1 Introduction

1.1 The concept of avoidable hospitalisations

To assess the adequacy, efficiency and quality of primary health care within the broader health system, one indicator that researchers have focused upon is 'avoidable hospitalisations'. In general terms, avoidable hospitalisations represent a range of conditions for which hospitalisation should be able to be avoided because the disease or condition has been prevented from occurring, or because individuals have had access to timely and effective primary care.

The early research introduced the terms 'avoidable hospitalisations' (see Weissman 1992) or 'preventable hospitalisations' (e.g. Billings et al. 1996) to refer to conditions which could be avoided if ambulatory care is provided in a timely and effective manner.

More recently, the term 'ambulatory care-sensitive conditions' (ACS conditions) has been adopted in some research, including in Australia. However, much of this research continues to use the terms 'avoidable' or 'preventable' (hospitalisations) when referring to ACS conditions.

A broader view of the concept of avoidable hospitalisations has been developed in New Zealand to encompass preventable hospitalisations (hospitalisations resulting from diseases preventable through population-based health promotion strategies, e.g. alcohol-related conditions; and lung cancer) and hospitalisations avoidable through injury prevention (e.g. road traffic accidents) (Jackson and Tobias 2001; Ministry of Health 1999); these are described briefly in *Section 1*.7. In this report the concept of avoidable hospitalisations is limited to ambulatory care-sensitive conditions.

Ambulatory care-sensitive (ACS) conditions are certain conditions for which hospitalisation is considered potentially avoidable through preventive care and early disease management, usually delivered in a primary care setting, for example by a general medical practitioner, or at a community health centre: see box opposite.

However, the use of avoidable hospitalisations as a performance indicator of access to, or the quality of, primary care should be predicated by the recognition that many different factors contribute to hospitalisation rates.

These include:

- age and sex;
- socioeconomic factors (ethnicity, income, level of education and insurance status);
- disease incidence, prevalence and severity;
- perceived health need and care-seeking behaviour;
- access to care;
- availability of care including supply of primary care physicians, hospital bed availability, a regular source of care or continuity of care;
- physician practice style; and
- whether care at home is feasible for reasons unrelated to health status or provision (Niti and Ng 2003).

Analyses of avoidable hospitalisations at the area level may assist as a tool to monitor need; as a performance indicator of variations in access to, or the quality of, primary care; or in allocating limited resources among communities. In addition, they may assist in defining the type of intervention which would have the most impact; or may have some use in evaluating interventions (Billings et al. 1993).

Avoidable hospitalisations from ambulatory care-sensitive conditions

Ambulatory care-sensitive (ACS) conditions include hospitalisations of people from causes considered to be responsive to prophylactic or therapeutic interventions deliverable in the primary health care setting, i.e. conditions that, with appropriate primary care, should not become serious enough to require admission to a hospital. Appropriate primary care may prevent the onset of an illness or condition, control an acute episodic illness or condition, or manage a chronic disease or condition.

Thus, these can be divided into three sub-categories (Vic DHS 2002):

- conditions that can be prevented through vaccination (e.g. influenza and pneumonia);
- selected chronic conditions that can be managed by pharmaceuticals, patient education, and lifestyle. Despite the challenges of behavioural change, it is commonly assumed that effective patient education during health care encounters can influence lifestyle (e.g. diabetes complications); and
- acute conditions for which hospitalisations are commonly avoidable with antibiotics or other medical interventions available in primary care (e.g. dental conditions).

1.2 History of the concept

Health services have greatly expanded their range and scope over the past thirty years, during which time interest has grown in attempting to evaluate their performance and to identify areas for improvement. A model for assessing the quality of health services was first articulated by Donabedian (1966). The three domains included in the model were the structure (organisation and inputs) of the service, its process of care, and the outcome for the patient.

Since then, much work has been undertaken to develop techniques for evaluating structures and processes of care. However, methods for assessing health outcomes attributable to the care received have proved more elusive, although there is continuing interest in doing so. This is because there is an ongoing need to ensure that health care investment results in improved health for individuals and populations; to understand the causes of geographic and social variation in practice; and to reduce the frequency of inappropriate, poor quality or unsafe care (Woolf 1990).

An earlier approach to assessing the quality of health care in terms of clinical outcomes has been to identify deaths that should not have occurred, given available health care interventions. This method was initiated in 1976 by Rutstein, who prepared a list of health conditions in consultation with an expert panel. Deaths from these causes represented 'untimely and unnecessary deaths' and their occurrence was 'a warning signal, a sentinel health event, that the quality of care might need to be improved' (Rutstein et al. 1976). Further studies into avoidable deaths have since been undertaken in many countries.

Following on from the avoidable mortality research, Billings and Teicholz (1990) introduced the concept of 'avoidable' or 'preventable' hospitalisations. Billings and Teicholz's study of uninsured patients in Columbia hospitals involved a patient survey, followed by expert judgment on whether the admission could have been avoided had the patients received appropriate, timely ambulatory care. The United Hospital Fund (1991; cited in Blustein et al. 1998), with John Billings as Principal Investigator and a medical advisory panel, subsequently developed a
list of 28 conditions as part of an ambulatory care access project – refer also to the first main research following this work, in Billings et al. 1993.

Subsequently, Weissman et al. (1992) examined hospital discharge data in Massachusetts and Maryland, using 12 avoidable hospital conditions, defined under ICD-9-CM. The conditions were selected based on a literature review and clinical guidance from physicians following specific criteria (refer to Weissman et al. 1992). In 1993, the United States' (US) Institute of Medicine recommended ACS hospitalisations as an outcome indicator of primary care access (Millman 1993). Since then, further research has followed overseas, with the main reporting in Australia arising after the first Victorian study of ambulatory care-sensitive conditions (see Victorian Department of Human Services 2002).

The rationale underlying the concept of avoidable hospitalisations from ambulatory care-sensitive conditions is that timely and effective care for certain conditions, delivered in a primary care setting, can reduce the risk of hospitalisation (Weissman et al. 1992; Billings et al 1993; Millman 1993).

As discussed above, admissions to hospital for these ACS conditions can be avoided in three ways. Firstly, for conditions that are usually preventable through immunisation, disease can be prevented almost entirely. Secondly, diseases or conditions that can lead to rapid onset of problems, such as dehydration and gastroenteritis, can be treated. Thirdly, chronic conditions, such as congestive heart failure, can be managed to prevent or reduce the severity of acute flare-ups to avoid hospitalisation (Laditka et al. 2003).

These conditions are narrowly defined. For example, Weissman et al. exclude stroke and pulmonary emboli because they consider the evidence linking primary care to the avoidance of hospitalisation for these conditions to be inconclusive. The selected conditions are also avoidable to various degrees. Asthma and congestive heart failure are conditions for which primary care treatment cannot be expected to prevent hospitalisations in all circumstances. However, conditions due to immunisable infectious diseases (such as measles) should be preventable in all cases (Pappas et al. 1997).

1.3 Strengths and limitations of the concept

The approach of assessing ACS hospitalisations in this way is appealing due to the general availability of hospital discharge data, compared to the limited data on ambulatory care. Avoiding a hospital admission represents a substantial "win" in limiting costs as well as enhancing the patient's quality of life (Clancy 2005). Differences between populations at risk are linked to the failure to obtain primary care at an earlier stage of the medical episode. As such, the rate of ACS hospitalisations has become an important indicator of health

system performance in the delivery of primary care (DeLia 2003).

In addition to measuring the overall effectiveness of primary health care, the analysis of hospitalisations for ACS conditions is also a commonly used indicator of the accessibility of primary health care. Underpinning this is the view that better access to primary health care should reduce avoidable hospitalisations. The concept of better access is linked to the supply of general practitioners (GPs), where individuals living in areas with reduced supply may experience difficulty in accessing GPs, compared to those living in areas with better GP supply. This can be evidenced by longer waiting times for appointments, longer travel times to obtain care, shorter physician consultations, and reduced follow-up (Zastowny, Roghmann and Caferata 1989; cited in Laditka et al. 2005).

Earlier research by Billings et al. (1993) reported that the largest differences between low and high income populations were observed in the young adult and middle aged populations. They suggest that these groups are most likely to be affected by access problems, with a higher rate of uninsured in these age groups, coupled with less experience in navigating the complexities of the health care system. Similarly, Bindman et al.'s (1995) avoidable hospitalisations analysis found that poor access to medical care resulted in higher rates of hospitalisation for a specified group of five chronic diseases. They concluded that improving access to care is more likely – than changing patients' propensity to health care; or eliminating the variation in physician practice style – to reduce hospitalisation rates for chronic conditions. However it should be noted that such findings are relevant to the US setting, where there is no universal provision of health care; and, as such, are not necessarily comparable to the Australian situation.

Whilst many studies have linked admissions from ACS conditions with the need for improved primary care access, there are conflicting results in the few studies that have directly examined the relationship between physician supply and avoidable hospitalisations (Clancy 2005; Laditka et al. 2005). For example, a recent study by Laditka et al. (2005) found that physician supply was positively associated with the overall performance of the primary health care system in a large sample of urban counties of the United States. However, a Manitoba study reported that those with the poorest health status had the highest hospital use, including for ACS hospitalisations, and expenditure rates, but were also found to found to have higher visits to physicians for several conditions (Roos et al. 2005).

An earlier US study by Blustein et al. (1998) reported that the poorer, sicker and less-educated population aged 65 years and over were more prone to hospitalisation for ACS conditions. However, they questioned whether the relationship between socioeconomic status and avoidable hospitalisations simply reflects socioeconomic gradients in patient health status and not in health care. Similarly, hospital admission rates in the United Kingdom reportedly reflect socioeconomic differences and patient morbidity, rather than quality in primary care (Giuffrida et al. 1999 and Reid et al. 1999; cited in Roos et al. 2005). Roos et al. concludes that doing "more of the same" (e.g. increasing physician supply) is unlikely to change the socioeconomic gradient accompanying physician visits and hospitalisations, and that markedly reducing ACS hospitalisations is likely to prove difficult.

Bearing in mind that much of the research to date – and particularly the discussion surrounding the usefulness of avoidable hospitalisations – has been undertaken in the US, it is still worthwhile to mention Clancy's (2005) alternative hypothesis in relation to the differing findings in relation to avoidable hospitalisations analyses. Clancy suggests that perhaps the aspects of primary care which are most effective in assisting individuals with chronic and acute conditions frequently associated with hospitalisations to manage their care have not yet been identified, and, in particular, for those in lower socioeconomic groups (Clancy 2005). Similarly, Roos et al. (2005) proposes the question whether barriers to care – such as time constraints, costs of transportation, lack of information, and so on – are significantly affecting primary care and eventual hospitalisation rates.

1.4 Research overview

International

Early avoidable hospitalisations research focused on socioeconomic status, comparing ACS hospitalisation rates among communities with differing income levels (Billings et al. 1993; Billings et al. 1996) or with differing insurance profiles (Weissman et al. 1992; Parchman and Culler 1999). Billings et al. (1993) found that area income was generally the most powerful predictor of the rate of avoidable hospitalisations across the zip code areas of New York, with higher rates in the lower socioeconomic population. Later studies have reported similar findings in relation to income (Billings et al. 1996; Pappas et al. 1997; DeLia 2003). Such findings have been replicated in adult, some studies of the elderly (although others suggest the pattern for the elderly is not as strong, e.g. Pappas et al. 1997), and paediatric populations

(Parchman and Culler 1999; Shi et al. 1999; Parker and Schoendorf 2000).

However, these findings are not universal – for example, Billings et al.'s (1996) study of US major cities and also several in Ontario, Canada found major differences between high and low income areas, but these were not applicable to Toronto, Canada's largest metropolitan area, with Billings et al. stating that the difference in the socioeconomic impact between Toronto and the other cities studied was startling.

Recent findings by Roos et al. (2005), introduced in *Section 1.3* above, examining both physician claims and hospital discharge abstracts in Manitoba between 1998 and 2001, found that residents from the lowest income neighbourhoods had higher rates of ACS hospitalisations, however, in addition, these residents also were found to have higher utilisation of physician visits for six (out of twelve) ambulatory conditions.

Other studies include the examination of urban and rural differences in the rate of avoidable hospitalisation, with findings generally reporting higher rates in rural than urban areas (e.g. Cloutier-Fisher et al. 2006). However, again, the suggested link between higher avoidable hospitalisation rates and physician supply is not universal. For example, Laditka et al.'s (2005) examination of ACS hospitalisations and physician supply, whilst controlling for intercounty differences in race, ethnicity, air quality and health system use and other characteristics, found that physician supply is inversely correlated with rates of ACS hospitalisations in urban areas but had no effect in rural areas.

Several US studies report associations between race and ACS hospitalisations with higher rates reported amongst the African Americans than the white population (for example Pappas et al. 1997; Kozak et al. 2001; Laditka et al. 2003). Gaskin and Hoffman (2000) found Hispanics and Afro-Americans more likely to be hospitalised. In particular – whilst controlling for differences in patients' health care needs, socioeconomic status, insurance coverage and availability of primary health care – Hispanic children, working-age African American adults and elderly patients from both minority groups were found to be at greater risk than similar white patients. Similarly, research examining ethnic differences in Singapore reported higher rates of avoidable hospitalisation for the Indian and Malay populations than the Chinese population (Niti and Ng 2003).

Australian

The first main study in Australia into ACS conditions was undertaken by the Victorian Department of Human Services (Vic DHS). Subsequent analyses were released by the Australian Institute of Health Welfare and the New South Wales Department of Health (NSW Health).

The Vic DHS (2002; 2004) *Ambulatory Care-sensitive Conditions* studies[1] examine the rate of ACS conditions by Primary Care Partnerships (PCPs), including presentation of the top ten ACS conditions and trends analyses. The AIHW's *Australian Hospital Statistics* reports (e.g. AIHW 2002; 2006) include analyses of ACS admissions by State/ Territory and remoteness, with the 2006 report including analyses by quintile of socioeconomic advantage/ disadvantage.

The *Report of the New South Wales Chief Health Officer* released in 2002 included ACS condition analyses by Divisions of General Practice, with comparisons to the rate of full-time working equivalent (FWE) GPs, and by condition, health regions and trends over time (see Population Health Division 2002). In NSW Health's 2004 report, trend analyses and ACS admission totals by condition and health region are presented (see Population Health Division 2004).

1.5 Approaches to defining ACS conditions

This section provides a brief overview of some of the main research, internationally and in Australia, to indicate the substantial variations in approaches to defining ambulatory care-sensitive conditions.

International

The majority of international research follows the earlier US approaches of Billings et al. (1993) – comprising 28 ACS conditions; Millman (1993) – 22 conditions; and Weissman et al. (1992) – 12 conditions, definable under ICD-9-CM; or a combination of these. Billings et al.'s (1993) and Millman's (1993) condition lists include additional criteria, in particular the allocation of procedure code exclusions for select conditions.

Examples of recent research mainly following Billings et al. (1993) include DeLia (2003); Laditka et al. (2003); and Laditka et al. (2005). The recent research by Roos et al. (1995) adopted only the recommended 12 ACS conditions by Billings et al.

[1] See also the online fact sheet updates for the DHS regions/PCP partnerships and Victoria as a whole, based on 2002/03 and 2004/05 data at: http://www.health.vic.gov.au/healthstatus/acsc/index.htm (accessed 25 October 2006).

(1993) which allow the use of 3-digit ICD-9-CM codes to allow examination of physician visits (for comparison with avoidable hospitalisations) over broader geographic areas (i.e. Canada), thus excluding the ACS conditions only definable by 4-digit codes.[2] Examples of research following Weissman et al. (1992) include Pappas et al. (1997) and Kozak et al. (2001).

Other researchers (e.g. Niti and Ng 2003) have adopted the methodology of Bindman et al. (1995), examining hospital admissions with a principal diagnosis of five specified chronic conditions – asthma, chronic obstructive pulmonary disease, congestive heart failure, diabetes mellitus or hypertension.

Australian

Stamp et al.'s (1998) study of ACS in Aboriginal and Torres Strait Islanders for specific cohorts, used ACS conditions and procedures based on a US study by Hadley and Steinberg (1993; cited in Stamp et al. 1998).

In Australia, the first Vic DHS (2002) report – titled *The Victorian Ambulatory Care-sensitive Conditions* Study – based their ACS conditions on several international studies, e.g. Weissman et al. (1992), Billings et al. (1993) and Millman (1993), comprising 19 ACS conditions, but additionally classifying the conditions into three sub-categories of vaccine-preventable; acute and chronic conditions. Their latest report (Vic DHS 2004) examines a similar list of conditions to their earlier studies, albeit with some modifications, and excluding the examination by the three sub-categories introduced in the 2002 study.

Since 2002, the AIHW's *Australian Hospital Statistics* reports have included rates of avoidable hospitalisations (termed 'potentially preventable hospitalisations'), with ACS conditions which were initially the same as the Vic DHS' (see AIHW 2002), but now include some variations (see AIHW 2006 – e.g. the coding for diabetes complications has changed substantially, and a new condition, rheumatic heart disease, is included).

Similarly, since 2002, NSW Health's *Reports of the New South Wales Chief Health Officer* (e.g. Population Health Division 2002) reported hospitalisations for ACS conditions, based on the earlier Vic DHS' research, but also with some variations. NSW Health's most recent report (see Population Health Division 2004) has some differences in condition codes and additional coding specifications, compared to the latest Vic DHS and AIHW condition lists. In particular, NSW Health has developed a new method of adopting procedure blocks under ICD-10-AM, as opposed to using procedure codes – the method currently used by Vic DHS and AIHW (and, previously, NSW Health) to exclude admissions based on procedure codes for select conditions.[3] This method of using procedure blocks was introduced as a way of dealing more effectively with the changes in procedure codes between ICD-10-AM editions. Note: NSW Health's list of ACS conditions was developed in conjunction with PHIDU, and as such the rates for all conditions are comparable to the rates presented in this atlas.

A summary of differences in conditions and coding specifications between the Victorian DHS, AIHW and NSW Health is included in Table A2 in Appendix 1.2.

The codes in use in this field change, as coding practices change, and as new medical and surgical procedures are introduced. A process has been initiated for Commonwealth, State and Territory health departments and other interested agencies to discuss the terminology and codes in use in Australia, with a view to obtaining consensus. The initial meeting of this group is planned for April 2007.

1.6 Age limits and classification

This section briefly highlights research where age limits have been applied, and also highlights some of the main differences in terms of the classification of ambulatory care-sensitive conditions.

Age limits

Whilst the main Australian research has examined avoidable hospitalisations from ambulatory conditions for the total population, it should be noted that some of the international research includes alternative age groups. Some of these approaches are described below.

For example, Weissman et al.'s (1992) early research included an analysis for the population aged less than 65 years. Some research adopting Weissman's ACS condition list presents totals for all ages, but includes analyses by age group, including those aged 65 years and over (e.g. Pappas et al. 1997; Kozak et al. 2001).

[2] Refer to the University of Manitoba Centre for Health Policy's 'ACS conditions' summary for a brief overview of Billings et al.'s (1993) methodology, including Roos et al.'s 2005 recent research, at: http://www.umanitoba.ca/centres/mchp/concept/dict/ACS_conditions.html (accessed 25 October 2006).

[3] The majority of the international research, and particularly the United States, continues to allocate ACS hospitalisations based on ICD-9-CM codes.

Similarly, Billings et al.'s 1993 paper reported ACS rates at all ages, but included analyses for several age groups, including the 65 to 74 years and 75 years and over age groups. However, Billings et al.'s (1996) later ACS study examined the population under 65 years of age only. Some international research has followed the approach of presenting total ACS for all ages (e.g. DeLia 2003; Pappas et al. 1997), which is the current approach of the main Australian research by Vic DHS (2002; 2004); AIHW (e.g. 2002; 2006) and NSW Health (Population Health Division 2002; 2004).

Other analyses incorporating differing age groups include an examination of both working and non-working age groups (e.g. Laditka et al. 2003); and the analysis of several age groups under 65, with a specific reference to children (e.g. Shi et al. 1999; Laditka et al. 2005). Casanova and Starfield (1995) included ACS analyses for children only, using a list of 20 conditions they designed for the paediatric population only, and recently utilised by Flores et al. (2006) for a study of avoidable hospitalisations in children under 18 years.

Blustein et al. (1998) presents analyses for the population aged 65 and over, but notes that the ACS conditions in their analysis, developed by the United Hospital Fund (UHF 1991; cited in Blustein et al. 1998) were to monitor hospitalisations primarily in the population under age sixty five, as the panel expressed reservation about using the list to classify hospitalisations in the elderly since some diseases present differently in older populations. Therefore, in Blustein et al.'s analyses they reported ACS hospitalisations in the elderly, excluding pneumonia, due to this condition being a common terminal event in older people.

The majority of the research in New Zealand has adopted the age limit of 74 in their avoidable hospitalisations' research, which includes, but is not limited to, ACS conditions (discussed in *Section 1.7* below – see Ministry of Health 1999 and 2003; Jackson and Tobias 2001). The Ministry of Health (2003) states that beyond the age of 75 classification of avoidable hospitalisations becomes increasingly problematic due to the increasing prevalence of co-morbidities.

In terms of age limits for select conditions only, several researchers present iron deficiency anaemia for children aged up to 5 years only, based on Billings et al. (2003) – e.g. DeLia (2003) and Roos et al. (2005). The main Australian research to date (by Vic DHS, AIHW and NSW Health) includes an age limit for influenza and pneumonia to exclude people under two months of age, following earlier research (e.g. Billings et al. 1993; Millman 1993), and this limit is generally adopted in the current international research.

Classification

Other limitations and differences between the research approaches include variations in the specification of conditions as 'principal diagnosis only' or 'in any diagnosis field'. In addition, there are different approaches in the use of additional selection criteria, including the adoption of exclusions for specific procedures for select conditions (refer also to *Section 1.5* above in relation to procedure codes versus procedure blocks).

In addition, the earlier Vic DHS analysis of ACS conditions, and the AIHW and NSW Health research to date, examined avoidable hospitalisations by preventable, chronic and acute sub-categories. Likewise, Laditka et al.'s (2003) analysis included similar sub-categories, albeit with 'acute' conditions termed 'rapid onset', but they note that the majority of the ACS hospitalisations are mostly examined as a single summary category.

1.7 Avoidable hospitalisations: Further research

As noted earlier, a broader measure of ACS conditions was put forward by the New Zealand Ministry of Health (1999). This measure included two other aspects of avoidable hospitalisations, namely preventable hospitalisations and hospitalisations avoidable through injury prevention.

In a subsequent paper, Jackson and Tobias (2001) developed this concept of potentially avoidable hospitalisations, which included proportioning conditions across preventable (hospitalisations resulting from diseases preventable through population-based health promotion strategies, e.g. alcohol-related conditions and lung cancer); ACS; and hospitalisations avoidable through injury prevention (e.g. road traffic accidents) sub-categories. The research included an age limit of 74 years. Jackson and Tobias (2001) state that the measure used was intended purely as an indicator of the scope for health gain – the potential to reduce the incidence of severe disease in the population – as opposed to ACS measures which are sometimes used as a performance indicator for primary health care.

More recently, New Zealand research has continued to present avoidable hospitalisations at a broader level, but limited to two categories – population preventable hospitalisations (which could be prevented through population health strategies); and ambulatory sensitive conditions (Ministry of Health 2003).

This broader avoidable hospitalisations concept is consistent with the avoidable mortality concept, based on initial work by Tobias and Jackson 2001; and developed further in a joint work between the Ministry of Health and PHIDU – see *Australian and New Zealand Atlas of Avoidable Mortality* (Page et al. 2006).

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