Frequent attenders at emergency departments: a linked-data population study of adult patients

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ABSTRACT

Objectives: To examine the characteristics of adult patient attendances to emergency departments (EDs) in Perth hospitals by patients' frequency of attendance.

Design, setting and participants: A linked-data population study of adults (aged ⩾ 15 years) attending all nine Perth hospital EDs between 1 July 2000 and 31 December 2006.

Main outcome measures: Proportion of frequent attenders (FAs; those attending five or more times annually); and demographic characteristics, mode of arrival at the ED, disposition (admission, transfer, discharge or death), urgency and clinical conditions by frequency of attendance.

Results: There was a mean of 1.5 attendances per individual per year, resulting in 1 583 924 attendances by 663 309 individuals over the 6.5 years of the study. Most patients (97.6%) attended Perth EDs fewer than five times a year. The more frequently patients attended, the more likely they were to be male, middle-aged and late-middle-aged, have self-referred, have mental and behavioural disorders and alcohol intoxication, to not wait to be assessed, and to arrive by ambulance. The groups of patients attending between 5–9 and 10–19 times per year (97.4% of FAs) had more urgent conditions, more circulatory system disease and higher admission rates than all other patients.

Conclusion: Most FAs at Perth EDs present fewer than 20 times a year and have more serious and urgent illness than other patients, more often requiring inpatient services. A very small minority of patients (around 100 patients/year) attends 20 or more times a year, many with mental and behavioural disorders and alcohol intoxication not requiring hospital admission.

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People who attend hospital emergency departments (EDs) frequently have often been described as a vulnerable population with high rates of alcohol and drug use, psychiatric disorders and chronic medical conditions.[1-3] This group of patients has, however, been difficult to characterise, as different studies have used different definitions of what constitutes frequent attendance.

One very large probabilistically linked statewide database in Utah in the United States, defined repeat attenders as having two visits in three years and serial attenders four visits in a year.[4] A smaller study from a single hospital in Sheffield in the United Kingdom compared the frequency distribution of attenders with a normal distribution and suggested that a frequent user be defined as someone who attends more than four times a year.[5] This figure was also used in a large statewide linked-data study in Massachusetts in the US.[6]

No studies have examined the changing characteristics of patients systematically as the number of ED visits increases, and little is known about people who attend EDs extremely frequently.

Our study examines how frequently individual patients attend EDs in Perth hospitals, and the pattern of demographic characteristics and clinical conditions associated with increasing attendance.

METHODS

Data sources

Western Australia's population was 2.01 million at 30 June 2005, with 1.48 million (73.6%) residing in metropolitan Perth,[7] which has seven public and two private hospitals with EDs. The Emergency Care, Hospitalisation and Outcome (ECHO) linked-data project linked all of metropolitan Perth's emergency care records to hospitalisation and mortality records for the whole state.[8] The methods and limitations of this study have previously been described in detail.[8]

Data were extracted from the Emergency Department Information System (EDIS), the primary data source for ECHO, and included all available ED records from the nine Perth hospitals with EDs for patients presenting between 1 July 2000 and 31 December 2006. EDIS is a patient-tracking system, containing data on patient demographic characteristics, admissions, transfers, discharges, time-tracking information and clinical information entered by clinical staff in real time.

Data linkage

Patients' emergency and hospital morbidity records were linked by the Western Australian Health Information Linkage Branch using a probabilistic matching process.[9] This process identified all emergency-attendance and hospital-admission episodes relating to the same individual, known as a "chain of events". Emergency records included patient demographic characteristics and clinical data; hospital morbidity records coded data related to hospital admissions.[10]

Cohort selection

This first phase of the Frequent Attenders at Emergency Departments (FATED) project examined adult patients (aged ⩾ 15 years) in view of the likely differences in characteristics between adult and paediatric frequent attenders (FAs). The cut-off of 15 or more years of age was chosen as this is the cut-off age for paediatric admission in Perth.

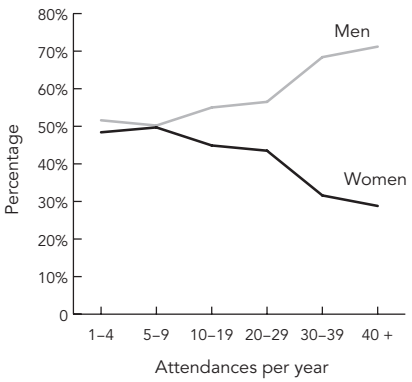
Adult patients were selected and sorted by year and ED presentation date and time, with the first ED presentation for each patient during a year identified as the "index presentation". Patients were then sorted into attender groups depending on the number of ED presentations in their chain of events for any year.

We adapted the definition of FA from a previous study's recommendation that frequent users be defined as those who attend more than four times annually.[5] Thus, we coded non-frequent attenders (NFAs) as those who presented to EDs 1–4 times in a year. To allow detailed differentiation of patient characteristics within the FA group, FAs were subcategorised according to their number of ED presentations in a year (5–9, 10–19, 20–29, 30–39 and 40+). Any patient had the potential to be an FA in any or all of the years of the study.

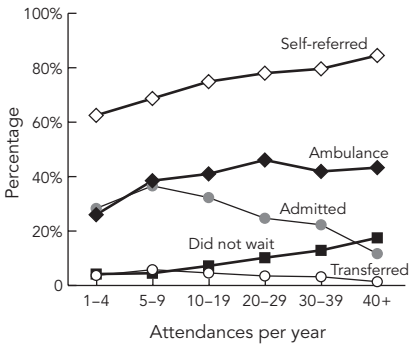
1 Annual number of patient attendances to Perth hospital emergency departments by year, 1 July 2000 to 31 December 2006

	Non-frequent attenders	Frequent attenders				
Attendances-per-year category	1–4	5–9	10–19	20–29	30–39	40+
No. of attendances each year						
2000 (6 months only)	72 511	739	104	11		
2001	135 917	2 680	405	51	17	18
2002	149 589	3 006	458	65	9	17
2003	157 930	3 288	458	65	15	22
2004	165 787	3 592	506	72	14	21
2005	178 391	4 031	522	76	18	22
2006	181 218	4 143	562	99	22	25
Total	**1 041 343**	**21 479**	**3015**	**439**	**95**	**125**

2 Percentage of men and women by frequency of attendance to Perth hospital emergency departments, 1 July 2000 to 31 December 2006



3 Selected arrival, admission and departure status by frequency of attendance for patients attending Perth hospital emergency departments from 1 July 2000 to 31 December 2006



Data analysis

Presentation characteristics and death in the ED were determined from the ED records. ED diagnoses were extracted as International classification of diseases, 10th revision (ICD-10) codes. Data were analysed with SPSS, version 15.0.0 (SPSS Inc, Chicago, Ill, USA). The χ^2 test was used to compare categorical outcomes of FAs with those of NFAs, and Student's *t* test was used to compare continuous variables. Statistical significance was determined at the 5% level.

Ethics approval

Ethics and record linkage approvals were obtained from the Human Research Ethics Committee at the University of Western Australia and the Confidentiality of Health Information Committee of Western Australia.

RESULTS

Attendances

Over the period 1 July 2000 to 31 December 2006, 663 309 individuals presented to Perth metropolitan EDs 1 583 924 times (mean, 2.4 times). When an individual presented to an ED in more than 1 year over that period, each first presentation annually defined the start of a chain of events for that year. These individuals contributed to 1 066 496 chains of events over the period of the study; so there was a mean of 1.5 attendances (1 583 924/1 066 496) per individual per year.

Box 1 shows the annual breakdown of attendances for NFAs and the five subcategories of FAs. Over the 6.5 years of the study, 25 153 annual chains of events were initiated by 18 396 FAs. On a per-year basis, FAs represented 2.4% (25 153/1 066 496 total chains of events) of attenders to Perth EDs. Of all FAs, 659 presented 20 or more times in any year over the 6.5-year period — an average of 101 patients per year between the nine hospitals. The maximum number of presentations by an individual patient by year was 28 in 2000 (6 months only); 97 in 2001; 76 in 2002; 162 in 2003; 132 in 2004; 196 in 2005; and 218 in 2006.

Patient characteristics

The overall predominance of men among ED attenders increased steadily with increasing number of attendances ($P < 0.001$), from 51.6% among NFAs to 71.2% among FAs attending 40+ times per year (Box 2). Age also differed significantly ($P < 0.001$) between NFAs (mean age, 45 years) and FAs (mean age, 49 years), with people in middle age and late-middle age accounting for increasing proportions of frequent attendances as the number of attendances increased, particularly in the 35–44-year and 55–64-year age groups.

Patients aged 35–44 years represented 15.0% of all attendances by NFAs, and this percentage increased steadily to 25.6% of FAs attending 40+ times per year. Those aged 55–64 years represented 10.3% of all attendances by NFAs, and 19.2% of FAs attending 40+ times per year. In contrast, 15–24-year-olds represented 22% of all attendances by NFAs, but only 8% of FAs attending 40+ times per year.

Arrival and discharge status

Self-referral increased progressively with increasing frequency of attendance, from 62.5% for NFAs to 84.5% for the 40+ visits per year group (Box 3). The admission rate was 28.3% for NFAs, increasing to 36.6% for FAs making 5–9 visits per year and 32.3% for those making 10–19 visits per year, before falling steadily to 11.7% in the 40+ visits-per-year group. Transfer patterns were similar to admission patterns (Box 3 and Box 4).

In contrast, the proportion of those who did not wait for treatment increased steadily from 4.2% of NFAs through the FA categories to 17.5% of those in the 40+ visits per year group. The rate at which patients discharged themselves at their own risk after initial assessment also increased steadily from 0.4% of NFAs to 3.5% of those in the 40+ visits-per-year group (Box 4).

The percentage of patients arriving by ambulance increased from just over a quarter of NFAs, to peak at 46.1% in the 20–29 attendances-per-year group (Box 3).

4 Admission and departure status by frequency of attendance for patients attending Perth hospital emergency departments from 1 July 2000 to 31 December 2006

	Non-frequent attenders	Frequent attenders				
Attendances-per-year category	1–4	5–9	10–19	20–29	30–39	40 +
Status						
Discharged	859 944 (61.6%)	65 357 (50.8%)	19 960 (52.4%)	5 844 (57.1%)	1 761 (56.2%)	4 616 (64.0%)
Admitted	395 371 (28.3%)	47 135 (36.6%)	12 302 (32.3%)	2 525 (24.7%)	700 (22.3%)	844 (11.7%)
Did not wait for assessment	58 924 (4.2%)	5 837 (4.5%)	2 725 (7.2%)	1 046 (10.2%)	405 (12.9%)	1 260 (17.5%)
Transferred	51 926 (3.7%)	7 474 (5.8%)	1 757 (4.6%)	359 (3.5%)	100 (3.2%)	99 (1.4%)
After-hours general practice clinic	12 918 (0.9%)	824 (0.6%)	340 (0.9%)	110 (1.1%)	51 (1.6%)	110 (1.5%)
Left at own risk	6 013 (0.4%)	1 325 (1.0%)	727 (1.9%)	264 (2.6%)	74 (2.4%)	250 (3.5%)
Dead on arrival	4 838 (0.3%)	111 (0.1%)	22 (0.1%)	3 (0)	1 (0)	0 (0)
Other	3 830 (0.3%)	604 (0.5%)	252 (0.7%)	82 (0.8%)	37 (1.2%)	37 (0.5%)
Died in emergency department	2 210 (0.2%)	59 (0)	5 (0)	1 (0)	0 (0)	0 (0)
Unknown	503 (0)	28 (0)	16 (0)	3 (0)	3 (0.1%)	2 (0)
Total	1 396 477 (100%)	128 754 (100%)	38 106 (100%)	10 237 (100%)	3 132 (100%)	7 218 (100%)

Urgency

Box 5 shows that patients who attended 5–9 times and 10–19 times in a year were over-represented in the highest three triage (Australasian Triage Scale [ATS][11]) categories — resuscitation (ATS 1), emergency (ATS 2) and urgent (ATS 3) — in comparison to both the NFAs and FAs presenting 20 or more times per year. ATS category 4 (semi-urgent) showed reciprocal changes, with patients who attended 5–9 times and 10–19 times in a year being under-represented, and overrepresentation in ATS 5 (non-urgent) increased progressively as attendance frequency increased.

Clinical conditions

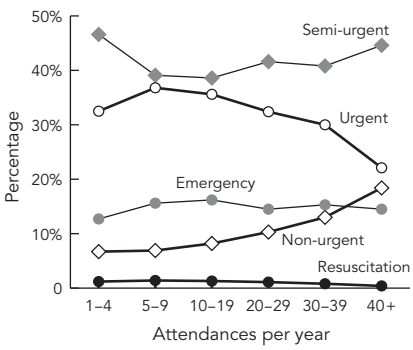
Of all 1 583 924 attendances by patients in the cohort, 274 408 (17.3%) did not have a discharge diagnosis entered. On further analysis, failure to record a discharge diagnosis was essentially confined to three hospitals in the study — the two private hospitals and one public hospital. We analysed the diagnostic data with and without these hospitals' patients in the sample. The rank order of discharge diagnoses was unchanged with omission of the data from these hospitals, suggesting no systematic bias in the failure to record a discharge diagnosis. The following data are reported without contribution from those three hospitals.

The spectrum of clinical disorders changed with increasing frequency of attendance. By ICD-10 chapter heading, the frequency of "Injury, poisoning and consequences of external causes" fell from 31.1% of attendances for NFAs to 18.0% for those attending 5–9 times yearly, and then fell steadily to 13.0% for FAs attending 40 + times yearly. "Circulatory system disorders" rose from 7.2% of diagnoses for NFAs to 9.1% for those attending 5–9 times per year, and then fell progressively to 2.4% of those attending 40 + times yearly. The frequency of "Mental and behavioural disorders" increased sharply with increasing frequency of attendance, from 3.9% of NFAs to 19.1% of those attending 40 + times yearly. Likewise, the frequency of "Factors influencing health status/services use" increased from 7.6% for NFAs to 25.9% for those attending 40 + times per year.

By individual ICD-10 disease diagnoses, the commonest diagnosis for all categories of FA was Z53.9 (procedure not carried out, unspecified reason). Analysing this further by departure status to determine what the code was used for most, 81% of those with this code were categorised as "did not wait". A further 8% were coded as "left at own risk" and the remaining 11% were recorded as being discharged. This diagnosis represented 3.4% of all diagnoses for NFAs and increased progressively through the FA categories to 14.8% for those attending 40 + times per year.

The code R07.4 (chest pain, unspecified) was used for 2.0% of all NFA diagnoses, rising to 5.3% of diagnoses of those attending 40 + times per year. Code I20.0 (unstable angina) rose 1.9% in NFAs to a maximum frequency of 2.6% in those

5 Urgency (Australasian Triage Scale[11]) profile by frequency of attendance for patients attending Perth hospital emergency departments from 1 July 2000 to 31 December 2006



attending 20–29 times per year, and then fell to 1.0% of the 40 + attendances per year group.

Code F10.0 (mental, acute intoxication) was not among the top 20 diagnoses for NFAs, but became the second most frequent diagnosis behind code Z53.9 for all patients attending 10 or more times per year, with a frequency of 8.5% in the 40 + attendances per year category. Similarly, code Z91.5 (personal history of self-harm) was not among the top 20 diagnoses for NFAs, but increased from 1.5% of those in the 5–9 visits per year category to peak at 2.5% in the 20–29 visits per year category. A variety of psychiatric diagnoses, including F41.9 (anxiety disorder, unspecified), F20.9 (schizophrenia, unspecified) and F32.9 (depressive episode, unspecified), appeared in the top 20 diagnoses of FAs, but not of NFAs.

Overall, there were distinct differences between moderately frequent attenders (MFAs; those attending 5–19 times a year; 24 494 patient attendances [2.30%]), and extremely frequent attenders (EFAs; those attending 20 or more times a year; 659 patient attendances [0.06%]).

Although there was an increase in unspecified chest pain with more frequent attendance, circulatory system disorders and unstable angina were more common in MFAs than NFAs and EFAs. MFAs were also more likely to have conditions of greater urgency and higher admission rates. MFAs represented 97.4% of FAs at Perth EDs.

EFAs self-referred more often (although often by ambulance), with conditions of lower urgency, more psychosocial problems and alcohol intoxication, and less need for inhospital treatment. They were much more likely not to wait for medical attention and to self-discharge.

DISCUSSION

Frequency of attendance

To our knowledge, our study is the first to explore in detail the changing demographic and other characteristics of people who attend EDs frequently, according to how often they attend. By using a linked-database of all hospitals in a geographically remote capital city, it is likely that we captured virtually all reattendances, even if the patients went to several different EDs. We found that, on a per-year basis, 2.4% of patients presenting to Perth EDs were FAs. This compares with 1% of FAs among patients presenting to EDs in Massachusetts in the US in a similar linked-data study.[6]

Nearly all patients (97.6%) attended Perth EDs 1–4 times in any year (ie, were NFAs), and 2.0% attended 5–9 times. There was a wide range in the number of presentations for the remainder of our sample, with a small but distinct subset (0.01%) presenting over 40 times annually, including a number who presented extraordinarily frequently, up to 218 times in a year. This range appears to be increasing in Perth.

Characteristics of frequent attenders as frequency of attendance increased

As attendance frequency increased, middle-aged and late-middle-aged men made up a larger proportion of the FA cohort. More FAs were more likely to be self-referred, and not to wait for medical attention or to self-discharge. Paradoxically, FAs' likelihood of arriving by ambulance increased with increasing frequency of attendance, with around 40% or more of FAs arriving by ambulance compared with about a quarter of NFAs.

There was a changing spectrum of illness with increasing frequency of attendance. On the one hand, our study substantiates the previously reported preponderance of mental and behavioural disorders,[5,12] acute intoxication[13] and self-harm among FAs, although we found FAs were more likely to arrive by ambulance.

Our study, however, found distinct differences between MFAs, NFAs and EFAs, with circulatory system disorders and unstable angina more common, and a greater likelihood of conditions of greater urgency, and higher admission rates in MFAs. Representing 97.4% of FAs at Perth EDs, MFAs are an important cohort of emergency patients with particularly serious and urgent problems, often needing inpatient care. MFAs appeared to be sicker and more in need of care than the average ED patient and the few EFAs.

It may be from EFAs that a common misconception has arisen about FAs being time-consuming "illegitimate" users of ED resources.[2] In fact, the great majority of FAs were sicker than other patients and more often required inpatient management. However, the total number of FAs comprised only a small percentage of ED patients, and the workload associated with their attendances was relatively inconsequential compared with the overall work of EDs.

Although EFAs had less urgent conditions and required admission less often, it should not be assumed that these patients are more suited to management in general practice, as their admission rate is still many times greater than that seen from general practice, and nearly half arrive by ambulance. A single hospital study in Melbourne has previously noted that attempting to divert the most frequent ED attenders to general practice may not be successful because of the severity, acuity and casemix of their presentations.[12]

Box 3 shows a widening disparity between admission rate and the use of ambulance services as the frequency of attendance to EDs increases. While EFAs clearly see their conditions as urgent and requiring hospital management, this is not borne out by their admission rate or the urgency of their conditions. Equally, once these patients arrive, they often do not wait for medical assessment or they self-discharge. The finding that mental health disorders and alcohol-related problems make up a large proportion of the diagnoses for this group raises questions about the extent and value of community-based resources for these people and these conditions. The very frequent use of ambulance services by these EFAs requires further study.

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COMPETING INTERESTS

None identified.

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