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Emergency demand and repeat attendances by older patients

J. Lowthian, A. Curtis, J. Stoelwinder, J. McNeil and P. Cameron

Department of Epidemiology and Preventive Medicine, Faculty of Medicine, Nursing and Health Sciences, Monash University, Melbourne, Victoria, Australia

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Correspondence
Judy Lowthian, Department of Epidemiology and Preventive Medicine, School of Public Health and Preventive Medicine, Monash University, Level 6, Alfred Centre, 99 Commercial Road, Melbourne, Vic. 3004, Australia.
Email: judy.lowthian@monash.edu

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Abstract

Background: Population ageing is projected to impact on health services utilisation including Emergency Departments (ED), with older patients reportedly having a high rate of return visits. We describe and compare patterns in ED utilisation between older and younger adults, and quantify the proportion and rate of return visits.

Methods: Population-based retrospective analysis of metropolitan Melbourne public hospital ED data, 1999/2000 to 2008/2009. Numbers of patients, presentations, re-presentations and rates per 1000 population were calculated, with comparison of older (aged ≥70 years) and younger (15–69 years) attendances.

Results: Population growth in each age group was similar over the study period, yet ED presentations rose by 72% for older adults compared with a 59% increase for younger adults. Rates per 1000 population rose with increasing age. Of the population aged ≥70 years, 39% presented to ED compared with 17% of the population aged 15–69 years in 2008/2009. Twenty-seven per cent of the increase in older adult presentations was driven by a cohort who attended ≥4 times in 2008/2009. The number of older patients presenting ≥4 times doubled over the decade, contributing to 23% of all older presentations in 2008/2009. ED length of stay rose with increasing age; 69% of older adults remained in ED for ≥4 h compared with 39% of younger adults in 2008/2009. The number of older adult ED hospital admissions doubled over the decade.

Conclusions: Older patients are disproportionately represented among ED attendances. They also have an increasing propensity to re-present to ED, indicating a need to identify the clinical, social and health system-related risk factors for re-attendance by specific patients.

Introduction

Demand for healthcare is rising across the developed world, with reports that Australian hospitals are burdened by increased Emergency Department (ED) attendances of up to 6% annually.[1] The total number of ED presentations to metropolitan Melbourne public hospitals rose by 55% over the 10-year period, ending 30 June 2009 with presentation rates averaging a 3.6% annual increase beyond that which can be explained by demographic change.[2] The fastest growth is among people aged ≥65 years,[3–7] who are estimated to represent 18% of all presentations.[8] Utilisation of ED resources by older patients is substantial, attributed to greater clinical complexity requiring more resources, longer ED stays and greater likelihood of admission.[9] Older patients are also reported to have a higher rate of return visits to the ED than their younger counterparts.[4]

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Population ageing and expectations for care have been identified as key factors contributing to the rise in demand.[10] A recent 14-year Australian study showed an acceleration over time in the rate of transportation by emergency ambulances to ED of the population aged 85 years or more. Predictive modelling forecasts the transportation rate could rise from 474/1000 in 2007–2008 to a rate of 844/1000 population aged ≥85 years by 2014–2015.[11] This will have a dramatic impact on all aspects of acute hospital care. In this context, we aimed to describe ED attendances by older adults throughout metropolitan Melbourne over the decade ending 30 June 2009; quantify their return visits and describe any differences in the patterns of utilisation by older adults with younger adults aged 15–69 years.

Methods

Study design and setting

We retrospectively analysed routinely collected data describing public hospital ED presentations across metro-

politan Melbourne for the 10-year period to 30 June 2009. This study was approved by the Monash University Human Research Ethics Committee and the Victorian Department of Health.

Data

De-identified data from the Victorian Emergency Minimum Dataset[12] were provided by the Victorian Department of Health. This dataset contains demographic and clinical data describing individual patient presentations to Victorian public hospitals with 24-h ED. Individual hospitals collect data using standard definitions and protocols to ensure comparability between facilities.[13] This analysis included metropolitan Melbourne ED data, excluding specialist maternity and the 'Eye & Ear' hospitals. Population data published by the Australian Bureau of Statistics were used to calculate presentation rates across the study period by age and gender.[14] Given current demography, older adults were defined as aged ≥70 years,[15] and younger adults aged 15–69 years.

Analysis

Demographic and clinical factors analysed included gender, mode of transport to ED, triage category, clinical reason for attendance, ED length of stay (LOS) and discharge destination from ED. Time trends in numbers of patients and numbers of ED presentations were estimated using descriptive statistics. Annual age and gender-specific presentation rates per 1000 persons were calculated adjusting for population change over time. Changes in arrival mode, clinical urgency and primary presenting clinical conditions, ED LOS, ED discharge destination and re-presentation numbers within a 12-month period were compared over the study period. Regression methods were used to model the effects and interaction on hospital admission from ED of age and gender, arrival by emergency ambulance, clinical acuity and ED LOS. Confidence intervals (CI) were generated to quantify precision of estimates. Stata version 11 was used for all analyses (StataCorp, College Station, TX, USA).

Results

The patterns comparing visits by older and younger adults in terms of mode of arrival, level of urgency, LOS in ED and ED discharge destination are summarised in Table 1. The total number of presentations by older adults increased by 72% between 1999/2000 and 2008/2009, just over three times the rate of growth of this age group within metropolitan Melbourne's population for the same time period. Growth in the number of presentations by younger adults was 59% over the same time period. In 2008/2009, 85 029 older adults made 141 775 ED visits, accounting for 16.6% of all ED presentations that year, while comprising just 9% of the population. Presentation rates increased in both age groups, rising from 133 to 175 per 1000 population aged 15–69 years, and from 278 to 393 per 1000 population aged ≥70 years between 1999/2000 to 2008/2009.

In 2008/2009, 55% of older adults presenting to ED were transported by an emergency ambulance, compared with 21% of the younger age group. Over 75% of older adults were triaged as urgent or semi-urgent (Australasian Triage Scale (ATS[16]) categories 3/4). The ATS is an ordinal scale from one to five, with one assigned to the most urgent clinical category. The most common clinical conditions in this older age group were chest pain, pneumonia and urinary tract infections. The proportion of presentations from residential aged care facilities (RACF) did not alter, with 12% of older presentations arriving from RACF over the study period. ED LOS increased with age with a median ED LOS of 6.5 h for patients aged ≥85 years in 2008/2009. Sixty-nine per cent of older adults remained in ED for ≥4 h compared with 39% of younger adults in 2008/2009. As shown in Table 2, ED LOS rose for more acutely unwell patients (ATS categories 1/2/3); however, it declined for lower urgency older patients (ATS categories 4/5).

The number of older adults admitted to hospital from ED doubled over the decade, with 552/1000 older adult ED presentations admitted to hospital (either to a ward or short-stay observation unit (SSOU))[a] in 2008/2009, an increase from 469/1000 older adult ED presentations in 1999/2000. This compared with 228/1000 younger adult ED presentations being admitted in 2008/2009.

Random effects regression indicated a 15.3% increase (95% CI 12.7% to 18%) over the study period in the number of older adult admissions to hospital through ED, after adjusting for the effects of age, gender, arrival mode, clinical acuity and ED LOS. This equated to an average annual increase of 3.9% in older adult admissions to hospital (95% CI 3.7% to 4.1%), compared with those discharged directly from ED. Table 3 summarises the multivariate model of the effects of arrival by emergency ambulance, urgency and ED LOS on the likelihood of older patients being admitted to hospital over the study period. In summary, when comparing admitted patients with those discharged directly home, older patients were 1.68 times more likely to have arrived by emergency ambulance than by other means; 2 times as likely to be

[a]SSOU are observation units collocated within ED, introduced as a demand management strategy in 2001/2002.

Table 1 Comparison of public hospital ED presentations by younger and older adults, metropolitan Melbourne: 1999/2000–2008/2009 (Source VEMD *excl specialist maternity & Eye & Ear Hospitals*)

	1999/2000	2008/2009	% change
	No.	*No.*	
Total ED presentations (all ages)	550 662	853 940	55
15 to 69 years	322 846	513 033	59
Rate/1000 persons	133	175	
≥70 years	63 295	102 100	61
Rate/1000 persons	253	339	
≥85 years	19 062	39 675	108
Rate/1000 persons	419	583	
Mean age (median)			
15 to 69 years	37.9 years (35 years)	38.6 years (37 years)	
≥70 years	79.5 years (78 years)	80.5 years (80 years)	
Female gender			
15 to 69 years	150 664	246 790	64
≥70 years	45 312	76 917	70
Arrival mode no.			
Walk-ins			
15 to 69 years	246 368	384 314	56
≥70 years	33 369	52 561	57
Ambulance/air			
15 to 69 years	69 776	105 551	51
≥70 years	47 643	78 246	64
Clinical urgency: triage category no.			
ATS 1			
15 to 69 years	4 046	4 664	15
≥70 years	2 026	2 096	3
ATS 2			
15 to 69 years	22 425	54 370	142
≥70 years	9 563	21 505	125
ATS 3			
15 to 69 years	95 255	165 919	74
≥70 years	30 677	58 589	91
ATS 4			
15 to 69 years	165 478	235 338	42
≥70 years	35 829	52 577	47
ATS 5			
15 to 69 years	34 611	51 762	49
≥70 years	3 789	5 706	28
ED LOS ≥ 4 h no. (% total)			
15 to 69 years	128 750 (39.9%)	197 941 (38.6%)	54
≥70 years	56 919 (69.1%)	98 351 (69.4%)	73
Disposition from ED			
Home			
15 to 69 years	225 996	336 117	49
Rate/1000 presentations	700	655	
≥70 years	33 308	51 062	53
Rate/1000 presentations	404	360	
Admitted to hospital†			
15 to 69 years	62 042	117 033	89
Rate/1000 presentations	192	228	
≥70 years	38 599	78 296	103
Rate/1000 presentations	469	552	

†Includes short-stay observation unit. ATS, Australasian Triage Scale; ED, Emergency Departments; LOS, length of stay; VEMD, Victorian Emergency Minimum Dataset.

Table 2 Length of ED stay (median hours) by triage category and age, 1999/2000 to 2008/2009 (Source VEMD *excl specialist maternity & Eye & Ear Hospitals*)

	ATS 1		ATS 2		ATS 3		ATS 4		ATS 5	
	2000	2009	2000	2009	2000	2009	2000	2009	2000	2009
70 to 74 years	4.4	5.6	5.9	6.1	5.8	6.0	4.9	4.5	2.4	2.0
75 to 79 years	5.0	6.0	6.1	6.5	6.0	6.4	5.4	5.0	2.4	1.9
80 to 84 years	5.2	6.3	6.7	6.7	6.2	6.8	5.8	5.6	2.7	2.1
≥85 years	4.9	6.0	7.0	7.0	6.4	7.0	6.2	6.2	3.4	2.0

ATS, Australasian Triage Scale; ED, Emergency Departments; VEMD, Victorian Emergency Minimum Dataset.

triaged as ATS category 2 than ATS category 3 and 3.6 times as likely to have an ED LOS of 4 to <8 h than < 4 h.

The changes over the study period in the numbers of younger and older adults attending on a single occasion, for those attending two to three times, or four or more times within a 12-month period are summarised in Table 4. Seventy-six per cent of younger adults presented on a single occasion during the 12-month period to 30 June 2009, accounting for 53% of the total ED attendances for younger adults. This compared with 65% of older adults who presented on a single occasion, accounting for 39% of the total older adult presentations for the same time period.

Between 1999/2000 and 2008/2009, there was a notable increase in the number and rate per 1000 population of individual older adults who presented on multiple occasions to ED within a 12-month period compared with younger adults (Table 4). Twenty-seven per cent of the increase in numbers of presentations by older adults was driven by a cohort who presented to ED ≥4 times in 2008/2009. Importantly, 7% of older adults attended ED four or more occasions, contributing to 23% of visits by this age group in 2008/2009. This compared with 4% of younger adults presenting four or more times, accounting for 16% of their total visits in 2008/2009.

Table 3 Multivariate model of the effects of arrival by emergency ambulance, clinical acuity and ED length of stay on the likelihood of admission compared with direct discharge from ED, of older patients (aged ≥70 years), metropolitan Melbourne ED 1999/2000 to 2008/2009 (Source VEMD *excl specialist maternity & Eye & Ear Hospitals*)

n = 1 022 905 presentations no. individual patients = 347 867 1999/2000–2008/2009	Odds ratio	95% CI (*P* < 0.000)
Arrival by emergency ambulance†	1.68	1.66 to 1.69
Triage level‡		
ATS category 1	2.69	2.58 to 2.82
ATS category 2	1.99	1.96 to 2.02
ATS category 4	0.48	0.47 to 0.49
ATS category 5	0.21	0.20 to 0.21
ED LOS§		
4 to <8 h	3.56	3.51 to 3.59
8 to < 12 h	7.3	7.2 to 7.4
≥12 h	13.7	13.5 to 14.0

†Compared with arrival by other means. ‡Compared with ATS category 3. §Compared with ED LOS <4 h. ATS, Australasian Triage Scale; CI, confidence interval; ED, Emergency Departments; LOS, length of stay; VEMD, Victorian Emergency Minimum Dataset.

Discussion

This study has confirmed a disproportionate increase in the number of older adults seeking emergency healthcare from acute public hospitals in metropolitan Melbourne over a 10-year period. This rise in demand was partly driven by a significant and growing proportion of return visits within a 12-month period. To our knowledge, this is the first population-based study of patient-level data to quantify the contribution of re-presentations by a cohort of individual patients to the increase in utilisation of ED services.

This increase in demand by older patients contrasts with the results of a recent Australian study which reported a decline in ED presentations to a single metropolitan ED by older people over a 5-year period in Brisbane.[17] The study authors reported that area-specific demographic changes may have contributed to this unexpected finding; however, this was not adjusted for in the analysis. The authors also implied that introduction of two aged care multidisciplinary interventions, designed by the ED to reduce older patient presentations, may have contributed to the reduction.

The Victorian State Government implemented the Care Coordination Program across Melbourne in 2001, to reduce demand and improve the quality of care provided to older ED patients.[18] Since implementation of this intervention, the numbers and rate of attendances of older patients have continued to rise incrementally. It is possible that diminished access to primary care services underpins some of the increase in demand shown by this current study.[19,20] It has also been speculated that ED may be an increasingly preferred source of timely accessible

Table 4 Frequency of presentations and re-presentations made by older and younger adults to public hospital ED, Melbourne, 1999/2000–2008/2009 (Source VEMD *excl specialist maternity & Eye & Ear Hospitals*)

15 to 69 years old age group				
Year ending 30 June	2000		2009	
Melbourne population aged 15–69 years	*n* = 2 426 663		*n* = 2 931 353	
	No. patients	No. ED visits (% total)	No. patients	No. ED visits (% total)
No. individual patients	231 142	322 846	357 901	513 033
No. attending ED X1	180 121	180 121 (56%)	271 962	271 962 (53%)
Rate/1000 population	74.2		92.8	
No. attending ED X2–X3	42 953	95 670 (30%)	72 138	161 070 (31%)
Rate/1000 population	17.7		24.6	
No. attending ED ≥ X4	8 068	47 055 (14%)	13 801	80 001 (16%)
Rate/1000 population	3.3		4.7	
≥70 years old age group				
Year ending 30 June	2000		2009	
Melbourne population aged ≥ 70 years	*n* = 296 123		*n* = 360 737	
	No. patients	No. ED visits (% total)	No. patients	No. ED visits (% total)
No. individual ED patients	52 881	82 357	85 029	141 775
No. attending ED X1	36 982	36 982 (45%)	55 362	55 362 (39%)
Rate/1000 population	124.9		153.5	
No. attending ED X2–X3	12 837	29 098 (35%)	23 652	53 834 (38%)
Rate/1000 population	43.4		65.6	
No. attending ED ≥ X4	3 062	16 277 (20%)	6 015	32 579 (23%)
Rate/1000 population	10.3		16.7	

ED, Emergency Departments; VEMD, Victorian Emergency Minimum Dataset.

healthcare, with the additional benefits of providing a 'one-stop' 24-h no-cost multidisciplinary specialist diagnostic and treatment service.[21,22] Of interest is the reducing LOS over the study period for lower urgency older patients. This may be as a result of increased efficiency of ED processes over time, which may have reinforced the benefits of a hospital-based acute care model over a fragmented community-based model.

The persistent growth in presentations and re-presentations to ED, in spite of implementation of interventions designed to reduce demand, suggests an urgent need for evaluation of the effectiveness and outcomes of these programmes. It is recognised that an ED visit for older adults is a sentinel event that can lead to substantial functional decline and other adverse outcomes.[23] Therefore, considering the patterns of re-presentation identified in our study, we recommend further research into following up older patients after they present to ED. This would provide valuable insight into clinical, psychosocial and health system risk factors in older adults for ED attendance and repeat presentations. It would inform the development of targeted evidence-based solutions for meeting the acute healthcare needs of the older population, particularly those at risk of re-presentation. It could also afford the opportunity to provide further insight into patient and provider expectations for care,[20] including discussion about end-of-life care planning.

The strength of this study is that it is population based, comprising analysis of more than 1 million public hospital ED presentations by patients aged ≥70 years over a 10-year period. However, this study was based on routinely collected data in a large city, so the findings may not be generalisable to non-urban regions. In addition, data quality and consistency cannot be guaranteed as data entry is reliant on clinicians and clerical staff working in an environment fraught with multiple distractions.[24,25] In addition, not all elements of demand are captured by routinely collected administrative data, such as social or patient decision-making factors. Furthermore, it is not known what the impact of strategies such as the Care Coordination Program has been as the strategies may have been quite effective in reducing demand.

Conclusion

There has been an incessant rise in demand for emergency healthcare by all age groups, with a disproportionate

growth in attendances and re-attendances by older adults observed over a prolonged period. A substantial number of individuals re-attend frequently for acute care implying current models of acute care are not meeting the growing needs of this age group. Review of acute community-based and hospital care models is required to manage ongoing demand in a sustainable and responsible manner. In addition, we need to ensure our community-based and hospital health workforce is equipped with the skills necessary to evaluate and facilitate appropriate referrals to manage the needs of older patients in a timely way. Proactive management of demand by older patients should be a high priority in order to sustain the functioning of the health system including ED and flow through the entire acute episode of care.

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Venous thromboembolism prophylaxis audit in two Queensland hospitals

N. M. Phillips[1] and V. J. Heazlewood[2]

[1]Department of Medicine, University of Queensland, Brisbane and [2]Department of Medicine, Caboolture Hospital, Queensland Health, Brisbane, Queensland, Australia

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Correspondence
Vernon Heazlewood, Caboolture Hospital, McKean Street, Caboolture, Qld 4510, Australia. Email: vernon_heazlewood@health.qld.gov.au

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Abstract

Background: Venous thromboembolism (VTE) represents a major public health problem in Australia and worldwide, contributing to hundreds of thousands of deaths each year.

Aim: To assess adherence to recommended guidelines in a range of clinical settings.

Methods: Retrospective, observational study of 955 medical (M), surgical (S) and orthopaedic (O) patient charts of all M, S and O patients admitted during March 2011. Patients on warfarin were excluded from the analysis. Appropriate or inappropriate prophylaxis was assessed according to high, medium and low risk stratification. Patient risk stratification for VTE, suitability of prophylaxis given, adverse events and length of stay were recorded.

Results: Nine hundred and thirteen eligible patients were assessed, 54% male, mean age 57 ± 21 years. Regarding the 372 M patients, 235 (63%) were on appropriate prophylaxis, compared with 84% (273/326) S and 78% (168/215) O patients (M to S, $P < 0.0001$; M to O, $P = 0.0002$; S to O, $P = 0.113$). High risk prevalence was 56% in M, 9% in S and 12% in O patients ($P < 0.0001$). Nine confirmed or possible VTE events occurred (seven M, with five of these on inappropriate prophylaxis). All three bleeding events (one fatal) were in M patients, two of whom had appropriate prophylaxis. Average length of stay was 4.1 ± 5.0, 2.1 ± 3.3 and 2.1 ± 3.8 days ($P < 0.001$) for M, S and O patients respectively.

Conclusion: Better adherence to prophylaxis guidelines is required, especially in M patients where the prevalence of high-risk VTE is greater.

Introduction

Venous thromboembolism (VTE) comprising deep vein thrombosis (DVT) and pulmonary embolism (PE) presents a major public health problem for developed nations, affecting about 0.1% of the population each year and being responsible for hundreds of thousands of deaths worldwide.[1] Almost 75% of VTE occur in the hospital setting, and it is considered to be one of the largest causes of preventable hospital death in developed nations.[2] In Australia, it accounts for 7–10% of hospital deaths, higher than the rate of cancer and cardiovascular disease.[3] It causes significant morbidity due to recurrence, post-thrombotic syndrome, chronic venous insufficiency and chronic thromboembolic pulmonary

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