SPECIAL ARTICLE

An observational cohort study on geriatric patient profile in an emergency department in the Netherlands

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ABSTRACT

Background: Currently, Dutch emergency care systems focus on rapid emergency department (ED) patient management with short completion times, which may not meet specific geriatric care needs.
Methods: Six-week observational study in patients aged ≥70 years, attending the ED of VU University Medical Center (VUmc, Amsterdam, the Netherlands) during weekday peak presentation times (10 AM - 10 PM).
Results: During six weeks, a total of 183 patients aged ≥70 years attended the ED, of which 117 (63.9%) presented during weekday peak hours. One hundred patients with a median age of 81 (min-max; 70-97 years) were prospectively observed. The majority presented with fall-related complaints (30%), multiple comorbidities (≥3 in 50.0%) and polymedication (≥5 in 53.7%). Mean ED length of stay was 175.8 (range 20-399) minutes (n=98). Of the patients discharged to their usual residence prior to the ED visit (n=58), 36.2% returned to our ED within 30 days; one in five of these patients had initially presented with a fall.
Conclusion: In this study, fall-related injuries were the most frequent presenting complaint during weekday peak presentation times in 70-plus patients. Of these, one in five discharged from the ED returned within 30 days. Our emergency care system may not adequately cover comprehensive ED geriatric assessment, or provide sufficient outpatient care after ED home discharge. We believe that EPs should be more aware of the complex problems encountered in acute geriatric patients and address follow-up care pathways such as geriatric outpatient services, more often in frail elderly patients discharged home.

KEYWORDS

Emergency department, acute care, geriatric, fall-risk, assessment

INTRODUCTION

Older patients represent an increasing proportion of emergency department (ED) populations.[1-3] Due to multiple comorbidities, polymedication and atypical presenting symptoms,[4] emergency care for the older patient is complicated and multifaceted. The current focus in Dutch emergency care is on rapid patient management with short (four-hour) completion times,[5,6] with care being delivered by certified emergency physicians, junior doctors, residents or consultants of different medical specialities.[7] Because of complex care needs, acute geriatric care requires a more integrated approach. As such, multiple studies on patterns of geriatric emergency care use have been conducted.[4,8-12] Due to international differences in organisational models of emergency care, these studies may not apply to the Dutch situation.
With this prospective observational study, we planned to explore the needs and care delivery in older patients presenting to the ED of a university hospital in the Netherlands, in order to pinpoint components deserving special attention.

MATERIALS AND METHODS

We performed a six-week exploratory prospective observational study from 21 November 2011 to 2 January 2012 at the ED of VU University Medical Center (VUmc) in Amsterdam, the Netherlands. VUmc is a 733-bed university medical centre with a top level ED, providing care for approximately 32,000 patients per year. During the period this study was conducted, the ED was staffed with certified emergency and acute (internal medicine) physicians, junior doctors, residents and specialist consultants. The only inclusion criteria were age ≥70 years, and the capability of the patient to provide informed consent. The nature of

the study was explained to the patients and subsequently written informed consent was obtained according to the principles of the Declaration of Helsinki. Critically ill patients presenting at the 'critical care room'[13] were not eligible for inclusion.
Study approval was provided by the local research ethics committee.

Data collection
All study patient data were collected by a single observer, a final-year medical student (QT) with clinical experience within the field of geriatric medicine, who was trained and supervised by a geriatric consultant (OJV) and a researcher involved in geriatric research with considerable clinical experience (EJMS). The observer was present in the ED on weekdays between 10 AM and 10 PM which have previously been shown to be the peak presentation times at the ED of VUmc.[5] Patient characteristics, including age, gender, comorbidity, outpatient medication use, residence before admission, cognitive function and presence of delirium in the ED, and information on adequacy of acute care, including presenting symptoms, referring specialist, consulting specialist(s), ED length of stay, ED disposition, and unplanned 30-day return visit, were extracted from paper-based and electronic medical patient records (computer system 'iSOFT Mirador') by the observer. Polymedication was defined as using five or more prescription drugs in patients for whom current medications could be checked against a current outpatient medication list obtained by the emergency physician via the loco regional pharmacy. Data on cognitive function and delirium were extracted from the patient's medical records, as well as prospectively collected by the observer with standardised observer-rated screening instruments (see next section). If the observer had any doubts about the cognitive assessment, a supervisor was consulted. ED length of stay was defined as the time spent in the ED from the moment of presentation until the moment of ED discharge, data which were extracted from the electronic patient registration system ('Medical Office'). 'ED home discharge' was defined as discharge back to the patient's residence prior to ED presentation. The VUmc electronic medical patient record of each participant was checked 30 days after initial ED presentation to evaluate unplanned repeat ED visits.

Standardised screening instruments for cognitive function and delirium
In order to objectively evaluate cognitive function and delirium, five validated assessment tools were used: 6-item Cognitive Impairment Test (6-CIT),[14] VMS delirium risk questions,[15] Confusion Assessment Method (CAM)[16] and delirium criteria according to the Diagnostic and Statistical Manual of Mental Disorders – fourth edition (DSM-IV criteria).[17]

Presence of cognitive impairment (CI) was directly assessed by the observer using the 6-CIT with a score ≥11/28 indicating CI.[14,18] Patients were screened for delirium risk with the VMS delirium-risk questions (score ≥1 indicating increased risk of developing in-hospital delirium).[15] To assess whether delirium symptoms were present in the ED, a shortened Dutch version of the CAM was used.[19] The CAM is a standardised tool which includes four features that enable non-psychiatrically trained clinicians to identify delirium and distinguish those symptoms from other cognitive disorders. Delirium was diagnosed according to the DSM-IV criteria.[17] The results of these tests were blinded to the physician responsible for the patient's treatment.

Statistical analysis
All statistical analyses were performed with Microsoft Excel 2003 and IBM® SPSS Statistics 20. Descriptive statistics were used to calculate median and means for patient characteristics data. The independent samples t-test was used for group statistics to calculate differences in ED length of stay for patients evaluated by one and two or more medical specialists. Two-tailed p values <0.05 were considered to indicate a statistically significant difference between those two groups.

RESULTS

Mean monthly visits and subsequent hospital admissions over the past 20 years of patients aged ≥70 years at VUmc are represented in *figure 1*. During this six-week study period, 183 patients aged ≥70 attended the ED, of which 66 presented outside weekday peak presentation times (10 PM to 10 AM). Of the remaining 117 patients, 14 presented to the critical care room, and three refused to participate, resulting in the inclusion of 100 patients for this observational study (*figure 2*).

Patient characteristics and presenting problems (*table 1*)
The median age of the participants was 81 (min-max; 70-97) years, 35% were men. Prior to ED presentation, 86% were living independently at home, and the majority were referred by their general practitioner (44%). The mean number of comorbidities per patient with a known medical history (n=94) was 3.04 (SD ±1.9; range 0-8). Fall-related injuries were the most common presenting symptom (30%).

Polymedication (*table 2*)
The treating ED physicians had access to a current outpatient medication list in 82 participants. The mean number of prescribed medications per patient was 5.3 (SD ±3.3; range 0-14). Polymedication (≥5 prescribed medications) was present in 53.7%.

Figure 1. *Mean monthly ED visits and subsequent hospital admissions of patients aged ≥70 years at VU University Medical Center (VUmc), Amsterdam, the Netherlands 1992-2011*

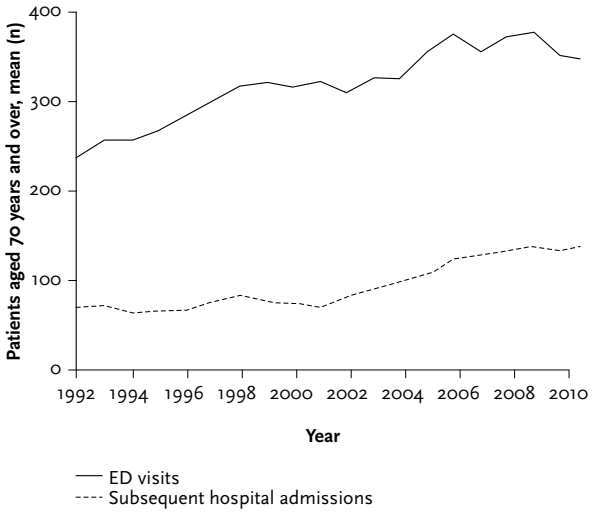

Figure 2. *Study flowchart*

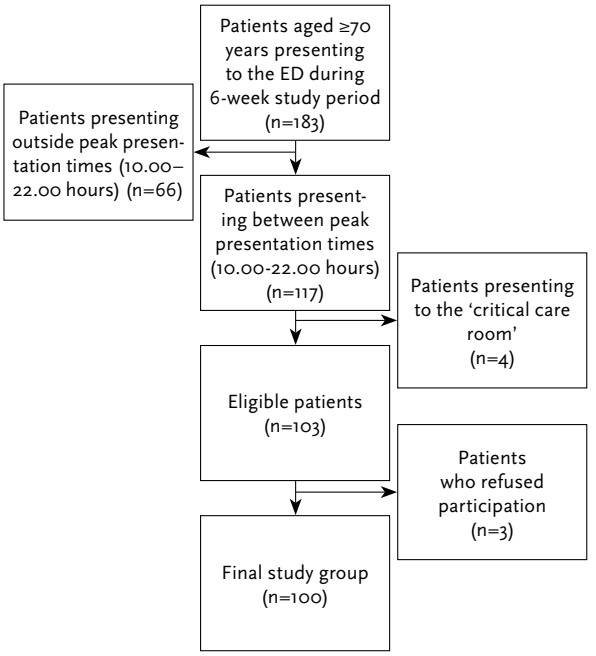

Table 1. *Study population characteristics and presenting problems*[¥]

Median age, years (min-max)	81 (70-97)
Male, %	35
Residence	
Independent at home	86
Assisted living	7
Nursing home	4
Rehabilitation centre	3
Comorbidities* (n=94), n	
Mean per patient (±SD; range)	3.04 (±1.9; 0-8)
≥3 comorbidities	47
Cardiovascular	85
Malignancy	30
Cerebrovascular	29
Endocrine disorder	20
Neuropsychiatric	16
COPD	14
Renal failure	12
Musculoskeletal	7
ED referral	
General practitioner	44
Self-referral	30
Emergency services	24
Nursing home physician	2
Presenting problems	
Falls	30
Shortness of breath	13
Neurological symptoms	10
General malaise	9
Abdominal pain	8
Cognitive or functional decline	6
Fever	6
Other±	18

[¥]Percentage (%) in the total study population (n=100), unless noted otherwise; *Multiple comorbidities per patient. Most frequent were: cardiovascular including (chronic) heart failure, hypertension, intermittent claudication, abdominal aortic aneurysm, and deep vein thrombosis; cerebrovascular including transient ischaemic attack (TIA), and cerebrovascular attack (stroke); endocrine disorders including diabetes and thyroid disease; neuropsychiatric including epilepsy, dementia, and psychological problems; ±including anaemia, melaena, mastitis, epistaxis, rectal bleeding, renal failure, pain/swelling/redness extremity, urine retention, minor injuries not related to falls.

Cognitive impairment and delirium (*table 3*)

In 16% of the participants CI was documented in the medical history, and included subtypes of dementia, Alzheimer's disease and Korsakoff's syndrome. Prospective evaluation of cognitive problems with the observer-rated 6-CIT (n=98) indicated signs of CI in 28.6%. The presence of delirium in the ED was monitored with the CAM, and delirium diagnosis was conclusive according to the DSM-IV criteria in 9%.

ED care delivery and disposition (*table 4*)

Mean ED length of stay in this cohort was 181.3 (SD ±100; range 20-720) minutes, and was registered in all but one patient (n=99). One patient stayed in the ED overnight (720 minutes) because of nursing home transfer problems. Excluding this patient, mean ED length of stay was 175.8 (SD ±84.1; range 20-399) minutes (n=98). Compared with clinical evaluation by one medical specialist (n=83),

Table 2. *Polymedication*

Mean prescribed medications*, n (±SD; range)	5.3 (±3.3; 0-14)
≥ 5 medications, n (%)	44 (53.7)
< 5 medications, n (%)	38 (46.3)

***Based on the availability of current outpatient medication lists via the loco regional pharmacy (n=82).**

Table 3. *Cognitive impairment and delirium¥*

Documented in medical record, n	16
Observer rated with the 6-CIT (n=98), n (%)	28 (28.6)
Delirium	9

¥Prevalence in the total study population (n=100), unless otherwise noted.

Table 4. *ED care delivery and disposition**

Mean ED LOS# (n=98), minutes (±SD; range)	175.8 (±84.1; 20-399)
Consulting specialists per patient§ (n=98)	
One, n (%)	83 (84.7)
Two or more, n (%)	15 (15.3)
ED diagnosis (n=100)	
Care problem	2
Cerebrovascular event	5
Decompensated heart failure	5
Fracture after fall	17
Infection	17
Other$	54
ED disposition	
Home discharge**	53
Hospital admission^	42
Nursing home	3
Rehabilitation centre	2
30-day ED return visit after ED discharge (n=58), n (%)	21 (36.2)
Initial presentation with falls, n (%)	4 (19.0)

***Percentage (%) in the total study population (n=100), unless noted otherwise; #ED length of stay (LOS) was not registered in one patient, and one other patient had to stay in the ED overnight because of nursing home transfer problems. Both were left out of the analysis; §including emergency physicians, internists neurologists, cardiologists, orthopaedists, surgeons, gastroenterologists, urologists, geriatricians, pulmonologists, oncologists, nephrologists, ear nose throat physicians, rheumatologists; $including contusion, COPD exacerbation, distorsion, neutropenic fever, hypoglycaemia, anaemia of unknown origin, cholecystolithiasis, diverticulitis, gastrointestinal bleeding, constipation, renal failure, aneurysm, atrial fibrillation, gastro-enteritis, medication side effect, haematoma, mastitis, benign paroxysmal positional vertigo, myelum metastases, hypothermia, hypercalcaemia, dislocated double J stent, empyema, commotion cerebri, epistaxis, skin injury, thrombocytopenia, peripheral vascular disease, lung tumour, cerebral vasculitis, infection after surgery (foot and knee), leg pain without a probable cause; **defined as discharge to usual residence prior to ED presentation; ^including 5 patients who were transferred and admitted to another hospital due to bed shortage at VUmc.**

consecutive patient evaluation by two or more consulting specialists (n=15) prolonged ED length of stay: 164.4 (SD ±78.9) and 238.9 (SD ±86.7) minutes (p=0.015) respectively. The overall admission rate was 42%. Nearly one in five (19%) participants with an unscheduled 30-day return visit to our ED after primary discharge (36.2%) initially presented with falls.

DISCUSSION

This exploratory prospective observational study was conducted to retrieve insight into the characteristics of geriatric patients presenting to the ED of a university hospital in the Netherlands. Some of the trends seen in our Dutch study population correspond to previous findings in studies conducted in the United States, Canada, United Kingdom and Belgium:[8,20-25] older patient ED visits and subsequent hospital admission rates are increasing, older patients are at risk for ED repeat visits, fall-related injuries represent a frequent reason for ED visits, multiple comorbidities and polymedication are the rule rather than the exception, and both CI and delirium are more prevalent than they are documented.

Illustrated by data retrieved from our hospital administrative database, ED visit rates for patients aged ≥70 years have steadily increased over the last two decades (*figure 1*). Due to a global increase in ED patient visits with a continuous threat of overcrowding, emergency care has focussed on rapid patient management with a four-hour maximum completion time target.[5,6,26,27] For the geriatric emergency population, this target may not benefit the quality of acute care delivered to them. A study conducted in the UK, evaluating the quality of ED care under the four-hour target between 2003 and 2006, showed that ED return visits and return visits ending in hospital admission increased in the elderly population (age ≥65 years), while visits of older patients were generally stable (annual change -0.19%; 95% CI -0.44% to 0.06%).[28,29] We found that 36.2% of the patients discharged to their usual residence prior to ED visit (n=58) returned to our ED within 30 days. Nearly one in five of these patients initially presented with fall-related complaints. Since patients were included during weekday peak presentation times and we merely evaluated unscheduled 30-day return visits to our ED, we believe our results may therefore underestimate the true extent of fall-related injuries in emergency care. Previous studies have shown that falls in the older adult are an important frailty indicator, and patients who have fallen in the past year are likely to fall again (likelihood ratio range, 2.3-2.8).[30] Even more important than the substantial health care costs,[31,32] falls are associated with adverse patient outcome.[33,34] Although different interventions such as fall risk and comprehensive geriatric assessment positively

affect the outcome for older patients after ED discharge,[35-37] general compliance to these guidelines is inadequate.[38,39] In 2008, the Hospital Patient Safety Program was initiated nationally in all Dutch hospitals to manage patient safety systematically according to ten different themes,[40] one of which addresses frailty in older adults. Its goal is to screen hospitalised patients aged 70 years and over on four frailty aspects (i.e. delirium, fall-risk, malnutrition and physical impairment), and to initiate preventative interventions when risk factors are identified. The relatively high rate of 30-day ED return visits in our study population triggered us to think about how we can improve follow-up for this particular group. Currently, facilities to profile and assess geriatric patients in an outpatient setting are available, but the contact between the EPs and these outpatient facilities are, in our opinion, suboptimal. What we would like to see happening is that EPs are trained in recognising geriatric patients likely to require additional care after ED home discharge, and that these patients are more often directly referred to a geriatric outpatient clinic. EPs and geriatric specialists should together develop a practical screening method to qualify patients in the acute care setting who may benefit from such a follow-up care pathway after ED home discharge. Also, directly approaching the patient's general practitioner to discuss at-home support services may also contribute to the quality of follow-up care after ED discharge, and with that, reduce the number of repeated ED visits or (unnecessary) hospital admissions.

The prevalence of CI (28.6%) and delirium (9%) in our exploratory study was similar to previous reports.[41] Although cognitive – in addition to or together with functional – decline prior to a geriatric adult ED visit is sometimes the only disease indicator, CI is not routinely screened by emergency room physicians.[42,43] Observations of our participants' medical records in addition to prospective cognitive function testing by the observer with the 6-CIT showed that CI was far more prevalent than it was documented: 28.6% (n=98) and 16% (n=100), respectively. Older patients with CI on admission are more prone to functional decline during the hospital stay.[44] The implications of cognitive dysfunction on elderly patient outcome underscore the importance of recognition and assessment of cognitive dysfunction in the ED. Although ED delirium prevalence was 9% in our survey, we only found enquiries on delirium symptoms in the participant's medical record when the referral question was (possible) delirium (n=3; 33.3%). Several publications have shown that although delirium is an important illness indicator and relatively prevalent among older ED patients, it is frequently not recognised as such.[45-48] Patients with unrecognised delirium may be sent home with untreated underlying medical conditions, leading to ED return visits and potentially increased morbidity or mortality.[49,50] In addition, delirious patients discharged home from the ED are more likely to miscomprehend discharge instructions,[51] leading to poor therapy adherence. Prior studies have reported in-hospital delirium incidence from 10-31% in comparable populations,[52-56] with in-hospital delirium contributing to prolonged hospital length of stay.[56,57] The lack of awareness, non-availability of practical screening tools and the typical fluctuation of delirium symptoms during the day, among other factors, make it difficult for acute physicians to observe delirium symptoms in the sometimes highly demanding ED. The substantial economic burden and negative patient outcome associated with delirium,[47,53,58-61] however, support the need to improve awareness of delirium among acute care physicians.

Several limitations of our exploratory study should be discussed. Because informed consent was required for this study, patients presenting to the critical care room could not be enrolled. A single trained observer was assigned to the data collection of this study, because of which we choose to merely include patients during peak presentation times (10 AM-10 PM) on weekdays. As such, a certain fraction of the older adults attending the ED during the six-week study period was missed (n=66, 36%), and unintended selection bias may have occurred. This was a single-centre exploratory prospective observational study, and one might question whether our results really reflect daily clinical practice in Dutch EDs. On the other hand, our results did generally correspond to previous published data. The aim of this observational study was therefore to pinpoint (unrecognised) components of geriatric emergency care in our hospital, and to create awareness about the frailty aspects in older patients in the Dutch emergency setting that require special attention. Despite the fact that our study population was relatively small and results were mainly observational in nature, it certainly informs us on some very relevant problems and systematic pitfalls which we believe must be tackled to optimise acute care for these particular patients.

CONCLUSION

In conclusion, our exploratory results demonstrated that falls were the most frequent presenting complaint during weekday peak presentation times in 70-plus patients. One in five patients presenting with falls returned to our ED within 30 days after initial home discharge. In addition, cognitive impairment and delirium were under-recognised. These results suggest that our emergency care system may not adequately cover comprehensive ED geriatric assessment, or provide sufficient outpatient care after ED discharge. Current European acute care systems focus on rapid patient management with care being delivered by many specialities. As a result, care delivery is fragmented, leading to poor care coordination. Reducing ED length

of stay by rapidly moving patients out of the ED may not result in optimal care delivery for the more frail geriatric patient population. We believe that EPs must be more aware of the complex problems encountered in acute geriatric patients and address follow-up care pathways such as geriatric outpatient services more often in frail elderly patients discharged home.

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