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ORIGINAL RESEARCH

Demand for public hospital emergency department services in Australia: 2000–2001 to 2009–2010

Gerry FitzGerald, Sam Toloo, Joanna Rego, Joseph Ting, Peter Aitken and Vivienne Tippett
School of Public Health, Queensland University of Technology, Brisbane, Queensland, Australia

Abstract

Objective: Hospital EDs are a significant and high-profile component of Australia's health-care system, which in recent years have experienced considerable crowding. This crowding is caused by the combination of increasing demand, throughput and output factors. The aim of the present article is to clarify trends in the use of public ED services across Australia with a view to providing an evidence basis for future policy analysis and discussion.

Methods: The data for the present article have been extracted, compiled and analysed from publicly available sources for a 10 year period between 2000–2001 and 2009–2010.

Results: Demand for public ED care increased by 37% over the decade, an average annual increase of 1.6% in the utilization rate per 1000 persons. There were significant differences in utilization rates and in trends in growth among states and territories that do not easily relate to general population trends alone.

Conclusions: This growth in demand exceeds general population growth, and the variability between states both in utilization rates and overall trends defies immediate explanation. The growth in demand for ED services is a partial contributor to the crowding being experienced in EDs across Australia. There is a need for more detailed study, including qualitative analysis of patient motivations in order to identify the factors driving this growth in demand.

Key words: *Australia, demand, emergency department, public hospital, utilization trend.*

Introduction

Hospital EDs are a significant and high-profile component of Australia's emergency health-care system. The crowding of EDs has been extensively described[1,2] and linked principally to Access Block and bed shortages.[3–5] The causes of ED crowding are complex and caused by a combination of input (demand), throughput (e.g. patient processing) and output (e.g. access block) factors.[6] The focus of the present paper is to quantify the increasing demand for ED care over the past decade in Australia and explore possible explanations for this increase.

In recent years, increasing ED presentations have been reported by various government agencies.[7,8] This

Correspondence: Professor Gerry FitzGerald, School of Public Health, Queensland University of Technology, Victoria Park Road, Kelvin Grove, Qld 4059, Australia. Email: gj.fitzgerald@qut.edu.au

Gerry FitzGerald, MD, FACEM, FRACMA, Professor of Public Health (Emergency and Disaster Management); Sam Toloo, BA, MA, PhD, Research Fellow; Joanna Rego, BA, MPH, PhD Candidate; Joseph Ting, MB BS, BMedSci, PG Dip Epidem, Dip LSHTM, FACEM, Emergency Physician; Peter Aitken, MB BS, FACEM, EMDM, Associate Professor, Senior Staff Specialist (Emergency Physician); Vivienne Tippett, MPH, PhD, Professor of Public Health (Paramedic Science).

Table 1. Gross number of ED occasions of service in Australian public hospitals: 2000–2001 to 2009–2010

Year	Unit	NSW	Vic.	Qld	WA	SA	Tas.	ACT	NT	Australia
2000–2001	'000	1771	1144	1168	566	476	92	93	97	5407
2001–2002	'000	2003	1210	1220	561	469	101	95	95	5755
2002–2003	'000	1982	1261	1223	571	472	97	96	94	5796
2003–2004	'000	1986	1289	1248	580	461	101	97	102	5864
2004–2005	'000	2007	1318	1282	593	474	122	94	104	5993
2005–2006	'000	2137	1409	1304	629	496	134	100	120	6328
2006–2007	'000	2304	1468	1382	727	516	125	96	123	6741
2007–2008	'000	2418	1523	1471	778	544	143	98	125	7101
2008–2009	'000	2417	1538	1525	783	532	146	102	129	7172
2009–2010	'000	2443	1592	1578	823	555	159	107	133	7390
Total growth	%	37.9	39.1	35.1	45.5	16.6	73.3	14.8	36.7	36.7
Annual growth	%	3.7	3.8	3.4	4.4	1.8	6.6	1.6	3.6	3.6

ACT, Australian Capital Territory; NSW, New South Wales; NT, Northern Territory; Qld, Queensland; SA, South Australia; Tas., Tasmania; Vic., Victoria; WA, Western Australia.

is not unique to Australia but reflects similar trends in other countries in the western world, most notably the UK[9], the USA[10,11] and Canada.[12] However, the reported trends have not been successfully analysed for significance or meaning, nor have the factors influencing those trends been fully distilled so as to form a common platform for rational policy development.

This is the first report of a suite of investigations being conducted as the Emergency Health Services Queensland study. The overall intent of this project is to identify the factors underlying increasing utilization by analysing in detail the characteristics of users and their reasons for using EDs. These analyses will form the evidentiary platform on which to propose alternative service delivery models that might appropriately and safely manage future demand. The aim of the present article is to provide a clear basis for that further research by describing and analysing current trends in utilization.

Methods

The data for the present article have been extracted and compiled from publicly available sources for a 10 year period between 2000–2001 and 2009–2010. Ethics approval for the research was granted by the Queensland University of Technology Human Research Ethics Committee.

Data for public hospital EDs were extracted from the Australian Institute of Health and Welfare hospital statistics.[7] The hospital ED statistics are sourced from National Public Hospital Establishment Database, which contains summary data on 'Accident and Emergency Occasions of Service' for 'almost all' public hospitals since 1995–1996.[13] We have used the data for the period of 2000–2001 to 2009–2010 to analyse time trends in ED presentations for the purposes of the present paper.

Census data and estimates published by the Australian Bureau of Statistics (ABS)[14–17] were used to adjust the overall ED presentation numbers to population-based presentations (presentations per 1000 persons) for each state, and for explaining the patterns in ED presentations.

For the analysis, we used SPSS 18 (SPSS, Chicago, IL, USA) and MS-Excel 2007 (Microsoft, Redmond, WA, USA). Descriptive statistics were used to analyse the ED presentations and growth rates over the study period. We then calculated Spearman correlation to test the strength of yearly increase in ED presentations. In order to adjust for population growth, we analysed relative rate ratios (RRR) and 95% confidence intervals (CI) based on a Poisson regression model. This is a more powerful test to ascertain the variations in ED presentations per 1000 persons in each year relative to 2009–2010 (reference category). It also establishes whether ED presentation rates followed a statistically significant pattern in each state or territory throughout the decade.

Results

Increasing emergency department presentations

Australian public hospital EDs provided nearly 7.4 million occasions of service to patients in 2009–2010 compared with 5.4 million in 2000–2001 (Table 1). The

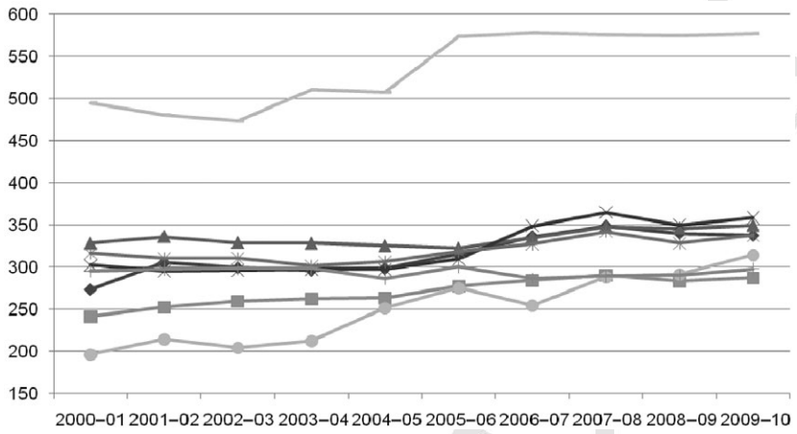

Figure 1. ED presentations per 1000 persons in Australian public hospitals: 2000–2001 to 2009–2010. (+) New South Wales, (+) Victoria, (+) Queensland, (+) Western Australia, (+) South Australia, (+) Tasmania, (+) Australian Capital Territory, (—) Northern Territory.

Table 2. Growth in ED presentations per 1000 persons in Australian public hospitals: 2000–2001 to 2009–2010

	NSW	Vic.	Qld	WA	SA	Tas.	ACT	NT	Australia
10 year growth (%)	23.6	19.1	6.6	18.7	6.8	60.3	0.9	16.6	17.3
Annual growth (%)	2.5	2.0	0.7	2.0	0.8	5.7	0.1	1.8	1.8
Spearman correlation	0.84**	0.94**	0.56	0.84**	0.74*	0.95**	–0.14	0.85**	0.91**

*P < *0.05*, **P < *0.01*. *ACT, Australian Capital Territory; NSW, New South Wales; NT, Northern Territory; Qld, Queensland; SA, South Australia; Tas., Tasmania; Vic., Victoria; WA, Western Australia.*

total growth during this period was about 37% and the average growth was 3.6% per annum. The highest growth occurred in Tasmania (73%), whereas South Australia (SA) and the Australian Capital Territory (ACT) recorded the lowest increases (16% and 14%, respectively). Other jurisdictions had growth rates between 35% and 45%.

The impact of population growth alone is adjusted by examining the utilization rate per 1000 persons. The overall ED presentations increased from 282 to 331 per 1000 persons during the study period in Australia showing an average annual increase of 1.6% (Fig. 1). The rates were consistently highest in the Northern Territory (NT) and lowest in Tasmania, Victoria and the ACT.

Table 2 shows the growth rates in ED presentations per 1000 persons. Despite having consistently lowest ED presentation rates, Tasmania showed a surprisingly high growth rate during the study period particularly from 2004–2005, which might be partly due to the inclusion 3 of data from Mersey Community Hospital, ••, ••. The ED data for this hospital were reported as a private hospital up to 2003–2004 and as a public hospital from 2004–2005 onwards. Similarly, Western Australia (WA) showed a spike in 2005–2006 onwards, which might partly be due to the inclusion of two new reporting public health units in 2004–2005 (p. 6).[18] Other states and territories have also experienced similar reporting arrangements to varying degrees in different years. The growths in the ACT and Queensland were not statistically significant.

Trends and patterns

The increase in ED presentation rates did not follow similar patterns (see Spearman correlations in Table 2). Tasmania, Victoria, NT, NSW and WA experienced strongly positive linear patterns; Queensland and SA followed non-linear (polynomial) trends, whereas the ACT's ED usage rate did not change significantly. A closer examination of the data (Fig. 1) shows that the ED usage rate reduced to a greater or lesser extent in most parts of the country in the years between 2001–2002 and 2004–2005 and again in 2008–2009. The ACT experienced statistically insignificant negative growth

over the decade, whereas Tasmania, NSW, Victoria and NT recorded significant increases in ED presentation rates. Queensland maintained the highest presentation rate among the larger states, but it appears that the other large states are catching up.

The regression results also confirm the patterns described above (Table 3). Accordingly, Tasmania's ED presentations per 1000 persons in 2000–2001 were 38% fewer than 2009–2010 (RRR = 0.623, CI 0.618–0.628). This pattern remained fairly constant until 2004–2005, but increased and continued to grow thereafter. On the contrary, the 2000–2001 ED presentation rates were very close to 2009–2010 in the ACT (RRR = 0.978, CI 0.970–0.987), SA (RRR = 0.933, CI 0.929–0.937) and Queensland (RRR = 0.921, CI 0.919–0.923) throughout the study period with little fluctuations. The 2000–2001 ED presentation rates in other locations were around 20% lower than 2009–2010, but increased gradually through the period. Overall, the presentation rates fluctuated between 2002–2003 and 2005–2006 in all areas except Victoria, which had a steady increase throughout the decade.

Discussion

The present article describes the growth and trends in the usage of public hospital EDs in Australia. The demand has been consistently increasing over the last decade in all locations except the ACT and should form the basis for future planning. The ED utilization rate in Australia, which is currently 331 per 1000 persons, has been growing at an average of 1.8% per annum over the past decade. Not only do the rates vary between the various states and territories of Australia, but also the growth in the utilization rate varies. This increased utilization rate requires understanding so as to better map future trends to population and social change.

The so-called 'inappropriate users' or 'GP' (general practice) patients have been commonly blamed for the increasing demand for ED services,[19,20] and to some extent this is added to by clinicians who often take a professional perspective that ignores the patient view. Many studies use a combination of the triage categories 4–5 and non-admitted as an indicator of low-acuity patients who can be cared for outside the ED. However, the Australian Institute of Health and Welfare reports showed that the proportion in the Australasian Triage Scale (ATS) 1–5 have remained 'fairly stable' at around 1%, 7%, 31%, 47% and 13% of total presentations, respectively, between 2001–2002 and 2008–2009.[7] Similarly, the admission rates have also remained unchanged at around 79%, 61%, 40% 16% and 5% within triage categories 1–5, respectively.[7] It is recognized that there are significant issues in the consistency of the application of the ATS and variations in data consistency, which limit the interpretation of the significance of these changes. The ATS is also an imprecise estimate of appropriateness, imprecision drawn not only from the variability in its application but also from the nature of urgency and its relationships to other concepts, such as severity or appropriateness. Furthermore, admission rates can reflect something of the severity of the patient. However, admission rates are also impacted on by hospital policies and by other societal influences. Although it is not reasonable to extract from this information judgements about the appropriateness of ED attendances, it is at the very least possible to state that there is no evidence that increased demand or utilization is due to overuse by lower-acuity patients or 'inappropriate use' based on retrospective clinical judgements.[21,22]

The explanation for changes in ED presentations might also be attributable to the changes in demography. Australia has experienced population growth at an average of 1.6% per annum for the 10 years to June 2010.[16] This growth in population has been most prominent in inner city areas, outer suburbs, urban infill areas and along the coast. Areas that have seen population decline include inland, rural areas and mining areas. Inner city and outer metropolitan growth rates (where most hospitals are) have ranged from 3% to 8% per annum.[14,15,17] Thus, urbanization can explain some of the variance if there are different utilization rates between urban and rural areas. Such data on these variations are not readily available.

A small change in the median age of a population can have dramatic effects on public health services. The Australian population is also ageing. The median age of the Australian population has increased by 4.8 years over the last two decades. Tasmania experienced the largest increase in median age over the last 20 years, increasing by 7.8 years from 32.1 years in 1990 to 39.9 years in 2010.[14,16,17] Calculations based on ABS reports show that the population aged 65–84 increased at an average annual rate of 2.03% and 85-year-olds and over increased at 4.66% annually over the past decade.[16] It is assumed that the elderly are more likely to require health services, including emergency health services, than younger people.[23] However, the ageing might not necessarily explain the whole trend of increasing ED usage. For instance, although the ACT had the highest

Table 3. Relative rate ratios of ED presentations per 1000 persons in Australian public hospitals: 2000–2001 to 2009–2010

	Relative rate ratio (95% confidence interval)							
	NSW	Vic.	Qld	WA	SA	Tas.	ACT	NT
2000–2001	0.798 (0.797–0.800)	0.830 (0.828–0.832)	0.921 (0.919–0.923)	0.831 (0.828–0.833)	0.933 (0.929–0.937)	0.623 (0.618–0.628)	0.978 (0.970–0.987)	0.847 (0.840–0.854)
2001–2002	0.895 (0.894–0.897)	0.867 (0.865–0.869)	0.940 (0.938–0.942)	0.813 (0.810–0.815)	0.914 (0.910–0.917)	0.682 (0.677–0.688)	0.987 (0.978–0.995)	0.826 (0.819–0.832)
2002–2003	0.880 (0.878–0.882)	0.893 (0.891–0.895)	0.919 (0.917–0.921)	0.816 (0.813–0.818)	0.914 (0.910–0.917)	0.648 (0.643–0.654)	0.988 (0.979–0.997)	0.813 (0.806–0.820)
2003–2004	0.877 (0.876–0.879)	0.902 (0.900–0.904)	0.916 (0.913–0.918)	0.816 (0.813–0.819)	0.887 (0.884–0.891)	0.668 (0.663–0.673)	0.995‡ (0.987–1.004)	0.873 (0.866–0.880)
2004–2005	0.880 (0.879–0.882)	0.910 (0.908–0.912)	0.918 (0.916–0.921)	0.820 (0.817–0.823)	0.905 (0.901–0.908)	0.802 (0.796–0.808)	0.956 (0.947–0.964)	0.873 (0.866–0.880)
2005–2006	0.929 (0.927–0.931)	0.958 (0.956–0.960)	0.912 (0.910–0.914)	0.852 (0.849–0.855)	0.938 (0.934–0.941)	0.874 (0.867–0.880)	1.005‡ (0.996–1.013)	0.984 (0.876–0.891)
2006–2007	0.989 (0.987–0.991)	0.980 (0.978–0.982)	0.943 (0.940–0.945)	0.960 (0.957–0.963)	0.964 (0.961–0.968)	0.810 (0.804–0.816)	0.945 (0.936–0.953)	0.989 (0.982–0.997)
2007–2008	1.021 (1.020–1.023)	0.996 (0.994–0.999)	0.977 (0.975–0.979)	0.997‡ (0.994–1.00)	1.005 (1.001–1.009)	0.917 (0.911–0.924)	0.950 (0.942–0.959)	0.978 (0.971–0.986)
2008–2009	1.004 (1.002–1.006)	0.985 (0.983–0.987)	0.986 (0.984–0.988)	0.973 (0.970–0.976)	0.971 (0.967–0.975)	0.927 (0.921–0.934)	0.972 (0.964–0.981)	0.987 (0.980–0.995)
2009–2010†	1	1	1	1	1	1	1	1

†*2009–2010 denotes reference year;* ‡*Not statistically significant; All others,* $P < 0.01$. *ACT, Australian Capital Territory; NSW, New South Wales; NT, Northern Territory; Qld, Queensland; SA, South Australia; Tas., Tasmania; Vic., Victoria; WA, Western Australia.*

growth of 7.65% in the number of persons aged 85 and over, its ED presentation rates did not change significantly. Also, in a separate analysis of ED presentations at Queensland public hospitals, we found that the presentations per 1000 persons decreased for the over 60 age group in the 5 years between 2003–2004 and 2008–2009, but increased among the 0- to 14-year-old group.[24]

There might be a multiplying effect of changing community attitudes to elderly people (wanting to do more) and declining general practitioner availability or involvement in after hours care.[25] Population projections suggest increases in the proportion of the population over the age of 65, and this increased proportion is likely to have an ongoing impact on ED demand. Hence the ongoing efforts by various investigators to keep these patients out of hospital by increasing levels of support for homes or nursing homes.[25,26]

The drivers for this growth are likely to be multifactorial and encompass the factors that influence an individual's decisions to access EDs, broader population level socioeconomic factors, and health system funding, service provision arrangements, and availability, accessibility and affordability of alternative care. A recent comprehensive literature review detailed the collection of factors.[27] However, it is currently unknown how these factors contribute to the individual's decision to access these services. The relative impact of these factors on the observed variations in utilization rates, particularly in explaining interstate variances in Australia and the increases in utilization over time, is also unclear. Additional studies are needed to determine the profile of ED users and their reasons for the utilization of the services. The Emergency Health Services Queensland study is pursuing analyses of the effect of different factors on emergency health services utilization, including qualitative studies, using patient surveys.

Study limitations

The data presented for the above analysis were derived from publicly available sources. Variations in definitions, types of activities reported for ED occasions of services across jurisdictions, and the varying number of reporting hospitals across the time present significant challenges to comparing and interpreting the data from the major databases available.

Population data from the ABS are estimates for most years and vary from publication to publication. As such, our analyses might present a somewhat different picture to other reports that use a different source.

The presented utilization trends in the present article exclude data from private hospitals as they do not report to central data sources, and therefore a full picture of EDs' utilization is difficult to achieve. However, because the existing reporting arrangements are as accurate as possible and as they present whole population data, the relative impact of data inaccuracies and definitions is likely to be minimal.

Conclusions

The growth in demand for public hospital ED services in Australia results from a complex interaction of multiple factors. A greater understanding of these factors and their impact on ED demand is necessary to inform public policy in emergency health and in particular to inform strategies designed to manage the growth in demand.

Further research should most notably include and consider patients and carers as influential 'social actors' who actively make a decision to seek emergency health care. Although studies abound on health service utilization, health-seeking and decision-making behaviours in other aspects of health care,[28] such research has scarcely been applied in the context of using ED services.[29]

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Author contributions

GF and VT conceived the study. GF and ST prepared the first draft. ST and JR performed the statistical analyses and submitted the ethics application. PA, JT and VT critically reviewed all the drafts and analyses. All authors contributed to and approved the final manuscript.

Competing interests

None declared.

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