

Article

Frequent use of emergency departments by older people: a comparative cohort study of characteristics and outcomes

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Editorial Decision 8 March 2018; Accepted 20 March 2018

Abstract

Objective: To characterise older people who frequently use emergency departments (EDs) and compare patient outcomes with older non-frequent ED attenders.

Design: Retrospective comparative cohort study. Logistic regression modelling of patient characteristics and health service usage, comparing older frequent ED attenders (≥ 4 ED attendances in 12 months) to non-frequent ED attenders.

Setting: Three Australian public hospital EDs, with a total of 143 327 emergency attendances in the 12 months.

Participants: People aged ≥ 65 years attending the ED in financial year 2013/2014.

Main Outcome Measures: The primary outcome was frequent ED use; secondary outcomes were ED length of stay, discharge destination from ED, hospital length of stay, re-presentation within 48 h, hospital readmission within 30 days and in-hospital mortality.

Results: Five percent of older people were frequent attenders ($n = 1046/21\,073$), accounting for 16.9% ($n = 5469/32\,282$) of all attendances by older people. Frequent ED attenders were more likely to be male, aged 75–84 years, arrive by ambulance and have a diagnosis relating to chronic illness. Frequent attenders stayed 0.4 h longer in ED ($P < 0.001$), were more likely to be admitted to hospital (69.2% vs 67.2%; $P = 0.004$), and had a 1 day longer hospital stay ($P < 0.001$). In-hospital mortality for older frequent ED attenders was double that of non-frequent attenders (7.0% vs 3.2%, $P < 0.001$) over 12 months.

Conclusions: Older frequent ED attenders had more chronic disease and care needs requiring hospital admission than non-frequent attenders. A new approach to care planning and coordination is recommended, to optimise the patient journey and improve outcomes.

Key words: emergency department, hospital, frequent attenders, aged, Australia, retrospective studies

Background

Frequent and repeated emergency department (ED) attendances by some patients is a common occurrence in emergency care worldwide [1–7]. Frequent ED attenders are generally accepted as people who attend the ED four or more times per year [8, 9]. Frequent ED attenders represent <5% of overall ED patients but account for up to

20% of ED presentations [10–12]. International studies have focused on identifying and addressing the factors associated with frequent ED use that is seen to contribute to ED overcrowding by vulnerable individuals [13]. Previous hospitalisations, high use of other health services, high rates of chronic illness and socio-economic distress are all associated with frequent ED attendance

[7, 14]. Additional factors associated with return or frequent ED visits include psychosocial problems such as lack of social support, cognitive impairment, anxiety and depression [15, 16]. A study of hospital and ED characteristics found that limited ED resources (<12 ED cubicles, no geriatric services) and indicators of ED care (weekend visits, fewer available hospital beds) were associated with return ED visits by older people but this study did not examine patient or clinical characteristics [17].

Frequent ED attenders are a heterogeneous group of patients [12, 18, 19] whose characteristics vary depending on the definition of frequent and very frequent ED attendance [18, 20, 21]. For example, Paul *et al.* [7] found older age, male gender and chronic respiratory or cardiac conditions were associated with frequent ED attendance. In contrast, Colligan *et al.* [2] and Leporetti *et al.* [8] report that younger people with mental illness were the most frequent ED attenders.

The characteristics of adults who are frequent ED attenders are described in a number of studies, but there are few reports on the characteristics of older people (aged ≥ 65 years) who visit an ED four or more times in a year. As older patients are the fastest growing demographic in many countries [22, 23] and frequent users of EDs with worse outcomes than non-frequent attenders in the same age group, a better understanding of ED use and outcomes from ED attendances are important to inform service delivery approaches, and improve the quality and safety of emergency care for older frequent ED attenders.

There are various definitions for frequent attendance with some studies choosing three or more ED visits and others as many as 15 visits in 12 months. Four or more visits annually are a commonly used definition and we have elected to use four or more attendances in 12 months as our threshold for frequent attendance. For the purposes of this study, an older ED user was defined as a patient aged 65 years or older. The outcomes of interest in this study were in-hospital mortality, hospital admission, hospital readmission within 30 days of discharge, and ED re-attendance within 48 h of hospital of ED discharge, all relating to the three study hospitals. The aim of this study was to: (i) describe the characteristics of older people who frequently use the ED and (ii) examine whether older people who are frequent ED users experienced worse outcomes than non-frequent older ED users.

Methods

Study Design, Setting and Participants

This retrospective cohort study was conducted at three hospitals from one Australian Metropolitan Health Service. The study setting, Eastern Health, has three EDs within geographically separate acute care hospitals, managing 143 327 attendances in 2013/2014 financial year [24]. One quarter (25%) of attendances ($n = 33\,926$) were by patients aged ≥ 65 years and 11% ($n = 15\,600$) were by those aged > 80 years.

Ethical Consideration

Ethics approval was obtained from the Institutional Review Boards of both the health service and Deakin University. A waiver of consent was granted for this low-risk retrospective study as the data were routinely collected for patient care and organisational reporting.

Data Collection and Statistical Analysis

Data were collected from organisational datasets, with data linkage at the patient level. The outcomes of ED re-attendance within 48 h and hospital readmission within 30 days of discharge are key performance indicators for the health service and therefore reliable measures within the dataset. Data were summarised using descriptive statistics. To examine relationships between variables, chi-square tests (categorical data) and Mann-Whitney tests (non-parametric continuous data) were used. Ordinal regression was used to examine the factors associated with frequent attendance comparing three groups (those with a single ED attendance, those with two or three ED attendances and those with four or more ED attendances in 12 months). Odds ratios (OR), with 95% confidence intervals (CI), adjusted by age group, gender and preferred language are presented. The OR compare risk for each admission by frequent attenders with non-frequent attenders, not compared with initial or last admission. Overnight arrivals were ED attendances between 2200 h and 0759 h. The triage categories were as per the Australasian Triage Scale (ATS) [25, 26] (Australasian College for Emergency Medicine, 2013; Australasian College for Emergency Medicine, 2016). Potentially avoidable presentations to the ED were defined as presentations where the patient was allocated a triage category of 4 or 5 and did not arrive by ambulance or police or correctional vehicle and was not admitted to the hospital, not referred to another hospital or did not die [27]. Frequency of ED visits within the 12-month period was determined by the number of visits to study hospitals only; it was not possible to ascertain if patients attended EDs outside this health service during the study period.

Results

In the 12-month study period, there was a total of 33 926 ED attendances by patients aged 65 years or older. The number of ED visits per older person varied [range 1–42] with 14 663 (43.2%) people having a single visit, 5364 (25.5%) patients had two or three visits and 1046 (5.0%) older people attended the ED four or more times in the year. This latter group (frequent ED attenders) accounted for a total of 5469 ED attendances or 16.9% of the total ED attendances by older people and 3.7% of all ED attendances at the three hospitals.

Compared with those with less than four ED visits per year, frequent ED attenders were significantly more likely to be male, aged 75–84 years, living with others, and had a preferred language other than English (Table 1). Almost 14% of older people attending the ED were from Residential Aged Care and frequent ED attenders were more likely to be from Residential Aged Care while single ED visits were more likely from community dwelling older people (Table 1).

There were clear differences in the diagnostic profiles, of frequent and non-frequent ED attenders (Table 2). Frequent ED attenders were more likely to be discharged from ED with a cardiac (18.9% vs 16.1%, $P < 0.001$), gastrointestinal (13.1% vs 11.7%, $P = 0.005$), respiratory (15.3% vs 10.7%, $P < 0.001$) or genitourinary (6.4% vs 4.5%, $P < 0.001$) diagnosis and less likely to be discharged with a musculoskeletal (11.3% vs 17.2%, $P = 0.001$), integumentary (5.0% vs 6.5%, $P < 0.001$), neurological (4.9% vs 7.6%, $P < 0.001$) diagnosis or collapse/dizziness (3.4% vs 5.7%, $P < 0.001$).

Table 3 presents the ED visit characteristics using an ordinal regression comparing frequency of ED attendance in three groups. Frequent ED attenders were significantly more likely to arrive overnight (OR 1.10, 95% CI = 1.0–1.2, $P < 0.001$) and by ambulance

Table 1 Demographic characteristics of older frequent ED attenders (≥ 4 visits) compared with non-frequent ED attenders

	Frequent ED attenders				Non-frequent ED attenders				P-value
	Total samples N = 32 282		≥4 Visits N = 5469		1 Visit N = 14 663		2–3 Visits N = 12 150		
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
Gender									<0.001
Male	14 848	46.0	2835	51.8	6464	44.1	5549	45.7	
Female	17 434	54.0	2634	48.2	8199	55.9	6601	54.3	
Age Group									<0.001
65–74 Years	11 489	35.8	1748	32.1	5803	35.6	3938	32.7	
75–84 Years	12 132	37.8	2293	42.2	5186	35.7	4653	38.6	
85+ Years	8435	26.3	1399	25.7	3581	24.6	3455	28.7	
Preferred language English									<0.001
Yes	29 828	92.4	4968	90.8	13 687	93.3	11 173	92.0	
No	2453	7.6	501	9.2	976	6.7	977	8.0	
Lived in									<0.001
Community	27 845	86.3	4692	85.8	12 836	87.5	10 317	84.9	
RACF	4437	13.7	777	14.2	1827	12.5	1833	15.1	
Living alone									0.001
No	29 571	91.8	5050	92.6	13 322	91.1	11 199	92.4	
Yes	2625	8.2	404	7.4	1298	8.9	923	7.6	
Marital Status									0.005
Married/defacto	9684	51.8	1843	54.2	4152	51.7	3689	49.1	
Single/divorced/widowed	9000	48.2	1555	45.8	3886	48.3	3559	49.1	

Table 2 Most common ED discharge diagnoses for older frequent ED attenders (≥ 4 visits) compared with non-frequent ED attenders

Diagnostic group	ED discharge diagnoses Most common	Frequent ED visits	Non-frequent ED visits		Odds ratio [95% CI]	P-value
		≥ 4 Visits n (%)	1 Visit n (%)	2–3 Visits n (%)		
Respiratory	Infection (e.g. pneumonia) COPD	835 (15.3)	1357 (9.3)	1370 (11.3)	1.59 [1.5–1.7]	<0.001
Genitourinary	Respiratory distress Urinary tract infection	349 (6.4)	566 (3.9)	643 (5.3)	1.44 [1.3–1.6]	<0.001
Cardiac	Haematuria Urinary retention	1031 (18.9)	2396 (16.3)	1913 (15.7)	1.21 [1.1–1.3]	<0.001
Gastrointestinal	Chest pain Congestive heart failure	714 (13.1)	1601 (10.9)	1537 (12.7)	1.13 [1.0–1.2]	<0.001
Integumentary	Atrial fibrillation Abdominal pain	275 (5.0)	1024 (7.0)	725 (6.0)	0.76 [0.7–0.9]	<0.001
Neurological	Constipation Diarrhoea	266 (4.9)	1219 (8.3)	829 (6.8)	0.62 [0.5–0.7]	<0.001
Musculoskeletal	Cellulitis Open wound	620 (11.3)	2706 (18.5)	1906 (15.7)	0.62 [0.6–0.7]	<0.001
Collapse/dizzy	Stroke/TIA Confusion Delirium Back ache Fracture Limb pain	185 (3.4)	903 (6.2)	612 (5.0)	0.59 [0.5–0.7]	<0.001

COPD, chronic obstructive pulmonary disease; TIA, transient ischaemic attack.

(OR 1.11, 95% CI = 1.1–1.2, $P < 0.001$). However, there were no significant differences between frequent and non-frequent older ED attenders in terms of ED visits on weekends vs weekdays (OR 1.00, 95% CI = 1.0–1.1; $P = 0.975$; Table 3). On arrival at ED, frequent attenders were less likely to be allocated to the most urgent ATS category, ATS 1 (OR 0.59, 95% CI = 0.5–0.8, $P < 0.001$) compared

with non-frequent attenders. The distribution over the other four ATS categories was similar and there was no significant association ($P > 0.05$) between triage category and being a frequent ED attender (Table 3). As the numbers at the two extremes of the triage scale (ATS 1 and ATS 5) were small, it is difficult to draw clinically meaningful implications from these results. Imaging was less commonly

Table 3 Characteristics of ED visits by older frequent ED attenders (≥ 4 visits) compared with older non-frequent ED attenders (single visit or 2–3 visits) using ordinal regression

Characteristic	Frequent ED visits	Non-frequent ED visits		Adjusted ^a odds ratio [95% CI]	P-value
	≥ 4 Visits <i>n</i> (%)	1 Visit <i>n</i> (%)	2–3 Visits <i>n</i> (%)		
Aged 65–74 years	1748 (32.1)	5803 (35.6)	3938 (32.7)	Reference	
Aged 75–84 years	2293 (42.2)	5186 (35.7)	4653 (38.6)	1.34 [1.3–1.4]	<0.001
Aged 85 years and older	1399 (25.7)	3581 (24.6)	3455 (28.7)	1.31 [1.2–1.4]	<0.001
Gender—male	2818 (51.8)	6426 (44.1)	5496 (45.6)	1.22 [1.2–1.3]	<0.001
Language—not English	494 (9.1)	969 (6.7)	968 (8.0)	1.26 [1.2–1.4]	<0.001
Arrival by ambulance	3403 (62.2)	6362 (43.4)	5130 (42.2)	1.21 [1.1–1.3]	<0.001
Arrival overnight	1212 (22.2)	2838 (19.4)	2462 (20.3)	1.10 [1.0–1.2]	<0.001
Arrival on weekend	1548 (28.3)	4045 (27.6)	3238 (26.7)	1.06 [1.0–1.1]	0.052
ATS category 1	41 (0.7)	163 (1.1)	94 (0.8)	0.59 [0.5–0.9]	<0.001
ATS category 2	1118 (20.4)	2791 (19.0)	2060 (17.0)	0.89 [0.7–1.0]	0.115
ATS category 3	2545 (46.5)	6664 (45.4)	5580 (45.9)	0.90 [0.8–1.0]	0.126
ATS category 4	1627 (29.7)	4716 (32.2)	4121 (33.9)	0.88 [0.8–1.0]	0.077
ATS category 5	138 (2.5)	329 (2.2)	295 (2.5)	Reference	
Pathology requested	3535 (64.6)	9265 (63.2)	7791 (64.1)	0.95 [0.9–1.0]	0.100
Imaging requested	3461 (61.1)	9671 (66.0)	7752 (63.8)	0.82 [0.8–0.9]	<0.001

^aAdjusted for age, gender and language; ATS, Australasian Triage Scale; Reference group = female, aged <75 years, preferred language English, did not arrive by ambulance or overnight (2200–0759), weekday arrival, ATS category 5, no pathology, no imaging required.

Table 4 Patient outcomes per visit, comparing older frequent ED attenders (≥ 4 visits) to older non-frequent ED attenders (single visit or 2–3 visits) using ordinal γ regression

Outcome	Frequent ED visits	Non-frequent ED visits		Adjusted odds ratio ^a [95% CI]	P-value
	≥ 4 Visits <i>n</i> (%)	1 Visit <i>n</i> (%)	2–3 Visits <i>n</i> (%)		
Stayed >4 h in ED	3340 (61.1)	8131 (55.5)	7083 (58.3)	1.14 [1.1–1.2]	<0.001
Required hospital admission	3701 (69.2)	9465 (66.2)	8144 (68.5)	1.14 [1.1–1.2]	<0.001
Re-visit to ED within 48 h ^b	322 (5.9)	72 (0.5)	622 (5.1)	3.75 [3.3–4.2]	<0.001
Readmission to hospital within 30 days ^b	1135 (20.8)	27 (0.2)	1111 (9.1)	7.55 [6.9–8.2]	<0.001
In-patient mortality (per visit)	72 (1.3)	421 (2.9)	221 (1.8)	0.52 [0.5–0.6]	<0.001

^aAdjusted for age, gender and language; Reference group = female, aged 65–74 years, preferred language English, stayed up to 4 h in ED, not admitted, no re-visit within 48 h, not readmitted within 30 days.

^bRe-visit or readmission to study hospital site.

requested for frequent ED attenders (OR 0.87, 95% CI = 0.9–0.9, $P = <0.001$) while there was no significant difference in pathology requests ($P = 0.649$; Table 3).

When considering the four factors associated with a potentially avoidable ED visit, namely not arriving by ambulance, triaged as ATS 4 or 5, did not die in ED and not admitted to hospital [27], there were 3811 ED visits which met all of these criteria. Frequent attenders were significantly less likely to have a potentially avoidable ED visit (OR 0.89, 95% CI = 0.8–1.0, $P < 0.001$), with just 8.9% ($n = 486/5469$) of visits by this cohort considered potentially avoidable, compared with 12.4% ($n = 3325/26\ 813$) by non-frequent attenders.

Patient outcomes examined were ED length of stay, frequency of hospital admission and hospital length of stay, ED re-attendance within 48 h and hospital readmission within 30 days (Table 4). Frequent ED attenders were more likely to stay in ED >4 h (OR 1.14, 95% CI = 1.1–1.2, $P < 0.001$) with a median length of stay of 5.0 h [Interquartile Range [IQR] = 3.4–7.9] compared with non-frequent ED attenders whose median ED stay was 4.6 h [IQR = 3.1–7.2] ($P < 0.001$).

Hospital admission was more likely for older frequent ED attenders (OR 1.14, 95% CI = 1.1–1.2, $P < 0.001$; Table 4), with more

admissions in 12 months (median = 3.0 [IQR = 2–5] vs 1.0 [IQR = 0–1], $P < 0.001$). The median hospital length of stay was also significantly longer for frequent ED attenders (3 days [IQR = 1–6] vs 2 days [IQR = 1–5], $P < 0.001$). Despite longer stay in ED and higher admission rates, the risk of re-attending an ED within 48 h was also higher for older frequent ED attenders (OR = 3.75, 95% CI = 3.3–4.2, $P < 0.001$).

The risk of hospital readmission within 30 days of discharge was greater for older frequent ED attenders (OR = 7.55, 95% CI = 6.9–8.2, $P < 0.001$; Table 4). Further, while the risk of mortality decreased for frequent attenders per visit (OR = 0.52; 95% CI = 0.5–0.6, $P < 0.001$), over 12-month period the in-hospital mortality rate for older frequent ED attenders was double that of non-frequent attenders (7.0% vs 3.2%, $P < 0.001$).

Discussion

This study results identified differences between older frequent and non-frequent ED attenders with respect to patient, clinical, diagnostic and ED attendance characteristics which were not the same as

those previously reported across all age groups. Older frequent ED attenders were more likely to be male, living with others, with an ED discharge diagnosis relating to chronic illness rather than mental health or drug and/or alcohol related issues, and have a preferred language other than English. These findings contrast with a recent systematic review across all age groups which found frequent attenders were more likely to be older, female and have a mental health diagnosis [21]. A study of early return visits to the ED and frequent attendance among older people found a history of heart disease, having ever been married, and not drinking alcohol daily predicted early return; while a history of diabetes, a recent ED visit, and lack of support predicted frequent attendance [16]. Our findings did not demonstrate that lack of support was a factor in frequent ED attendance, as we found older frequent ED attenders were more likely to be living with others. About 1 in 20 older ED users were a frequent attender: older frequent ED attenders accounted for 16.9% of ED presentations by older people and 3.8% of all ED presentations. This is similar to findings previously reported in the literature, including one Australian study [28] that found 4.8% of older people were frequent attenders (≥ 4 visits per year) and accounted for 18.7% of ED presentations.

In our study, older frequent ED attenders were more likely to be aged in the middle group of categories, between 75 and 84 years. The need for emergency care was confirmed by the fact that older frequent attenders more commonly arrived by ambulance, overnight, remained longer in ED and were more likely to be admitted than non-frequent ED attenders, with a higher number of hospital admissions in the 12-month period. These findings suggest their clinical problem could not be managed by alternative care providers and that the decision to attend ED was appropriate. This is further supported by the finding that ED visits by older frequent ED users were less likely to meet the Australian Institute of Health and Welfare definition for potentially avoidable ED attendances [27] than visits by non-frequent attenders.

The length of hospital admission was significantly longer for frequent ED attenders when compared with non-frequent attenders. The reason for more frequent and longer hospital admissions is unclear, but one possible explanation is differences in diagnostic profiles between frequent and non-frequent attenders. In support of this, older frequent ED users in this study were more likely to have an ED discharge diagnosis of cardiac, gastrointestinal, respiratory or genitourinary issues and less likely to have collapse, musculoskeletal or neurological events. These diagnostic differences may suggest that older frequent ED users have more chronic disease requiring ongoing treatment than older non-frequent ED users who tended to have diagnoses suggestive of acute, new issues. Patients with chronic disease often have clear management plans in place in primary care, so their in-patient care requirements may be different to a patient with a new, acute onset complaint.

Frequent ED use by patients with chronic disease and specifically older patients with chronic disease is well documented [8]. Despite the introduction of targeted programmes directed towards older patients with chronic illness, this group continue to frequently attend ED when requiring healthcare, suggesting that current ED avoidance interventions may need to be tailored to older frequent attenders [29]. For example, a systematic review of three interventions to reduce ED attendance found that case management resulted in some cost savings, but with inconsistent reductions in ED attendance [9]. It may also be argued that failures of ED avoidance initiatives are because many older, frequent ED users have care needs that are more appropriately managed in an acute care hospital than the

primary care setting [12]. A study by Naughton *et al.* [15] of repeat ED visits by older people found that almost half (48%) were discharged from ED with no documented referrals made to community services. The authors concluded that the ED is a safety net for older people regardless of their economic or demographic backgrounds. Further, with the exception of elective surgical procedures, the predominant portal of entry to Australian acute care is via an ED.

While these outcomes are similar to previous studies of adult frequent ED users across all age groups, the patient and clinical characteristics are very different. In our study, older frequent ED attenders experienced worse outcomes (longer ED stay, need for hospital admission, re-attendance at the ED within 48 h and readmission to hospital within 30 days of discharge) compared with non-frequent attenders. From the regression modelling, it appeared that older frequent ED attenders had a lower in-hospital mortality, which was the risk of dying following any one ED visit. When the full 12-month period was considered, the in-hospital mortality rate for older frequent ED attenders was double that of non-frequent attenders. A systematic review examining patient outcomes from 31 studies found adult frequent ED attenders also had increased odds of hospital admission of 2.58- and 2.2-fold increased odds of mortality within a year, compared with non-frequent attenders [30]. While it has been suggested that for some older patients potentially non-beneficial treatments are common towards the end-of-life [31], our study found that frequent ED attenders were significantly less likely to have a potentially avoidable ED visit. The reasons that older frequent ED attenders experienced worse outcomes warrants further investigation using data additional to that found in organisational databases. It is possible that specific healthcare requirements of patients with chronic disease, such as symptom control and end-of-life care, may explain these increases in hospital admissions and in-hospital mortality. Interventions to reduce readmissions and ED visits for older people, such as medication review by a pharmacist after discharge [32], patient-centred discharge instruction [33] or post-discharge assessment by nurses [34] may need to be tailored to meet the needs of older frequent ED attenders.

Limitations

There are limitations that should be considered when interpreting the study findings. First, this was a retrospective study using organisational data, so there was potential for coding errors, however, this risk should be overcome by the large sample size. Second, this was a single health service study but did include three different EDs that were geographically separate and situated in hospitals offering different clinical services. Finally, in assessing frequency of ED visits within the 12-month period, it was not possible to ascertain if patients attended EDs outside this health service during the study period, or the rate of re-presentation to ED within 30 days, 60 days or 90 days, thus mortality estimates reported here are likely an underestimate.

Conclusions

One in six ED attendances by older people was by an older frequent attender. There were clear differences in patient, clinical, diagnostic and ED attendance characteristics between frequent and non-frequent older ED attenders. These differences indicate that older frequent ED users have more chronic disease and care needs that require ED care, and often hospital admission. Older frequent ED users experienced worse outcomes than non-frequent attenders, including longer stay in ED, higher rates of hospital admission, in-hospital mortality, re-attendance

to the ED within 48 h and readmission to hospital within 30 days of discharge. The study findings raise questions about ED avoidance initiatives for older people based on the premise that care can be delivered by services other than EDs and that hospital admission is avoidable. A new approach to care planning and coordination of care for older frequent ED users is needed to ensure safety and quality of care, optimise the patient journey when hospital admission is required and improves patient outcomes.

FUNDING

This work was supported by a grant from the Eastern Health Research Foundation. The funding body did not play a role in the design of the study or collection, analysis and interpretation of data or in writing the manuscript.

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