



## The effect of lifestyle choices on emergency department use in Australia



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### ABSTRACT

**Background:** Much attention has been paid to patient access to emergency services, focusing on hospital reforms, yet very little is known about the characteristics of those presenting to emergency departments.

**Objectives:** By exploiting linkage of emergency records and a representative survey of the 45 and older population in Australia, we provide unique insights into the role of lifestyle in predicting emergency presentations.

**Methods:** A generalized linear regression model is used to estimate the impact of lifestyles on emergency presentations one year ahead. We control for extensive individual characteristics and area fixed-effects.

**Results:** Not smoking, having healthy body weight, taking vitamins, and exercising vigorously and regularly can reduce emergency presentations and also prevent subsequent admissions from emergency. There is no evidence that heavy drinking leads to more frequent emergency visits, but we find a high tendency for heavy drinkers to smoke and be in poor health, which are both major predictors of emergency visits.

**Conclusions:** Targeted public health interventions on smoking, body mass and exercise may reduce emergency visits. Effective public health interventions which target body mass, exercise, current smoking and smoking initiation, may have the effect of reducing ED usage and subsequent admission.

Individual-level data linking a survey of the population 45 and older in Australia with their emergency department (ED) records is exploited to provide unique insights into the role of lifestyle in predicting emergency care. Controlling for demographic and socioeconomic characteristics, as well as chronic conditions, we find that being a non-smoker, having a healthy body weight, taking vitamins, and doing a vigorous exercise at least once a week can prevent ED presentations. Being a non-smoker, taking vitamins and exercising also prevent subsequent admissions from ED. We do not find a similar protective effect from complying with dietary recommendations. There is no evidence that heavy drinking alone leads to more frequent ED visits, but we find a high tendency for heavy drinkers to smoke and be in poor health, which are both major predictors of ED visits. These results suggest that targeted public health interventions on smoking, body mass and exercise can reduce ED visits. The use of linked data provides important insight into the characteristics of potential ED users which in turn is valuable for the planning of health services.

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### 1. Introduction

Much attention has been paid in recent years to the performance of hospital emergency departments [1–4]. As demand for emergency care grows, various policies

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have been introduced to improve patient access to emergency services; these include the setting of waiting time targets and programs to reduce attendances by those who could receive appropriate treatment elsewhere [5–7]. While these measures focus on the hospitals, very little is known about the characteristics of those presenting to emergency departments. The aim of this paper is to shed light on this matter by exploiting the linkage of individual level emergency department (ED) administrative records with a large population survey. The survey contains rich information on demographics, socioeconomic characteristics, lifestyle choices and health conditions of respondents, providing in-depth information about potential ED presenters. Under a central budget allocation system, this information can aid in the setting of budgets to meet differential demands for ED services across areas. It can also indicate likely reductions in ED demand that might flow from public health initiatives aimed at improvements in lifestyle choices.

A number of past studies have examined the link between smoking and alcohol consumption on the use of hospital services. Smoking has been consistently found to be positively linked to health service utilisation [8–10]. The results for alcohol consumption, on the other hand, are more complex [11,12]. While it is generally agreed that alcohol abuse has significant economic and social costs, apart from alcohol-related injuries or accidents, it is often difficult to assess its impact on health service use, particularly in emergency care, because it tends to manifest in other health problems [13,14]. Some studies have found that moderate (low risk) drinkers have lower health care use than non-drinkers, but this relationship varies with age and sex [8–10]. Another study finds that for females, not drinking at all is results in the lowest the risk of injury [15]. Still other studies find that excessive drinking is positively linked to the use of emergency services [16] and that alcohol related problems are over represented in ED [17,18].

However, results from these studies can only be interpreted as association, not causation. Typically they adopt a regression framework, in which a retrospective measure of health care use, such as presentations at ED over the last 12 months, is regressed against lifestyle variables. This ‘backward-looking’ model is likely to produce biased estimates of the causal effects of lifestyle on service use because health services may alter current lifestyle. To develop effective preventive policy, it is important to establish a causal impact of lifestyle factors.

Furthermore, many of these studies are based on hospital databases which only have information on those visiting the facility and omit non users from the comparator group [15]. As such, these studies cannot provide information about potential patients. Often they are drawn from a case study of a single or small group of hospitals, raising concerns about generality of the results [16,19].

In this paper, we advance the literature by estimating a ‘prospective’ model of ED visits, which avoids the potential bias due to reverse causality of ED visits on lifestyle. In addition, we investigate whether there is a differential effect of lifestyles on ED presentations resulting in a subsequent admission to hospital. Arguably, presentations

leading to an admission may indicate more severe health problems than presentations that result in non-admission discharges. It is estimated that ED presentations leading to admission cost at least 80% more (depending on the ED triage category) than presentations that result in non-admission discharges [20].

We use a large survey data set of the non-institutionalised Australian population aged 45 and over that is linked to administrative data on ED presentations in New South Wales (NSW), the largest state in Australia. In Australia, this age group incurs two thirds of total health care expenditure and is responsible for over half of the ED presentations [21]. Australian residents are entitled to choose to receive free hospital and emergency services as a public patient in any public hospital. In 2007–2008 in NSW, over 90% of emergency presentations occurred in public hospitals and public ED presentations grew by about 30% between 2003 and 2007 [21]. Except for life threatening cases, emergency presentations at private hospitals are charged a significant fixed fee for service.

## 2. Data and methodology

Our survey data is the 45 and Up Study of 267,188 NSW residents aged 45 and over (>45). Respondents were randomly selected from the Medicare Australia enrolment database and surveyed once between 2006 and 2010 [22].<sup>1</sup> The survey contains rich information about respondents’ demographics, socioeconomic characteristics, lifestyle, self-assessed health, as well as more objective measures of health status, such as physical limitation and diagnoses. The 45 and Up data can be linked at the individual-level to the NSW Emergency Department Data Collection (EDDC) from 2006 to 2009. This means that although survey respondents are interviewed once, we have records of their ED presentations for a four year period.<sup>2</sup> The data linkage to the EDDC was performed by the Centre for Health Record Linkage (ChReL) using a probabilistic matching on first name, surname, date of birth and address.<sup>3</sup> The linked, de-identified data is released under ethics approval from the NSW Population Health Services Research Ethics Committee.

After deletion of records of individuals who responded uninvited or had an invalid age, the final sample consists of 265,468, Table 1 presents summary statistics of their demographic and socioeconomic characteristics. The largest groups are aged between 50 and 65 years, are married, have tertiary education, are in paid employment, and are earning more than the median income of the NSW 45+ population (\$36,000 in 2007–2008). Table 1 also reports,

<sup>1</sup> Details of the survey can be found in <http://www.45andup.org.au/>.

<sup>2</sup> The EDDC is based on responses from participating EDs. A description of the coverage of the EDDC can be found at <http://www.cherel.org.au/data-dictionaries#section1>. 90 out of 150 hospitals are reported as participating in the EDDC and the linked sample used here has ED observations from all 90 hospitals. Since all principal and most large EDs participated, it is estimated that approximately 80% of ED admissions in NSW are covered. See [http://www.health.nsw.gov.au/pubs/2006/ar\\_2005\\_2006.html](http://www.health.nsw.gov.au/pubs/2006/ar_2005_2006.html).

<sup>3</sup> For details on the linkage procedure and quality, see <http://www.cherel.org.au/>.

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