

**Patient-reported impact of after-hours house-call services on the utilization of emergency department services in Australia**

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# **TITLE PAGE**

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Patient-reported impact of after-hours house-call services on the utilization of emergency department services in Australia.

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## **ABSTRACT**

**Objectives:** This paper explores, from the patients' perspective, the likely impact of the Australian after-hours house-call (AHHC) medical services on emergency department (ED) presentations. This has become imperative given the significant cost difference between patient presentations to either the AHHC or ED, and their practical implications for healthcare funding.

**Design, setting and participants:** A cross-sectional, self-reported survey of all 10,838 patients in Australia known to have patronised AHHC services over the last week of January 2016.

**Main Outcome Measure:** The study used a validated, self-completion questionnaire, dispatched through a mix of online and postal methods.

**Results:** A total of 1,228 questionnaires were returned, of which 1,211 included all relevant sections of the survey (11.2% response rate). 486 patients (40.1%) indicated that they would have gone to the ED on the same day or night of their illness had the AHHC not been available, with the elderly (65 and above) and children (under 16) accounting for nearly two-thirds of these (64.6%).

Following their AHHC consultations, 103 (8.5%) patients eventually attended the ED, meaning that the service prevented 383 patients from attending the ED, a decrease of 78.8%.

Stratification based on location showed that this impact was seen across all states and territories in Australia where AHHC services exist, ranging from a reduction of 73.9% in Western Australia to 85.0% in Tasmania. Similarly, the impact cuts across all patient demographics, including age ranges, gender, and social divides.

**Conclusions:** Based on our respondents' reports, AHHC services appear to be associated with a reduction in ED visits in Australia, with the impact cutting across all regions and patient demographics.

**Keywords:** After-hours, patients, emergency department, general practitioners, deputising services, house-calls.

## **INTRODUCTION**

Recent news publications in Australia have argued that improved access to after-hours primary care helps reduce the pressure on hospital emergency departments (EDs).<sup>1,2</sup> These same sources claim that low acuity ED presentations in Australia have grown little (only 1.4% per annum) over the four years to 2016, and attributed this limited growth to the concomitant rise in after-hours house call (AHHC) services. On its part, AHHCs in Australia have reportedly grown rapidly over recent years,<sup>1-3</sup> and, with an annual growth rate of 12%, represent the fastest-growing primary care service in the country.<sup>1</sup> AHHC services attended to some 1.51 million patients in 2013 alone, representing nearly 38% of all 'urgent' after-hours presentations (EDs accounted for almost all other urgent presentations).<sup>4</sup>

This paper explores the likely impact of AHHC on Australian ED presentations from the point of view of patient intention. Almost all the other studies published to date on this subject have relied on data directly obtained from EDs.<sup>5-9</sup> The problem with this approach is that the validity of the results depends on the imputation that any decrease (or increase) in ED presentations observed is 'causally' related to the existence or otherwise of an after-hours service during the time of the survey. While this might be true in some cases, it is also likely that other factors might influence changes in ED presentation numbers and that these factors might not have been properly accounted for in the analyses. As identified by a study looking at a 10-year trend in ED presentations,<sup>10</sup> such factors might include increasing population, an increasing proportion of elderly persons as a result of increased longevity, as well as the availability or otherwise of General Practices (GPs) in different areas.

Further, exploration of patients' beliefs and intentions regarding their likelihood of utilising ED or other services in the absence of AHHCs (before they actually present to the ED) provides an alternative perspective from which to understand the impact of these services on the broader health

system. This approach is supported by the findings of a Dutch study,<sup>5</sup> which concluded that GPs, along with ambulances, are best placed to optimise ED usage by identifying patients who really need to utilise ED services.

Studies have reported mixed findings on the impact of after-hours medical services on ED presentations. One Australian investigation reported a reduction in low acuity presentations (LAPs),<sup>6</sup> while another concluded that after-hours GP services had no impact at all.<sup>7</sup> Overseas, multiple studies<sup>8,11,12</sup> seem to support a reduction in ED presentations, although British studies reported either an increase in such presentations,<sup>9</sup> or no changes at all.<sup>13</sup>

Given the substantial difference in the cost to the Australian government between a patient with an LAP attending ED (range from AU\$ 400 to 500) and being seen by an AHHC service (AU\$127 to 150),<sup>14</sup> it is important to understand the potential impact that the availability of effective AHHC services has on ED presentations. This study, therefore, aims to deepen this understanding. The findings should be useful to policy makers and managers in AHHC and healthcare more generally, in relation to prioritisation of human and material resources. Its findings will also add to the growing literature of after-hours care and home visits globally, and will be of value to various countries known to be interested in the establishment and/or organization of similar services.<sup>4</sup>

## **METHODS**

### **Setting and Participants**

Study participants comprised all patients known to have patronised an AHHC service in Australia over the one-week period from January 25th to 31st, 2016. Patients in aged care facilities were excluded because of the complexities associated with decision-making in relation to alternative care strategies in this setting. In the case of children or people with disabilities who were unable to respond on their own behalf, questionnaires were completed by the parents, guardians or other

responsible adults in the households who either witnessed the consultations or were able to confer with the primary patients seen. Where more than one person was seen on the same day or on multiple occasions within the one week period under survey, our survey focused on the 'main' patient attended to during the main consultation(s).

It is worth noting that, in Australia, some general practices and cooperatives also provide after-hours office-based and home-visiting services, while some telephone triage and web-based services are available as well.<sup>15</sup> Most patients have their own GPs, but are not restricted to them (be it in or after hours) and can access any of the aforementioned services as needed. It should also be noted that while most AHHC service providers only provide home-visits, a number of them also offer office-based services. This study, however, is focused only on the provision of home-visits by dedicated AHHC services.

Call centre staff of all AHHC service providers in Australia are trained to triage the patients who call to request a home visit and in cases where symptoms suggest a severe acute illness patients are advised to call an ambulance or go directly to a hospital ED. These mechanisms suggest that our findings will be focused on patients with relatively low-acuity problems.

### **Questionnaire design, dispatch and follow-up**

We designed a self-completed, cross-sectional survey that relied on a validated 15-question tool (Supplementary Data S1), to collect data for multiple studies concerning AHHC patients. The validation of the questionnaire involved piloting with 20 patients who required a doctor's visit out-of-hours (prior to the survey), but were attended to by their own regular GPs. Comments from them were considered alongside views from experts and colleagues of the researchers to modify and produce the final four-paged tool. This study is based on the data from Questions 5 and 6 of the questionnaire, which focused on participants' beliefs about what action they would have taken had

an AHHC service not been available, as well as whether they subsequently attended an ED despite the benefit of an AHHC.

A combination of postal and online electronic (e-mailed) questionnaires was utilised in order to reach patients who had no access to electronic documents. The mode of delivery for each participant was determined by the AHHC companies, who also handled the despatch of the questionnaires directly, without the involvement of the researchers. This approach was utilised in order to maintain the confidentiality of the patients and protect their personal data. The questionnaire despatch was done either directly (as in the case of the online questionnaires, where the questionnaires were delivered as links contained in emails sent to the patients) or in conjunction with the Griffith University Printing Service for the postal versions (for the printing, packaging, confidential addressing and posting of the relevant documents without the involvement of the research team). The AHHC companies included cover notes as they deemed necessary, in addition to cover letters from the researchers, which were attached to the questionnaires.

Electronic forms were returned by email, while the postal questionnaires were returned through enclosed, postage-paid, return envelopes. Overall, a total of 10,838 patients (3,817 online and 7,021 by post) were invited to participate in the study.

We did not utilise follow up reminders for two reasons. Firstly, because the AHHC services were ongoing, some of the respondents were likely to have re-used the service by the time reminders were sent, which might have influenced responses. Secondly, given that time would have elapsed between the initial use of the AHHC and the time the reminders reach the respondents, recall bias might have occurred, which might have significantly affected data quality.<sup>16</sup> On the other hand, the absence of reminders might have reduced response rates and threatened generalisability. For this reason, we estimated the required sample size in advance.

### **Sample size estimation**

To calculate the minimum number of responses required to estimate the outcome of this study, an estimation was done based on a projected 50% impact of AHHC on ED utilisation. With a population size of 10, 838 and allowing for an error margin of 5% with a 95% confidence interval, we estimated that the minimum required number of responses was 371.

### **Statistical analysis**

All analysis was performed using SPSS version 22.0. The survey first identified patients who believed that they would have attended EDs had the AHHC not been available to them. We then considered those who subsequently attended an ED after the visit from an AHHC doctor. We also stratified according to location (states and territories in which the patients were seen) and patient demographics.

### **Ethical Considerations**

Participation was voluntary and participants were provided with an information sheet on the basis of which they consented or not to complete and return the questionnaire. Ethical Approval was obtained from the Human Research Ethics Committee (HREC) of Griffith University (Reference Number 2015/854).

### **Financial support**

No external financial support was obtained for this study.

## **RESULTS**

### **Basic response characteristics**

A total of 1,228 of the 10,838 (586/3,817 online and 642/7,021 postal) questionnaires were returned and 1,211 completed the relevant sections for this paper, giving an 11.2% response rate. The basic characteristics of the respondents are summarised in Table 1.



### **Alternatives to AHHC and ED follow-up after AHHC consultations**

Table 2 captures the patients' responses regarding their beliefs about what they would have done had the AHHC service not been available. A total of 486 out of 1,211 (40.1%) believed that they would have gone to an ED the same day or night. Following AHHC consultations, a total of 103 respondents (8.5%) ended up visiting the ED. On this basis, we conclude that a net of 383 patients (486 - 103) were diverted from an ED attendance by the availability of the AHHC service, representing a 78.8% decrease.

Stratifying these findings according to states (Table 3) reveals similar reductions across the country, with a range from 73.9% in Western Australia to 85.0% in Tasmania. When stratified by patient demographics (Table 4), we found a reduction in likely ED visits across all variables (range of 76.9% to 78.9%), including age, gender, pension status, marital status, employment status and income. We also observed similar reductions irrespective of whether the respondents were students or not, or if they lived with children or not.

## **DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS**

We find it interesting that 103 of the total respondents reported actually attending an ED following an AHHC visit, compared to the 486 who had planned to do so had they not been attended to by the AHHC services. This represents a net drop of 383 patients or nearly 80% of the total number who believed that they would have gone to the ED had the AHHC not been available (Table 2). This would appear to indicate that the AHHC services have a significant net reductive effect on ED presentations. It should be noted that the 103 might include some patients that had not planned to attend the ED *ab initio* (possibly because they might not have known how sick they were but were referred there by the visiting doctors) and so would not have been part of the initial 383. Our study did not aim to find out how many in this original group of 383 who intended to attend the ED that

ended up going there. Rather, we focused on the number who ended up visiting the ED versus the overall number who believed that they would have gone there had the AHHC service not been available, in order to generate the net impact of the AHHC services. It should therefore be kept in mind that, potentially, the net number might have been an increase had the AHHC services added more to the original number that would have gone to the ED without their intervention, as was the case with a British study published in 2010.<sup>9</sup>

In financial terms (projected from available data from recent publications),<sup>2,14</sup> these 383 patients would cost the Australian Government an estimated AU\$168,520 per week (AU\$440 per patient) had all these patients been seen in the ED, as against the estimated AU\$49,790 (AU\$130 per patient) it costs for them to be seen by the AHHC. Based on projections from this survey, this leaves a net saving of AU\$118,730 per week for the government (or about AU\$6,173,960 over a 52-week year). Policy makers with access to the ED and AHHC actual figures can make the relevant extrapolations from these findings.

Our finding that 40.1% of patients in our study believed that they would have attended an ED had the AHHC service not been available is very similar to the report from a Dutch study<sup>5</sup> that 43% of patients would normally self-refer to the ED if there were no out-of-hours primary care services. It is also nearly identical to a report from one of the leading AHHC services in Australia that 40% of their patients stated that ED would have been their only other alternative if the AHHC was not there<sup>1</sup>. A recently published Australian paper, citing a secondary source, also stated that about 39% of 440 adults surveyed would have gone to an ED if they had no option of a home visit after-hours doctor, again bringing our finding in line with information in the existing literature. Unfortunately, none of these cited publications went further to find out how many of their respondents eventually ended up attending ED after a confirmed AHHC visit. Our work is the first to explore this.

Among related studies with different survey methods, a 2010 retrospective study of ED presentations to a hospital in Wagga Wagga, Australia, also reported a decline in ED presentations

following the advent of after-hours, office-based primary care services.<sup>6</sup> However, the magnitude of the reduction reported in Wagga Wagga was only 8.2%. Our findings align more closely with those of a Canadian Study that found a 40% reduction in ED attendance using a methodology based also on counting ED presentations.<sup>8</sup> In contrast, another Australian study published in 2004 reported no change in LAP presentations to a Perth ED,<sup>7</sup> as did a 2004 survey carried out in Sheffield, UK.<sup>12</sup> Our findings are also at variance with another British study that reported an increase in ED presentations following changes in local after-hours services.<sup>9</sup>

The foregoing comparisons should all be treated with caution, though, as the study methodologies were all different from ours and focused on the provision of office-based after-hours services rather than home-visits. One might expect that home-visit services would have a greater impact (as found in our study), because, if patients are required to travel from their homes anyway, despite feeling unwell, they might choose to present directly to the ED rather than an office-based service that might be perceived as offering less comprehensive care. In contrast, the opportunity to be assessed at home, without the need to travel might, represent a more attractive alternative to an ED presentation. In addition, the fact that Australian AHHC services are available to patients without charge under the country's universal health insurance system (Medicare) might make them more attractive than services in countries where fees are levied, also, potentially explaining the higher rate of reduction in our study.

Another finding from our study, which might underline the importance of the impact of AHHC on ED presentations, is that nearly two-in-three (64.6%) of the participants who believed that they would have gone to the ED had the AHHC service not been available, were from the age groups of 'under 16s' (29.2%) and '65s and over' (35.4%). As shown in Table 4, these numbers were reduced by 85.5% and 75.4% respectively following AHHC attendances. It has been claimed that these age groups represent the 'vulnerable' with respect to accessing after-hours medical services<sup>17</sup> and are generally more likely to rely on AHHC more than other age groups, according to Medicare claims data.<sup>1</sup> Our

raw data, summarized in Table 1, also support this claim, as we found that more than half (57.2%) of the total patients seen by AHHC services were in these same age groups of 'under 16' (30.7%) or '65 and over' (26.5%), despite these groups constituting only about one-third of the general Australian population (19.1% for the 'under 14s' and 14.9% for the 'over 65s').<sup>18</sup>

### **Conclusions**

Based on the beliefs of participants in our study about their likely alternative behaviours, the availability of AHHC appears to have been associated with an almost 80% reduction in the number of patients who would have presented to an ED, potentially translating to significant financial benefits to the Australian public purse. This effect was observed across all demographics and all states and territories of Australia. Patients under 16 and over 65 were the biggest users of the AHHC and were most likely to have attended EDs had the service not been available.

### **Study Limitations:**

Our methodology did not enable identification of the types or acuity of the conditions for which participants sought assistance from AHHC services. However, as already pointed out in the main text, since all of the AHHC service providers undertake telephone triage to decide whether immediate ambulance attendance is required prior to agreeing to send an AHHC physician, it is likely that the majority of conditions to which our results relate were of low acuity. Another potential limitation is the fact that the study was carried out over a single one-week period. For this reason, seasonal variations in types and volumes of illnesses might influence the generalisability of our study. Also, we relied on respondents' beliefs about their likelihood of having attended an ED had the AHHC service not been available. This may not directly translate to them actually doing so, but we have no reason not to believe them, and, as such, do not expect this to result in any systematic bias in our findings. Finally, the response rate for the study was relatively low and, as explained in the 'methods' section, we did not undertake aggressive follow up in order to avoid distortion of the

data. In any case, given that the number of responses exceeded the estimated sample size, this potential limitation is likely to have been of limited effect. In addition, our finding on the number of patients that might have gone to the ED had the AHHC not been available is consistent with similar reports regarding the intentions of patients in similar studies,<sup>1,19</sup> suggesting that the effect of any non-response bias is negligent.

### **Recommendations**

- Recommendations for clinical practice
  - Given our finding that the provision of AHHC services across all of Australia may be associated with substantial reductions in presentations to EDs, arguably linked to reductions in cost, we recommend that state, territory and the federal governments investigate approaches to broaden and improve the efficiency of the services across the country.
- Recommendations for future research
  - Future studies should aim to address the limitations cited above, particularly in relation to the types and acuity of the conditions managed by AHHC compared with EDs.

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**CONFLICTS OF INTEREST:** None.

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**Table 1: Basic demographics of the patients seen by Australian after-hours house call services over a one week period in January 2016**

<b>Statistic</b>	<b>Parameters</b>	<b>N</b>	<b>%</b>
<b>Main person seen by doctor</b> (n= 1,218)	Myself (Respondent)	735	60.3
	Someone else in household	483	39.7
<b>State of residence</b> (n= 1,226)	Australian Capital Territory (ACT)	29	2.4
	New South Wales (NSW)	215	17.5
	Northern Territory (NT)	0	0.0
	Queensland (QLD)	434	35.4
	South Australia (SA)	158	12.9
	Tasmania (TAS)	45	3.7
	Victoria (VIC)	279	22.8
	Western Australia (WA)	66	5.4
<b>Age of main patient seen</b> (n= 1,223)	Less than or equal to 16 years	375	30.7
	17 to 24 years	67	5.5
	25 to 39 years	154	12.6
	40 to 64 years	30	24.8
	65 years or over	324	26.5
<b>Gender</b> (n= 1,222)	Males	488	39.9
	Females	732	59.9
	Transgender	2	0.2
<b>Family income</b> (n=1,178)	AU\$180,000 or more	100	8.5
	Up to \$80,000 but less than AU\$180,000	421	35.7
	Less than AU\$80,000	657	55.8
<b>Employment status of person seen</b> (n=1,164)	student (employed)	55	4.7
	student (not employed)	165	14.2
	employed and not studying (PT and FT)	288	24.7
	Unemployed (searching, retired, children, etc.)	656	56.4
<b>marriage status of person seen</b> (n=1,196)	Single without kids (never married, separated, widowed)	287	24.0
	Single with kids (never married, separated, widowed)	72	6.0
	Coupled with kids (married, co-habitation, defacto, etc.)	200	16.7
	Coupled without kids (married, co-habitation, defacto, etc.)	277	23.2
	Not applicable (person seen under 18 years)	360	30.1
<b>Pension status of person seen</b> (n=1,215)	Pensioner (or benefits) of any kind	460	37.9
	Not on any pension	376	30.9
	Not applicable (under 18 years)	379	31.2



**Table 2: Patient-reported alternatives to medical care had the after-hours house call (AHHC) services not been available to them**

Alternatives if AHHC not available		Number of patients (%)	
Gone to seen own GP at the earliest possible time		467 (38.6%)	
Attended an office-based, after-hours clinic that same day or night		192 (15.9%)	
Done Nothing		66 (5.5%)	
Gone to the emergency department that same day or night		486 (40.1%)	
<b>TOTAL</b>		<b>1,211 (100.0%)</b>	
<b>EMERGENCY DEPARTMENT (ED) BREAKDOWN ONLY</b>			
Consultation Pattern	Patients who planned to go the ED if not for the AHHC (A)	Patients who eventually went to the ED after the AHHC visits (B)	Net Change = [B-A] (% Change = [B-A]x100/A)
<b>TOTALS</b>	<b>486</b>	<b>103</b> (21.2% of A; 8.5% of total respondents)	<b>-383 (-78.8%)</b>

**Table 3: Alternatives to the after-hours house calls (AHHC) vs Actual Emergency Department (ED) visits: Stratification by Patients' States of Residence**

States/Territory	ED Intention/Outcome		Net Change = [B-A]
	Patients who planned to go the ED if not for the AHHC (A)	Patients who eventually went to the ED after the AHHC visits (B)	(% change = [B-A]A/100)
Australian Capital Territory	9 (1.9)	2 (1.9)	-7 (-77.8%)
New South Wales	91 (18.7)	20 (19.4)	-71 (-78.0%)
Queensland	181 (37.2)	40 (38.8)	-141 (-77.9%)
South Australia	54 (11.1)	10 (9.7)	-44 (-81.5%)
Tasmania	20 (4.1)	3 (2.9)	-17 (-85.0%)
Victoria	108 (22.2)	22 (21.4)	-86 (-79.6%)
Western Australia	23 (4.7)	6 (5.8)	-17 (-73.9%)
<b>TOTALS</b>	<b>486 (100.0)</b>	<b>103 (100.0)</b>	<b>-383 (-78.8%)</b>

*NB: Northern Territory excluded as the AHHC service was not operational there as at the time of the survey.*

**Table 4: Alternatives to the after-hours house calls vs Actual Emergency Department (ED) visits: Stratification by Patients Variables**

S/N	Patient Variables	Categories in the Variables	ED Intention/Outcome		Net Change = [B-A]  (% change = [B-A]A/100)
			Patients that planned to go the ED if not for the AHHC (A)	Patients that eventually went to the ED after the AHHC visits (B)	
1	Age (in years) of main patient seen	<=16 years	141 (29.2)	20 (19.4)	-121 (-85.8)
		17-24	17 (3.5)	9 (8.7)	-8 (-47.1)
		25-39	45 (9.3)	6 (5.8)	-39 (-86.7)
		40-64	109 (22.6)	26 (25.2)	-83 (-76.1)
		>=65	171 (35.4)	42 (40.8)	-129 (-75.4)
<b>TOTALS</b>			483 (100.0)	103 (100.0)	-380 (-78.7%)
2	Gender	Male	197 (40.9)	51 (49.5)	-146 (-74.1)
		Female	284 (58.9)	52 (50.5)	-232 (-81.7)
		Transgender	1 (0.2)	0 (0.0)	-1 (-100.0)
	<b>TOTALS</b>			482 (100.0)	103 (100.0)
3	Pension	Yes	209 (60.9)	49 (62.0)	-160 (-76.6)
		No	134 (39.1)	30 (38.0)	-104 (-77.6)
	<b>TOTALS</b>			343 (100.0)	79 (100.0)
4	Student Status	Studying	78 (17.0)	16 (16.5)	-62 (-79.5)
		Not Studying	381 (83.0)	81 (83.5)	-300 (-78.7)
	<b>TOTALS</b>			459 (100.0)	97 (100.0)
5	Employment Status	Employed	103 (22.4)	20 (20.6)	-83 (-80.6)
		Not employed	356 (77.6)	77 (79.4)	-279 (-78.4)
	<b>TOTALS</b>			459 (100.0)	97 (100.0)
6	Marital Status	Single (Never married, separated, widowed, etc.)	146 (43.3)	32 (41.0)	-114 (-78.1)
		Couple (Including legally married, co-habitation, defacto, etc.)	191 (56.7)	46 (59.0)	-145 (-75.9)
	<b>TOTALS</b>			337 (100.0)	78 (100.0)
7	Whether children live in Household	Living with kids	153 (45.4)	40 (51.3)	-113 (-73.9)
		Not living with kids	184 (54.6)	38 (48.7)	-146 (-79.3)
	<b>TOTALS</b>			337 (100.0)	78 (100.0)
8	Income (AU\$)*	High: >=180,000	34 (7.3)	7 (7.0)	-27 (-79.4)
		Mid: >=80,000 - <180,000	146 (31.5)	26 (26.0)	-120 (-82.2)
		Low: <=80,000	284 (61.2)	67 (67.0)	-217 (-76.4)
	<b>TOTALS</b>			464 (100.0)	100 (100.0)

\*Groups available from: <https://www.ato.gov.au/rates/individual-income-tax-rates/>. Last accessed 7/5/2016