highlight some of the key challenges that the Survey faces and how those challenges are currently being met. These challenges include comparability of data across different surveys, and dealing with discordant findings across different surveys.

In addition, this presentation will highlight a few case studies on how certain design changes led to unexpected secondary uses of the data.

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Maximising the use of Queensland preventive health survey series data

Susan Clemens

Background: The Queensland preventive health telephone survey series has been conducted since 2002. This surveillance system is the primary mechanism to monitor risky health behaviours, such as smoking, obesity, and physical activity. Each year, the survey collects information on 12,500 adults and 2,500 children. Results inform a range of state wide preventive health strategies.

Aim: Data collection, dissemination, and use environments are changing rapidly. Survey methods are evolving to meet new expectations and to adapt to new challenges. This presentation describes three strategies employed by the preventive health surveillance system to maximise the use of data to inform policy directions within government.

Results: The first strategy involves enhanced dissemination strategies to meet multiple needs, including increased availability of regional information. The second strategy involves extending traditional surveillance system objectives beyond routine monitoring. Examples include (1) identifying and recruiting participants with low prevalent behaviours into targeted sub-studies, and (2) refining the periodicity of collection for health domains to enable enhanced collection of behaviours with specific policy interest. Lastly, the survey collected population benchmarking data for a novel subpopulation to assess bias in studies using non-probability samples.

Conclusion: Contemporary expectations for surveillance system information create both additional demands and opportunities. Leveraging these opportunities increases the value of this resources and will contribute to its ongoing viability.

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Joint effect: heatwave and air-pollution on ambulance services in WA

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Introduction: As the frequency and intensity of heatwaves increases, emergency health service utilisation, including ambulance callouts, have correspondingly increased across the world. The impact of air pollution on health adds to the complexity of the effects. This research work is the first known study to analyse the joint effect of heatwaves and air pollution on the ambulance service in Western Australia (WA).

Methods: A time series design was used. Daily data on ambulance callouts, temperature and air pollutants (PM_{10}, $PM_{2.5}$, O_3, NO_2, SO_2 and CO) were collected for the Perth metropolitan area, WA for 2006-2015. Poisson regression modelling was used to assess the association between heatwaves, air pollution, and ambulance callouts. Risk assessments on age, socio-economic status (SES), and joint effect between air pollution and heatwaves on ambulance callouts were conducted.

Results: The ambulance callout rate was higher during heatwave days (14.20/100,000/day) compared to non-heatwave days (13.95/100,000/day) with rate ratio 1.017 (95% confidence interval 1.012-1.023). The ambulance callout rate was higher in people aged 60 years and above, people with low SES, and those who lived in inland areas. Significant joint effects were observed between heatwaves and PM_{10}, O_3 & CO on ambulance callouts after adjusting for the other risk factors.

Conclusions: Ambulance service callouts are an important indicator to evaluate heatwave related emergency morbidity in WA. As the concentration of all air pollutants were lower than the Australian National Standards, the interactive effect of heatwave and air pollutants need to be further examined, especially when it exceeds the standards.

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Heatwaves and work-related injuries in Australia: A multi-city study

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Publish consent withheld

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Occupational exposure to carcinogenic agents among manufacturing employees in Malaysia

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Purpose: It is estimated that 19% of all cancers globally are attributable to the environment, including occupational settings. This paper will share the findings on characteristics of selected manufacturing employees in Malaysia who are occupationally exposed to carcinogenic agents.

Methods: A total of 1291 manufacturing employees were selected from the nationwide Health Screening Programme database of the Social Security Organisation (SOCSO) to participate in this cross-sectional study. Advance invitation letters were posted to the selected employees before being called to participate in Computer Assisted Telephone Interview (CATI). Exposure levels were determined using the Malaysian version of web-based automated expert assessment method (OccIDEAS). Exposure status was linked with participants' sociodemographic and occupational characteristics.

Results: Among 501 eligible respondents, 78.8% were occupationally exposed to at least one carcinogenic agent. Prevalence of exposure was the highest for α–chlorinated toluene (33.1%), diesel exhaust (31.5%) Environmental Tobacco Smoke (30.1%), graveyard shift work (11.6%) and other solvents (2.8-9.6%). Respondents from Malay and Bumiputera ethnicity and lower income group were more likely to be occupationally exposed to at least one carcinogenic agent. High level of exposure to at least one carcinogenic agent was significantly associated with being a non-smoker and working for more than nine years.

Conclusion: This study is an important addition to scientific literature in the area of occupational health epidemiology. Prevalence and differences in occupational exposure to carcinogenic agents across socioeconomic strata as observed indicate possible target areas for preventive actions or developing policy options to reduce cancer burden in the country.

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Young men's receptiveness to workplace suicide intervention

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Background

Suicide is a leading cause of death among young men. Health literacy, and help-seeking are known to be poor within this group, but little is known about what interventions are most successful in improving understanding of suicide and mental illness among young men.

Aim

This research aimed to examine the effectiveness of a workplace program in shifting suicide beliefs and improving suicide and mental health literacy.

Methods

Pre- and post-training survey data of 20,125 respondents was obtained from a workplace training program database of evaluation results between 2016 and 2018. Generalized estimating equation (GEE) models were fitted to examine change in suicide beliefs, and predictive margins and their SEs were computed. Mean differences in belief change were obtained for the overall sample, and by age and gender.

Results

Significant shifts in all beliefs except one were observed following training across all age-groups. While pre-test scores on most beliefs were showed greater suicide literacy aong older respondents, there was some evidence that younger respondents showed greater desirable change in beliefs. Younger respondents showed greater propensity to regard the workplace, and the construction industry more broadly as having some responsibility to reduce suicide rates and address mental health.

Conclusions

Results indicate that while suicide and health literacy may be lower among young men, they show great amenability to belief change.

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Impact of ambient temperatures on work-injuries in three Australian cities

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Publish consent withheld

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Financial impact of injury for older workers: utilising administrative data

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Background Given rapidly ageing workforces and the challenges this poses, there is a need to better understand how injury in older workers impacts financially on individuals and society; Statistics NZ's newly available Integrated Data Infrastructure (IDI) containing linked Governmental administrative and survey data provides the opportunity to explore this.

Aim To quantify the impact of injury over three years on the financial well-being of older workers.

Methods Using a population-based e-cohort of workers aged 45-64 years, linked de-identified IDI data from Inland Revenue (income tax), Accident Compensation Corporation (ACC; injury), Ministry of Health (chronic conditions) and Statistics NZ (socio-demographic) was used to compare the 21,639 with an injury-related entitlement claim in 2009 to the remaining 596,133. Adjusted geometric mean ratios (aGMRs) were used to estimate differences in work and total income from all taxable sources (work, pension, ACC, other benefits).

Results Differences in total income increased over time. In the third year, those injured received on average $NZ2630 less than the comparison group; equivalent to a 6.7% drop (aGMR 0.933 (95%CI 0.925, 0.941)). Restricting to income from work, those injured received 29.2% less than the comparison group at three years (aGMR 0.708 (95%CI 0.686, 0.730)).

Conclusion Although the substantial impacts of injury on income were mainly mitigated by public income transfers, relative losses in total income increased in the three years following injury. The loss of future earnings potential at a time when older workers need to be preparing financially for retirement is concerning and needs to be understood further.

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Prevalence of occupational exposure to asthmagens derived from animals, fish and/or shellfish among Australian workers

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Introduction: Several animal, fish and/or shellfish derived substances encountered in the workplace can initiate or exacerbate asthma. The aims of this study were: to produce a population-based estimate of the current prevalence of occupational exposure to animal, fish and/or shellfish derived asthmagens, to identify the main circumstances of exposures and to identify occupations with the highest proportions of exposed respondents.

Methods: We used data from the Australian Work Exposure Study-Asthma, a telephone survey that investigated the current prevalence of occupational exposure to asthmagens among Australian workers. A web-based tool was used to collect job task information and assign exposure to asthmagens, including animal, fish and/or shellfish derived asthmagens. Prevalence ratios to determine risk factors for exposure were estimated using modified Poisson regression.

Results: Of the 4878 respondents, 12.4% were exposed to asthmagens derived from animals, fish and/or shellfish. Exposure to these asthmagens was significantly higher in workers residing in regional and remote areas, compared with major cities. The main circumstance of exposure to animal derived asthmagens was through cleaning up rat/mice infestations, while the main circumstance of exposure to fish and/or shellfish derived asthmagens was through preparing and cooking salmon. Occupational groups with the highest proportion of exposure to animal or fish and/or shellfish derived asthmagens were farmers/animal workers and food workers, respectively.

Conclusions: This is the first study investigating occupational exposure to animal, fish and/or shellfish derived asthmagens in a nationwide working population. These results can be used to inform the direction of occupational interventions to reduce work-related asthma.

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Association between medication adherence and outcomes following myocardial infarction

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Background

Patients with suboptimal adherence to guideline-recommended medications following myocardial infarction (MI) have increased risk of adverse outcomes.

Aim

To determine the association between adherence to statins, beta blockers (BB), renin-angiotensin aldosterone system inhibitors (RAASi) and clopidogrel in the year following MI and cardiovascular outcomes using restricted cubic spline (RCS) analysis.

Methods

We identified a cohort of 5938 patients aged >65 years in Western Australia who had an MI from 2003-2008 and survived one-year post-discharge. Adherence was calculated using proportion of days covered (PDC) from first medication supply date to one-year post-discharge (landmark date). Outcomes were major adverse cardiac events (MACE) and death within one-year following the landmark date. Cox proportional hazard models with RCSs were used to determine associations between PDC adherence (linear or categorical) and outcomes.

Results

A 10% decrease in adherence to statins in the landmark period significantly increased the one-year risk of MACE (5.1%) and death (6.2%). BB adherence did not affect either outcome at any level of adherence. RAASi and clopidogrel showed curvilinear RCS relationships. Lower levels of adherence to RAASi (<70% and 70-<90% versus ≥90%) significantly increased the risk of death (33.2% and 28.2% respectively). Adherence <90% to clopidogrel significantly increased the risk of death by approximately 30%.

Conclusion

In seniors who survived one-year post-MI, higher adherence to statins was associated with lower risk of MACE and death. In contrast, BB had no effect, whilst high adherence to RAASi and clopidogrel is important. RCSs are useful for visualising the relationship between adherence and outcomes.

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Socioeconomic variation in absolute cardiovascular disease risk and treatment

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Background: Cardiovascular disease (CVD) events are highly preventable and disproportionately affect socioeconomically disadvantaged individuals, challenging efforts to reduce CVD burden. Population-level data on variations in absolute CVD risk and treatment are needed.

Aim: To estimate absolute and relative socioeconomic inequalities in absolute CVD risk and use of guideline-recommended medications in the Australian population to identify opportunities to reduce inequalities in CVD events.

Methods: Cross-sectional representative data on 4,751 people aged 45-74 from the 2011-12 Australian National Health Survey, including interview, physical measurement, and blood and urine sample data. Poisson regression with robust standard errors was used to calculate prevalence differences (PD) and ratios (PR) for prior CVD, high 5-year absolute risk of a primary CVD event and guideline-recommended medication use, in relation to socioeconomic position (SEP, measured by education).

Results: Age- and sex-adjusted prevalence of high absolute risk of a primary CVD event among those of low (school certificate), intermediate (certificate/diploma/trade) and high (university degree) SEP were 12.6%, 10.9% and 7.7%, respectively (PD, low vs. high SEP=5.0% [95%CI:2.3-7.7], PR=1.6 [1.2-2.2]); corresponding prevalences for prior CVD were 10.7%, 9.1% and 6.7% (PD=4.0% [1.4-6.6], PR=1.6 [1.1-2.2]). Proportions using recommended preventive medication among those with high primary risk were 21.3%, 19.5% and 29.4% for low, intermediate and high SEP (PD=-8.1 [-24.9-8.8], PR=0.7 [0.4-1.3]), respectively; corresponding results for prior CVD were 37.8%, 35.7% and 17.7% (PD=20.2 [9.7-30.5], PR=2.1 [1.3-3.5]).

Conclusion: There is substantial potential to prevent CVD events and reduce inequalities through appropriate management of high absolute CVD risk in the population.

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Monitoring stroke incidence after Closing the Gap using linked data

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Background

The Australian Government's ''Closing the Gap'' (CtG) program, introduced since 2008, aims to reduce health gaps among Indigenous Australians, with monitoring of progress being integral to the program.

Aim

We explored linked data methods to determine whether CtG has impacted on population-based acute stroke incidence in Western Australia.

Methods

First-ever strokes 2001-2013 were identified from linked hospital and mortality records. Prevalence-adjusted population denominators contributed to Indigenous and non-Indigenous age/sex-standardised rates (ASSRs). Two methods were used to measure trends: i) *Joinpoint* regression determined change-points in trends; ii) a period-stratified analysis (2001-2008; 2009-2013) with Poisson regression (sex/age-adjusted) estimated annual percentage changes. Analyses were stratified by Indigenous status, and annual Indigenous to non-Indigenous rate ratios (RRs) calculated by sex, metro-rural and broad age-group (20-54; 55-74).

Results

12,689 first-ever strokes (6.5% Indigenous) were identified. Indigenous annual ASSRs fluctuated but were consistently >3.5-times higher than non-Indigenous. Joinpoint analyses suggested significant incidence reductions during 2001-2013 for Indigenous females (-3.3%/year) and rural populations (-5.6%/year). The period-stratified analysis found no significant difference in Indigenous incidence for 2001-2008 versus 2009-2013. Non-Indigenous incidence overall was unchanged from 2001-2013 but increased in 20-54 years (+1.5%/year) and decreased in rural residents (-1.0%/year). Period-stratified analysis showed a significant reduction in Indigenous/non-Indigenous RRs in rural areas only.

Conclusion

Since 2001, Indigenous stroke incidence reduced among female and rural residents, but the overall gap has not. Given the complex determinants and long lead-time to stroke, evidence of impacts of CtG are likely to be delayed, with linked data offering a robust approach to monitoring.

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A linked data analysis of multimorbidity in Aboriginal and non-Aboriginal patients hospitalised with atherothrombotic disease in Western Australia: Implications for disease management

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Background: The associated comorbidities in atherothrombotic disease (ATD) patients impose significant challenges in the disease management. We investigated the prevalence and pattern of multimorbidity (presence of two or more chronic conditions) in Aboriginal and non-Aboriginal Western Australian (WA) residents with ATDs.

Methods: We identified a cohort of patients aged 25-59 years admitted to WA hospitals with a discharge diagnosis of ATD (from 1 January 2000 to 30 June 2014) using a population-based linked administrative health data. Multimorbidity patterns were empirically explored through latent class analysis.

Results: Half of the cohort had multimorbidity, although this was much higher in Aboriginal people (Aboriginal: 79.2% vs. non-Aboriginal: 39.3%). Only a quarter were without any documented comorbidities. Hypertension, diabetes, alcohol abuse disorders and acid peptic diseases were the leading comorbidities in the major comorbid combinations across both Aboriginal and non-Aboriginal cohorts. We identified four and six distinct clinically meaningful classes of multimorbidity for Aboriginal and non-Aboriginal patients, respectively. Out of the six groups in non-Aboriginal patients, four were similar to that identified in Aboriginal patients. The largest proportion of patients (33% in Aboriginal and 66% in non-Aboriginal) was assigned to the relatively healthy group, with most patients having less than two conditions. Other groups showed variability in degree and pattern of multimorbidity.

Conclusion: Multimorbidity is common in ATD patients and the comorbidities tend to interact and cluster together. Physicians need to consider these in their clinical practice. Different treatment and secondary prevention strategies are likely to be useful for management in these cluster groups.

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Cannabis use and sex differences in cardiometabolic health

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Background. Growing evidence shows cannabis use is associated with lower rates of metabolic dysregulation. Despite cannabis impacting each sex differently, few studies have examined the metabolic profile of male and female cannabis users separately. Our aim was to investigate whether cannabis use is associated with metabolic syndrome and its components in men and women with psychotic illness.

Method. The second Australian psychosis survey used a two-phase design to randomly select a nationally representative sample of adults with psychotic illness for interview and physical assessment. A total of 1078 men and 735 women provided data on cannabis use. Multiple logistic regression was used to model, separated for each sex, the influence of no, occasional and frequent past-year cannabis use on metabolic syndrome, adjusting for potential covariates including antipsychotic medication, smoking, alcohol and physical activity.

Results. In the past-year, 179 women and 419 men had used cannabis. The proportion of each sex with metabolic syndrome was 58.1% and 57.6% respectively. Unadjusted analyses showed frequent cannabis use was associated with significantly lower odds of metabolic syndrome for both sexes. In weighted adjusted analyses, the association between metabolic syndrome and frequent cannabis use remained significant for men (OR =0.49, 95% CI=0.31-0.78), but not for women (OR=0.68 95% CI=0.37-1.24). Frequent cannabis use was associated with smaller waist circumference, lower blood pressure and lower triglyceride levels in men but not women.

Conclusions. Our data indicate that, for men only, regular cannabis use may have cardiometabolic protective effects, suggesting cannabinoid regulation of energy balance may be sex-dependent.

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Mixed effects prediction model for ascertaining rheumatic heart disease status

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Background:

Several International Classification of Disease-10 (ICD-10) codes for rheumatic heart disease (RHD) are non-specific and default to RHD if rheumatic origin of valvular disease is unspecified. This results in substantial biases in RHD counts.

Aim:

To develop a comprehensive prediction model for predicting RHD status from ICD-codes in linked hospital records from five Australian jurisdictions

Methods:

RHD-coded (ICD-10 I05-I09) patient episodes (n=4087) in Queensland were validated through chart reviews and linked with hospital records from 2000 to 2017. Demographic and diagnosis variables available from the linked data include age, sex, Aboriginal status, diagnosis codes from multiple admissions (including previous acute rheumatic fever, group A streptococcal infection and non-rheumatic valvular and congenital heart disease), hospital and admission type, relevant procedure codes, pregnancy and socioeconomic variables.

Results:

We developed a prediction algorithm based on a generalised linear mixed model. Variables are categorised ("binned") by subject and each bin is introduced subsequently into the model. Each candidate model is k-fold cross-validated and the optimal variable set is chosen based on a combination of loss functions. We suggest appropriate methods for predicting out of sample random effects. Results will be validated using other machine learning methods such as classification and regression trees and random forests. The model is illustrated through empirical data from the Australian RHD Burden study.

Conclusion:

This prediction algorithm will allow us to credibly quantify the burden of RHD at a national level which is a key prerequisite for guiding national efforts to end RHD within a generation.

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Using big data to improve vascular risk prediction and better targeted treatment

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Readily available treatments can halve the risk of premature vascular disease but under- and over-treatment is common and there are substantial ethnicity- and deprivation-related inequities in vascular disease burden. The effectiveness of most treatments depends on patients' risks of developing vascular disease but estimating risk is difficult without risk prediction algorithms and few valid algorithms have been developed.

We have established three overlapping 'big-data' cohort studies, a primary care cohort, a hospital cohort and a national cohort. These cohorts are electronically linked to the same routine national health datasets of laboratory investigations, drug treatment, hospitalisations and deaths. Using these linked data we are: i. developing new risk prediction algorithms to assist clinicians estimate vascular risk in multiple high-risk populations; ii. investigating in whom, where and why, under- and over-treatment and inequities in vascular risk and risk management occur; iii. developing and implementing a multi-algorithm risk prediction engine and a 'big-data' vascular health information platform to support initiatives to increase appropriate treatment, reduce inequities in vascular disease outcomes and improve overall vascular health.

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The future of epidemiology

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Scientific enquiry in the areas of health and medicine continue to evolve as the understanding of our world and access to new technologies expand. Since John Snow's sentinel work using statistical mapping to investigate cholera outbreaks, the discipline of epidemiology has also undergone considerable transformation. The expansion of focus from infectious to non-communicable disease, and the incorporation of socio-ecological paradigms have characterised changes in the field of epidemiology over the last century. Accordingly, epidemiological theory and methods have developed in-step with this changing focus leading to the modern epidemiology movement which gained considerable traction in the second half of the 20th century.

Exponential advances in technology over recent decades have unquestionably created new and exciting avenues for health research. The advent of big data, data linkage, geo-spatial technology, machine learning, natural langue processing, real-time analytics and the expanding 'omics universe, to name but a few, provide many opportunities, and also possess a range of risks, for the field of epidemiology as a standalone discipline. We likely stand on the cusp of the next era for our discipline. However, for epidemiology to thrive, new methodologies need to be conceptualised and embraced with fresh approaches to adopt new technologies as they continue to develop. This session will overview the potential opportunities and challenges ahead for the discipline of epidemiology. An expert panel will also bring together leading thinkers and practitioners across health, technology and community sectors to discuss implications and possible solutions for the future of epidemiology.

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Accumulation of chronic conditions in overweight and obese women across the adult lifespan: a national cohort study of Australia

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Background It is well established that higher body mass index (BMI) is associated with greater risk of many individual chronic conditions. Little is known about the role of BMI in the accumulation of multiple chronic conditions (multimorbidity) across the adult lifespan. We aimed to prospectively quantify the association between time-varying BMI and accumulation of chronic conditions in three age-group cohorts.

Methods We included 31,609 women (10,582 born in 1973-78, 12,355 born in 1946-51, and 8672 born in 1921-26) from the Australian Longitudinal Study on Women's Health who were followed up approximately every 3 years from 1996. Generalized estimated equations was used to calculate the odds ratio (OR) and 95% confidence interval (CI) for cumulative incidence of nine chronic conditions in relation to time-varying BMI, age group and disease history.

Results A U-shaped pattern in the association of BMI with number of chronic conditions was observed in 1946-51 and 1926-21 Cohorts. Women who were obese experienced a marked accumulation of additional chronic conditions after they became multimorbid. Compared to women with normal weight and no chronic conditions, adjusted ORs for developing two or more new chronic conditions in obese women were 2.7 (95% CI, 2.4-3.0), 3.3 (95% CI, 2.8-3.8) and 5.3 (95% CI, 4.6-6.0) for those with no chronic conditions, one chronic condition, and multimorbidity, respectively. These results were consistent across the three age-group cohorts.

Conclusion Overweight and Obesity are associated with the accumulation of chronic conditions. This effect appears to be consistent among young, middle-aged and older adult women.

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Using biomedical survey data to understand rate of unreported chronic disease risks in Aboriginal and Torres Strait Islander Australians

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Disparities in health between Indigenous and non-Indigenous Australians are widely reported, particularly with respect to chronic diseases. Comparisons of self-reported and objectively measured risk data suggest that a substantial proportion of the Australian population are unaware of their risk status, with potential implications for prevention of chronic disease and associated complications for individuals. This analysis explores rates of reported and unreported chronic disease risks in Aboriginal and Torres Strait Islander Australians and examines sociodemographic characteristics associated with unreported risk.

3,293 Indigenous adults provided blood samples as part of a national health measures survey. We compared the prevalence of self-reported and measured high blood pressure (HBP), high cholesterol (HC), diabetes, and chronic kidney disease (CKD). The level of agreement was assessed using the kappa statistic and logistic regression explored sociodemographic factors associated with unreported risk.

The self-reported prevalence of HBP, HC, diabetes and CKD was 9%, 6%, 10% and 4% respectively, while objectively-measured prevalence of each was 21%, 26%, 8% and 3%. Differences were statistically significant at $p<0.01$ for HBP and HC. Kappa statistics were 0.17, -0.05, 0.61 and 0.34, respectively. Unreported HBP was associated with male sex and younger age, while unreported HC was associated with lower household income. Chronic disease risk factors were prevalent in a cohort of Aboriginal and Torres Strait Islander adults, and unreported risk was high for HBP and HC. Awareness of risk levels at the individual and population levels is key for better health outcomes and service provision and planning in this priority population.

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Body mass and menopause: Pooled analyses of 11 prospective studies

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Background

No consistent conclusion on the association between body mass index (BMI) and age at natural menopause was established.

Aim

To examine the relationship between BMI and age at menopause, we pooled individual-level data from 11 prospective studies.

Methods

Over 24 000 women who experienced menopause after recruitment were included. Baseline BMI was categorised according to the WHO criteria. Natural menopause is recognised to have occurred after 12 consecutive months of amenorrhea. Age at menopause was categorised as <45 years (early menopause), 45-49, 50-51 (reference category), 52-53, 54-55, and ≥56 years (late menopause). Multinomial logistic regression models were used to estimate multivariable relative risk ratios (RRRs) and 95% confidence intervals (CI) for the associations between BMI and menopause age.

Results

The mean (standard deviation) age at menopause was 51.4 (3.3) years, with 1.6%, 26.5%, and 12.8% of the women underweight, overweight, and obese, respectively. Compared with normal BMI group (18.5-24.9 kg/m^2), underweight women had over 2-fold

risk of early menopause (RRR 2.15, 95% CI 1.50-3.06), while overweight (1.52, 1.31-1.77) and obese women (1.54, 1.18-2.01) were at higher risk of late menopause. Overweight and obesity were also significantly associated with 20% increased risk of menopause at ages 52-53 and 54-55 years. No association between underweight and late menopause was observed. A higher risk (1.23, 0.89-1.71) for early menopause among obese women was suggested but not significant.

Conclusion

Overweight and obese women had more than 50% higher risk of late menopause, while underweight women had over twice the risk of early menopause.

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Trends in WA adults' perceptions and intentions relating to their own body weight.

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Background: Despite good public awareness of the health consequences of overweight and obesity, WA adults' perceptions of what constitutes a healthy weight and intentions to reach or maintain a healthy weight are progressing more slowly.

Aim: To examine population-level changes in WA adults' perceptions of their own body weight and their intentions to change their weight.

Methods: This study reports on self-report data from the WA Health and Wellbeing Surveillance System relating to adults (16+ years); a rolling, cross-sectional population-level survey managed by the WA Department of Health. Body mass index categories (not overweight or obese, overweight, or obese) were derived from self-reported height and weight and contrasted with perceived weight status (not overweight, overweight or very overweight).

Results: Only about half of WA adults had a perceived weight status that matched their body mass index category. For WA adults whose perceived weight status did not match their body mass index category, almost all underestimated the category they belonged to. The proportion of adults able to correctly classify their body weight has declined significantly in recent years. This is likely a consequence of continued increases in the population prevalence of overweight and obesity, combined with little or no change in perceived weight status. Even with increases in the population prevalence of overweight and obesity, intentions to lose weight have remained relatively unchanged.

Conclusions: Improved awareness of what constitutes being overweight or obese may help to raise intentions to lose weight and achieve population health goals to curb overweight and obesity.

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"ICD coding for Rheumatic Heart Disease: a validation study"

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Background: International Classification of Diseases codes for rheumatic heart disease (RHD) (I05-I08) include valvular heart disease of unspecified origin, limiting their usefulness for estimating RHD burden. An expert opinion-based algorithm was developed to improve the accuracy of these codes for epidemiological case ascertainment. The algorithm included unspecified diagnoses not defaulting to RHD plus selected codes pertaining to mitral valve involvement in people <60 years.

Aim: To determine the positive predictive value (PPV) of this algorithm

Methods: Chart reviews of RHD-coded admissions to three Western Australian adult tertiary hospitals (2009-2016) authenticated RHD status. We selected all cases with algorithm-positive codes from population groups at high risk of RHD and an age-stratified random sample from low-risk groups. RHD status was based on echocardiographic reports or clinical diagnosis in charts. PPVs were calculated and compared by population risk status (high/low risk), broad-age group, sex and principal/secondary diagnosis.

Results: High-risk cases (198/368=53.8%) had significantly higher PPV (83.8%) than low-risk cases (54.9%) (p=0.0012). The PPV of RHD as a principal diagnosis in the low-risk group was substantially higher than if it was an additional diagnosis (principal=84.5%; additional=44.4%) (p<0.0001) but it was not different in the high risk group (p=0.096). The PPV was highest (91.8%) for high-risk patients <35 years.

Conclusion: The PPVs of algorithm-defined cases were high for high-risk but not low-risk groups, suggesting that further research is needed before using the algorithm for high/low-risk population comparisons. The algorithm can be used for epidemiological monitoring in high-risk contexts or in people <35 years.

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Potentially-avoidable hospital admissions among Indigenous children aged 0-5 years

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Background

To improve early childhood health, resources must be directed towards causes of morbidity amenable to change.

Aim

To determine the rates, causes, length of stay for potentially avoidable hospital admissions (PAHA) in the first five years of life among all Aboriginal and Torres Strait Islander children born in Western Australia between 2000-2013, and to examine the key associations with this morbidity.

Methods

Paediatric avoidable hospital admissions (ambulatory care sensitive and other) occurring from 29 days to 5 years of age were identified from hospital separation data linked to Midwives Notifications' and other datasets (*Defying the Odds* study). Episodes of care were created and rates per 1000 person-years and for individuals were calculated. Length of stay was also determined.

Results

Preliminary results show that among Aboriginal and Torres Strait Islander children in WA in the first two years, the rate of PAHA was 278 per 1000 person-years of follow-up, and 101/1000 person-years during the ages 2-5 years. The leading causes of admissions were bronchiolitis, gastroenteritis, and upper respiratory infection in during the ages 29 days - <2years and dental, otitis media, and skin infections for the ages of 2-5 years. 43% of the children had at least one potential post-neonatal PAHA, and 10% had three or more. Mean length of stay was 2.7 (±3.9 SD) days.

Conclusions

This ongoing work will examine contributing factors for children, families and regions that are associated with risk of avoidable hospitalisations among Aboriginal children to direct prevention efforts and inform effective resource allocation.

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Cultural-security of Health and Social Services for Aboriginal Families in Western Australia (WA)

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Background

Despite significant improvements, there still remains a large disparity in early childhood (0-5 years) health outcomes between Aboriginal and non-Aboriginal children. Availability of high quality, culturally-secure services are likely to be key factors in reducing the gap.

Aims

We explored the scope, reach and cultural-security of health and social services available to Aboriginal children and families in Western Australia.

Method

Online surveys were developed to explore perspectives of staff on the scope, reach, quality and cultural-security of their service. Currently operational community-based and governmental health and social services for Aboriginal families located in metropolitan Perth and regional areas were identified and staff were approached to participate in the survey.

Results

21 services were recruited from: Perth metro (48%), Goldfields/Kalgoorlie (29%), Great Southern (19%) and South West (5%). 57% were Aboriginal community controlled health services (ACCHSs). Services were categorised based on the main service provided which included: family support (38%); general health (24%); alcohol/drug (14%); and maternal/child health (9%). 58 valid survey responses were received; 33% identified as Aboriginal. Majority of the staff perceived the service to be cultural-security (73%). 11% were unsure of which 80% identified as non-Aboriginal. A higher proportion of staff from ACCHSs thought the service was cultural-security compared to non-ACCHSs staff. Participants who said the service was not culturally-security were from non-ACCHSs family support services.

Conclusion

Although there is high level of cultural-security in services, more focus should be in improving cultural-security of non-ACCHSs and family support services and increasing cultural-security knowledge among non-Aboriginal staff.

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Suitable frameworks for mHealth app evaluation in Australian healthcare reimbursement

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Publish consent withheld

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Improving REporting of DAta from Registries (IREDAR) Guidelines

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Background

Various checklists exist to improve the quality of data reporting in the healthcare field by identifying and standardising key items so the quality of studies can be easily appraised. No such guidelines exist for clinical quality registries.

Aim

To develop a checklist for registries covering a variety of medical conditions and devices.

Methods

We reviewed existing reporting guidelines to develop items encompassing key elements of a registry report including design, methods and data analysis. Consensus on the final checklist of items to be included for analysis and reporting in registries was obtained using a modified Delphi process, which includes online survey and teleconference. Participants were a multidisciplinary panel comprising 13 clinical leads of registries and statisticians. All the items identified from the review were included in an online survey, which is underway, and rated on their relative importance. Consensus for an item to be included in the final checklist was achieved using the Interpercentile Range Adjusted for Symmetry (IPRAS) measure.

Results

The review of existing reporting guidelines resulted in 23 items. This IREDAR checklist includes 1 item for the 'Title and Summary' section, 2 items under 'Introduction', 13 items under 'Methods', 4 items under 'Results', 2 items under 'Discussion' and 1 item under 'Other Information'. We will present each item in detail, with descriptions and clinical examples. The results of the Delphi process will be presented.

Conclusion

The publication of this checklist for reporting of registry data will improve the quality and reliability of reports generated from registries.

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Use of large-scale GP administrative data for antibiotic prescribing research

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Background

Global developing antibiotic resistance necessitates research to identify and limit driving factors for imprudent antibiotic prescribing. However, in Australia this research has to date been limited by the paucity of access to large-scale, individual-level, patient-prescriber data from primary care.

Aim

This project will utilise administrative data from Australian primary care to identify factors predictive of antibiotic prescribing not conforming with the national therapeutic guidelines, with a focus on upper respiratory and urinary tract infections.

Methods

De-identified patient-prescriber data from 2012-2016 inclusive was obtained from GP software by NPS MedicineWise using the MedicineInsight program in 52 de-identified, consenting practices in Western Australia (WA). This project involves a strategic partnership between the WA Primary Health Alliance and Curtin University. Guideline adherence is assessed using algorithms developed based on the national therapeutic guidelines for antibiotic prescribing, and incorporating indications, clinical observationsand pathology results. Levels of adherence assessed include whether a prescription was likely indicated, and choice of agent. Descriptive statistics and generalized linear mixed methods are used to identify patient- and practice-related factors predictive of non-conforming prescribing.

Results

Descriptive results will be presented highlighting the usefulness of administrative data for research, and its challenges and limitations. The strategic partnership approach facilitates vital links to GPs for support in understanding the strengths and weaknesses of administrative data, and its implications for interpretation. This partnership will be key in the translation of findings to practice and supporting national antimicrobial stewardship efforts.

Conclusion

Routine administrative data can support research in Australian primary care.

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Development of a time-duration measure of continuity of primary care: A threshold effects approach to identify optimal primary health care use for diabetes

Ninh Ha, Mark Harris, David Preen, Suzanne Robinson, Rachael Moorin

Publish consent withheld

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Overcoming the data drought: exploring general practice in Australia by network analysis of big data

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Objectives: To investigate the organisation and characteristics of general practice in Australia by applying novel network analysis methods.

Design: We analysed Medicare claims (~1.7 million patients per year) for general practitioner consultations during 1994–2014 by a random 10% sample of Australian residents, and applied hierarchical block modelling to identify provider practice communities (PPCs) using shared patient care. We describe characteristics of PPCs, including bulk-billed claims, patient loyalty, and patient-sharing.

Results: The number of PPCs fluctuated during the 21-year period with 7747 PPCs in 2014. The proportion of larger PPCs (≥6 providers) increased from 32% in 1994 to 43% in 2014, while that of sole provider PPCs declined from 50% to 39%. The median annual number of claims per PPC increased from 5,000 (IQR, 40–19,940) in 1994 to 9,980 (190–23,800) in 2014; the proportion of PPCs that bulk-billed all patients was lowest in 2004 (21%) and highest in 2014 (29%). Continuity of care and patient loyalty were stable; in 2014, 50% of patients saw the same provider and 78% saw a provider in the same PPC for at least 75% of consultations. Density of patient-sharing in a PPC was correlated with patient loyalty to that PPC.

Conclusions: During 1994–2014, Australian GP practice communities have generally increased in size, but continuity of care and patient loyalty have remained stable. Our novel approach to the analysis of routinely collected data allows continuous monitoring of the characteristics of Australian general practices and their influence on patient care.

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Rural cancer patients' response to cancer costs in Western Australia

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Background. It has been reported that one in ten rural Western Australians experience financial catastrophe whilst receiving cancer treatment. There is a need to understand how rural patients experience and respond to the financial burden imposed by a cancer diagnosis.
Aim. To describe how cancer patients experience and manage their treatment-related costs.
Methodology. Two hundred and eighty-five adults who had completed treatment for breast, lung, colorectal or prostate cancer and resided in one of four rural regions of WA reported financial characteristics relating to treatment decision making and assistance accessed. Chi squared tests were conducted to identify characteristics associated with accessing financial assistance, experiencing financial catastrophe, and being impacted by financial factors during treatment decision-making.
Key Findings. Sixty-eight participants (24%) reported that their treatment decision-making was affected by financial factors, 153 (54%) accessed financial assistance, and 52 (18.2%) experienced financial catastrophe. Financial catastrophe was experienced by a greater proportion of participants who resided outside the South West region (26% vs 16%, p=0.036), who had private health insurance (27% vs 10%, p=0.003), who travelled for treatment (32% vs 12%, p<0.001), or who changed employment after diagnosis (33% vs 18%, p=0.023). More participants who resided outside the South West (78% vs 32%, p<0.001), had breast cancer (61% vs 49%, p=0.047), or travelled for treatment (82% vs 28%, p<0.001) received financial assistance.
Conclusions. These findings promisingly suggest cancer patients that require financial assistance are receiving it. They will be used in multivariate analyses to further explore patient financial burden and financial assistance utilisation.

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Health concerns of disadvantaged Australians, does national research funding address those concerns?

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Background: In 2016, the most disadvantaged groups of Australians died at twice the rate of those in the least disadvantaged groups (AIHW 2016). To reduce inequities, health research must better cater to the needs of Australia's most disadvantaged populations, but thus far there have been no investigations into whether projects funded by the NHMRC complement the primary health concerns of disadvantaged groups.

Aim: To identify the health concerns of key disadvantaged populations and investigate the portion of NHMRC funding invested into projects addressing these concerns.

Method: Self-reported health concerns were collected from the literature for five disadvantaged groups in Australia: low-socioeconomic status, rural and remote, people with disabilities, older Australians, and prisoners. NHMRC project

grant databases (2012 – 2017) were searched and projects were identified which matched the collected health concerns of the disadvantaged groups.

Results: The most frequently reported health concerns included lack of available information about health issues and health services, lack of service availability, and disrespectful treatment by health professionals. Of $2,520,000,000 estimated to be spent by the NHMRC, only 0.26% was directed towards addressing the identified health concerns of the five disadvantaged groups.

Conclusions: Project grants from the NHMRC address some of the self-reported health concerns of disadvantaged groups, but the amount is a small percentage of overall project grants. To improve the health of disadvantaged groups, a more systematic approach to identifying health concerns of Australians should be undertaken and correlated with national research funding.

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Data linkage for surveillance of hepatitis C outcomes in NSW

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Background

Hepatitis C (HCV) infection causes cirrhosis and liver cancer, imparting substantial health risk. New pharmaceuticals, available since 2016, cure HCV and should improve outcomes. This linked data study determined which demographic factors differentially impact on morbidity and mortality in HCV notifications compared with matched controls in NSW, pre-2016.

Methods

The case cohort included all NSW HCV notifications (2005-2015). The control cohort, one-to-one matched on age-group, sex, remoteness and SEIFA score at baseline was selected from notifications un-associated with liver damage. Comorbidity histories and follow-up outcomes (all-cause death and liver-related hospital admissions) were identified for both groups from linked admissions and death data to mid-2017. Group-specific event incidence rates were calculated within levels of each demographic characteristic. Interaction terms within Cox regression models determined which demographic characteristics had a differential impact on outcomes in cases versus controls.

Results

A total of 30,053 HCV notifications were matched to controls. The unadjusted admissions rates were 6.7 and 0.2 events per 1000 person-years in HCV and control notifications respectively. For all-cause death they were 12.9 and 5.9. Age, comorbidities and SEIFA were significantly associated with differentials in time-to all-cause death in HCV compared to controls. Comorbidities were significantly associated with differentials in time-to-admission.

Conclusion

Risk of both outcomes was elevated in HCV notifications compared with matched controls. The differentials in time-to-death varied between HCV and controls with age, comorbidities and SEIFA while differentials in time-to-admission varied with comorbidities only. This study forms the baseline for ongoing surveillance of outcomes in HCV notifications post-2016.

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Epidemic intelligence needs of stakeholders in the Asia-Pacific region, 2017

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Background: Global surveillance systems are crucial for early detection, assessment and response to public health threats. A new epidemic observatory, Epi-watch is being developed to monitor and provide critical analysis of global outbreaks and epidemics of public health significance.

Aim: To inform the development of Epi-watch, we sought to understand the global outbreak surveillance needs of stakeholders involved in epidemic response and surveillance in the Asia-Pacific region.

Methods: We designed an online semi-structured stakeholder questionnaire. Purposive and snowball sampling methods were used to identify 128 participants who use epidemic intelligence and outbreak alert services in their work in government and non-government organisations in selected countries in the Asia-Pacific region.

Results: All respondents (N=91) agreed that it was important to remain up to date with global outbreaks. The main reason for following outbreak news was as an early warning for serious epidemics (83/91; 91%). Mainstream media and specialist internet sources such as WHO (n=54/91; 59%), ProMED-mail (n=45/91; 49%) and CDC (n=31/91; 34%) were the most common sources for global outbreak news, while use of rapid intelligence services such as HealthMap were less common (n=9/91; 10%). Only 51% (46/91) of respondents thought their sources of outbreak news were timely and sufficient for their needs. Not enough critical appraisal (38/91; 42%) and lack of time to read/watch/listen to information (36/91; 40%) were reported as limitations of outbreak sources.

Conclusion: Users identified a need for more timely and reliable epidemic intelligence. Better methods to deliver rapid epidemic intelligence to end-users should be explored.

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What can existing data tell us about Australian sport fatalities?

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Changes to the physical and social environments in which sport is played, together with recent high-profile cases of death and other adverse events, have brought sport safety to the public's attention. Every serious and fatal event offers the potential to learn and ensure such events do not continue to happen. However, before prevention opportunities can be realised, an understanding of the number of fatalities and how they occur is required. These data are not routinely reported on by a central source in Australia. This study aimed to catalogue existing datasets relevant to Australian sport fatalities and evaluate the presence and consistency of eight recommended core data items from Australian and international fatality surveillance guidelines. Focusing on Australian football and cricket, from 2000 onwards, data were sourced from: National Coronial Information System, sports injury insurance providers, hospital separations, online news media and sports-specific registries. The datasets use different time frames and definitions. The proportion of data items complete is presented, with text descriptors. There were between 1 to 71 Australian football fatalities identified and 0 to 174 cricket fatalities identified. Demographic (age, sex) and broad case information (state, date of death, place) were consistently presented. The sport and activity related data were more varied, with data missing or incomplete as well as providing insufficient detail to use for sport-specific analysis. Data on sport-related fatalities are currently collected across a wide variety of data sources with varied quality which impacts on the ability to identify, learn from and capitalise on prevention opportunities.

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Smoking and menopause age: Pooled analysis of over 200,000 women

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Background

The dose-response relationships on the degree of smoking and age at natural menopause have been less clear.

Aim

To examine the effect of intensity, duration, cumulative dose, and timing of cigarette smoking on age at menopause using pooled data from 17 observational studies.

Method

A total of 207,231 and 27,580 postmenopausal women were included in the cross-sectional and prospective analyses, respectively. Information on smoking status, cigarettes smoked per day (intensity), smoking duration, pack-years (cumulative dose), age started and years since quitting smoking was collected. Age at menopause was categorised as <40 (premature), 40-44 (early), 45-49, 50-51 and ≥52 years.

Results

In both current and former smokers, higher intensity, longer duration, higher cumulative dose, earlier age at start smoking, and shorter time since quitting smoking were significantly associated with higher risk of earlier menopause. Duration (Bayesian information criterion (BIC): 366427.8) and cumulative dose (BIC: 381329.5) of smoking were two strong predictors of menopause age. Among current smokers with duration of 15-20 years, the risk was markedly higher for premature (15.58, 11.29-19.86) and early menopause (6.55, 5.04-8.52). Also, current smokers with 11-15 pack-years had over 4-fold (4.35, 2.78-5.92) and 3-fold (3.01, 2.15-4.21) risk of premature and early menopause respectively. Smokers who had quit smoking for more than ten years had similar risk as never smokers (1.04, 0.98-1.10).

Conclusion

The probability of earlier menopause is positively associated with intensity, duration, cumulative dose, and earlier initiation of smoking. Smoking duration is a much stronger predictor of premature and early menopause than others.

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Tobacco smoking and prostate cancer survival: systematic review and meta-analysis

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Background: While a number of studies indicating tobacco smoking has a detrimental impact on survival and recurrence after a prostate cancer diagnosis, there has been no quantitative review of this literature and it is unclear whether tobacco smoking affects clinical populations differentially. We conducted a systematic review and meta-analysis to investigate the associations between tobacco smoking and overall (OM) and prostate cancer-specific (PSM) mortality and recurrence after a prostate cancer diagnosis.

Methods: EMBASE and ISI Web of Science were searched for English-language studies, published up to August 17, 2017, which conducted a survival analysis to estimate the association between tobacco smoking and OM, PSM and/or recurrence. A random-effects meta-analysis was conducted to estimate the summary hazard ratios (HRs) for the associations between tobacco smoking and the three outcomes.

Results: A total of 28 studies met the inclusion criteria. The results of the primary meta-analysis indicate current smokers have significantly poorer overall survival (Summary HR=1.96, 95% CI=1.69, 2.28), prostate cancer-specific survival (Summary HR=1.79, 95%CI=1.47, 2.20) and recurrence-free survival (Summary HR =1.48, 95%CI=1.28, 1.72) than never smokers. Similar results were found in population-based studies and in studies conducted in specific clinical populations.

Conclusions: The results of this systematic review and meta-analysis indicate that tobacco smoking at prostate cancer diagnosis is associated with a significantly increased risk of overall mortality, prostate-cancer specific mortality and recurrence. Further research should concentrate on the impact of smoking cessation post-diagnosis and post-treatment on prognosis, and the feasibility and effectiveness of smoking cessation programs.

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Impact of full-field digital mammography versus film-screen mammography: systematic review

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Background: Most breast screening programs worldwide have replaced screen-film mammography with full-field digital mammography in expectation of technical, clinical and economic advantages. However, we are only now able to measure the effects of this practice shift on health outcomes among asymptomatic women eligible for population screening.

Aim: This systematic review assess the impact of screening with digital mammography on screen detected breast cancer rates and interval cancer rates, as indicators of additional net benefit through early detection, or additional net harm from overdiagnosis.

Methods: We searched Medline, Premedline, PubMed, Embase, NHSEED, DARE and Cochrane databases and identified 2139 potentially eligible papers. 31 papers were included after exclusions for relevance, duplication and other exclusion criteria. Primary outcomes are detection rates and interval cancer rates. Secondary outcomes include recall rates, false positive rates, and positive predictive values. Results are stratified by first and subsequent screening rounds.

Results: Preliminary results for primary outcomes reveal a small increase in screen detected cancers across all studies. In 7 studies with data on interval cancer rates, we observed a statistically non-significant decrease in interval cancer rates.

Conclusion: This pattern of results shows a small increase in cancer detection which may result in future benefit for screened women, but is also consistent with an increase in overdiagnosis. This reinforces the need to carefully evaluate effects of future changes in technology such as 3D mammography to ensure incremental changes to screening programs do not lead to a poorer ratio of benefit to harm from screening.

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Hysterectomy and ovarian cancer risk: A population-based record-linkage study

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Background: Recent studies have called into question the long-held belief that hysterectomy without oophorectomy protects against ovarian cancer.

Aim: This population-based longitudinal record-linkage study aimed to explore this relationship, overall and by age, time-period, surgery type, and indication.

Methods: We followed 837,942 women on the Western Australian electoral roll across a 27-year period using linked hospitals, births, deaths, and cancer records. Dates of hysterectomy (n=78,596) and oophorectomy were determined from hospital records and ovarian cancer diagnoses (n=1,655) were ascertained from cancer registry records. We used Cox regression to estimate hazard ratios (HRs) and 95% confidence intervals (CIs) for the association between hysterectomy and ovarian cancer incidence.

Results: Hysterectomy was not associated with risk of invasive ovarian cancer overall (HR [95% CI] 0.99 [0.87-1.13]), or the most common serous subtype (1.05 [0.90-1.24]). Estimates did not vary significantly by age, time-period or surgical approach. However, among women with endometriosis (6%) or with fibroids (6%), hysterectomy was associated with substantially decreased ovarian cancer risk, overall (HR [95% CI] 0.18 [0.13-0.25] and 0.28 [0.21-0.38], respectively) and across all subtypes.

Conclusions: Our results suggest that for most women, having a hysterectomy with ovarian conservation is not likely to substantially alter their risk of developing ovarian cancer. However, while our findings among women with endometriosis or fibroids require replication, these suggest that reducing ovarian cancer risk could be considered as a possible benefit when making decisions about surgical management of these conditions.

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Oral HPV infection and past sexual behaviour – findings from Queensland

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Background: The increasing incidence of oropharyngeal squamous cell carcinoma (OPSCC) is linked to oral human papillomavirus (HPV) infections. Despite recent dramatic increase in OPSCC in younger Australians, there is little published data on oral HPV prevalence in Australia.

Aim: To investigate the natural history of oral HPV infection in a Brisbane sample.

Methods: We recruited 627 participants aged 20 to 70 years in Greater Brisbane from June 2014 to November 2016. Participants were asked to complete a questionnaire about basic demographics, life-style factors, medical history and sexual behaviour. Saliva samples were collected with a commercial saliva collection kit (DNA Genotek) from all participants for HPV testing and typing.

Results: 73 of the 627 baseline saliva samples (11.6%) tested positive for oral HPV. Among the HPV-positive samples, HPV-33 was the most prevalent HPV type, followed by HPV-16. Compared to oral HPV-negative participants, participants infected with oral HPV reported a higher number of lifetime partners for passionate kissing (p=0.001), giving and receiving oral sex to more partners in a lifetime (p=0.016 and 0.002, respectively), more lifetime sexual intercourse partners (p=0.013), previously being diagnosed with a sexually transmitted infection (p=0.001) and wearing mouth jewellery (p=0.04). We found no associations with oral HPV status and gender, age, smoking, alcohol consumption, illicit drugs use, or preferred gender(s) of sex partners. Past history of a previous abnormal Pap smear result was not associated with oral HPV infection in women.

Conclusion: We found strong associations between multiple sexual partners and oral HPV infection.

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Older women living alone: supporting wellbeing using health and social care services

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Background

Women are more likely to live alone as they grow older compared to men. Many older women find themselves ill-equipped to meet the challenges of living alone with social isolation, financial decline and multiple chronic health conditions all impacting negatively on health and wellbeing. The knowledge gap is significant relating to older women living alone, with an absence of proven strategies to maximize their wellbeing while living in the community.

Aim

To profile women aged 55 or older who access home nursing services in Victoria, Australia.

Methods

Data for more than 72,000 women who received care from a home nursing organisation during 2006-2015 were analysed using chi-square tests for independent samples and Kruskal-Wallis H Tests to compare the profiles of women who lived alone and those who lived with others. Multivariate logistic regression was used to identify factors that predicted living alone.

Results

Approximately 40% of women lived alone, with significantly more women living alone in 2015 compared with 2006. Women living alone experienced more clinical diagnoses but had lower Charleston Comorbidity Index Scores than those living with others. Women were 70% more likely to live alone if they were aged over 86, and were 80% less likely to live alone if they spoke an Asian language as their primary language.

Conclusion

Older women living alone are at high risk of poor health and social outcomes. This study reinforces the growing complexity of older individuals as they age in place in the community.

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Vegetable diversity and subclinical and clinical atherosclerotic vascular disease

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Background: Increasing vegetable intake and diversity are recommended to maintain good health. The benefits of increasing vegetable intake are well established. However, evidence for vegetable diversity is scarce.

Aim: To investigate the associations of vegetable diversity with atherosclerotic vascular disease (ASVD) mortality and subclinical measures of atherosclerosis in a cohort of elderly Australian women.

Methods: Vegetable diversity was assessed within a validated food frequency questionnaire using a single question, 'How many different vegetables do you usually consume each day (<1 to ≥6 per day)'. Cox proportional hazards modelling was used to assess the association between vegetable diversity and ASVD mortality in 1,226 women aged ≥70 years without clinical ASVD or diabetes mellitus at baseline (1998). In 2001, high-resolution B-mode carotid ultrasonography was used to measure common carotid artery intima-media thickness (CCA-IMT) (n=954) and carotid plaque severity (n=968). Subclinical measures of atherosclerosis were analysed using linear and logistic regression.

Results: Over 15 years (15,947 person-years) of follow-up, 238 ASVD-related deaths were recorded. Vegetable diversity (number/d) was inversely associated with ASVD mortality (multivariable-adjusted HR=0.83, 95%CI=0.78, 0.93, P=0.001). Women consuming ≥5 different vegetables per day had 4.8% lower mean CCA-IMT (P=0.003) and 5.1% lower maximum CCA-IMT (P=0.001) compared to women consuming <3 different vegetables per day. No associations were observed between vegetable diversity and carotid plaque severity (P>0.05).

Conclusions: These data identify a potential benefit of increasing vegetable diversity among elderly women for ASVD risk reduction. Further studies are needed to replicate these findings in older men and younger cohorts.

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Explaining geographical variation in bowel cancer screening participation in Victoria

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Background: Bowel cancer screening is a highly effective public health initiative, although National Bowel Cancer Screening Program (NBCSP) screening participation was only 41.2% in Victoria in 2015-16.

Aim: To assess factors associated with geographic variation in NBCSP % screening participation in Victoria, Australia.

Methods: We analysed publicly available bowel cancer screening data, Australian Bureau of Statistics 2011 census data and Victorian Population Health Survey data, using Statistical Area 2 (SA2) as the unit of analysis. The dependent variable was NBCSP participation in 2015-2016. Using linear regression and dominance analysis, we investigated a range of potential area-based determinants of screening, including remoteness, socio-economic status, education, income, community amenity, proportion of people speaking English well, country of birth, ancestry, religion and language.

Results: We produced maps of Victoria showing the variation in NBCSP participation. A multivariable model explained 77% of the variance in screening participation. Screening rates are strongly associated with cultural variables (country of birth, ancestry, religion, whether both parents were born overseas, language), community amenity, socio-economic status, remoteness, income and education. There was a non-linear inverted U-shaped relationship between screening and income.

Conclusions: People living in regional areas, with English background, high community amenity and medium income are more likely to participate in screening. People living in cities, culturally diverse areas, areas with low community amenity, and areas with low or high income, are less likely to participate in screening.

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Statin use in cancer survivors: cohort study using CPRD data

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BACKGROUND: Cancer survivors may be at increased risk of cardiovascular diseases, but little is known about whether prescribing guidelines for the primary prevention of cardiovascular disease are adequately implemented in these patients. AIM: To compare use of lipid-lowering drugs between cancer survivors and control patients with no previous cancer, specifically initiation and persistence on statins for primary prevention.
METHODS: We conducted a longitudinal population based open cohort study. Among individuals aged ≥40 during 2005-13 within the UK Clinical Practice Research Datalink primary care database, we identified cancer survivors ≥1y post-diagnosis and never-cancer controls. Using logistic regression, we compared these groups with respect to uptake of statins within one month of a high recorded cardiovascular risk score; and among statin initiators, we compared persistence on statins (time to statin cessation) using Cox modelling.
RESULTS: Among 4202 cancer survivors and 113035 controls with a record indicating a high cardiovascular risk score, 23.0% and 23.5% respectively initiated a statin within one month (adjusted odds ratio 0.98 [91.8-1.05], p=0.626). Among 12142 cancer survivors and 366280 controls who initiated a statin, cancer survivors appeared more likely to discontinue statin treatment than controls (adjusted HR 1.07 [1.01-1.12], p=0.02). This greater risk of discontinuing was only evident after the first year of therapy (p-interaction <0.001).
Conclusion: Although cardiovascular risk is thought to be higher in cancer survivors compared to the general population, cancer survivors were no more likely to receive statins, and more likely to cease therapy, than general population controls.

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Socioeconomic disparities in colorectal cancer screening mediated via health behaviours

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The factors driving the association between socioeconomic status and colorectal cancer (CRC) screening are not well defined. In this study, we assessed whether two indicators of poor health behaviour mediated the association between socioeconomic status and CRC screening uptake.

Using population-based data from the Australasian Colorectal Cancer Family Registry, we conducted a causal mediation analysis to determine whether smoking and body mass index (BMI) mediated the association between socioeconomic status – as assessed by educational attainment and Index of Relative Socioeconomic Disadvantage (IRSD) – and CRC screening.

Of 2,193 participants, 25% (95%CI: 23.0%-26.7%) reported at least one previous CRC screening event. The odds of screening uptake increased by 10% for each additional year of schooling (OR 1.10, 95%CI: 1.04-1.16), and 9% for each higher IRSD quintile (OR 1.09, 95%CI: 1.01-1.18). We found 13.5% of the association between CRC screening uptake and years of schooling, and 15% of the association with IRSD to be mediated by pack-years of smoking. We found no evidence on the mediation effect of BMI.

Socioeconomic disparities in screening result in poorer people being less protected from CRC incidence and mortality. A better understanding of the complex interactions underlying the current social gradient in CRC screening is needed in order to develop effective interventions to reduce existing disparities and overall burden of CRC. Our findings suggest that low screening uptake may be due, in part, to poorer health behaviour. Interventions focused on health behaviour might be a valid avenue to increase screening in low socioeconomic categories.

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Longitudinal progression of chronic conditions and multimorbidity before and after cancer diagnosis in mid-aged women: a nationwide cohort study in Australia

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Background There is an increased focus on multimorbidity among cancer survivors. We aimed to determine whether women experience greater risk of multimorbidity before, during, and after cancer diagnosis compared to women without cancer. **Methods** We conducted a prospective 5 to 1 matched cohort analysis of 7499 women from the Australian Longitudinal Study on Women's Health. Women were followed from 1996 (aged 45-50 years) through 2016. Prevalence and incidence of multimorbidity (developing two or more chronic conditions except cancer) in both cohorts were assessed up to 18 years before and after cancer diagnosis. We estimated the time-varying odds ratios (OR) and 95% confidence interval (CI) for incidence of multimorbidity, adjusted for related predictors (sociodemographic factors, behaviors, and menopause status). **Results** Half of women had multimorbidity at the time of cancer diagnosis. The ORs for developing multimorbidity were 1.18 (95% CI, 1.08-1.30), 1.42 (95% CI, 1.22-1.65), and 1.13 (95% CI, 1.02-1.25) for the cancer cohort before, during and after cancer diagnosis, respectively. Similar trends were found among individual cancers, with the highest increased risk noted for women with cervical cancer around diagnosis (OR, 4.8; 95% CI, 3.0-7.5). The associations of incidence of multimorbidity with predictors were similar for cancer and comparison cohorts. **Conclusion** Women with cancer experience a higher risk of multimorbidity before, during, and after cancer diagnosis with the difference highest at the time of diagnosis. These findings should be considered when developing strategies and measures for prevention, treatment, and intervention of both cancer and other chronic conditions among cancer survivors.

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Analysis of mortality outcomes for national cancer screening programs

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Background

Australia's national cancer screening programs aim to reduce cancer morbidity and mortality by actively recruiting and screening target populations for early detection or prevention of disease. This study analysed the cancer mortality outcomes for participants in the national bowel, breast and cervical cancer screening programs.

Aim

To compare cancer mortality outcomes for national bowel, breast and cervical cancer screening program participants and non-participants.

Methods

Data from the National Bowel Cancer Screening Program, BreastScreen Australia, National Cervical Screening Program, Australian Cancer Database and the National Death Index were linked to produce a data set containing all people diagnosed with cancer in Australia, their participation (or not) in the national bowel, breast and cervical cancer screening programs and whether they had died. For people diagnosed with colorectal, breast or cervical cancers, Cox proportional hazards regression was used to compare the probability of death from cancers diagnosed through participation in the national cancer screening programs to cancers that were not.

Results

For people diagnosed with colorectal cancers after an invitation to screen in the National Bowel Cancer Screening Program in 2006–2010, the risk of death before 2016 was 2.05 times as high in those who did not participate, compared with those whose cancer was diagnosed through participation. Results for breast and cervical cancers will also be presented.

Conclusion

The risk of death from colorectal cancers was lower for people diagnosed through participation in the National Bowel Cancer Screening Program.

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Leprosy in Australian Indigenous and immigrant populations: time for vaccine

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Background

Leprosy is a notifiable infection of skin and nerves caused primarily by Mycobacterium leprae. In Australia, leprosy is found primarily in northern indigenous populations and immigrants from endemic regions overseas.

211,973 cases were reported globally in 2015. Prevention is based on surveillance, and treatment is based on WHO protocols of multidrug treatment (MDT) since 1995. In Australia, the trend of decreasing incidence has recently reversed, particularly in at-risk populations.

Findings

Australian National Notifiable Disease Surveillance System data show the highest four-year incidence was 1991-1994 (58 cases). By 1999-2002, the number decreased to 23. Since then, it has risen consistently: in the three years 2015–2017, 53 cases were reported, which is approaching the highest incidence.

Symptoms take 9 months to 20 years to develop. People who are infected are not treated until they show symptoms, and they are infectious until treated. Additionally, the multi-drug treatment duration is long (6-24 months), and the diagnosis carries significant stigma, regardless of effective treatment. Therefore, the best course of prevention for people in close contact to known patients may be vaccination.

There have been many attempts to develop a vaccine: from first generation Bacillus Calmette–Guérin; to second generation antigens from M. Leprae; to third generation recombinant subunit vaccine. To date, an effective vaccine has been elusive.

Conclusion

Leprosy has been controlled since the WHO-MDT initiative, but is now increasing in Australia. Development of an effective vaccine may be an effective method of infection control in Australia and in endemic areas.

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Lung cancer from occupational low-dose mixed asbestos fibre exposure

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Background: The potential of low-dose exposure to mixed asbestos fibres to cause lung cancer is not well understood.

Method: A cohort of 1,848 men (mean age=62 years; 26% with radiographic asbestosis) occupationally exposed to low-dose mixed asbestos fibres in Western Australia was followed-up from 1990 to 2014 to ascertain their risk of lung cancer. Mixed-effects Poisson regression models were fitted to identify the effect of cumulative asbestos exposure (assessed using the AsbJEM (van Oyen et al., 2015)) after adjusting for sex and time-varying confounding from age, smoking and radiographic asbestosis.

Results: Sixty cases (3.3%) of lung cancer developed during the study period. There was no significant exposure-response relationship between cumulative asbestos exposure and lung cancer after adjusting for age, smoking and radiographic asbestosis (RR=0.81 per unit increase in log of cumulative exposure, 95%CI=0.53-1.21). Men with asbestosis had higher rates of lung cancer (RR=2.36, 95%CI=1.38-4.03) than men without and there was a significant effect of asbestos exposure on the occurrence of asbestosis (RR=1.18 per unit increase in log of cumulative exposure, 95%CI=1.02-1.36).

Conclusion: Our data shows little evidence that low-dose mixed fibre asbestos exposure increases the risk of lung cancer, although radiographic asbestosis raises the risk 2.5-fold. This may be due to the small number of cases coupled with the comparatively low exposures, the lack of discrimination of our exposure assessment tool at these low doses, and the fairly shallow exposure-response relationship between asbestos and lung cancer, all leading to a dilution of the true dose-response effect.

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Work-unit social capital and long-term sickness absence: a prospective cohort study of 32 053 hospital employees

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Abstract

Background: Workplaces could serve as vital sources of social capital, which has the potential to affect employee health positively.

Aim: To investigate the prospective association between work-unit social capital and long-term sickness absence among hospital employees followed for 1 year.

Methods: This study is based on the Well-being in HospitAL Employees (WHALE) cohort. The study sample consisted of 32,053 individuals nested within 2,182 work-units in the Capital Region of Denmark. Work-unit social capital was measured with an eight-item scale covering trust, justice and collaboration, and it was computed as the aggregated mean of individual-level social capital. Long-term sickness absence was operationalised as ≥29 consecutive days of absence. We conducted two-level hierarchical logistic regression analyses controlling for individual and work-unit covariates. We used a 12-point difference in social capital as the metric in our analyses. Further, we calculated the population attributable fraction (PAF) to estimate the proportion of long-term sickness absence cases attributable to the exposure of low social capital.

Results: The OR for long-term sickness absence associated with a 12-point higher work-unit social capital was 0.73 (95% CI: 0.68-0.78). We found a significant association between higher work-unit social capital and lower long-term sickness absence across social capital quartiles: compared with the lowest quartile, the OR in the highest quartile was 0.51 (95% CI: 0.44-0.60). The PAF associated with being in sub-optimal quartiles of work-unit social capital was 32.9%.

Conclusions: The study provides support for work-unit social capital being a protective factor for long-term sickness absence among hospital employees.

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Risk of Autoimmune Diseases from Occupational Silica and Diesel Exposure

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Background: Exposure to respirable crystalline silica (RCS) has been found to increase risk of common autoimmune diseases (AIDs) such as: Rheumatoid Arthritis, Systemic Lupus Erythematosus and Systemic Sclerosis. However, the dose-response relationship of these associations is still largely unknown. Exposure to diesel engine exhaust (DEE) has been found to induce allergic responses, promote inflammation and possibly contribute to the development of AIDs. However, few studies have investigated this relationship, despite DEE being a common exposure in the occupational and environmental setting. In spite of mounting evidence documenting the harmful potential of DEE, there are currently no legal exposure limits in Australian workplaces.

Aims: To determine an association between DEE exposure and various AIDs. To estimate the potential dose-response relationship of RCS and DEE exposure and various AIDs.

Methods: This study uses data from a large modern-day mining cohort (N=153,922) in Western Australia. Data collected on subjects includes comprehensive health, demographic, smoking and employment information, with further access to linked administrative health data to identify AIDs cases. Additionally, quantitative personal estimates of cumulative RCS and DEE exposure were calculated for the entire cohort, most of whom were employed during an era of improved mining practices and decreasing exposure concentrations. Using a nested case-control study design, prevalent cases are age, sex and period matched to eligible controls from the entire cohort. Analyses include the construction of multivariate conditional logistic regression models to produce exposure odds ratios for DEE and RCS.

Results: Data analysis is ongoing with results anticipated in August.

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Using registries to increase compensation for occupational cancer in Norway

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Background

Most developed countries give patients with occupational diseases the right to compensation. However, studies show that many do not receive the compensation to which they are lawfully entitled. In Norway, few lung cancers (5%) and mesotheliomas (29%) were notified to the Labour Inspectorate as possibly occupationally related. According to estimated attributable fractions, 20% and 84% is expected. Through a collaboration between the Cancer Registry of Norway and the Norwegian Labour and Welfare Administration, patients with selected cancer diagnoses from 1998 receive letters informing them about the rights of compensation for occupational cancer. All men newly diagnosed with lung cancer and all mesothelioma or sino-nasal cancer cases are included. The Western Australian Parliament is presently proposing to introduce a similar scheme.

Aim

To evaluate the impact of a program to increase the number of claims for compensation for occupational cancer and investigate to what extent it reaches its target population.

Method

We collected data on intended and actual responses to the distributed information and the outcome of the filed claims during 1999-2001.

Results

Among male lung cancer and mesothelioma patients, 24% and 59% of those informed intended to file a claim. Among those who did file a claim, 81% of lung cancer patients (230/283) and 98% of mesothelioma patients (144/147) received compensation.

Conclusion

The project is successfully increasing the number of claims. The proportion of compensated cancers is still lower than the expected. For a more detailed evaluation of the process, we plan to extend the analysis to 1986-2016.

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Determinants of the increase in early term planned births

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Background: There has been an increase in early-term planned births (prelabour caesarean or labour induction at 37–38 weeks gestation).

Aim: To determine factors associated with early-term planned birth and to assess to what extent these factors explain the increase in these births in New South Wales.

Methods: A population-based linked data cohort study of all liveborn singleton births between 33 and 40 weeks gestation in New South Wales between 2005 and 2015. The outcome was early-term planned birth. Multilevel multivariable models were used to examine the association between year of birth and early-term planned birth (compared with full term births), adjusting for year, maternal and hospital characteristics.

Results: There were 932,882 singleton births in NSW between 33 and 40 weeks gestation. The proportion of early term planned births increased over the study period by 39%, from 12 to 17%. The characteristics that explained the most variation in early-term planned births were previous caesarean, pregnancy hypertension, gestational diabetes, maternal age and the type of hospital (public vs. private). Among women who had a previous caesarean, were ≥30 years old, had gestational diabetes or gave birth in a private hospital, there was an increase in the proportion of births that were early-term planned ($p<0.001$ for all).

Conclusion: Maternal and hospital characteristics explained a small proportion of the increase in early planned births, with the most influential characteristics being previous caesarean birth, pregnancy hypertension, gestational diabetes, maternal age, and the type of hospital (public vs. private).

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Effect of small-for-gestational-age on educational outcomes: A linked data study

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Background: Small-for-gestational-age (SGA) is used as a proxy for intrauterine growth restriction, which is associated with adverse outcomes.

Aims: To determine whether children born SGA have poorer educational outcomes than children who were born not SGA, for gestational ages 24–41 weeks.

Method: A record linkage cohort study of children born in 1994–2005 in NSW, with follow up to 2014. Multiple births were excluded. Linked birth records and standardised educational test (NAPLAN) results were used to compare low numeracy and reading scores (<1SD below mean) and undertake multivariable analyses using robust Poisson generalized estimating equations.

Results/findings: Of 546,993 births that linked to an education record, 11% were SGA. The proportion of children born SGA with low scores was higher than in children born not SGA, at all gestational ages. The proportion with low scores for numeracy and reading decreased with increasing gestational age in both SGA (numeracy: 67% at 24–25 weeks, 20% at 39–41 weeks) and not SGA (numeracy: 47% at 24–25 weeks, 14% at 39–41 weeks) children. After adjusting for confounders, children born SGA were more likely to have low scores than not SGA children at all gestational ages and had an overall increased risk of 31% (95%CI 29%–33%) for numeracy and 25% (95%CI 23%–27%) for reading.

Conclusions: The risk of a poor educational outcome decreases with each increasing week of gestational age and children born SGA are at greater risk than children born not SGA, at all gestational ages.

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Timely delivery of babies with severe growth restriction in Western Australia

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Background: Severe growth restriction (SGR, birthweight below the 3rd percentile) is a risk factor for poor perinatal outcomes. The rate of severe of SGR undelivered at 40 weeks (SGR40+) has been adopted as a health system performance indicator in Victoria since 2010, but this is not routinely reported in Western Australia (WA).

Aims: To investigate trends in the proportion of SGR40+ singletons in WA, the morbidity and mortality patterns of these babies and maternal characteristics.

Methods: Using data extracted from core population health datasets and linked by the Data Linkage Branch of the WA Department of Health, we report the proportion of SGR40+ singletons between 2006-2015. Using 2014-15 data, we describe their outcomes and maternal characteristics compared to 1) all babies born 37 or more weeks with no SGR and 2) SGR babies born at 37-39 weeks (SGR37). Logistic regression was used to identify associated factors.

Results: Between 2006-2015 the proportion of SGR 40+ singletons decreased from 40.2% to 30.9%. The maternal factors associated with SGR40+ (e.g. 1st birth, smoking, having Aboriginal, Asian or African ethnicity, low BMI, delayed ante-natal care) are all known risk factors. Compared to non- SGR births, SGR40+ births had higher stillbirth and mortality rates, although these estimates were imprecise as based on small numbers. SGR40+ babies were also more likely to have qualified newborn care days than those without SGR but less likely than SGR37 babies.

Conclusion: Routinely collected data is a useful tool for monitoring trends in SGR40+ births and their outcomes.

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Maternal morbidities associated with post-delivery use of cessation pharmacotherapies

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Publish consent withheld

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GenV: A state wide initiative to accelerate lifecourse research

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Background

Generation Victoria (GenV) is a whole-of-state initiative in Victoria, Australia, designed to enhance the speed, capacity and connectedness of currently disparate aspects of children's research.

Aim

GenV aims to generate evidence that will reduce the burden of modern childhood epidemics and thence rates of adult chronic diseases, and in so doing change the landscape of large scale research.

Methods

The GenV 2020 Cohort will be open to the families of all 160,000 babies born in Victoria over two years from late 2020. At its foundation are consent, maximising use of existing data and biospecimens, augmentation with phenotypic measures, and a design that combines the capacity for both observational and rigorous intervention research spanning wellness to uncommon illness. To avoid the burden and attrition of traditional birth cohort studies, it will bring together high-dimensional (e.g. genomic), geographic and large linked administrative datasets, and capitalise on existing health visits to collect data crucial to understanding chronic disease.

Results

Since launching in December 2017 with philanthropic and state government funding, GenV has focused on building its LifeCourse Data Repository, commissioning state-of-the-art biobanking facilities, developing the 2020 Cohort Protocol, and setting up the GenV Solutions Hub that will drive policy partnerships, discovery and intervention capabilities, capacity building, knowledge transfer and public dialogue.

Conclusion

GenV conceptualises an entire system (the state of Victoria) becoming a single dynamic research platform. By 2035, its vision is to have helped solve complex issues affecting today's children and helped prevent the 'diseases of ageing' faced by tomorrow's adults.

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Needs and priority areas for building capacity in the Australian pharmacoepidemiology workforce

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Participation in work and activities following injury and subsequent injury

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Background

While participation in work and society is beneficial for health and wellbeing, injury can result in activity limitations and participation restrictions. There is currently limited knowledge about factors associated with these outcomes following injury including the impact of sustaining subsequent injuries (SIs).

Aims

To: 1) describe participation in work and activities 12 months following a sentinel (initial) injury, and 2) examine the impact of sustaining SIs on these participation outcomes.

Methods

Data were combined from three sources: 1) interviews from participants (n=2856) recruited to the Prospective Outcomes of Injury Study following an Accident Compensation Corporation (ACC) entitlement claim, 2) electronic data from ACC about sentinel and subsequent injuries, and 3) the National Minimum Dataset for injuries involving hospitalisation. Using multivariable models, characteristics of SIs were examined as potential predictors of reduced participation.

Results

At 12 months, 30% reported fewer paid work hours, 12% had reduced unpaid work, and 25% had reduced activities. Sustaining a SI predicted reduced paid work (RR 1.5; 95%CI 1.2, 1.8), but not unpaid work or activities. Participants with intracranial SIs were at highest risk of reduced paid work (RR 3.2, 95%CI 1.9, 5.2). Those sustaining SI at work had less risk of working fewer hours (RR 0.7; 95%CI 0.6, 1.0) than those with non-work SIs.

Conclusion

Reduced participation is prevalent after a substantive sentinel injury, and sustaining SI impacts on return to paid work. Identification of SI characteristics that put people at high risk of participation restriction may be useful for focusing rehabilitative attention.

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Factors associated with physical activity and sedentary behaviour in older adults from six low and middle-income countries

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Rising life expectancy in low- and middle-income countries (LMIC), coupled with the increasing burden of non-communicable diseases, accentuates the importance of generating information to support public health strategies. The purpose of this study was to identify correlates of physical activity and sedentary behavior in LMIC.

We analysed Wave 1 data (collected 2007–2010) from the World Health Organisation longitudinal Study on global AGEing and adult health (SAGE), which focuses on nationally representative samples of adults aged 50 years and older from six countries (China, n = 13,157; India, n = 6560; Mexico, n = 2301; Russian Federation, n = 3763; South Africa, n = 3836; and Ghana, n = 4305). Associations of physical activity (operationalised as meeting physical activity guidelines of ≥150 min/week of moderate-to-vigorous physical activity or not) and sedentary behaviour (≥4 h/day versus <4 h/day) with demographic, health and health risk, functional, interpersonal, and environmental factors were assessed using multivariate logistic models.

Across the six countries, we found fairly consistent and reasonably strong associations between both physical activity and sedentary behaviour and several demographic factors (age and employment, in particular), self-reported health, instrumental activities of daily living, factors relating to socialising, and household location. Correlates of physical activity and sedentary behaviour in LMIC appear to be similar to those found in high-income countries.

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Using Growth-Mixture Modeling to reveal hidden decay-of-impact trajectories after health education

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Background

Programs for teaching self-management skills to people with chronic diseases can reduce anxiety and depression, but those benefits appear to be small.

Aim

We tested the hypothesis that important differences among the program's participants are "averaged out" in summary statistics – that the benefits are actually large for some participants and small for others.

Methods

Adults with various chronic diseases (n=456) participated in the Chronic Disease Self-Management Program. We focused on two of the many outcome indicators: anxiety and depression. Both were measured four times over one year. To reveal latent trajectories – distinct patterns of change over time – we used Growth-Mixture Modeling (GMM) and the Bayesian information criterion.

Results

GMM identified two trajectories. One trajectory began from a low-anxiety baseline, and it showed almost no change. The other trajectory began from a clinically important high-anxiety baseline, and it showed marked improvement, but that improvement was followed by deterioration back to the baseline level, i.e. decay of impact. Almost half of the participants (46%) had the decay-of-impact trajectory. The results for depression were similar (51%).

Conclusion

First, GMM identified two distinct trajectories of change in anxiety and depression after a health-education intervention. Second, about half of the participants had a large decay of impact. If those people can be identified early, then "booster-session" reinforcements can be offered to them specifically, to help them maintain their new self-management skills. GMM can change the way these programs are evaluated, directing attention away from overall averages and toward pattern-defined groups.

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Use of Facebook to recruit research participants

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Background

Social media (primarily Facebook) is a relatively new source of recruitment of research participants.

Method

The Australian Breakthrough Cancer (ABC) Study is an online prospective cohort study that aims to include 50,000 participants aged 40-74 years (www.abcstudy.com.au). A range of recruitment sources have been used including Facebook, word of mouth, invitations via the Australian Electoral Commission, Cancer Council events/communications.

Results

Of the almost 80,000 registrants, 36,672 ABC participants can be directly attributed to registering via Facebook (ie they clicked through from an advertisement for the ABC Study). Facebook also has the capability for users to 'share' the message thus increasing the reach. In total, 52,452 indicate they heard about the study via Facebook, representing 66% of all registrants. For those registrations directly attributable to Facebook, the per acquisition cost was $1.61.

Participants recruited via Facebook were more likely to be in younger age groups and less likely to complete the study than those recruited via other channels.

Facebook initially generated a large number of female registrants but the flexibility of the platform allowed for targeting of the advertisements and associated messaging to males which increased the registration of males.

Conclusion

Targeting of messaging and audience can be successfully used to modify the types of respondents to Facebook recruitment advertisements. Although the rate of completion was lower than 'traditional' sources of recruitment, the cost per acquisition was cheaper making it feasible to recruit a larger number of participants to obtain the desired study size.

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Measuring illicit drug use via a telephone survey: practice implications

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Aim: To examine the consistency of illicit drug use estimates from a telephone survey compared to an anonymous self-complete survey.

Background: Non-anonymous interviewing was considered best practice when seeking information on sensitive behaviours; although most studies making these recommendations arose during the 1980s and 1990s. Subsequent attitude shifts towards illicit drugs, mobile phone availability, and mass social media uptake challenges the existing advice on methods for eliciting information on sensitive behaviours.

Method: Ever and recent use of ecstasy, marijuana, methamphetamine and cocaine was collected on the NSW Population Health Survey (NSWPHS) and the National Drug Strategy Household Survey (NDSHS) in 2016. Methods for both surveys have been described elsewhere. Prevalence estimates and odds ratios were calculated using R's 'Survey' package. Respondents that answered questions on illicit drug use, lived in NSW, and were aged between 16 and 44 years were analysed (NSWPHS: N=2,367; NDSHS: N=2,299).

Results: State-wide estimates of recent ecstasy and methamphetamine use were consistent between the two surveys, while recent marijuana and cocaine use were slightly lower on the NSWPHS. Ever use estimates in the NSWPHS were consistently lower compared to the NDSHS. The results remained the same after adjusting for age and sex.

Conclusion: Estimates of illicit drug use were generally lower for the telephone survey compared to the anonymous self-complete survey. However, recent ecstasy and methamphetamine use were consistent between the two survey approaches. Observed differences between the surveys have implications for the measurement and interpretation of statistics on illicit drug use, which needs further exploration.

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Imputing missing country of birth in estimating cancer incidence for migrant groups.

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Background – Country of birth (COB) is missing for 12% of people with a cancer diagnosis reported to the Victorian Cancer Registry (VCR). It is hypothesised that most of these people would not have been born in Australia, therefore giving rise to underestimates of cancer incidence in migrant populations when incomplete records are excluded.

Aim – Our aim was to evaluate and compare the accuracy in estimating cancer incidence in migrant groups of: (i) using complete records only and (ii) multiple imputation approaches to handle missing country of birth.

Methods – Using data from the VCR for 2008-2015, we used multiple imputation by chained equations in R to impute missing COB data based on year of diagnosis, year of birth, cancer type, age, sex, residential location and socioeconomic status. From 20 imputations, the mean incidence and standard error was calculated for each of 12 COB regions. We compared results to those obtained using additional data from the Victorian Admitted Episodes Database (VAED) to assess their accuracy.

Results – The mean incidences ranged between 200 and 2,000 per 100,000 population. The incidence for the VCR-only data was the lowest across all COB groups. When comparing with estimates using the VCR-only data to the equivalent complete-case dataset including additional COB data from the VAED, we found that multiple imputation gave accurate estimates.

Conclusion – Our results show that the complete-records approach underestimates cancer incidence in migrant groups as well as Australian/New Zealand born people. Multiple imputation provides accurate estimates of cancer incidence.

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Who chooses to participate in an Australia-wide population-based research study?

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Background: The demographic characteristics of people who choose to participate in population-based research studies impacts the generalisability of research findings.

Aim: To examine factors associated with participation in a randomised controlled trial of melanoma prevention in the Australian general population.

Methods: A total of 6,402 Australians aged 18-69 years in the Medicare database were invited by the Department of Human Services on behalf of the University of Sydney to participate in a study examining the impact of personalised melanoma genomic risk information on skin cancer prevention behaviours. We examined the proportion of people who gave consent according to age, sex and the SEIFA Index of Relative Socio-economic Advantage and Disadvantage (a low score indicates a greater relative disadvantage).

Results: A total of 251 (4%) participants gave consent, were eligible and completed baseline measures, but this differed by age and sex groups: men aged 18-44 years: 2%, women aged 18-44 years: 4%, men aged 45-69 years: 5% and women aged 45-69 years: 8%. Higher SEIFA scores were associated with a higher consent rate; people mailed invitations had a mean SEIFA of 1005 (SD 73.5) and those enrolled in the study had a mean of 1024 (SD 70.3); mean difference = 17.6, 95% confidence interval of 8.3-26.9, p = 0.0002). This SEIFA association with participation was consistent across age, sex and state/territory subgroups.

Conclusion: Higher participation in a population-based study involving personalised genomic risk information was associated with female sex, older age-group and higher socioeconomic status.

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Impact of direct-acting antiviral therapy for hepatitis C on liver disease burden: a population-based linkage study

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Background

Since March 2016, Australia has developed a program of unrestricted access to highly effective direct-acting antiviral (DAA) therapy for hepatitis C virus (HCV). Subsequently, DAA uptake has rapidly increased nationally, with around 26% (n~60,000) of people with chronic HCV treated. To inform future HCV strategies, including the World Health Organization (WHO) target of 65% reduction in liver-related mortality by 2030, a program of monitoring and evaluation is essential. The aim of this study is to develop an evaluation framework to assess the population-level impact of DAAs on HCV-related liver disease burden.

Methods

In NSW, HCV notifications are linked to several administrative databases, comprising HIV diagnosis; antiviral therapy; hospitalisation, including those for decompensated cirrhosis (DC) and hepatocellular carcinoma (HCC); and mortality. The study population includes a retrospective cohort of ~112,000 people with an HCV notification, 1993-2017.

Results

Trends in total and age-standardised DC and HCC diagnosis and liver-related deaths will be presented, 2000-2017. Median survival following a DC or HCC diagnosis will be evaluated. Given high DAA therapy uptake among people with cirrhosis in 2016-2017, an impact on incidence of advanced liver disease complications and survival among people with advanced liver disease is anticipated.

Conclusions

Data linkage studies comprise a major component of HCV liver disease burden monitoring in the DAA era. Pre-DAAs, these studies have contributed to characterisation of the population-level burden of DC, HCC, and liver-related mortality. Data linkage studies continue to monitor the specific impact of DAA scale-up and guide progress towards WHO HCV 2030 elimination targets.

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Factors leading to bariatric revision surgery in Australia

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Background

The incidence of obesity and the need for subsequent weight loss surgery in Australia is on the rise. The National Health Survey revealed that from 2014-2015, 63.4% of Australian adults were overweight or obese, an increase from 56.3% in 1995. Excess body weight can be a risk factor for developing chronic diseases such as cardiovascular disease, diabetes and kidney disease. It is therefore vital to understand the safety and outcomes of bariatric surgery and identify the risks associated with further weight gain that requires revision surgery.

Aim

This research project aimed to investigate several modelling approaches to identify key baseline factors associated with revision incidence and the time between primary and revision surgeries.

Methods

Data extracted from the Bariatric Surgery Registry on 13 February 2018 was used to analyse primary bariatric patients with procedures performed in Australian hospitals from February 2012 to December 2016. Nelson-Aalen cumulative revision incidence rates were calculated and the Cox proportional hazards model was used to identify individual demographic and clinical variables associated with revision. A stepwise regression model process and Likelihood ratio tests were used to identify the final multivariate specification. Time varying covariates and stratification methods were explored.

Results

A total of 14,150 primary bariatric patients met the inclusion criteria with 1.9% of patients having revision surgery within 12 months of their primary surgery. After stratification by primary procedure type and the year of primary surgery, male patients and primary surgery in private hospitals were protective factors for revision incidence.

1. (ABS) Australian Bureau of Statistics. (2015). National Health Survey: First results, 2014–15. Canberra, Australia: ABS. Retrieved from http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4364.0.55.0012014-15?OpenDocument (Accessed: March 6, 2018)

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BrainyApp: A smartphone intervention application for lifestyle modification

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Background

Despite advances since the 2010 AHRQ & NIH systematic review, the available evidence is still insufficient to provide lifestyle recommendations regarding the prevention of cognitive decline and dementia. However, there is considerable research that suggests modifiable lifestyle factors reduce the incidence and prevalence of disease and cognitive decline. Furthermore, technological advancements are catalyzing a paradigm shift in the methodology of intervention. The availability and accessibility of smartphones are introducing new avenues for mHealth intervention. In this setting, advocacy agencies are developing programs to encourage people to engage with healthy activities to minimise their risk of dementia. With this objective, Dementia Australia, in partnership with Bupa Health Foundation, developed BrainyApp.

Aim

Our aim was to investigate the users of BrainyApp and the community data-set with a view to observational cohort recruitment via smartphone app. To examine the representativeness of cohort recruitment compared to traditional recruitment strategies.

Methods

Participants downloaded the BrainyApp on iOS/Android device. Stratified descriptive statistics were produced for: Demographics, Brain Health Survey, Brain Game, Quick Quiz, Activities.

Results

Between the 16th February 2016 and the 6th of March 2017, 9580 subjects downloaded BrainyApp and 8904 (92.2%) logged into BrainyApp at least once. Out of the 7787 BrainyApp users that provided demographic information; 72.7% (n=5663) were female, mean age was 49.7 years (SD=17.5).

Conclusion

Multimodal interventions via mHealth recruit a broad age range of participants and with similar health metrics to the general population. BrainyApp users showed significantly higher adherence to Australian health guidelines than the general population.

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MedicineInsight, an Australian national primary health care database

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Background

MedicineInsight is the first, large-scale primary care dataset of longitudinal de-identified electronic health records (EHRs) in Australia. MedicineInsight was established by NPS MedicineWise in 2011 with funding provided by the Australian Government Department of Health.

Aim

To describe MedicineInsight, a rich source of health data for epidemiological research and informing policy makers.

Methods

The MedicineInsight program collates routinely collected de-identified EHRs data from clinical information systems of consenting general practices on a continuing basis. Data are not collected from patients who opt out. MedicineInsight operates under ethics approval and a robust data governance framework.

Results

MedicineInsight covers 3.6 million regular patients (with at least 3 visits in the last 2 years) from about 3,300 general practitioners and 650 general practices across Australia. Data include demographics, diagnoses, symptoms, prescriptions, immunisations, tests and health-related behaviours. Among regular patients, the majority are female (55%), aged ≥40 years (51%), reside in major cities (70%) and 2.7% are Aboriginal and/or Torres Strait Islander. MedicineInsight has been used for post-marketing surveillance of medicines/vaccines and research into cardiovascular disease, chronic kidney disease, diabetes, pain, obesity and lung cancer.

Conclusion

Originally established to support quality improvement and post-market surveillance of medicines, MedicineInsight data are available to support a wide range of activities including observational and interventional research. While harnessing its value, users must also understand the complexities of using 'big data' for research purposes.

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Cancer and screening data linkage

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Background

Linking data sets can enable analyses that are not possible using each data set separately. AIHW has undertaken several data linkage projects to compare cancer and mortality outcomes for cancers diagnosed through participation in national cancer screening programs and cancers diagnosed through other means.

Aim

To describe cancer data linkages and the methodologies involved.

Methods

Data from the National Bowel Cancer Screening Program, BreastScreen Australia, the National Cervical Screening Program, the Australian Cancer Database, the National Death Index and the National HPV Vaccination Program Register, were probabilistically linked by the Australian Institute of Health and Welfare using personal identifiers.

Results

Data from the national cancer screening programs, the Australian Cancer Database, the National Death Index and the National HPV Vaccination Program Register were successfully linked. The data set contains all people diagnosed with cancer in Australia irrespective of whether they participated in the national breast, bowel and cervical cancer screening programs and all individuals who participated in the national breast, bowel and cervical cancer screening programs irrespective of whether they were diagnosed with cancer. The linked data set was used to analyse screening behaviours across the three programs and to analyse the cancer mortality outcomes for cancers diagnosed through participation in these programs.

Conclusion

Cancer data sets can be linked to enable analyses that are not possible using each data set separately. The AIHW is working to establish enduring linked data sets for cancer and other topics that are not project-specific so could be used for numerous different projects.

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Leading causes of death among serving and ex-serving ADF personnel

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Background

The study is the first to take a population-based approach to analysing the leading causes of death among serving and ex-serving ADF personnel.

Aim

The study identifies the leading causes of death among serving and ex-serving ADF personnel with at least one day of service between 2002 and 2015 and determines if any cohorts are at a greater risk of death from particular causes in comparison to the equivalent Australian population.

Methods

The study population was derived using data linkage. Linking existing data, for example administrative data, cost-effectively maximises the use of data while enabling population-based analysis. The study population was derived from linking administrative data from the Department of Defence with mortality data held by the Australian Institute of Health and Welfare to determine the number of deceased personnel.

Counts were used to identify the leading causes of death among serving and ex-serving ADF personnel. Crude rates and standardised mortality rates were used to compare cohorts of ADF personnel and identify whether or not any have a higher risk of death in comparison to the Australian population of the same age and sex.

Results

The cause of death results are not due for public release until later in 2018. It is anticipated that these results will be presented at the conference.

Conclusion

The results from this analysis may help to further inform policy and develop interventions to reduce the rates of death for particular leading causes among serving and ex-serving ADF personnel.

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Back to the Future: A retrospective, prospective data linkage Study

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Background

The Coordination of Health Care (CHC) Study was developed to address the paucity of information on continuity of care in Australia.

Aim

The Study aims to link prospective and retrospective hospital, emergency department (ED), Medicare and pharmaceutical claims data for consenting participants from the 2016 Survey of Health Care (designed to report on samples from Primary Health Networks).

Methods

The methodology will use probabilistic linking for hospital and ED data. Approximately 26,500 Survey respondents consented to hospital and ED linkage.

For the consenting cohort, the Australian Bureau of Statistics (ABS) will create a CHC cohort identifier dataset with a Project Specific ID (PSID) and variables. The ABS will provide the whole CHC cohort identifier dataset to state and territory Data Linkage Units. The state and territory data custodians will map the PSID to the National Minimum Dataset (NMDS) IDs. The AIHW will use the PSID and NMDS IDs to extract content data of consenting participants in the National Hospital Morbidity Database and National Non-Admitted Patient Emergency Department Care Database and provide to the ABS for merging with the Survey. A de-identified linked dataset will then be provided to AIHW researchers for analysis.

Results

Ethics and data custodian approvals are in place for data linkage to occur, with local level reporting to happen thereafter.

Conclusion

A suite of information will be available on continuity of care to provide opportunities for research and analysis on a broad range of health care related policy questions, patient experience and outcomes.

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Large scale reporting using complex statistical methods requires parallel computation

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Background: HealthStats NSW http://www.healthstats.nsw.gov.au/ is an open data platform for large scale reporting of summarised statistics from more than 10 routinely collected, large administrative data sources across a wide range of health topics. The data are regularly updated using reproducible code and semi-automated processes, including producing small Local Government Area (LGA) estimates and confidence intervals using spatial smoothing methods. The feasibility of using such complex statistical methods on larger datasets requires more efficient approaches to data analysis workflows for ongoing large scale reporting.

Aim: To improve processing efficiency for large scale public reporting of small area life expectancy estimates.

Methods: We explored the use of parallel computation through multi-core processors, changes to data management and statistical procedures as a solution to reduce analysis time without compromising the validity of estimates.

Results: We estimated age and sex specific death rates by LGA and year using generalised additive models and produced estimates of life expectancy with bootstrapped 95% confidence intervals (CIs). Sequential computation of CIs using 10,000 bootstraps took days to complete, however the independence of model coefficients for bootstrapping suggested an 'embarrassingly parallel' workload and was completed in hours in parallel. This approach included determining an optimal number of bootstrap replications for valid inference and also required careful handling of intermediate data to overcome memory limitations.

Conclusion: The use of parallel computation with modern epidemiological datasets will soon be a necessity for researchers using complex statistical methods particularly when applying these to very large datasets.

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The role of social capital in self-rated health: findings from multi-year population health surveys

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BACKGROUND/AIMS

Individual social capital is increasingly considered to be an important determinant of an individual's health. In this study, the relationship between individual-level social capital, based on measures of participation, engagement, trust and safety, and self-rated health was investigated in an Australian sample using routinely-collected population health survey data.

METHOD

The analyses are based on a multi-year dataset comprising 12,770 adults (40% males) who participated in the ACT General Health Survey between 2007 and 2016. Using a regression modelling approach, the strength of the association between self-rated health and social capital and demographic variables, including income, education, employment status, Indigenous status, smoking status, body mass index and physical activity was examined.

RESULTS

The proportion of ACT residents reporting fair or poor self-rated health was estimated to be 18% (males: 15%; females: 20%). A number of lifestyle factors were associated with fair or poor self-rated health, including smoking (OR=1.7), obesity (OR=1.7) and low physical activity (OR=1.8). Having a low annual income (less than $20,000) was associated with a twofold increase in odds of fair or poor self-rated health. After adjustment for demographic variables, lack of trust (OR=1.3) and feeling unsafe (OR=1.4) were also associated with higher odds of fair or poor self-rated health.

CONCLUSION

These findings confirm the importance of social disadvantage and social isolation as independent risk factors for fair or poor self-rated health. They provide further justification for public health policies and programs that increase support for socially-excluded populations and strengthen their connection to their community.

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Disability-based discrimination and health: findings from an Australian-based population study

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Background: Disability-based discrimination is an under-recognised public health problem that is likely to contribute to disability-based health inequities.

Aim: Among working-age Australian adults with a disability, we assess the association between disability-based discrimination and both overall health and psychological distress.

Methods: Using data from the 2015 Australian Bureau of Statistics Survey of Disability, Ageing and Carers we estimated the proportion of working-age women and men (15–64 years) with disability who report disability-based discrimination by socio-demographic characteristics and assessed the association between disability-based discrimination and self-reported health and psychological distress.

Results: Nearly 14% of Australians with disability reported disability-based discrimination in the previous year. Disability-based discrimination was more common among people living in more disadvantaged circumstances (unemployed, low income, lower-status occupations), younger people and people born in English-speaking countries. Disability-based discrimination was associated with higher levels of psychological distress (OR: 2.53, 95%CI: 2.11, 3.02) and poorer self-reported health (OR: 1.63, 95%CI: 1.37, 1.95).

Conclusion: Disability-based discrimination is a prevalent, important determinant of health for Australians with disability. Public health policy, research and practice needs to concentrate efforts on developing policy and programs that reduce discrimination experienced by Australians with disability.