

Local trends in emergency department attendances by older patients in an ageing national population

Kevin Chu, Anthony Brown and William Lukin

Abstract

Nursing-led aged care services were set up at our Emergency Department (ED) in 2004–05 to assist in the appropriate discharge of older patients. This study examined local trends in ED attendances by older patients. A retrospective study was conducted at an inner-city adult ED in a region with a 2.2% annual growth rate. Patient demographics, Australasian Triage Scale (ATS) category and admission/discharge status were collected from January 2002 to December 2006. Total ED attendances increased 7.7% from 66 687 in 2002 to 71 801 in 2006. Older patients' attendances, however, decreased 3.1% from 12 356 to 11 971. This decrease in ED attendances by older patients was unexpected. This may represent local population trends and/or be related to ED services designed to manage older patients and nursing home residents in the community. The planning of health services for older people therefore needs to take into consideration the influences on local trends in changing population demographics.

Aust Health Rev 2009; 33(1): 117–123

AGEING OF THE Australian population is well recognised.¹ The Australian population is projected to increase from 20.1 million in 2004 to 23.0–24.9 million in 2021. People aged 65 years and older are anticipated to increase from 2.6

What is known about the topic?

Ageing of the Australian population is well recognised, with older adults increasing their use of emergency departments (EDs).

What does this paper add?

This paper examined trends in attendances for older (≥ 65 years) and younger (14–65 years) patients, finding a decrease in ED presentations, but that admissions for older ED patients remained relatively stable at 1 in 2 patients.

What are the implications for practitioners?

Our data suggest that the number of presentations by older patients could decrease in certain regions, influenced by a dilution effect of a younger population and possibly by a "healthier older migrant" effect plus local nurse-led aged-care programs in the ED. The planning of emergency health services needs to take into account the influences on local trends in changing population demographics.

million (13% of population) in 2004 to 4.5–4.6 million (18%–19% of population) in 2021.

Population ageing will impact on the demand for and provision of health services. Data from the Australian Bureau of Statistics (ABS) National Health Surveys revealed that 38% of people aged 65–75 years visited their doctor in the 2 weeks before interview, and that 23% had been hospitalised within the previous 12 months.²

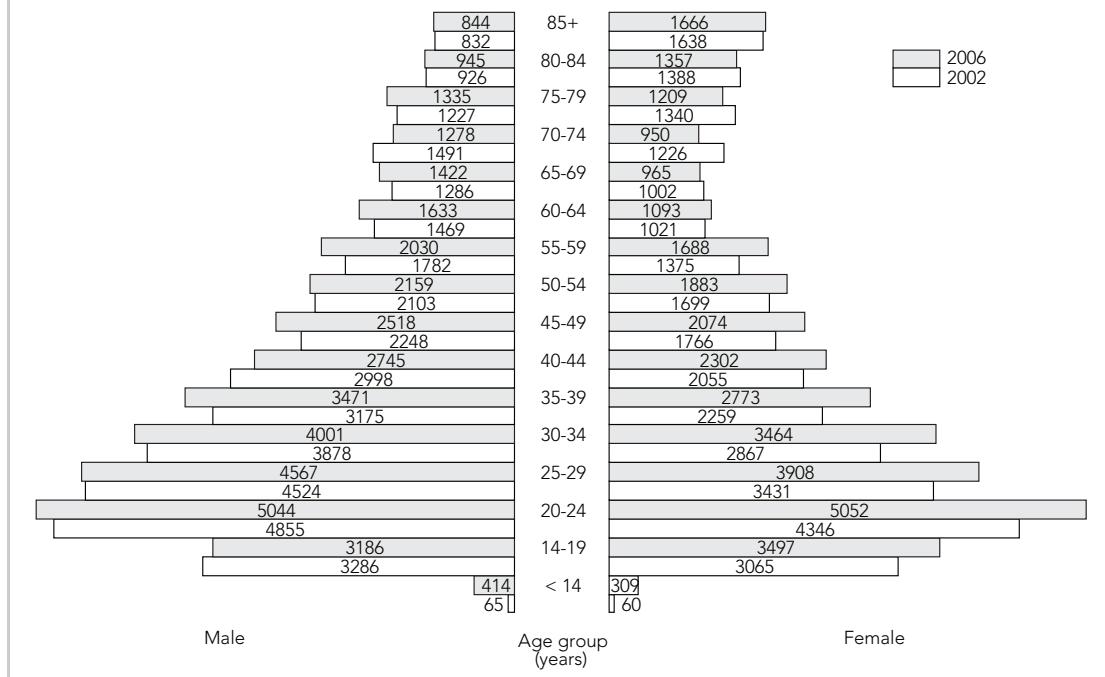
Compared with younger age groups, older patients may require different types of care in hospital.³ The proportion of episodes for rehabilitation, geriatric evaluation and management, and maintenance care all increase with age. Despite their relatively greater need for non-emergency and critical care, the emergency department (ED) is likely to remain an important point of entry into the health care system for many older people.

A cross-sectional study in 2001 at our ED has shown that older patients used relatively more ED resources than younger patients.⁴ Compared with

Kevin Chu, MBBS, MS, FACEM, Senior lecturer, School of Medicine, University of Queensland; and Staff Specialist
Anthony Brown, MBChB, FRCP, FRCSEd, FACEM, FCDEM, Associate Professor, School of Medicine, University of Queensland; and Staff Specialist
William Lukin, MBBS, FACEM, Senior lecturer, School of Medicine, University of Queensland; and Staff Specialist Department of Emergency Medicine, Royal Brisbane and Women's Hospital, Brisbane, QLD.

Correspondence: Dr Kevin Chu, Department of Emergency Medicine, Royal Brisbane and Women's Hospital, Butterfield Street, Herston, Brisbane, QLD 4029.
k.chu@uq.edu.au; Kevin_Chu@health.qld.gov.au

I Number of Emergency Department attendances stratified by age and sex for 2002 and 2006



the 14–65 years age group, patients aged 65 years and older were more likely to be triaged to higher clinical urgency categories. Older ED patients had a higher percentage of hospital admissions and longer total ED time even after adjusting for triage category. The greater ED resource utilisation by older people in an ageing population will put further pressure on EDs, which are already under strain.⁵ The purpose of this study was to examine local trends in ED attendances by older patients in the 5 years since our 2001 study.

Methods

A retrospective ecological study for exploring time trends was performed. Patients presenting to the ED of a major metropolitan adult tertiary-referral teaching hospital in Brisbane from January 2002 to December 2006 were studied. Paediatric patients presenting to this adult ED were redirected to the nearby specialist children's hospital after initial assessment.

The study hospital ED was located in the inner-city and serviced geographically half of the city and surrounding regional areas, supported by two other community-based hospital EDs. The city population surpassed 1.8 million in 2006, having grown at an average annual rate of 2.2% in the previous 5 years. This was one of the highest growth rates in the country.⁶ The populace is culturally diverse, with 20% born overseas. The Australian national population, by comparison, increased by 1.2% per year during the same period, reaching 20.7 million in 2006.

For the purpose of analyses, patients were divided into an older (≥ 65 years) and a younger (14–65 years) age group in keeping with ABS groupings. Trends in attendances were determined for each group and comparisons were made between the two. The Australasian Triage Scale (ATS) category, hospital admission and total ED time were used as markers of ED resource utilisation in our previous study.⁴ Trends in resource utilisation using these markers were

2 Number of Emergency Department attendances from 2002 to 2006

Age group (years)	2002	2003	2004	2005	2006	Change from 2002 to 2006 (%)
≥ 65	12 356	12 751	12 796	12 174	11 971	-3.1
14–65	54 204	58 065	58 468	59 609	59 107	9.0
< 14	125	97	367	724	723	
Missing	2	1	3	1	0	
Total	66 687	70 914	71 634	72 508	71 801	7.7

3 Number of Emergency Department attendances stratified by Australasian Triage Scale category from 2002 to 2006

Australasian Triage Scale category	2002	2003	2004	2005	2006	Change from 2002 to 2006 (%)
<i>Patients aged 65 years and older</i>						
1 + 2	2 462	2 060	2 157	2 081	2 086	-15.3
3 + 4	7 679	8 659	8 890	8 666	8 707	13.4
5	2 215	2 032	1 749	1 384	1 132	-48.9
Not assigned*	0	0	0	43	46	
<i>Patients 14–65 years</i>						
1 + 2	6 314	6 008	6 087	7 324	7 330	16.1
3 + 4	38 263	43 536	43 611	44 328	45 304	18.4
5	9 627	8 521	8 770	7 590	6 185	-35.8
Not assigned	0	0	0	367	288	

* Patients admitted from another hospital or outpatient department but were transiting through or waiting for a bed in the Emergency Department were not assigned an Australasian Triage Scale category in 2004–2005.

followed in this study. Access block has been used as an indicator of ED overcrowding.⁵ Trends in access block were also examined for the study period.

Patient demographics, ATS category, total ED time, and admission/departure status were acquired from computerised hospital databases. The ATS is an ordinal scale ranging from 1 to 5 with one being assigned to the most urgent clinical category.⁷ The scale has been related to a range of outcome measures and resource consumption.^{8–10} Total ED time was calculated from arrival and departure times.¹¹ Hospital admission included patients admitted to beds within the ED and the ED's short-stay ward, and patients referred to another hospital for admission in keeping with the National Health Data Dictionary.¹² Access

block was expressed as the proportion of patients requiring hospital admission, who have a total ED time greater than 8 or more hours.¹¹

Descriptive statistics were calculated using proportions for categorical data, and medians and interquartile ranges for non-parametric continuous data. Changes in ED attendances were analysed using the Chi-square test for trends.

Results

Total ED attendances increased 7.7% from 2002 to 2006 (Box 1 and Box 2). There was a difference between older and younger patients. Older patients' attendances fell 3.3% during this period after peaking in 2004, while younger patients' attendances rose 9.0% ($P < 0.001$).

4 Percentage of Emergency Department attendances resulting in a hospital admission from 2002 to 2006

Australasian Triage Scale category	2002 (%)	2003 (%)	2004 (%)	2005 (%)	2006 (%)
<i>Patients aged 65 years and older</i>					
1 + 2	84.8	81.5	83.5	84.5	79.5
3 + 4	56.8	54.2	56.2	57.3	52.0
5	2.5	2.4	2.1	1.9	1.3
<i>Patients younger than 65 years</i>					
1 + 2	68.0	65.9	64.2	58.2	46.7
3 + 4	32.4	30.1	31.2	26.6	19.0
5	8.0	9.1	12.0	6.2	1.6

5 Median total Emergency Department time from 2002 to 2006

Admission status	2002 (h)	2003 (h)	2004 (h)	2005 (h)	2006 (h)
<i>Patients aged 65 years and older</i>					
Admitted					
Median	4.97	5.63	7.03	6.73	7.17
Q1–Q3*	3.43–6.75	3.78–8.43	4.75–10.78	4.55–9.58	4.80–10.28
Discharged					
Median	2.48	2.68	3.40	3.37	3.80
Q1–Q3*	1.12–4.07	1.23–4.32	1.48–5.55	1.55–5.22	1.98–5.90
<i>Patients younger than 65 years</i>					
Admitted					
Median	2.62	2.75	3.65	4.32	5.55
Q1–Q3*	0.48–4.63	0.65–4.87	0.83–6.42	2.33–6.88	3.32–8.75
Discharged					
Median	2.20	2.33	2.95	2.77	2.85
Q1–Q3*	1.17–3.46	1.27–3.68	1.48–4.73	1.28–4.47	1.42–4.60

* Interquartile range.

However, the changes in attendances were dissimilar for different triage categories (Box 3). The number of younger patients classified as ATS categories 1–4 rose, while the number classified as ATS category 5 fell. In 2006, only one in ten younger patients was classified as ATS category 5, while eight of ten were ATS categories 3–4. Numbers of older patients classified as ATS categories 1–2 and ATS category 5 fell, while numbers in ATS categories 3–4 rose. Again in 2006, only one in ten older patients was classified as

ATS category 5, while seven of ten were ATS categories 3–4.

The percentage of ED attendances resulting in hospital admissions was higher for older compared with younger patients for all triage categories (Box 4). This percentage fell marginally for older patients, but markedly for the younger age group during the study period.

Total ED times were longer for older compared with younger patients in both admitted and discharged groups (Box 5). During the study

6 Admitted Emergency Department patients who experienced access block, from 2002 to 2006

Age group (years)	2002	2003	2004	2005	2006
≥ 65	14.0%	27.9%	41.7%	37.8%	41.4%
14–65	5.4%	8.6%	16.6%	18.6%	29.4%
All	7.7%	13.7%	23.3%	24.2%	33.4%

period the total ED time increased for all patients irrespective of age or admission status. Access block increased from 7.7% in 2002 to 33.3% in 2006 (Box 6). Access block was greater for older compared with younger patients.

Discussion

The relative fall in ED attendances by patients aged 65 years and older was unexpected and surprising, when the number of ED attendances was increasing over the study period. The study hospital was located in a city with one of the highest growth rates in the country. With an ageing population, the expectation was for the proportion of attendances by patients aged 65 years and older to increase. There are several possible reasons for this unexpected opposite trend. The first is that a younger population is moving into the region and population ageing is slowed or reversed here. Another possibility is that the older people who migrate to this region are healthier than their age-related peers, who do not change their domicile. Thirdly, our recently implemented ED-led aged care service is having the desired effect.

Population statistics for the Brisbane Local Government Area were available from the 2001 and 2006 Census.^{13,14} In the period between the two census years' data, the number of people aged 15–65 years increased 2.1% per year and comprised 70.1% of the population in 2006. During the same time, the number of people aged 65 years and older increased 1.3% per year and comprised 11.8% of the population in 2006. Although the study hospital's catchment area only

constituted the northern half of the Brisbane Local Government Area, the census statistics do suggest that the findings in this study may be explained by a greater number of younger people moving into the region, thus diluting the effects of a national ageing population. This study was unable to determine whether there was an additional "healthy older migrant" effect to explain the findings.

Although the national population is growing and ageing, there are regional differences in growth. Regions with the highest growth rate are outer suburbs, inner areas of capital cities and some regional centres, particularly along the coast.⁶ The study hospital was located in the inner city where there was a strong demand for residential development based on urban renewal. Three of the hospital's surrounding suburbs have experienced prominent population growth at 12.4% to 13.7% per year in the 5 years to 2006.⁶ A younger working population may be attracted to live in such areas, whereas the older retiring population may be moving away from the inner city. Furthermore, there was decommissioning of several nursing homes in the inner city. The beds lost were replaced by an expansion and consolidation of residential aged care facilities in the outer suburbs.

In 2004–05, the study hospital ED implemented two nursing-led aged care services in response to anticipated increases in attendances by older patients. The first was a Community Assessment and Referral Service (CARS) to assist in the appropriate discharge of older patients from the ED and to draw on existing community services to support independent living upon discharge. The second was a Hospital in the Nursing Home (HiNH) program to support the acute care needs of older people in residential aged care. The need for improved coordination of care between EDs and residential aged care institutions has been previously recognised.¹⁵

The implementation of these services was associated with a decrease in attendances by older patients from 2004 to 2006 to pre-2002 levels. This association, however, does not necessarily indicate cause and effect. Similar services have been imple-

mented in other parts of the country with varying success.¹⁶⁻²² The quintessence of such services is an integrated, multidisciplinary approach to assist in the acute hospital and post-discharge care of older people at risk of repeated hospital presentations. The emphasis has been on returning these patients to and maintaining them in the community. The provision of care in the patient's home, as opposed to the hospital, has physical and cognitive advantages for the older patient.²⁰

Measuring outcomes for these services has been problematic.¹⁶ Commonly used measures include ED presentations and admissions, hospital admissions from all sources, length of hospital stay, use of outpatient services, residential aged care admissions, use of community resources, physical and cognitive function over time, and patient plus carer satisfaction. The use of the ED by attendances for patients 65 years and older, as reported in this study, is a crude measure, but one that does provide a framework for examining trends. The effectiveness of our CARS and HiNH programs requires further evaluation. A future examination comparing age composition of non-emergency hospital admissions with ED admissions may provide an insight. If trends are due to a population effect, the age composition of non-emergent and emergent patients will be similar, but if falling ED presentations by older patients are due to ED-led aged care services, there may be a lesser proportion of older patients among emergency compared with non-emergency admissions.

The fall in ED attendances by patients aged 65 years and older observed in this study was not uniform across all triage groups. The number of older ED patients triaged under the lower (ATS 5) and higher (ATS 1 and 2) urgency categories fell, while those triaged under intermediate (ATS 3 and 4) urgency categories rose. The most noticeable change was the halving of numbers of older patients triaged to ATS category 5 during the study period. The prevention of re-presentations by older patients triaged to a lower urgency may be more readily achievable than the prevention of re-presentations by those triaged to intermediate urgencies. However, ATS category 5 patients only contributed to a small proportion of all presenta-

tions. The explanation for trends in ED attendances between triage categories will need to be explored in future research by examining the proportion of various diagnostic groups, or clinical presentations within each triage category.

The percentage of ED attendances resulting in hospital admission for older and younger patients fell during the study period. The fall was marginal for the older patients, but marked for younger patients. This percentage remained higher for older compared with younger patients, as in our 2001 study. A known under-supply of inpatient hospital beds relative to ED demand may have contributed to the discharge of a greater proportion of ED patients for outpatient or general practitioner care, particularly among younger patients.

A disturbing trend over the study period was the increase in ED access block, which was worse for older patients. Despite a decrease in the percentage of ED attendances resulting in hospital admission, our hospital ran at near full capacity (>95% bed occupancy) for much of the study period, resulting in admitted patients staying longer and longer in the ED. Total ED time was again longer for older compared with younger patients as in our 2001 study. ED overcrowding is a significant problem that has been reported to be associated with increased mortality on days 2, 7, 10 and 30 following an ED presentation.^{6,23,24}

The national demand for health care by older people is expected to rise as the population increases and ages. Older patients continue to use more health resources than younger patients, placing greater demand on EDs, which are already at stretched capacity to cope. The increased demand by older patients, however, may not be uniform across Australia. Our data suggest that the number of presentations by older patients could actually decrease in certain regions, influenced by a dilution effect of a younger population movement, and possibly by a "healthier older migrant" effect plus local nurse-led aged care programs in the ED. The planning of emergency health services including aged care therefore needs to take into consideration the influences on local trends in changing population demographics.

Competing interests

The authors declare that they have no competing interests.

References

- 1 Australian Bureau of Statistics. Population projections, Australia, 2004 to 2101. Canberra: ABS, 2006. (ABS Cat. No. 3222.0.).
- 2 Australian Bureau of Statistics. Health of older people in Australia: a snapshot, 2004–05. Canberra: ABS 2006. (ABS Cat. No. 4833.0.55.001.)
- 3 Karmel R, Lloyd J, Hales C. Older Australians in hospital. Canberra: Australian Institute of Health and Welfare, 2007. (AIHW Bulletin no. 53. Cat. no. AUS 92.)
- 4 Chu K, Brown AT. Older patients' utilisation of emergency department resources: a cross-sectional study. *Aust Health Rev* 2001; 24: 44-52. Available at: http://www.aushealthreview.com.au/publications/articles/issues/ahr_24_3_010701/ahr_24_3_44-52.asp (accessed Nov 2008).
- 5 Australasian College for Emergency Medicine. Access block and overcrowding in emergency departments. Melbourne: ACEM, 2004.
- 6 Australian Bureau of Statistics. Regional population growth, Australia, 2005–06. Canberra: ABS, 2007. (ABS Cat. No. 3218.0.)
- 7 Australasian College for Emergency Medicine. Policy on the Australasian Triage Scale. Melbourne: ACEM, 2000.
- 8 Erwich-Nijhout MA, Bond MJ, Baggooley C. Costings in the Emergency Department, Flinders Medical Centre, Adelaide. Report for the Commonwealth Department of Health and Family Services, 1996.
- 9 Jelinek GA. Casemix classification of patients attending hospital emergency departments in Perth, Western Australia. Development and evaluation of an urgency based casemix information system for emergency departments [Doctor of Medicine Thesis]. Perth: University of Western Australia, 1995.
- 10 Whitby S, Ieraci S, Johnson D, et al. Analysis of the process of triage: the use and outcome of the national triage scale. Report to the Commonwealth Department of Health and Family Services, 1997.
- 11 Australasian College for Emergency Medicine. Policy document. Standard terminology. Melbourne: ACEM, 2001.
- 12 Australian Government, Australian Institute of Health and Welfare. National Health Data Dictionary, version 13.2. Available at: <http://meteor.aihw.gov.au/content/index.php?id/355992> (accessed Jan 2008).
- 13 Australian Bureau of Statistics. 2001 Census tables: Brisbane (C) (local government area) - Qld. Canberra: ABS, 2001. Available at: <http://www.census-data.abs.gov.au> (accessed Jul 2008).
- 14 Australian Bureau of Statistics. 2006 Census tables: Brisbane (C) (local government area) — Qld. Canberra: ABS, 2006. (ABS Cat. No. 2068.0 – 2006 census tables). Available at: <http://www.census-data.abs.gov.au> (accessed Jul 2008).
- 15 Finn JC, Flicker L, MacKenzie E, et al. Interface between residential aged care facilities and a teaching hospital emergency department in Western Australia. *Med J Aust* 2006; 184: 432-5.
- 16 Roberts RM, Dalton KL, Evans JV, Wilson CL. A service model of short-term case management for elderly people at risk of hospital admission. *Aust Health Rev* 2007; 31: 173-83. Available at: http://www.aushealthreview.com.au/publications/articles/issues/ahr_31_2_0507/ahr_31_2_173.asp (accessed Nov 2008).
- 17 Basic D, Conforti DA. A prospective, randomised controlled trial of an aged care nurse intervention within the Emergency Department. *Aust Health Rev* 2005; 29: 51-9. Available at: http://www.aushealthreview.com.au/publications/articles/issues/ahr_29_1_0205/ahr_29_1_051-059.asp (accessed Nov 2008).
- 18 Corbett HM, Lim WK, Davis SJ, Elkins AM. Care coordination in the Emergency Department: improving outcomes for older patients. *Aust Health Rev* 2005; 29: 43-50. Available at: http://www.aushealthreview.com.au/publications/articles/issues/ahr_29_1_0205/ahr_29_1_043-050.asp (accessed Nov 2008).
- 19 Brand CA, Jones CT, Lowe AJ, et al. A transitional care service for elderly chronic disease patients at risk of readmission. *Aust Health Rev* 2004; 28: 275-84. Available at: http://www.aushealthreview.com.au/publications/articles/issues/ahr_28_3_131204/ahr_28_3_275-284.asp (accessed Nov 2008).
- 20 Caplan GA, Coconis J, Woods J. Effect of hospital in the home treatment on physical and cognitive function: a randomized controlled trial. *J Gerontol A Biol Sci Med Sci* 2005; 60: 1035-8.
- 21 Caplan GA, Williams AJ, Daly B, Abraham K. A randomized, controlled trial of comprehensive geriatric assessment and multidisciplinary intervention after discharge of elderly from the emergency department — the DEED II Study. *J Am Geriatr Soc* 2004; 52: 1417-23.
- 22 Caplan GA, Ward JA, Brennan NJ, et al. Hospital in the home: a randomised controlled trial. *Med J Aust* 1999; 170: 156-60.
- 23 Sprivilis PC, Da Silva JA, Jacobs I, et al. The association between hospital overcrowding and mortality among patients admitted via Western Australian emergency departments. *Med J Aust* 2006; 184: 208-12.
- 24 Richardson DB. Increase in patient mortality at 10 days associated with emergency department overcrowding. *Med J Aust* 2006; 184: 213-16.

(Received 5/02/08, revised 10/07/08, accepted 16/09/08) □