The effect of locational and social disadvantage on utilisation and outcomes of health care: Cardiovascular disease

Kate J. Brameld, C. D'Arcy, J. Holman

Centre for Health Services Research, Department of Public Health, The University of Western Australia

Todd Owen

Data Linkage Unit, Health Information Centre, Department of Health (WA)

Abstract

Introduction

This study uses the WA Linked Database to provide an overview of the effects of social and locational disadvantage and possession of private health insurance on access to and outcomes following hospital care across Western Australia at the level of the ABS Collector's District (CD). The study will cover all major diagnostic categories of the Australian National Diagnosis Related Group (AN-DRG) system as well as specific chronic diseases and procedures based on national priorities. Some preliminary results from this study will be presented.

Method

Geocodes on the hospital morbidity records of the WA Linked Database allow indices of relative disadvantage (SEIFA) and accessibility and remoteness (ARIA) to be allocated to individual records at the level of the ABS Collectors District (CD). The hospital morbidity database includes a variable indicating possession of private health insurance. Admission and procedure rates, length of stay, cumulative readmission risk and case fatality rates will be calculated for the time periods 1994–96 and 1997–99 with follow-up to 2004 according to the categories of social and locational disadvantage and private health cover. Risk adjustment will be made for age, sex, Aboriginality and comorbidity. The effects of locational and social disadvantage will be compared between 1994–96 and 1997–99.

Results

The risk of readmission and death at one year were significantly decreased in 1997–99 compared to 1994–96. There was an increasing risk of readmission and death within one year with increasing disadvantage and there was an increasing risk of readmission within one year with decreasing accessibility of services. Case fatality at one year did not appear to be affected by accessibility to services. The risk of readmission or death at 30 days post index admission did not appear to be affected by period of time, socioeconomic status or accessibility of services.

Discussion

This preliminary data indicates that socioeconomic status and access to services do affect the risk of readmission and death within one year following hospital admission within Australia. However, the analysis is currently biased by the absence of geocodes on approximately 16% of records and the propensity for certain categories of records not to be geocoded, eg remote aboriginal communities and institutions. Further analysis will take into account the relationship of the outcome to the index event, the effects of comorbidity, severity of disease and propensity of patients to move because of their illness.

Introduction

The utilisation of health services is affected by their proximity. Since the 1950's studies have described inverse or negative relationships between distance to health care personnel or facilities and utilisation of their services.[1] People in rural and remote Australia have lower rates of Medicare utilisation and higher mortality than those living in capital cities.[2] Studies in WA also have shown significant effects of spatial access on utilisation of preventive health services, such as child health and mammographic screening clinics, in the population of metropolitan Perth.[3 4]

Socioeconomic status is known to be a major determinant of illness, with socially disadvantaged groups experiencing higher mortality rates from conditions such as cardiovascular disease and cancer.[5] Low socioeconomic status is associated also with poorer outcomes from many diseases.[6] Epstein et al found that patients with low socioeconomic status had hospital stays 3–30% longer than people who were better off, as well as higher readmission rates within 60 days.[7 8] In contrast, there is evidence to suggest that access to some 'high-tech' procedures may be reduced in disadvantaged groups. Rates of cardiac procedures have been positively associated with mean household income.[9 10]

Studies on the effects of health insurance status on health care utilisation and outcomes have been conducted mainly in the US. Uninsured US patients are less likely to receive physician care and have lower access to health services.[11 12] However, in the 1993 Spanish National Health Survey, possession of health

insurance was not associated with use of health services.[13] The effects of private health insurance cover on health care utilisation and outcomes in Australia is poorly understood at the population level, nor has there been any attempt to separate the influence of private cover from other sociodemographic and geographic determinants.

In this study we will use the WA Linked Database to look at the effects of social and locational disadvantage and possession of private health insurance on access to and outcomes following hospital care across Western Australia at the level of the ABS Collector's District (CD).[14] CD's are the smallest areas for which census-derived Socio-Economic Indices For Areas (SEIFA indices) are available and comprise approximately 250 households.[15] Misclassification error and resultant bias towards the null are much reduced using SEIFA indices of social disadvantage based on CD compared with postcode. The study will cover all major diagnostic categories of the AN-DRG system as well as specific chronic diseases and procedures based on national priorities.

Method

The project will use the Australian Bureau of Statistics socio-economic indices for areas (SEIFA), specifically the index of relative disadvantage to measure socio-economic status at the level of the census Collector's District. The index of relative socioeconomic disadvantage is one of five SEIFA indices. The indices are created by combining a range of variables using principal component analysis. For the index of relative disadvantage these include variables relating to qualifications, income, unemployment, type of job, home ownership, one parent families, marital status, car ownership, school leaving age, aboriginality, number of families per household and fluency in English.[15]

Locational disadvantage will be measured using the accessibility/remoteness index of Australia (ARIA).[16] The ARIA index calculates remoteness based on the distance by road to specified service centres. There are four categories of service centres depending on size, the smallest having a population of 5,000. Every populated locality gets a score between 0 and 12 and these are combined into five categories ranging from highly accessible to very remote.

The measures of locational and social disadvantage are matched to the hospital morbidity records according to the CD of residence of the patient. CD's are attached to the patients records according to a geocode. A geocode is a geographical point described by a specific longitude and latitude. All records on the hospital morbidity database have been geocoded since 1993, prior to which the patient records contained insufficient address information for geocoding to be performed.

Possession of private health insurance is one of the data items collected on the hospital morbidity database.

Hospital utilisation will be measured according to admission and procedure rates, average and cumulative length of stay. Outcomes will be measured according to cumulative readmission risk at 30 days and one year and case fatality rates at 1, 3 and 5 years.

The effect of socio-economic and locational disadvantage and possession of health insurance on healthcare utilisation rates and outcomes measures will be measured using Poisson regression and Cox regression respectively. Risk adjustment will be made for age, sex, Aboriginality and comorbidity and the effects of locational and social disadvantage will be compared between 1994–96 and 1997–99. All categories of hospital admissions will be studied, initially according to the 21 major diagnostic categories of the Australian national DRG case mix system and then for specific diseases and procedures based on national priorities.

Results

The table shows some preliminary results for this study; relative risk of readmission and death by time period, SEIFA and ARIA categories for non-aboriginal patients with an index admission for cardiovascular disease as defined by major diagnostic category number 5. The results have not been adjusted for comorbidity.

The risk of readmission and death at one year were significantly decreased in 1997–99 compared to 1994–96, there was an increasing risk of readmission and death at one year with increasing disadvantage and there was an increasing risk of readmission at one year with decreasing accessibility of services. Case fatality at one year did not appear to be affected by accessibility to services. The risk of readmission or death at 30 days post index admission did not appear to be affected by period of time, socioeconomic status or accessibility of services.

Discussion

This preliminary data indicates that socioeconomic status and accessibility to services do affect the risk of readmission and death within one year following hospital admission within Australia. These results are consistent with current literature. For example, a recent Australian study found that distance to services affected the mortality rate following cardiovascular disease, although this was not adjusted for socioeconomic status.[17] The study measured excess coronary mortality among Australian men and women living outside capital city statistical divisions and showed that mortality rates were significantly higher outside capital cities and had been declining at slower rates than in the capital cities.

A North American study found that distance affected accessibility to coronary artery bypass surgery in New York and California, but this was not so in Canada, possibly due to different regionalisation policies and universal insurance cover.[18]

Studies in Scotland have shown that while socioeconomic factors influence the overall rates of coronary heart disease events, studies of case fatality after admission to hospital for acute myocardial infarction show only modest socioeconomic gradients.[19 20] This is likely to be associated with reports that

70–80% of deaths within 30 days of AMI occur before admission to hospital .[21] However, research has also shown that mortality rates outside hospital following first AMI are higher in the more deprived population groups.[22]

For this study we have yet to take into account the effect of comorbidity, for which we will use the Charlson Index, [23] and we will also be looking at specific outcomes whereas the data presented are for any outcome. A further stage of the study will also make an adjustment for severity of illness and we will also look at the extent to which people may move house as a result of the onset of chronic disease.

One of the major problems with the study at this present time is that 20% of records were unable to be geocoded. This problem is worse in the remote areas of Western Australia. For example, 64% of those living in the far north had missing geocodes, compared to 9% of those living in the north metropolitan region. Records may not be geocoded as a result of incomplete or inaccurate address information on records and also as a result of incomplete coverage of the Property Street Address database (maintained by the Department of Land Administration – DOLA) that is used for geocoding. Successful geocoding requires that records have a street number and this may not be the case for people living in remote locations and for people living in institutions who may record the name of the institution rather that its street number. The data linkage unit are currently looking at a number of ways of improving the geocoding rate, including methods of directly assigning CDs which requires less address information than to geocode. We are also able to improve the allocation of CDs in cases where there is only one CD per postcode and in cases where patients have some, but not all of their records geocoded, so that information may be transferred between records if the address information indicates that the person is unlikely to have moved house.

A further problem is the small numbers of aborigines and that a large proportion of the aboriginal population live in remote areas and are disproportionately affected by missing geocodes. Analysis of aboriginal patients will therefore have to be done separately using broader categories of age, socioeconomic status and accessibility/remoteness.

This project will deploy the WA Record Linkage Project in undertaking a comprehensive investigation of the independent effects of locational and social disadvantage and private health cover on health care utilisation and outcomes in the Australian health system. It will highlight whether or not there is significant variation in health care utilisation and outcomes according to socioeconomic status and place of residence, while taking into account confounding variables such as age, sex, race, comorbidity and severity of illness. It will also show whether there is a specific problem for patients in rural and remote areas having to migrate towards major population centres on account of serious illness. The identification of inequities in health service access and outcomes will allow the specific problem areas to be targeted and policies to be developed that will reduce inequities in health care provision that are unacceptable. This research is a priority in a country that prides itself on universal access to high quality health services.

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	Readmissions		Case Fatality
	30 days	1 year	1 year
Time period			
1994–96	1.01 (0.98–1.05)	1.03 (1.01–1.05)	1.20 (1.15–1.26)
1997–99	1.0	1.0	1.0
SEIFA			
Highly disadvantaged	0.99 (0.94–1.03)	1.15 (1.12–1.18)	1.34 (1.25–1.44)
Disadvantaged	1.00 (0.96–1.05)	1.10 (1.07–1.13)	1.17 (1.08–1.26)
Average	0.97 (0.92–1.02)	1.06 (1.03–1.10)	1.15 (1.07–1.24)
Advantaged	0.99 (0.94–1.04)	1.05 (1.01–1.07)	1.14 (1.06–1.24)
Highly advantaged	1.0	1.0	1.0
ARIA			
Very remote	1.07 (0.87–1.32)	1.12 (0.99–1.27)	1.21 (0.80–1.8)
remote	1.07 (0.97–1.19)	1.14 (1.07–1.21)	0.99 (0.83–1.19)
Moderately accessible	1.04 (0.96–1.12)	1.06 (1.02–1.11)	1.06 (0.94–1.18)
accessible	0.97 (0.90–1.04)	1.04 (1.00–1.08)	0.97 (0.88–1.08)
Highly accessible	1.0	1.0	1.0

* Results adjusted for age and sex

Table 1 Relative risk of readmission and case fatality following admission for cardiovascular disease (95% confidence intervals in brackets)