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Research paper

An observational, retrospective study of the length of stay, and its influencing factors, among elderly patients at the Emergency Department

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ABSTRACT

Aim: To examine the length of stay (LOS), and its influencing factors, at the Emergency Department (ED) among elderly patients admitted to the geriatric, internal medicine or neurology department.
Materials and methods: We retrospectively obtained data of all consecutive elderly patients admitted from the ED to the geriatric, internal medicine or neurology department in University Medical Centre Utrecht, and Rijnstate Hospital, a non-academic teaching hospital, between January 1st, 2013 and May 1st, 2013.
Results: In total 1028 patients met the inclusion criteria. The median LOS at the ED was 243 minutes (range: 21–728). Patients admitted to the neurology department had a significant shorter LOS at the ED. Factors significantly associated with a longer LOS at the ED were daytime arrival at the ED, a low triage urgency, more specialists involved, more diagnostics requested and a long time between request and execution of admission. Patients had a shorter LOS when arriving at the ED in the evening or night, high urgency at triage, less specialists involved and less diagnostic tests were performed.
Discussion: No article has been published which compared the elderly admitted to different departments. The LOS of elderly at the ED in this study was shorter than in found published data.
Conclusion: The median LOS at the ED for elderly patients was over four hours. To reduce this time an accurate referral, less diagnostic tests and timely transfer to the ward might be beneficial.

1. Introduction

Elderly patients frequently visit the Emergency Department (ED) [1,2]. A large, retrospective study in the United States estimated that 32–46% of all ED visits were elderly patients [3]. An other study estimated the emergency department use of elderly patients as 36% of all visits, although the local population consisted of 12% elderly [4]. A Swiss study calculated an increase, between 2005 and 2010, of ED visits of 20% for patients with an age between 18 and 64 years, of 26% for patients of 65 years and older and of 46% for patients of 85 years or older [5]. Elderly presenting at the ED stay longer in this department than younger patients [1,6,7]. This difference was even greater between older and younger patients who are not subsequently admitted to the hospital. Elderly have more comorbidities, increased laboratory and radiology tests ordered and have more acute medical problems compared to the young. The elderly were more often transported by ambulance and are more frequently admitted to the hospital [1,7]. In two older American studies, performed in 1986 and 1992, the length of stay (LOS) of elderly patients, ≥65 years of age, was roughly three

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hours. This was an increased LOS in comparison with younger patients [1,7]. A more recent study performed in Switzerland published a median duration of stay at the ED of 6.5 hours for patients with an age between 65 and 84 years and a median duration of stay at the ED of nine hours for patients with an age of 85 years and older [5]. A review mentioned a 19 to 58% increased LOS for elderly patients [8]. Elderly seem to have a longer LOS at the ED even though this is not an optimal environment for them. Elderly could benefit from a calmer environment and adjusted beds and chairs [9,10].

A possible explanation for the increased LOS could be that elderly patients present with atypical symptoms and more comorbidities which complicates triage [2,11]. Also, commonly used triage scale, like the Emergency Severity Index (ESI), are not validated in the elderly [10,12].

To date no studies have been published with data in The Netherlands with regard to determinants of LOS of elderly patients in the ED. Furthermore data of elderly patients compared between specialties are not available. In everyday practice, there is an assumption that geriatric patients admitted to the ED have a longer LOS at the ED.

First aim of this study was to investigate the LOS at the ED of elderly who are subsequently admitted to the hospital and analyzed whether this differed for the geriatric, internal medicine or neurology department. Furthermore, we examined which factors influenced the LOS at the ED.

2. Materials and methods

2.1. Setting

This study was performed in University Medical Centre Utrecht (UMCU) and in Rijnstate Hospital in Arnhem, a non-academic teaching hospital. UMCU has 1042 beds and had 34,902 admissions in the year 2012. Rijnstate Hospital in Arnhem has 955 beds and had 35,235 admissions in the year 2012.

2.2. Population

All elderly patients consecutively admitted from the ED between January 1st, 2013 and May 1st, 2013 to the geriatric, internal medicine and neurology ward were included in this study. Elderly patients were defined as 70 years of age or older. This cutoff point was based on the median age of patients admitted to the geriatric department in 2012, excluding the lowest 10% of the range.

Patients were excluded if they were referred to the ED from the outpatient clinic or a different hospital, because it was presumed that they had already been examined by a doctor in the outpatient clinic and this could influence the LOS at the emergency department.

2.3. Data extraction

We obtained the LOS at the ED from all patients from their electronic patient file. Additional data extracted from the patient file included: age, sex and whether there is documentation from a visit at the hospital in the previous three years. Furthermore the following data were obtained from the ED file: comorbidities (measured with the Charlson Comorbidity Index [13]), number of chronically used medication, living conditions before visit (independent, residential home or nursing home), moment of arrival at ED (office hours: 08.00–18.00 hours on weekdays), urgency determined at triage (high, medium high, medium or low), accuracy of referral (referral to the specialty that eventually admits the patient), number of specialists involved in the care at the ED, number of times laboratory, radiology tests and EKG's were ordered, delay between request and execution of these diagnostic tests, delay between request and execution of admission, whether transfer to a different location in the same hospital was necessary, whether patients were included in a stroke protocol and, if applicable, received thrombolysis. In the files all orders and execution of orders was noted in minutes. In UMCU there were no data concerning time between request and execution of admission. All data were made anonymous.

2.4. Statistical analysis

The data were analysed using IBM SPSS Statistics Version 20.

Baseline characteristics were analyzed by descriptive statistics. All descriptive statistics were noted as mean and standard deviation or, in case of a skewed distribution, as median and range.

Length of stay and differences between departments were studied by independent *t*-test or a Mann-Whitney U test was performed if distribution was not normal.

To determine which factors influence the LOS at the ED an univariate analysis was performed and variables with a *P*-value < 0.3 were entered in a linear regression model to determine the variables that independently influenced the LOS.

Statistical significance was achieved with *P*-value < 0.05.

2.5. Ethics

No permission from the Medical Ethics Committee was necessary due to the fact that this study was an observational, retrospective case file study. All data used were anonymous.

3. Results

Between January 1st, 2013 and May 1st, 2013, 1028 patients were admitted from the ED in UMCU or Rijnstate hospital to one of the studied departments. Two hundred and sixty-four (26%) patients were admitted in UMCU and 764 (74%) in Rijnstate hospital. One hundred and eighty-five (18%) patients were admitted to the geriatric, 531 (52%) to the internal medicine and 312 (30%) to the neurology ward. The mean age of included patients was 80 years and 45% was male. Sixteen percent of all patients lived in a residential or nursing home. Patients in UMCU were younger ($P < 0.001$), were more often male ($P = 0.036$) and were more often living independently before admission ($P = 0.005$). Table 1 shows these and other baseline characteristics.

3.1. Length of stay at ED

The median LOS at ED for all groups combined was 243 minutes (range: 21–728 minutes). The length of stay was equal for patients admitted to the geriatric and internal medicine departments. Patients admitted to the neurology ward had a significantly shorter LOS than patients admitted to both the geriatric and internal medicine ward (Fig. 1). In the UMCU, the stay at the ED was significantly longer for patients admitted to the internal medicine department. In Rijnstate, the median length was significantly longest for patients admitted to the geriatric department followed by the internal medicine and neurology department.

3.2. Factors influencing the LOS at ED

The results of the univariate analysis are shown in Table 2. Significantly influencing factors on the LOS were the moment of arrival at the ED, triage urgency, accuracy of referral, amount of