Author/s:
Lowthian, J;Turner, L;Joe, A;Pearce, C;Brijnath, B;Browning, C;Shearer, M;Mazza, D

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Lowthian Judy (Orcid ID: 0000-0002-9780-5256)

Emergency demand, repeat and frequent presentations by older patients in metropolitan Melbourne: a retrospective cohort study using routinely-collected hospital data

Key findings

- Comparing 2008 with 2012, the annual number of older patient ED presentations increased steadily, with the majority of repeat and frequent presentations classified as non-potentially avoidable general practice (PAGP) - type, suggesting they could not be managed outside the hospital system.
- In particular, frequent non-PAGP-type ED presentations were most commonly for acute exacerbation of chronic conditions such as a cardiovascular or respiratory illness, highlighting the importance of initiatives such as the Australian Health Care Home.
- The decrease in frequent visits for PAGP-type presentations suggests that initiatives to reduce avoidable ED visits have been effective.

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Key words: emergency care systems; emergency department utilisation; geriatrics; primary care

ABSTRACT

Objectives: To describe patterns for potentially avoidable general practice (PAGP)-type and non-PAGP-type ED presentations by older patients during 2008 and 2012.

Methods: Retrospective analysis of ED presentations by patients ≥70 years for 2008 and 2012. Metropolitan Melbourne public hospital data were obtained from the Victorian Emergency Minimum Dataset. Outcomes were characteristics of PAGP-type and non-PAGP-type presentations as defined by the Australian Institute of Health and Welfare; numbers and rates per 1000 population ≥70 years of repeat (x 2–3/year) and frequent (≥x4/year) PAGP-type and non-PAGP-type presentations.

Results: The older metropolitan Melbourne population increased by 10.3% between 2008 and 2012, while the number of ED presentations increased by 12.7%. The volume of PAGP-type presentations decreased by 2.6%, with declining rates per 1000 population ≥70 years of repeat (7.2 to 6.2) and frequent (0.7 to 0.4) presentation. In contrast, the volume of non-PAGP-type presentations grew by 15.4%, with increasing repeat (57.6 to 60.7) and frequent (13.1 to 14.2) presentation rates per 1,000 population ≥70 years. The majority (39%) of non-PAGP-type presentations by frequent ED attenders was due to cardiovascular or respiratory problems.

Conclusions: The rate of repeat and frequent PAGP-type presentations by older people decreased in 2012 compared with 2008, suggesting that initiatives implemented to reduce avoidable presentations may have had an effect. However, an increase in the rate of frequent non-PAGP-type presentations, predominately for acute exacerbation of cardiovascular and respiratory conditions, has important implications for planning future healthcare delivery; hence the importance of initiatives such as the Health Care Home.

INTRODUCTION

Demand for healthcare persists, with Australian emergency department (ED) presentations accounting for approximately 12% of total hospital costs.[1] Provision of care within EDs may not, however, always constitute efficient use of the specialised staff and emergency services available in these departments. In 2015-16, approximately 4% of patients who presented and were triaged in EDs did not wait for treatment. Furthermore, almost 63% of patients treated in EDs departed without being admitted to hospital or being referred elsewhere.[2] It has been reported that up to 40% of ED presentations are non-urgent and could be managed in community settings.[3] Despite a policy focus on encouraging patients to access primary care rather than ED services, if appropriate; activity in Australia's public hospital EDs continues to rise, with an estimated average annual 2.7% increase in the number of presentations between 2011-12 to 2015-16.[2]

The number of ED presentations across Melbourne has risen significantly in recent years, with an average annual increase of 3.6% after accounting for population change.[4] A significant proportion of growth in demand is by older age groups ≥70 years, with an

average 6.1% annual increase resulting in this older cohort accounting for more than 18% of ED presentations.[5] This increase is associated with numerous factors including population ageing. However, an important driver is the increasing number of older patients who make multiple visits to the ED annually.[6] The accompanying clinical complexity of this cohort requires substantially more ED resources.[7] Therefore, increased ED presentations by older patients represent a significant challenge to the Australian hospital system.

The *'Reducing elderly patients' avoidable presentations for emergency care treatment' (REDIRECT)* was a multi-disciplinary project, funded by the Australian Primary Health Care Research Institute. *REDIRECT* comprised quantitative and qualitative studies to determine the factors associated with ED use EDs by older patients. This manuscript presents the findings from *REDIRECT*'s quantitative study which include the features of potentially avoidable general practice (PAGP)- and non-PAGP-type ED presentations by older patients in metropolitan Melbourne during 2008 and 2012; and characterisation of repeat and frequent presentations by this cohort. Our analyses provide a baseline measure which may prove useful in evaluating the impact of new primary care initiatives on ED use, such as the Australian Government Health Care Home program which commence trialling in October 2017.[8]

METHODS

Study design and setting

We retrospectively analysed routinely collected data describing presentations to 22 public hospital EDs across metropolitan Melbourne (population of 4.1 million people)[9] for the calendar years 2008 and 2012. The study was approved by Monash University's Human Research Ethics Committee.

Data source

De-identified data from the Victorian Emergency Minimum Dataset (VEMD) were provided by the Victorian Department of Health and Human Services' data custodian, Victorian Data Linkages (VDL).[10] VDL assessed and approved the study protocol prior to releasing VEMD data for analysis. The VEMD encompasses data from 39 Victorian public hospitals with a 24-hour ED, submitted to the state government for health service planning, quality improvement and research. VDL classified 17 hospitals as regional, and 22 as metropolitan - our study analysed data from all metropolitan hospitals. Data comprised demographic and clinical variables including age, residential postcode, triage category according to the Australasian Triage Scale,[11] arrival mode and discharge destination. VDL created unique identifiers to distinguish individual patients presenting to different hospitals. Population data published by the Australian Bureau of Statistics were used to calculate presentation rates across the study period by age and gender.[9]

Inclusion and exclusion criteria: Data were included for all presentations by people aged ≥70 years. Presentations to children's, maternity, and 'Eye & Ear' hospital EDs were excluded.

Data quality: Previous studies to validate reliability of VEMD data found that this dataset was not always complete.[12] [13] For variables in our study with missing information, the extent of missing data is reported.

Study outcomes

Primary outcomes were (a) characteristics of PAGP-type and non-PAGP-type ED presentations by older patients, and (b) repeat and frequent PAGP-type and non-PAGP-type ED presentations by this cohort. Repeat presentations were defined as 2–3 annual presentations, while frequent presentations were defined as ≥4 annual presentations. The Australian Institute of Health and Welfare (AIHW) definition for PAGP-type presentations was used, namely '*an emergency type of presentation* (where the patient) *is allocated a triage category 4* (semi-urgent) *or 5* (non-urgent)*, and did not arrive by ambulance, police or correctional vehicle, and was not admitted to hospital and did not die*'.[14] Variables related to the characteristics of ED presentations included gender, age group, usual accommodation, socioeconomic status, source of referral to ED, ED Length of Stay (LOS–date/time of discharge minus arrival date/time), and destination or status upon departure from ED. Socioeconomic status was approximated through linking the patient's residential postcode to an associated SEIFA 2011 Index of Relative Socio-Economic Disadvantage (IRSD) decile.[15]

Statistical analysis

Data cleaning involved checking for outliers, duplicated information, values that were outside of the codes for a given variable, and mismatched information between related

variables. Data were analysed for the calendar years 2008 and 2012. Annual volumes and presentation rates per 1000 population aged ≥70 years were calculated for PAGP- and non-PAGP- type ED presentations, across both repeat and frequent ED presentations. Comparisons between 2008 and 2012 were made firstly at the episode-level by analysing overall ED presentations, and secondly at the patient-level by collapsing the data to analyse individual patients for their number of annual presentations. Chi-squared and Wilcoxon rank sum tests were used for comparisons, with significance assumed at the $p < 0.05$ level. Missing data were included in all statistical calculations. All analyses were conducted using Stata version 13 (StataCorp LP).

This study is reported in accordance with the REporting of studies Conducted using Observational Routinely-collected health Data (RECORD) statement.[16]

RESULTS

Between 2008 and 2012, the metropolitan Melbourne population aged ≥70 years grew by 10.3% from 353,010 to 389,206 people; with the number of ED presentations by this age group in the region increasing by 12.7% from 140,560 to 158,423. Age and gender distribution of presentations changed little across the study period (Table 1).

In 2008 there were 20,893 (14.9%) PAGP-type ED presentations, decreasing by 2.6% to 20,346 (12.8%) presentations in 2012 ($p<0.001$). At the same time, 119,667 (85.1%) presentations in 2008 were classified as non-PAGP-type, increasing by 15.4% to 138,077 (87.2%) presentations in 2012 ($p<0.001$). ED LOS was noticeably lower for PAGP-type

presentations, with a median of 2.9 hours vs 6.5 hours for non-PAGP-type presentations in 2008 (p<0.05), and similarly in 2012 (2.9 vs. 5.9 hours, p<0.05).

Table 2 summarises the number and rates of single, repeat and frequent presentations. The number of repeat patients (x2-3/year) increased slightly from 24,001 to 27,150 (13.1%, p=0.06), corresponding to an increase in a rate of 68 to 69.8 per 1000 population ≥70 years. The number of frequent (≥x4/year) presenting patients increased from 5,984 to 6,911 (15.5%, p=0.10), corresponding to a rate increase of 17 to 17.8 per 1000 population ≥70 years. Of note, in both years frequent attenders, who accounted for 7.1% and 7.3% of the patient cohort in 2008 and 2012 were responsible for 22.2% and 22.7% of all presentations for each year, respectively.

Table 3 shows the frequency of presenting patients according to PAGP-type status. Between 2008 and 2012, there was a decrease of 221 (7.9%, p<0.01) in the number of patients aged ≥70 years who attended an ED on more than one occasion per year for PAGP-type presentations. Interestingly, the volume of frequent PAGP-type presentations in 2008 and 2012 exhibited a decrease of 387 (30.9%, p<0.001), corresponding to a decrease in rate from 0.7 to 0.4 per 1000 population aged ≥70 years. In contrast, the volume and rate of non-PAGP-type presentations by frequent presenting patients rose by 4,751 (20.1%, p<0.001), corresponding to a rate increase from 13.1 to 14.2 per 1000 population aged ≥70 years. In particular, the majority of frequent non-PAGP-type presentations at both time points were for cardio-respiratory conditions, increasing from 9,319 (39.5%) to 11,133

(39.3%) of frequent presentations in 2008 and 2012, respectively (p=0.59). Urinary tract problems were the second most common diagnosis in the non-PAGP-type presentations, comprising 1,700 (7.9%) and 1,929 (7.5%) of all frequent visits by older adults in 2008 and 2012, respectively (p=0.09). The majority of frequent non-PAGP-type presentations originated from community-dwelling patients, realising a 4,975 (27.3%) increase between 2008 and 2012, compared with an increase of 220 (5.7%) by residents of aged care facilities (significant difference in patient's usual accommodation between 2008 and 2012, p<0.001). During the period studied, the number of presentations by frequent non-PAGP-type patients that resulted in hospital admission increased from 16,406 to 21,843 (69.6% vs. 77.1%, p<0.001).

DISCUSSION

This study confirms persistent emergency demand by older patients, with an increase in ED presentations that was disproportionately higher than the rise in population aged ≥70 years between 2008 and 2012. The majority (85%) of ED visits by older people were for non-PAGP-type conditions, and the ED LOS (median time of 6 hours/presentation) was twice that for PAGP-type presentations. This suggests that ED resources are, for the most part, appropriately utilised for presentations where specialist emergency care was necessary. This study also confirms a continuing propensity for older patients to return to ED for care, with a 15.5% increase in the number of frequent presenting patients. From 2008 to 2012, there was a 20.1% increase in the number of non-PAGP-type presentations where the patient

visited ED ≥4 times in a 12-month period. This suggests that the majority of patients who attended frequently could not be managed outside the hospital system. To our knowledge, frequent return to ED by older Australians has not previously been examined by comparing PAGP-type to non-PAGP-type presentations.

This increasing trend in ED re-presentations by older patients has been corroborated previously.[5] Importantly, the number of patients attending for PAGP-type presentations decreased during the 5-year study period, accounting for just 12.8% of all visits by older people in 2012. This suggests that initiatives to divert such visits away from ED have had some effect, such as Ambulance Victoria's Referral Service, established in 2003, that facilitates direct referral to a community-based service or telephone advice service as an alternative to being transported to ED.[17 18] Although there is a paucity of evidence for most other diversion strategies, it is also possible that chronic disease management programs, establishment of Super Clinics that encompass allied health, imaging and pathology services with increased availability of after-hours care by GPs, co-location of GP clinics in acute hospitals, and the work of Primary Health Networks (formerly Medicare Locals) may have reduced PAGP-type ED re-presentations. In addition, impact of the steady uptake of mobile acute hospital specialist 'in-reach' programs during working hours, and 'after-hours' locum services by residential aged care facilities to enable home-based treatment whilst avoiding hospital transfer, cannot be ignored.[19 20]

The clinical nature of frequent non-PAGP-type presentations identified in our study highlights the burden of chronic disease in this age group, with cardiorespiratory conditions requiring admission a predominant driver. Multiple chronic illnesses in older adults have been found to be a strong predictor of unplanned hospital admissions via ED.[21] With an ageing population and higher numbers of people with chronic illness,[22] the observed 20.1% increase in volume of frequent visits between 2008 and 2012 suggests there is likely to be continued growth in re-presentations associated with acute exacerbations of chronic illnesses such as cardiovascular disease and respiratory disease.

Although acute illness or acute exacerbation of chronic illness is a precipitating factor for ED presentation, it often overlays a plethora of hidden psychosocial issues in older patients. Anxiety,[6] feeling depressed,[23] lack of social support[6 23] and cognitive impairment[24 25, 26] have been identified as predictors of return visits; alongside prior ED presentation[24 23 26] and previous hospitalisation.[6] It is recognised that the fast-paced nature of the ED environment is not always conducive to assessment beyond the primary medical reason for presentation. The development of new guidelines in the UK that advocate holistic screening as a strategy to identify and manage hidden deficits, may help reduce risk for ED re-presentations.[27]

It is likely that hospital admissions requiring additional resources across multiple streams of healthcare will continue to increase.[22] This obviously has implications for health policy and planning of healthcare delivery in the future. Establishment of patient-centred medical homes in the US has realised reduction in ED use and hospitalisations for older patients with

complex chronic illnesses. These benefits have been attributed to enhanced health outcomes due to ongoing improved continuity and integration of care, preventive measures and chronic disease management.[28] It remains to be seen whether the implementation of the Australian Government Health Care Home initiative will have a similar impact. In a reform of the Australian primary healthcare system, the establishment of Health Care Homes seeks to integrate healthcare across all sectors, providing continuity and coordination of services in a team-based approach according to patient needs and wishes.[29] In this new care model, a Health Care Home is a general practice or Aboriginal Community Controlled Health Service (ACCHS) where a general practitioner develops and coordinates a shared care plan for patients with chronic and complex health conditions. Twenty practices and ACCHS in Australia will commence trialling Health Care Home services on 1 October 2017. A further 180 practices and ACCHS will begin on 1 December 2017.[8] It will be of interest whether reform of primary healthcare services to better manage patients with chronic illnesses will reduce the demand for emergency treatment of these conditions.

Limitations

A strength of this study is that the analysed dataset spanned a 5-year period of routinely collected population data related to ED presentations by patients aged ≥70 years in a sizeable metropolitan region of Australia. Our findings are likely to be a reasonable representation of the health concerns and health-seeking behaviour of urban older Australians. Certain limitations of our study should be considered. A metropolitan

population focus means that we are unable to generalise these findings to regional and rural settings. Approximately 10% of potentially avoidable general practice-type ED presentations were due to a referral by a local medical officer (general practitioner). It is not clear why GPs may be referring potentially GP-manageable patients to an ED. In some cases, it may in anticipation of the need for more comprehensive assessment or care, particularly for clinically complex older patients. Alternatively, the definition used for classifying PAGP-type presentations may not be accurately identifying conditions that could be managed in a general practice environment. GPs may be correctly triaging patients as needing hospital care due to a non-PAGP condition, but the presentation is classified by AIHW criteria to be of a PAGP-type. In support of this claim, the AIHW definition used to identify PAGP presentations has received much criticism in recent times around overestimation of the number of presentations that could be dealt with in the primary care setting, particularly in the older population,[29] which may mean our study overestimates the numbers of PAGP-type ED presentations. In a similar study exploring low acuity patient presentations to New South Wales EDs, substantial variation was shown in the estimated proportion of low acuity patients depending on the method (ACEM, AIHW, or Sprivulis) used to define this cohort.[30] Further discussion and consensus is required as to what constitutes a low acuity patient or PAGP-type presentation. Adoption of the National Emergency Access Target (NEAT) in 2011, to incentivise EDs to discharge, transfer or admit patients within 4 hours,[31] may have resulted in an overestimation of non-PAGP patients in 2012 due to low acuity patients being admitted to short-stay wards in an effort to work towards a 4-hour turnaround target.[32]

Finally, while our data captures all ED presentations in the metropolitan Melbourne region, it is possible that some individual patients may have visited other hospital EDs outside the region.

CONCLUSION

The decrease in rate of PAGP-type presentations by older people suggests that strategies implemented to reduce avoidable ED presentations have had an effect. However, the increasing frequency of re-presentations by older community-dwelling patients with acute exacerbation of chronic illnesses such as cardiovascular disease and respiratory conditions has important implications for planning future healthcare delivery; hence the importance of initiatives such as the Health Care Home.

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Competing Interests: None to declare.

Supplemental information

Queries regarding access to the study protocol, raw data and programming code should be directed to Professor Danielle Mazza at danielle.mazza@monash.edu

REFERENCES

1. Independent Hospital Pricing Authority. National Hospital Cost Data Collection, Public Hospitals Cost Report 2012-2013, Round 17. Canberra: Commonwealth of Australia, 2015.
2. Australian Institute of Health and Welfare. Emergency department care 2015–16: Australian hospital statistics. Health services series no. 72. Cat. no. HSE 182. Canberra: AIHW, 2016.
3. Uscher-Pines L, Pines J, Kellerman A, Gillen E, Mehrota A. Deciding to visit the emergency department for non-urgent conditions: a systematic review of the literature. Am J Manag Care. 2013;19(1):47-59.
4. Lowthian JA, Curtis AJ, Jolley DJ, Stoelwinder JU, McNeil JJ, Cameron PA. Demand at the emergency department front door: 10-year trends in presentations. Med J Aust. 2012;196:128-32.
5. Lowthian J, Curtis A, Stoelwinder J, McNeil J, Cameron P. Emergency demand and repeat attendances by older patients. Intern Med J. 2013;43(5):554-60.
6. Naughton C, Drennan J, Treacy P, Fealy G, Kilkenny M, Johnson F, et al. The role of health and non-health-related factors in repeat emergency department visits in an elderly urban population. Emerg Med J. 2010;27(9):683-7.
7. McCusker J, Bellavance F, Cardin S, Trepanier S, Verdon J, Ardman O. Detection of older people at increased risk of adverse health outcomes after an emergency visit: the ISAR screening tool. J Am Geriatr Soc. 1999;47(10):1229-37.

8. Department of Health CoA. Health Care Homes: Reform of the Primary Health Care System. Canberra: CoA, 2017. [Cited 12 Nov 2017]. Available from: http://www.health.gov.au/internet/main/publishing.nsf/content/health-care-homes.
9. Australian Bureau of Statistics. Population by Age and Sex, Regions of Australia - Victoria by Geographical Classification [ASGS 2011]. Canberra: Commonwealth of Australia, 2013.
10. Victorian State Government Department of Health and Human Services Australia. Victorian Emergency Minimum Dataset - VEMD. Victorian Hospital Data Reports Reference Files. Melbourne: Victorian Government Health Information, 2014.
11. Australasian College of Emergency Medicine. Policy on the Australasian Triage Scale - Document P06. Melbourne: ACEM, 2013 [Cited 12 Nov 2017]. Available from: https://acem.org.au/getattachment/693998d7-94be-4ca7-a0e7-3d74cc9b733f/Policy-on-the-Australasian-Triage-Scale.aspx.
12. Marson R, Taylor DM, Ashby K, Cassell E. Victorian Emergency Minimum Dataset: factors that impact upon the data quality. Emerg Med Australas. 2005;17(2):104-12.
13. Gray SE, CF F. Assessing the completeness of coded and narrative data from the Victorian Emergency Minimum Dataset using injuries sustained during fitness activities as a case study. BMC Emergency Medicine 2016;16:24. doi.org/10.1186/s12873-016-0091-4.
14. Australian Institute of Health and Welfare. National Healthcare Agreement: PI 19– Selected potentially avoidable GP-type presentations to emergency departments.

Canberra: AIHW, 2017 [Cited 14 Jul 2017]. Available from: http://meteor.aihw.gov.au/content/index.phtml/itemId/630030.

15. Australian Bureau of Statistics. An Introduction to Socio-Economic Indexes for Areas (SEIFA) (ABS Cat. No. 2039.0). Canberra: ABS, 2006.
16. Benchimol EI, Smeeth L, Guttmann A, Harron K, Moher D, Petersen I, et al. The REporting of studies Conducted using Observational Routinely-collected health Data (RECORD) Statement. PLoS Medicine. 2015;12(10):e1001885. doi:10.1371/journal.pmed.
17. Lowthian JA, Jolley DJ, Curtis AJ, Currell A, Cameron PA, Stoelwinder JU, et al. The challenges of population ageing: accelerating demand for emergency ambulance services by older patients, 1995-2015. Med J Aust. 2011;194(11):574-8.
18. Eastwood K, Morgans A, Smith K, Hodgkinson A, Becker G, Stoelwinder J. A novel approach for managing the growing demand for ambulance services by low-acuity patients. Aust Health Rev. 2015 doi: 10.1071/AH15134.
19. Larkins A, O'Brien K, Geddes C. Residential Aged Care In-Reach Clinical Support Pilot Progam Evaluation 2009. Melbourne: Dench McLean Carlson, 2009.
20. Joe A, Lowthian JA, Shearer M, Turner LR, Brijnath B, Pearce C, et al. After-Hours Medical Deputising Service Use by Older People. Med J Aust. 2016;205(9):397-402.
21. Chan DKY, Chong R, Basilikas J, Mathie M, Hung W. Survey of major chronic illnesses and hospital admissions via the emergency department in a randomized older population in Randwich, Australia. Emerg Med. 2002;14:387-92.

22. Australian Institute of Health and Welfare. Australia's health 2014: in brief. Cat. no. AUS 181. Canberra: AIHW, 2014. [Cited 12 Nov 2017]. Available from: https://www.aihw.gov.au/getmedia/e5f83366-7da8-47e6-8c85-c1b89c1a8b79/17353.pdf.aspx?inline=true.
23. McCusker J, Cardin S, Bellavance F, Belzile E. Return to the emergency department among elders: patterns and predictors. Acad Emerg Med. 2000;7(3):249-59.
24. Lowthian JA, Straney LD, Brand CA, Barker AL, Smit DeV, Newnham H, et al. Unplanned early return to the Emergency Department by older patients - The Safe Elderly Emergency Department Discharge (SEED) Project. Age and Ageing. 2016;45(2):255-61.
25. Caplan GA, Brown A, Croker WD, Doolan J. Risk of admission within 4 weeks of discharge of elderly patients from the emergency department--the DEED study. Discharge of elderly from emergency department. Age Ageing. 1998;27(6):697-702.
26. Arendts G, Fitzhardinge S, Pronk K, Hutton M, Nagree Y, Donaldson M. Derivation of a nomogram to estimate probability of revisit in at-risk older adults discharged from the emergency department. Intern Emerg Med. 2013;8(3):249-54.
27. Banerjee J, Conroy S. Quality care for Older People with Urgent & Emergency Care Needs: The "Silver Book". College of Emergency Medicine, British Geriatrics Society, editors. London: http://www.bgs.org.uk/index.php?option=com_content&view=category&layout=blog&id=207&Itemid=888; 2012.

28. Grumbach K, Bodenheimer T, Grundy P. The Outcomes of Implementing Patient-Centered Medical Home Interventions: A Review of the Evidence on Quality, Access and Costs from Recent Prospective Evaluation Studies, August 2009. Washington DC: Patient-Centered Primary Care Collaborative, 2009.
29. Primary Health Care Advisory Group. Better Outcomes for People with Chronic and Complex Health Conditions. Canberra: Department of Health, Commonwealth of Australia, 2015 [Cited 12 Nov 2017]. Available from: http://www.health.gov.au/internet/main/publishing.nsf/Content/76B2BDC12AE54540CA257F72001102B9/$File/Primary-Health-Care-Advisory-Group_Final-Report.pdf.
30. Stephens A, Broome R. Patterns of low acuity patient presentations to emergency departments in New South Wales, Australia. Emerg Med Australas. 2017;29:283-90.
31. Council of Australian Governments (COAG). The National Health Reform Agreement - National Partnership Agreement on Improving Public Hospital Services, 2011. [Cited 12 Nov 2017]. Available from: http://www.federalfinancialrelations.gov.au/content/npa/health/_archive/national-workforce-reform/national_partnership.pdf.
32. Sullivan C, Staib A, Khanna S, Good N, Boyle J, Cattell R, et al. The National Emergency Access Target (NEAT) and the 4-hour rule: time to review the target. Med J Aust. 2016;204(9):354.e1-e5

Table 1: Metropolitan Melbourne public hospital ED presentations by patients aged ≥70 years during 2008 and 2012, by potentially avoidable general practice (PAGP)-type presentation status, N (%; 95% confidence interval)

	PAGP-type ED presentations		non-PAGP-type ED presentations	
	2008	**2012**	**2008**	**2012**
Number of ED presentations†	**20,893 (14.9; 14.7-15.1)**	**20,346 (12.8; 12.7-13.0)**	**119,667 (85.1; 84.9-85.3)**	**138,077 (87.2; 87-87.3)**
Gender				
Female	11,068 (53; 52.3-53.7)*	10,538 (51.8; 51.1-52.5)*	65,206 (54.5; 54.2-54.8)*	74,645 (54.1; 53.8-54.3)*
Age group (years)				
70-79	13,295 (63.6; 63.0-64.3)*	12,604 (61.9; 61.3-62.6)**	53,697 (44.9; 44.6-45.2)*	60,663 (43.9; 43.7-44.2)**
80-89	6,742 (32.3; 31.6-32.9)	6,880 (33.8; 33.2-34.5)	51,760 (43.3; 43-43.5)	61,172 (44.3; 44.0-44.6)
90-99	845 (4.1; 3.8-4.3)	846 (4.2; 3.9-4.4)	13,935 (11.6; 11.5-11.8)	15,701 (11.4; 11.2-11.5)
100+	11 (0.1; 0-0.1)	16 (0.1; 0-0.1)	275 (0.2; 0.2-0.3)	541 (0.4; 0.4-0.4)
Patient's usual accommodation				
Private residence	20,016 (95.8; 95.5-96.1)*	19,684 (96.7; 96.5-97.0)**	96,675 (80.8; 80.6-81.0)*	114,510 (82.9; 82.7-83.1)**
Residential facility	393 (1.9; 1.7-2.1)	299 (1.5; 1.3-1.6)	16,260 (13.6; 13.4-13.8)	18,778 (13.6; 13.4-13.8)
Other/Unknown	484 (2.3; 2.1-2.5)	363 (1.8; 1.6-2.0)	6,732 (5.6; 5.5-5.8)	4,789 (3.5; 3.4-3.6)
Socioeconomic status (quintiles)‡				
1,2 – *Most Disadvantaged*	6,051 (29.0; 28.3-29.6)*	6,077 (29.9; 29.2-30.5)**	32,967 (27.5; 27.3-27.8)*	41,153 (29.8; 29.6-30.0)**
3	2,661 (12.7; 12.3-13.2)	2,964 (14.6; 14.1-15.1)	15,450 (12.9; 12.7-13.1)	20,463 (14.8; 14.6-15.0)
4,5 – *Least Disadvantaged*	9,998 (47.9; 47.2-48.5)	11,195 (55.0; 54.3-55.7)	61,377 (51.3; 51.0-51.6)	76,002 (55.0; 54.8-55.3)
Missing data	2,183 (10.4; 10.0-10.9)	110 (0.5; 0.4-0.6)	9,873 (8.3; 8.1-8.4)	459 (0.3; 0.3-0.4)

Source of referral to ED				
Self/family/friends	18,154 (86.9; 86.4-87.3)*	18,054 (88.7; 88.3-89.2)**	97,440 (81.4; 81.2-81.6)*	119,106 (86.3; 86.1-86.4)**
Local medical officer	2,151 (10.3; 9.9-10.7)	1,893 (9.3; 8.9-9.7)	9,119 (7.6; 7.5-7.8)	7,936 (5.7; 5.6-5.9)
Other	588 (2.8; 2.6-3.0)	399 (2.0; 1.8-2.2)	13,108 (11.0; 10.8-11.1)	11,035 (8.0; 7.8-8.1)
Length of stay in ED (hours) – median (IQR)	2.9 (1.6 - 4.6)*	2.9 (1.6 - 4.3)**	6.5 (4.0 - 10.2)*	5.9 (3.8 - 9.4)**
Destination or status on departure from ED				
Left the ED "at risk"	1,923 (9.2; 8.8-9.6)*	1,861 (9.1; 8.8-9.5)**	1,144 (1.0; 0.9-1.0)*	1,326 (1.0; 0.9-1.0)**
Died / dead on arrival	0 (0; 0-0)	0 (0; 0-0)	1,551 (1.3; 1.2-1.4)	1,095 (0.8; 0.7-0.8)
Admitted to a hospital facility	0 (0; 0-0)	0 (0; 0-0)	82,108 (68.6; 68.4-68.9)	104,977 (76; 75.8-76.3)
Home	18,863 (90.3; 89.9-90.7)	18,336 (90.1; 89.7-90.5)	30,262 (25.3; 25.0-25.5)	27,943 (20.2; 20.0-20.4)
Residential care facility	98 (0.5; 0.4-0.6)	141 (0.7; 0.6-0.8)	1,847 (1.5; 1.5-1.6)	2,715 (2.0; 1.9-2.0)
Other	9 (0; 0-0.1)	8 (0; 0-0.1)	28 (0; 0-0)	21 (0; 0-0)
Missing data	0 (0; 0-0)	0 (0; 0-0)	2,727 (2.3; 2.2-2.4)	0 (0; 0-0)

* Statistically significant difference between PAGP- and non-PAGP-type presentation groups in same year ($p < 0.05$)

** Statistically significant difference between PAGP- and non-PAGP-type presentation groups in same year ($p < 0.001$)

† The percentages in this row represent a proportion of all ED presentations for a particular year

‡ Socio-economic status quintiles were generated using the Australian Bureau of Statistics SEIFA 2006 Index of Relative Socio-Economic Disadvantage deciles and the postcode for the usual place of residence of the patient. The *Most Disadvantaged* SES category represents the areas containing the 40% of the population with the most disadvantage, and the *Least Disadvantaged* SES category represents the areas containing the 40% of the population with the least disadvantage.

Source: Victorian Emergency Minimum Dataset (VEMD)

Table 2: Frequency of presentations to metropolitan Melbourne public hospital EDs by patients aged ≥ 70 years, 2008 and 2012, N (%)

	2008		2012	
Metropolitan Melbourne population aged ≥70 years	N=353,010		N=389,206	
	No. patients*	No. ED visits	No. patients*	No. ED visits
No. individual patients	84,600	140,560	94,407	158,423
No. patients attending ED x 1	54,615 (64.6)	54,615 (38.9)	60,346 (63.9)	60,346 (38.1)
Rate/1000 population	154.7	-	155	-
No. patients attending ED x 2 - 3	24,001 (28.4)	54,723 (38.9)	27,150 (28.8)	62,113 (39.2)
Rate /1000 population	68	-	69.8	-
No. patients attending ED ≥ x 4	5,984 (7.1)	31,222 (22.2)	6,911 (7.3)	35,964 (22.7)
Rate/1000 population	17	-	17.8	-

* Significant difference between 2008 and 2012 in numbers of presenting patients ($p < 0.05$)

Source: Victorian Emergency Minimum Dataset (VEMD)

Table 3: Frequency of presentations by patients aged ≥70 years to metropolitan Melbourne public hospital EDs during 2008 and 2012, by PAGP-type presentation status

	PAGP-type presentations				non-PAGP-type presentations			
	2008		**2012**		**2008**		**2012**	
Metropolitan Melbourne population aged ≥70 years	N = 353,010		N = 389,206		N = 353,010		N = 389,206	
	No. Patients (%)	No. ED visits (%)	No. Patients (%)	No. ED visits (%)	No. Patients (%)	No. ED visits (%)	No. Patients (%)	No. ED visits (%)
No. of individual patients*	16,886	20,893	16,840	20,346	74,857	119,667	85,036	138,077
No. patients attending ED x 1	14,094 (83.5%)	14,094* (67.5%)	14,269 (84.7%)	14,269* (70.1%)	49,882 (66.9%)	49,882* (41.7%)	55,897 (65.9%)	55,897* (40.5%)
Rate/1000 population	39.9		36.7		141.3		143.6	
No. patients attending ED x 2 – 3	2,544 (15.1%)	5,546* (26.5%)	2,399 (14.2%)	5,211* (25.6%)	20,347 (27.3%)	46,202* (38.6%)	23,617 (27.8%)	53,846* (39.0%)
Rate/1000 population	7.2		6.2		57.6		60.7	
No. patients attending ED ≥ x 4	248 (1.5%)	1,253* (6.0%)	172 (1.0%)	866* (4.3%)	4,628 (6.2%)	23,583* (19.7%)	5,522 (6.5%)	28,334* (20.5%)

Rate/1000 population	0.7	0.4	13.1	14.2

* Significant difference in presentations between 2008 and 2012 ($p < 0.001$)
Source: Victorian Emergency Minimum Dataset (VEMD)