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Unplanned early return to the emergency department by older patients: the Safe Elderly Emergency Department Discharge (SEED) project

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Abstract

Background: an emergency department (ED) visit is a sentinel event for an older person, with increased likelihood of adverse outcomes post-discharge including early re-presentation.
Objectives: to determine factors associated with early re-presentation.

Methods: prospective cohort study conducted in the ED of a large acute Melbourne tertiary hospital. Community-dwelling patients ≥65 years were interviewed including comprehensive assessment of cognitive and functional status, and mood. Logistic regression was used to identify risk factors for return within 30 days.

Results: nine hundred and fifty-nine patients, median age 77 years, were recruited. One hundred and forty patients (14.6%) re-presented within 30 days, including 22 patients (2.3%) on ≥2 occasions and 75 patients (7.8%) within 7 days. Risk factors for re-presentation included depressive symptoms, cognitive impairment, co-morbidity, triaged as less urgent (ATS 4) and attendance in the previous 12 months, with a decline in risk after 85 years of age. Logistic regression identified chronic obstructive pulmonary disease (OR 1.78, 95% CI 1.02–3.11), moderate cognitive impairment (OR 2.07, 95% CI 1.09–3.90), previous ED visit (OR 2.11, 95% CI 1.43–3.12) and ATS 4 (OR 2.34, 95% CI 1.10–4.99) as independent risk factors for re-presentation. Age ≥85 years was associated with reduced risk (OR 0.81, 95% CI 0.70–0.93).

Conclusion: older discharged patients had a high rate of early re-presentation. Previously identified risk factors—increased age, living alone, functional dependence and polypharmacy—were not associated with early return in this study. It is not clear whether these inconsistencies represent a change in patient case-mix or strategies implemented to reduce re-attendance. This remains an important area for future research.

Introduction

Older people aged 65 or more are disproportionately represented in emergency departments (EDs), with evidence of an acceleration in attendances over the past decade beyond that accounted for by population ageing [1–3]. This is pertinent, as an ED visit is defined as a sentinel event for an older person [4]; often associated with functional decline, reduced health-related quality of life, death and other adverse outcomes after discharge, including increased risk of early re-presentation [5–7].

Older people often have complex medical and psycho-social issues that lead to longer times spent in the ED and increased likelihood of hospital admission to best understand the nature of their presenting complaint [3]. This adds to pressures facing ED clinicians and administrators regarding patient flow and time targets, while safeguarding high-quality care.

Optimal care of older patients in ED not only includes management of the acute presenting illness or injury, but also effective management of discharge to the community [8]. Early unplanned re-presentation is one of the indicators used to measure quality and safety of care provided by an ED [9], with evidence indicating that up to 20% of older people return within 1 month [10]. Therefore, optimal ED care would logically include assessment of risk of early re-presentation.

In this context, we aimed to identify the predictors of early and frequent re-presentation within 30 days of an ED visit in an older Australian population. This study is part of the Safe Elderly Emergency Discharge (SEED) project [11], which aims to develop a best practice model of care for older patients presenting to EDs.

Methods

Study design and setting

This was a prospective study of a cohort of emergency patients attending The Alfred Hospital, a 638-bed tertiary referral public hospital in metropolitan Melbourne (population 4.35 million in 2014) [12]. The ED comprises 8 trauma/resuscitation bays, 19 ED and 6 fast track cubicles, 18 short stay beds and has an annual census of ~59,000 presentations per year.

Acute medical care is provided in Australian EDs with no out-of-pocket costs for patients. Fast track provides treatment of ambulant non-complex (single system problem) patients who can be discharged within <2 h. Short Stay Units (SSU) provide care for patients requiring observation and/or specialist assessment who are anticipated to be discharged home within 24 h.

Participants

The cohort comprised community-dwelling patients aged ≥65, who attended ED between 31st July 2012 and 30th November 2013. Patients were recruited on week days between 0800–1900 and 0900–1300 on Saturdays throughout the study period.

Eligible patients were triaged as categories 2–5 on the Australasian Triage System (ATS), which equates to being assessed as having an emergent, urgent, semi-urgent or non-urgent condition[13], determined by emergency clinicians as medically stable; anticipated to be discharged home by the Consultant Emergency Physician within 48 h of arrival from ED, SSU or Acute Medical Unit (AMU); and willing and able to participate in follow-up telephone calls over a 6-month period conducted in English. Patients were excluded if they had severe cognitive impairment as determined by screening with the Mini Mental State Examination (MMSE < 10) [14], resided in a high-level nursing care home or left ED before being seen for treatment.

Informed verbal consent was provided by the patient and/or a nominated informant. Ethical approval was provided by the Human Research Ethics Committees of the Alfred Hospital and Monash University.

Methods of measurement

A structured interview was conducted by study staff in English with the patient or their nominated informant in the ED, SSU or AMU. The survey was developed by a multidisciplinary committee based on review of the literature and previously developed questionnaires. It encompassed questions about demographic and social information including age, sex, cultural background, living arrangements, involvement of community care or support services, medication management and accessibility to their general practitioner (GP); health service use over the previous 12 months; and information pertaining to the current ED visit: reason, referral source, means of transport and health service use within the previous 2 weeks. Functional status was evaluated with validated tools, including: cognition-MMSE [14]; independence with personal activities of daily living (ADL) and instrumental ADL the Barthel Index [15] and Lawton Instrumental ADL [16], currently and 2 weeks before the presenting illness/injury; falls risk-Balance Confidence Level (ABC-6) [17]; mood-Geriatric Depression Scale-5 items (GDS-5) [18] and the Identification of Seniors at Risk (ISAR) screening tool [19]. Additional information was collected from the ED medical record including triage level, principal and co-morbid diagnoses using the International Classification of Diseases, 10th Revision, Australian Modification (ICD-10-AM), number of current prescription and over-the-counter medications, ED care pathway, and time and day of arrival and discharge. The baseline interview was considered to represent the index ED visit for these patients.

Outcomes

The primary outcome measure was any unplanned early re-presentation to ED as recorded on the hospital's administrative database. Frequent return within this time period was examined as a secondary outcome. We defined early return as re-presentation within 30 days of the index visit and frequent return as ≥2 attendances within the 30 days, excluding the index visit.

Data analysis

Re-presentation rates among the SEED cohort were measured at 7 and 30 days. We investigated potential associations between patient characteristics and risk of re-presentation within 30 days using logistic regression. The association between the probability of re-presentation and continuous variables was first analysed using non-parametric Lowess regression. Subsequent models employed the Lowess curve to appropriately model association between the predictors and probability of re-presentation. Univariable logistic regression models were fitted to each patient characteristic, and a subsequent multivariable model included those predictors with a P-value of <0.1 in the univariable models. Significance was considered as $P < 0.05$.

Representativeness of the cohort

We compared characteristics of the SEED cohort against the first presentation of all other patients aged ≥65 and triaged as ATS 2–5 who attended ED during the study period, using the hospital's administrative database. Continuous variables were compared using a Student t-test, categorical variables were compared using the χ^2 distribution and proportions were compared using an exact binomial test.

Results

Study cohort

A total of 959 patients were recruited during the study period for follow-up, as shown in Supplementary data, Appendix 1, available in *Age and Ageing* online. Table 1 summarises selected characteristics of the cohort. Just over half were female ($n = 535$, 56%); median age was 77 years (IQR 70–84), with 213 (22%) of the cohort aged ≥85. The majority were born in Australia or New Zealand ($n = 535$, 56%), with 435 (45%) living alone.

Almost half the cohort ($n = 457$, 47.7%) had at least one co-morbid condition (median no. = 0, IQR 0–1), and the median number of medications was 6 (IQR 3–9). The most frequent principal diagnoses were chest pain, collapse/fainting, joint pain/arthralgia, dizziness/vertigo and abdominal pain/colic.

One in four ($n = 245$, 26%) were cognitively impaired, and 293 (31%) were dependent in one or more personal ADLs 2 weeks prior to the ED visit. Regular, formal or informal care assistance in the home was given to 374 patients (39%). One-third reported that they walked with the assistance of an aid, and 223 (23%) reported having fallen on ≥2 occasions in the previous 12 months. Over 25% of patients ($n = 259$) presented with depressive symptoms or reported having depression.

The majority ($n = 810$, 84%) were seen by the allied health team during the ED care episode, and 862 (89%) were transferred to the SSU for further evaluation with prior to discharge home.

Comparison of the SEED population with other older ED attendees during the study period indicated the cohort was similar regarding age, ambulance use and overnight arrival; but was more likely to be Australian born ($P < 0.001$), speak English as their preferred language ($P < 0.001$) and triaged as less urgent ($P < 0.001$).

Rate and frequency of early return

In the month following discharge, 140 patients (14.6%) made at least one unplanned re-presentation, including 75 patients (7.8%) within the first 7 days. This included 22 patients (2.3%) re-attending frequently. (Supplementary data, Appendix 2, available in *Age and Ageing* online).

Of the 140 returning patients, 17 (1.8%) were admitted to hospital for a multiday stay, median length of stay 4 days (IQR: 2–8). The majority of these ($n = 10$) returned with

Table 1. Selected characteristics of SEED study cohort

	n = 959	%
Demographic characteristics		
Age		
Median (IQR)	77 (70–84)	
65–74 years	396	41
75–84 years	350	37
≥85 years	213	22
Sex		
Female	535	56
Living arrangements		
Lives alone	435	45
Care assistance (formal/informal) in place	374	39
Has a regular GP	936	97.5
Clinical characteristics		
Ambulance arrival	554	58
Triage category upon ED arrival		
ATS 2	105	11
ATS 3	457	48
ATS 4/5	388	40
Top 5 principal ED diagnoses		
Chest pain	137	15
Collapse/faint	63	7
Joint pain/arthralgia	37	4
Dizziness/vertigo	37	4
Abdominal pain/colic	32	4
Number of medications		
Median (IQR)	6 (3–9)	
Number of co-morbidities		
Median (IQR)	0 (0–1)	
Independently mobile unaided	638	67
Falls history (≥2) in previous 12 months	223	23
Balance—confidence level		
(ABC-6 <50%)	364	38
Poor/fair self-rated health		
Premorbid (2 weeks previously)	203	21
Cognition		
Mild impairment (Mini Mental State Examination (MMSE) (20–23)	170	18
Moderate impairment (MMSE 10–19)	75	8
Functionally independent in continence, personal, mobility ADLs		
Premorbid (2 weeks previously)	666	69
Functionally independent in instrumental ADLs		
Premorbid (2 weeks previously)	593	62
Mood		
Symptoms of depression (GDS-5 ≥2)	259	27
ED attendance in previous 12 months (self-reported)	438	46
ED processes/model of care		
Allied Health involvement	810	84
Transfer for observation to SSU/AMU before discharge	862	89
ED LOS (h)		
Median (IQR)	3.26 (2.2–3.9)	

same or related condition to the index primary problem. One patient died in hospital, 11 were discharged home and 5 were transferred for inpatient rehabilitation.

Of the 22 patients who returned ≥2 occasions, the majority (n = 15) returned with the same or a related problem to that at the index presentation, with 9 patients admitted on their last re-presentation within the month for a multiday stay.

Risk factors for early return

The univariate and multivariate association between the primary outcome of an unplanned re-presentation within 30 days and potential risk factors is summarised in Table 2. Factors with a significant association included mild or moderate cognitive impairment (OR 1.60, 95% CI 1.03–2.49; OR 1.99, 95% CI 1.10–3.63, respectively), pre-existing co-morbid condition (OR 1.62, 95% CI 1.13–2.32), another ED visit in the previous year (OR 2.45, 95% CI 1.69–3.55) or being triaged as less urgent (ATS 4) for this visit (OR 2.04, 95% CI 1.01–4.14). Patients with depressive symptoms were 48% more likely to return within 1 month (OR 1.48, 95% CI 1.02–2.17).

The association with age demonstrated a 14% decline in risk in the relative odds of re-presentation within 30 days for every year over the age of 85 years (OR 0.86, 95% CI 0.76–0.97).

Factors that were still significantly predictive after we adjusted for confounding with multivariate regression were COPD (OR 1.78, 95% CI 1.02–3.11); moderate cognitive impairment (OR 2.07, 95% CI 1.09–3.9); ED attendance in the previous 12 months (OR 2.11, 95% CI 1.43–3.12) and ATS 4 upon arrival for this visit (OR 2.34, 95% CI 1.1–4.99). For every year over age 85 years, there was a 19% decline in the relative odds of re-presentation within 30 days (OR 0.81, 95% CI 0.7–0.93).

Discussion

Demand for emergency care in Australia is steadily increasing 32% over the last decade [20]. The fastest growth is by people aged ≥65 [2]. We demonstrated a high rate of unplanned re-presentation in community-dwelling patients aged ≥65 who were discharged directly home from ED. Factors independently associated with early unplanned return included cognitive impairment, COPD, ED presentation in the previous 12 months and lower triage category. The oldest old aged ≥85 were less likely to re-visit. These outcomes likely reflect the challenge of managing complex geriatric syndromes in the dynamic time critical environment of the ED. They also highlight important subgroups for whom novel interventions should be targeted to decrease re-presentation risk.

Early ED return is inevitable and even encouraged in some frail older patients. Return rates in similar populations discharged directly home range from 13.1 to 18.6% [19, 21–24], with the highest rates reported in European studies [22, 24]. Our cohort's unplanned revisit rate is comparable to that reported by a recent Australian study [23]. In common with our findings, reasons for early re-presentation are previously reported to be more likely for the same diagnosis [19, 21, 25, 26]. In addition, 12% of those who re-attended within the month required inpatient admission, which falls within the 3–25% range reported by other studies [6]. Patients with COPD had increased relative odds of ED re-presentation; so discharge planning with direct linkage to COPD support services may help mitigate this [27].

Table 2. Factors and their association with unplanned early return to ED

Analysis	Univariable		Multivariable	
Variable	OR	95% CI	OR	95% CI
Male	1.11	0.77–1.59		
Lives alone	1.13	0.79–1.62		
Triage category				
2	Reference		Reference	
3	1.46	0.72–2.96	1.68	0.79–3.59
4	2.04	1.01–4.14	2.34	1.10–4.99
5	1.76	0.55–5.59	2.10	0.63–7.03
Weekend attendance	1.24	0.73–2.11		
Night-time arrival	0.56	0.15–2.08		
Age (years)	0.98	0.96–1.00		
Aged ≥85 years	0.86	0.76–0.97	0.81	0.70–0.93
English as preferred language	0.84	0.42–1.70		
Australian born	0.90	0.63–1.30		
Mini Mental State Examination (MMSE)				
Normal (>24)	Reference		Reference	
Mild impairment (20–23)	1.60	1.03–2.49	1.56	0.98–2.48
Moderate impairment (10–19)	1.99	1.10–3.63	2.07	1.09–3.90
GDS-5 ≥2 (possible depression)	1.48	1.02–2.17		
Personal ADLs (Premorbid) (<20)	1.20	0.82–1.77		
Instrumental ADLs (Premorbid) (<8)	1.22	0.85–1.76		
ED visit in previous 12 months	2.45	1.69–3.55	2.11	1.43–3.12
Self-rated health poor/fair				
Today	1.61	1.12–2.31	1.30	0.89–1.92
In general	1.35	0.89–2.04		
Receives care assistance/support	1.21	0.84–1.73		
Polypharmacy				
>9 medications	1.00	0.63–1.59		
>12 medications	1.10	0.93–1.31		
Fallen within the previous 12 months	1.28	0.85–1.92		
Ambulance transport for index visit	0.82	0.57–1.17		
Pre-existing co-morbid conditions				
Any co-morbidity	1.62	1.13–2.32		
Diabetes	1.50	0.97–2.32	1.50	0.95–2.37
Rheumatoid arthritis	2.70	1.15–6.32	2.49	1.00–6.22
COPD	1.86	1.10–3.14	1.78	1.02–3.11
Seen by Allied Health Team	0.78	0.49–1.25		

Risk factors in our cohort previously recognised by other studies include cognitive impairment [21, 23, 28], concurrent illness [19, 23, 24, 29] and previous use of ED [19, 23, 30]. Our finding that re-presentation was less likely with increasing age was unexpected and in contrast to others [23, 31]; although a recent New Zealand study [26] reported a similar finding. These older patients may have died or been transferred to a nursing care home. In addition, other previously identified predictors in similar cohorts, including living alone [23], functional dependence [21, 28], the presence of formal or informal support services [21, 24] and polypharmacy [23, 28] were not associated with re-presentation. This was in spite of one-quarter of our cohort being aged ≥85, with almost half living alone. Underlying factors that may have influenced this finding were the majority (69%) being functionally independent with personal and instrumental ADLs, and 97.5% having a regular GP.

The greatest risk associated with early re-presentation was in patients who were triaged as less urgent (ATS 4). Results about an association with triage level are conflicting; however,

a French study of non-admitted patients aged ≥75, recently identified a 1.3-fold increased likelihood of patients triaged as less acute (ATS 4/5) returning early [29]. The majority of studies reporting on predictors and risk factors for early return by older people were published in the 1990s, so this finding may be related to strategies since implemented to reduce re-attendance. There has also been a persistent rise in demand across the developed world for hospital-based emergency care by older people, beyond that accounted for by demographic changes [1, 2, 32]. This may reflect changes in case-mix and type of patients currently seeking care from EDs, which is supported by studies showing that changes in access to GP care influences reasons for using an ED [33]. Our finding supports the use of co-ordinated assessment of all older ED patients, regardless of apparent acuity, to identify any unmet needs that could benefit from targeted discharge planning and linkage with appropriate community services.

The second factor associated with a more than twofold increased risk was attendance in the previous 12 months. Reasons for attending ED are not completely explained by

severity or acuity of illness [34], with patients and families increasingly making the decision to seek health care from EDs. Contributing factors include underlying concerns regarding timely accessibility to primary care, as well as a preference and expectation for specialised hospital-based care [35–37]. There may be potential for development of specialist outreach services to divert such patients away from the ED.

Patients with moderate cognitive impairment were more than twice as likely to re-present. The ED environment is not always conducive to assessment of cognitive function. However, the strength of this risk factor highlights the importance of screening at the time of attendance, as cognitive impairment is a hidden co-morbidity affecting every stage of the patient's management, from obtaining a history, consent for diagnostic testing and engagement in the treatment plan. Sixty per cent of older patients report not understanding ED discharge information [38]. Therefore, communication with family and/or care givers and GP is also relevant to establishment of a safe discharge plan that ensures comprehension and follow-up of recommendations. The strength of this risk factor highlights a need for targeted interventions for patients with cognitive impairment that include seamless post-discharge support to help reduce return visits.

The strengths of this study include the prospective design, sample size and comprehensive nature of patient interviews. Recruitment was conducted over a 21 consecutive month period to avoid any selection bias arising from seasonal variation. In addition, we checked the hospital database to ensure capture of unplanned re-presentation dates, diminishing loss to follow-up or confounding by recall bias. Some limitations however should be considered. In cases where patients did not re-present to The Alfred, we relied on self-report ($n = 3$); which may have occurred more often, so our re-presentation rates may be conservative. Our cohort is not representative of the total older emergency population, rather a subgroup of discharged community-dwelling patients not requiring hospitalisation or surgery, and whose preferred language was English, as in other studies of predictors for ED return [19, 21, 23]. These two patient groups potentially have different factors associated with re-presentation risk, warranting investigation in future research. A strict protocol was followed for recruitment; however, patients were not included at random, so selection bias is an issue. Patients were recruited during day-time hours, Monday to Saturday, due to personnel resource limitations; however, evening arrivals were captured the following morning. This recruitment protocol was similar to other reported studies [5, 19, 23]. Furthermore, this is a single-site study conducted at a large metropolitan public hospital ED, so the findings are not generalisable to privately funded EDs or to regional settings.

In conclusion, older patients discharged home from ED had a high rate of early unplanned return. Previously, identified risk factors including older age, living alone, functional dependence or polypharmacy, were not associated with early re-presentation in this study, which may represent a change in patient case-mix, or the impact of strategies implemented to reduce ED return by patients with these risk factors. The

presence of cognitive impairment suggests that it is timely for further research into targeted interventions with ongoing case management to reduce re-presentation risk. ED attendance during the previous 12 months and categorisation as less urgent were significantly predictive, reinforcing the need for co-ordinated holistic assessment of all older patients in ED, referral and direct linkage with appropriate community services, alongside communication with family, caregivers and GPs, to mitigate risk of early return.

Key points

- Older patients have a high rate of unplanned early return to ED.
- Risk factors included cognitive impairment, previous ED attendance, and lower triage category.
- This highlights the need for co-ordinated assessment of all older patients, with timely referral and linkage for post-discharge care.

Supplementary data

Supplementary data mentioned in the text are available to subscribers in *Age and Ageing* online.

Conflicts of interest

None declared.

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