

After-hours general practice clinics are unlikely to reduce low acuity patient attendances to metropolitan Perth emergency departments

Yusuf Nagree, Tor NO Erceleve and Peter C Sprivulis

Abstract

Objective: To model the effectiveness of after-hours general practice (GP) in reducing metropolitan Perth emergency departments' (ED) low acuity patient (LAP) attendances and costs.

Methods: We estimated LAP attendances by comparison of the product of (A) the difference between self-referred and GP-referred ED discharge rates and (B) total self-referred attendances ($LAP\ attendances = A \times B$). We then compared after-hours ED LAP attendance rates and costs with inner metropolitan "working-week" ED LAP attendance rates and costs, when GP services are maximally available.

Results: Working-week LAP attendances comprised 8.2% (95% CI, 8.0%–8.4%) of inner metropolitan ED attendances. Excess weekend and evening LAP attendances were estimated to comprise 16.5% (95%CI, 15.9%–17.0%) and 4.5% (95%CI, 4.1%–4.9%) of outer and inner metropolitan ED attendances respectively and totalled less than 3.0% of ED costs.

Conclusions: Low acuity patients form a relatively constant, inexpensive proportion of ED workloads. After-hours GP LAP services are unlikely to significantly reduce ED attendances or costs.

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Yusuf Nagree, MB BS, GradDipCompSci, FACEM, Director of Emergency Services and Clinical Senior Lecturer, University of Western Australia.
Emergency Department, Armadale Health Service, Armadale, WA.

Tor NO Erceleve, BSc, MB ChB, Emergency Registrar.
Emergency Department, Fremantle Hospital, Fremantle, WA.

Peter C Sprivulis, MB BS, FACEM, PhD, FACHl, Harkness Fellow in Healthcare Policy 2004-2005.

Department of Medicine, Brigham and Women's Hospital and Institute for Healthcare Improvement, Boston, MA, USA.

Correspondence: Dr Tor N O Erceleve, Emergency Department, Fremantle Hospital, PO Box 480, Fremantle, WA 6959. tor@iinet.net.au

What is known about the topic?

The problem of increasing demand for care in hospital emergency departments has led to experimentation with alternative sources of care, including after-hours GP clinics at or near EDs. The goal is to enable low acuity patients to receive appropriate primary care and thereby "free up" the ED for sicker patients.

What does this study add?

The numbers of low acuity patients, and their treatment costs, are low. There are more such patients in outer metropolitan Perth than the inner city areas at all times of the day and week. The number of patients is probably not enough for after-hours GP clinics to be viable.

What are the implications?

A focus on diverting low acuity patients as a means of relieving the pressure on hospital EDs is unlikely to produce any noticeable effects.

DEMAND FOR EMERGENCY SERVICES in most developed economy health care jurisdictions is increasing (Cameron, Kennedy & McNeil 1999). Factors that may be contributing to this increase include population ageing, increasing patient expectations concerning medical care, and changes in the balance of primary care delivery between emergency departments and other sources of primary health care (Cameron, Kennedy & McNeil 1999; Cameron, Scown & Campbell 2002). It has been claimed that a significant cause of the increased emergency department demand is due to "general practice patients" attending emergency departments rather than their general practitioner (Sprivulis 2003). Furthermore, it is claimed that emergency department overcrowding and ambulance diversion would be alleviated by aggressively developing strategies to redirect such "general practice patients" to general practices collocated with emergency departments (O'Leary 2004). This

I Characteristics of Perth metropolitan hospital emergency departments

Hospital	Type	Location	Total 2003 attendances	Patients requiring admission (%)	Patients attending by ambulance (%)
A	Adult tertiary referral	Inner metropolitan	51 584	44.3%	38.5%
B	Adult tertiary referral	Inner metropolitan	37 978	46.7%	39.5%
C	Adult and paediatric tertiary referral	Inner metropolitan	39 386	37.6%	30.8%
D	Paediatric tertiary referral	Inner metropolitan	41 708	23.3%	7.5%
E	Adult and paediatric secondary referral	Outer metropolitan	34 973	20.2%	12.6%
F	Adult and paediatric secondary referral	Outer metropolitan	29 227	18.0%	11.2%
G	Adult and paediatric secondary referral	Outer metropolitan	28 299	19.3%	16.2%
Total	Adult and paediatric	All metropolitan	263 155	31.5%	23.6%

claim is disputed by the Australasian College of Emergency Medicine, which asserts that there is little cross-over of general practice workload in most emergency departments (Knox 2004).

After-hours general practice clinics have been trialled adjacent to a number of metropolitan emergency departments (Ieraci et al. 2000; Ruffin & Hooper 2003; Bolton & Thompson 2001; Liaw et al. 2001). There may be a *prima facie* case for their operation as a means of extending the available hours of access for patients seeking greater flexibility in access to primary care services (Liaw 2001). However, at present there does not appear to be conclusive evidence that their operation has had a substantial impact upon patient attendances at adjacent or nearby emergency departments (Ruffin 2003, Bolton 2001).

A recent study by Sprivulis illustrated a method for estimating low acuity patient (LAP) workload at a Perth metropolitan hospital, using the discharge rate of general practitioner-referred patients as a benchmark of the appropriateness of emergency department attendance by self-referred patients (Sprivulis 2003). By using general practice referrals as a benchmark, this method allows direct estimation of the number of low acuity patients attending emergency departments that may be manageable in the general practice setting.

The aim of this study is to use this method to model the capacity of after-hours general practice services to reduce LAP attendances to Perth metropolitan emergency departments, and to assess the cost effectiveness of such services.

Methods

This is a retrospective observational study using data from the Emergency Department Information Systems (EDIS) deployed at seven Perth Public Emergency Departments. EDIS is a computerised patient tracking system used for real time management of emergency department flow and for the production of emergency department key performance indicators. The hospitals, casemix and proportion of admissions and ambulance attendances are described in Box 1.

The period studied was 1 January to 31 December, 2003. A low acuity patient is defined for the purposes of this study as a patient that a general practitioner would not be expected to refer to an emergency department (Sprivulis 2003). General practitioner referrals were identified from the 'referral source' field of EDIS. This field is populated from a drop-down menu during patient registration and audit indicates the field is >99% complete. There is no default value and patients are identified as referred by general practitioner

on the basis of an accompanying referral letter or from the presence of an electronic telephone referral record from a general practitioner in the 'patient expects' screen of EDIS.

Low acuity patient attendances were calculated from non-ambulance attendances only, using the method described by Sprivulis (Sprivulis 2003). Low acuity patients are estimated to be the product of (A) total self-referred presentations for Australasian Triage Score (ATS) categories 3, 4 and 5 and (B) the difference between the self-referred and general practice referred discharge rates from the emergency department. Total LAP presentations = (A × B). Using this method, the excess in the discharge rate of self-referrals is

attributed to a lack of general practice screening of the self-referrals (Sprivulis 2003).

LAP attendance patterns were calculated for grouped inner metropolitan tertiary hospitals and outer metropolitan secondary hospitals for defined periods (Box 2) and as a whole. Weekday attendances were defined as patient attendances from 08:00 to 16:59 hours, Monday to Friday; weekday evening patient attendances were between 17:00 and 23:59 hours, Monday to Friday. Weekend attendances were between 08:00 and 23:59 hours on Saturday and Sunday, and overnight attendances were between 00:00 and 07:59 hours daily. The general practice referred discharge rate for the entire metropolitan area was used as the bench-

2 Defined periods for LAP attendances

	08:00 to 16:59	17:00 to 23:59	00:00 to 07:59
Mon	Weekday attendances (baseline LAP at inner metropolitan hospitals)	Weekday evening attendances	Overnight attendances
Tues			
Wed			
Thurs			
Fri			
Sat	Weekend attendances		
Sun			

3 Australasian Triage Score 3, 4 and 5 non-ambulance attendances to metropolitan Perth emergency departments for the 2003 calendar year

Referral source	Admitted	Total	Discharge rate
GP	5094	12 379	58.8%
Self	29 679	171 045	82.6%
Total	34 773	183 424	81.0%

4 Perth metropolitan emergency departments LAP attendance proportions

Period	Total attendances	LAP attendances	LAP (%)	95% CI	Excess LAP (%)	95% CI
Outer metropolitan						
Weekday	26 247	5 159	19.7%	19.2%–20.1%	11.5%	10.8%–12.1%
Weekday evening and weekend day and evening	52 114	12 848	24.7%	24.3%–25.0%	16.5%	15.9%–17.0%
Overnight	14 137	3 171	22.4%	21.7%–23.1%	14.2%	13.3%–15.1%
Total	92 498	21 178	22.9%	22.6%–23.2%	14.7%	14.2%–15.2%
Inner metropolitan						
Weekday	55 009	4 511	8.2%	8.0%–8.4%	—	—
Weekday evening and weekend day and evening	88 031	11 199	12.7%	12.5%–12.9%	4.5%	4.1%–4.9%
Overnight	27 616	3 818	13.8%	13.4%–14.2%	5.6%	5.0%–6.2%
Total	170 656	19 529	11.4%	11.3%–11.6%	3.2%	2.9%–3.6%

mark discharge rate for calculating excess self-referral rates for all time periods at all hospitals.

A "baseline" LAP attendance rate was defined as the average weekday LAP attendance rate at inner metropolitan hospitals (the lowest LAP attendance rate). As the working week is the time of maximum general practice availability, it is assumed for the purposes of this study that this is the time that emergency departments are least likely to receive low acuity patients due to general practice non-availability. An estimate of the excess LAP attendances during other periods for both inner and outer metropolitan emergency departments was calculated as the difference between the LAP attendance rate during the period and the baseline LAP attendance rate. This figure was used to estimate the proportion of total

emergency department workload that may be diverted to after-hours general practice services.

On the basis of previous studies that have illustrated that LAP attendances consume significantly less than 50% of the resources consumed by non-LAP attendances (Knox 2004; Sprivulis 2003), LAP attendances were conservatively costed at 50% of average emergency department attendance cost for the entire Perth area as reported by the Health Department of WA (\$74.50, or half of \$149) in order to estimate the cost of LAP attendances to Perth emergency departments (Sprivulis 2003; Sprivulis 2004; Department of Health 2003).

Analysis was conducted using the Statistical Package for the Social Sciences (SPSS) for Windows version 11 (SPSS Inc 2000). Permission to access accumulated data from the hospitals was

5 Perth metropolitan emergency departments average excess low acuity patient (LAP) attendances per hospital for the 2003 calendar year

Period	Outer metropolitan				Inner metropolitan			
	Excess LAP attendances	95% CI	Cost of excess LAP attendances	95% CI	Excess LAP attendances	95% CI	Cost of excess LAP attendances	95% CI
Weekday	3007	2824–3164	\$74 666	\$70 121–\$78 562	—	—	—	—
Weekday evening and weekend day and evening	8574	8263–8834	\$212 932	\$205 189–\$219 384	3981	3627–4335	\$74 145	\$67 555–\$480 736
Overnight	2012	1884–2140	\$49 964	\$46 798–\$53 131	1554	1387–1720	\$28 943	\$25 842–\$32 044
Total daily	13 593	13 131–14 055	\$337 562	\$326 080–\$349 044	5535	5016–6227	\$103 088	\$93 424–\$115 974

6 Estimated costs of low acuity patient (LAP) attendances as a percentage of total emergency department (ED) costs

	Total LAP attendances				Weekday evening and weekend day and evening LAP attendances			
	95% CI	Percentage of ED total	95% CI		95% CI	Percentage of ED total	95% CI	
Total attendances	40 707	41 070–40 343	15.5%	15.3%–15.6%	12 555	11 890–13 169	4.8%	4.5%–5.1%
Costs (1000)	\$3126	3086–3161	8.2%	8.1%–8.2%	\$992	\$930–\$1054	2.5%	2.4%–2.6%

obtained from the Director of Emergency Medicine at each hospital.

Results

There were 263 155 patient attendances to the six emergency departments during the study, including a total of 183 424 non-ambulance ATS category 3, 4 and 5 patients. A comparison of ATS 3, 4 and 5 general practice-referred patients and self-referred patients for the entire study population is presented in Box 3. Low acuity patients (11.4%; 95% CI, 11.3%–11.6%) comprised a lower proportion of total emergency department attendances at inner metropolitan emergency departments at all times when compared with outer metropolitan hospitals (22.9%; 95% CI, 22.6%–23.2%; $\chi^2 < 0.001$; Box 4). The proportion of LAP attendances was higher at both inner and outer metropolitan hospitals during the evenings, at weekends and overnight.

The LAP attendance proportion of total attendances during the working week at the inner metropolitan hospitals was 8.2% (95% CI, 8.0%–8.4%). A comparison of inner metropolitan and outer metropolitan LAP attendances above the baseline rate is presented in Box 4 and Box 5. The excess LAP attendance rate above the baseline rate was less than one patient an hour at both outer and inner metropolitan hospitals for all periods (Box 5).

Low acuity patients attending at all periods are estimated to account for 8.2% (95% CI, 8.1%–8.2%) of total emergency department costs. Excess low acuity attendances above baseline inner metropolitan attendance rates during weekday evenings, weekend days and weekend evenings are estimated to account for 2.5% (95% CI, 2.4%–2.6%) of total emergency department costs for the Perth metropolitan area (Box 6).

Discussion

The incidence of ambulance diversion from Australasian metropolitan emergency departments is increasing (Knox 2004). On the assumption that most ATS 3, 4 and 5 attendances could be

managed by general practice clinics and that this may reduce ambulance diversion rates, considerable attention has been directed at developing strategies to reduce ATS category 3, 4 and 5 attendances at emergency departments (O'Leary 2004; Knox 2004).

The Australasian Triage Score (ATS) is an urgency score not an acuity score (Knox 2004). Patients in categories 3, 4 and 5 are generally not primary care patients (Sprivulis 2003; Sprivulis 2004). Measuring low acuity patients can be time consuming and often relies upon subjective and retrospective chart reviews (Sprivulis 2003). The method of estimating low acuity patients developed by Sprivulis provides an objective measure of low acuity patients that is based upon actual, measurable general practice referral patterns as a benchmark for the appropriateness of self-referral to emergency care (Sprivulis 2003).

This simple formula cannot reflect all dimensions of the practices, culture and range of the entire health system of an area. However, one advantage of using general practice referrals as a benchmark for appropriateness of self-referral is that general practice referrals should continue to be a valuable monitoring tool as skills, resourcing and health policy incentives to manage low acuity patients in both the emergency department and general practice settings change over time.

The findings of this study indicate that low acuity patients form a relatively constant proportion of emergency department workloads, even during normal working hours at large inner metropolitan emergency departments. The identification of higher absolute LAP attendances per hospital and proportion of presentations at outer metropolitan hospitals is consistent with concerns that access to general practice services in outer metropolitan areas is poorer than in inner metropolitan areas (Wilkinson 2000).

Western Australia is undersupplied with general practitioners compared with eastern States, with 1029 people sharing a general practitioner in Western Australia compared with 878 in New South Wales (Wilkinson 2000). The Perth outer metropolitan areas of Kwinana, Wanneroo, Canning and Armadale all had more than 1400

people sharing a general practitioner, whereas 800–1200 people share a general practitioner in inner metropolitan areas of Perth (Wilkinson 2000).

Our finding, that LAP presentation rates to outer metropolitan emergency departments are essentially constant, suggests that improving *working hours* access to general practice services should be first priority in reducing low acuity attendances to outer metropolitan emergency departments. This would, at the very least, reduce working hours LAP attendances and might also allow some out-of-hours patients to consider deferring presentation to the following day.

The findings of this study indicate that it is unlikely that providing after-hours general practice services would significantly reduce workloads in metropolitan Perth emergency departments. Also, we consider it unlikely that specific after-hours general practice services could be configured to provide care for evening and weekend attendances for less than the estimate of average excess LAP costs during these periods of \$142 000 per hospital per year. This figure equates to an hourly cost of just under \$41 per hour.

Limitations

The assumption that after-hours LAP attendances would not fall below working hours LAP attendance rates requires consideration. The factors that result in low acuity patients deciding to seek emergency care after hours may differ from those which affect patients who choose to attend emergency departments during work hours. In addition, some non-LAP attendances may be divertible to appropriately configured alternative after-hours services. It is therefore possible that the calculated divertible burden of emergency department workload may be an underestimate. However, even if 50% of all LAP attendances were considered divertible, including overnight attendances, this would still represent less than 5% of the total emergency department costs for metropolitan Perth.

This study was not designed to examine the possible role of general practice in other strategies

to reduce demand for acute health care that may impact favourably upon emergency department workload, such as the potential impact of general practice coordinated chronic disease management plans in reducing hospitalisation rates, or the role of general practice in improving the interface between hospital and community health services when patients are discharged from hospital beds or emergency departments. Effective primary care is integral to effective acute demand management and requires ongoing policy development and research.

Conclusions

Low acuity patients form a relatively constant, inexpensive proportion of emergency department workloads. After-hours general practice services for LAP attendances are unlikely to significantly reduce total emergency department attendances or costs. However, if reducing LAP attendances is considered a desirable health system objective in its own right, initial efforts should focus upon improving LAP access within working hours to general practice services in outer metropolitan areas.

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Competing Interests

None identified.

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