Frailty is associated with a history with more falls in elderly hospitalised patients

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ABSTRACT

INTRODUCTION: When elderly people are admitted to hospital, their risk of falling may often not be recognised. The risk of falling in the elderly is linked to frailty. In a Danish study, it was found that the "Identification of Seniors at Risk" screen (ISAR) predicted the patients' amount of health problems, days in hospital and readmission. It may therefore also be a predictor of frailty. This study aimed to evaluate how many elderly patients were admitted to an emergency department (ED) because of a fall and to examine if there was a correlation between these patients and their ISAR score.

METHODS: A descriptive cohort study was conducted including patients aged 65 years or older admitted to the ED, n = 198. The following data were collected: ISAR screen, cause of admittance. Furthermore, a retrospective journal review was performed by a specialist in geriatrics.

RESULTS: Prior to admission, 31% had experienced a fall. Of those, 67% were not referred for further fall assessment. Patients who had experienced falls had more health problems than patients without falls (mean 5.7 versus mean 4.4 ($p = 0.00$)) and more had cognitive impairment (31% versus 14% ($p = 0.00$)). A positive correlation was found between patients' ISAR score and falls ($p = 0.03$).

CONCLUSION: To prevent further falls and readmissions, it is crucial not only to focus on elderly people's presenting problems, but also on their dizziness and falls, especially in cognitively impaired elderly patients, and to make a plan for further assessment and follow-up. We suggest the ISAR screen as a supplement to measurement of vital signs as it may predict frailty and falls.

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TRIAL REGISTRATION: The study was approved and registered with the Danish Data Protection Agency under the Capital Region of Denmark's joint notification of health research (j. no.: 2007-58-0015, AMH-2013-003, I-Suite no.: 02495).

When elderly patients are admitted to an acute medical unit (AMU) or assessed in an emergency department (ED), the risk of falling may often not be recognised. The focus will normally be on treating an injury, not on collecting information on dizziness or previous falls. As a consequence, no preventive measures or follow-up are planned after discharge, not even if the cause of the current reference was a fall. The Danish Health and Medicines Authority has published recommendations on the assessment and management of people aged 65 years and older who have experienced falls with a view to initiating targeted interventions. To recognise elderly people at risk of falling, four simple questions concerning loss of consciousness, problems walking, gait or balance, previous falls and dizziness should be asked [1]. It seems that this is not common practice in Danish EDs or AMUs as a previous Danish study of patients who come into contact with the ED found that a minimum of 37% of the patients who had experienced a fall prior to admission were not referred for further follow-up [1, 2].

Postural stability is a complex process depending on several factors such as eyesight, motor systems and sensory systems, input from the environment and an ability to respond to such input. These links in the process are often weakened by disease, age or both which results in dizziness and falls. In a third of people aged 65 years and older and in half of the elderly aged 85 or older, a fall occurs within one year [3, 4]. These falls often have grave consequences, including diminished functional capacity, disability, reduced quality of life and death [5].

The risk of falling in the elderly is linked to several other adverse health outcomes such as disability, comorbidity and cognitive impairment and frailty. Frailty is thus a very important supplement to vital signs as a basis for triage of the elderly patients observed at the ED or admitted to the AMU. The selection of a frailty index suitable for hospitalised elderly patients is crucial to predict falls [6]. In a current Danish study it was found that the "Identification of Seniors at Risk" screening (ISAR) predicted the patients' amount of health problems, days in hospital and readmission; and the ISAR is therefore suitable to predict frailty [7, 8].

This focus of this study was to examine if there was a correlation between patients with a fall prior to the current admission and their ISAR score, and if ISAR screening as a supplement to triage could identify more patients with one or more falls prior to the current admission.

We also wanted to evaluate how many patients aged 65 years or older with one or more falls prior to their current admission seen in the ED or admitted to the AMU were referred for subsequent fall assessment and treatment.

ORIGINAL ARTICLE

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TABLE 1

Baseline data, acute medical unit or emergency department.

	n (%)
Patient visits ≥ 65 yrs	278 (100)
Admitted from nursing homes	28 (10)
Female	154 (55)
ISAR score	
0	24 (12)
1	39 (20)
2	43 (22)
3	48 (24)
4	28 (14)
5	12 (6)
6	4 (2)
Patients discharged to	
Independent living	211 (76)
Nursing home/rehabilitation	53 (19)

TABLE 2

ISAR correlation: fall vs no fall.

	Fall (N = 68)	No Fall (N = 130)	p-value[a]
ISAR, mean (± SD)	2.6 (± 1.4)	2.2 (± 1.5)	0.05
ISAR, n (%)			
0-1	14 (21)	49 (38)	0.03
2-3	36 (53)	55 (42)	0.03
4-6	18 (26)	26 (20)	0.03

ISAR = Identification of Seniors At Risk-screening; SD = standard deviation.
a) p ≤ 0.05 considered significant.

METHODS

We conducted a descriptive cohort study to make an early identification of the frail elderly people as a supplement to using vital signs as a basis for triage and to identify referred patients who had a history of falls and/or dizziness (falls) in connection with their current admission. The setting was the AMU and the ED of Amager Hospital, a small hospital in the capital area of Denmark. The population of the catchment area is 150,000. We included patients aged 65 years or older and used the internationally recognised screening tool ISAR to identify the frail elderly patients (ISAR ≥ 2) [7, 8].

During a 14-day period days in January 2013, the Mobile Geriatric Team (MGT) received daily lists of all patients ≥ 65 years visiting (stay less than 24 hours) the ED or being admitted (stay more than 24 hours) to the AMU. All these patients were included. The MGT assessed the patients during the day using the ISAR screening instrument. In patients already dismissed, the screening was done by telephone. We excluded patients admitted from nursing homes because a high ISAR score was expected in these frail patients; and their inclusion would therefore bias the results. The baseline data included age, gender and ISAR score. Follow-up data were medication, co-morbidity (number of health problems), length of stay, readmissions at one and three months, mortality during the stay and after one and three months and whether the patients were referred for further investigation of their falls/dizziness (falls).

To determine if the patient had problems with falls, pain, delirium, dementia, depression or nutrition, the medical journals of all included patients were assessed retrospectively by a specialist in geriatrics (SG). Depending on whether the medical journals contained information on history of falls or falls in relation to the current admission, patients were classified as either "falls" or"no fall". It was also registered whether or not the patients had been ISAR-screened and if any results of the screening were unknown to the SG at the time of the assessment.

Descriptive statistics were calculated to describe the sample. To compare whether patients with falls were linked to acute readmission or death, Person's χ^2 statistic was calculated. To examine if patients with falls were associated with a higher ISAR score, length of hospital stay and medication, student's T-test was calculated. A p-value < 0.05 was considered significant. All statistical procedures were performed using SPSS for Windows, version 14.0 (SPSS Inc., Chicago, IL, USA).

Trial registration: The study was approved and registered with the Danish Data Protection Agency under the Capital Region of Denmark's joint notification of health research (j. no.: 2007-58-0015, AMH-2013-003, I-Suite no.: 02495).

RESULTS

During the inclusion period, 278 patients ≥ 65 years were assessed in the ED or AMU; 5% were readmissions. The mean age was 78 years (range: 65-101 years). The patients' baseline data are presented in **Table 1**.

The ISAR screen was performed on 198 patients. Among the 80 patients who were not screened, 18 (7%) were medically unstable, two (1%) had not provided their telephone number, 28 (10%) were admitted from a nursing home, 26 (9%) had other reasons (for instance did not answer their telephone), and six (2%) gave no reason. A total of 68% had an ISAR score of 2 or more.

Retrospectively, the SG found that 86 patients (31%) had experienced a fall prior to admission; of these, 68 were ISAR screened and 54 (79%) had an ISAR score of ≥ 2 (mean 2.6) indicating frailty. We found that patients with an ISAR score of 0-1 had a significantly lower reported fall history than patients with an ISAR score of 2-3 and 4-6 (p = 0.03), **Table 2**.

Patients who had experienced a fall prior to the current admission had a mean of 5.7 health problems compared with patients without who had a mean of 4.4 (p = 0.00), they were significantly older than patients with no falls, and they had a longer lengths of stay. However, we did not find more falls among females than among males, **Table 3**.

A significantly larger part of patients with falls than patients without falls had cognitive problems (31% versus 14%; p = 0.00), Table 3. The patients were prescribed a mean of six drugs daily, and there were no significant difference in this regard between the two groups. Results on correlation between falls, readmissions and mortality are presented in **Table 4**, no significant correlations were found.

A total of 40 patients (67%) with falls were not referred for further investigation/assessment or follow-up.

TABLE 3

Patient characteristics.

	Fall (N = 86)	No fall (N = 192)	p-value[a]
Age, yrs, mean (± SD)	80.3 (± 9.6)	76.0 (± 8.3)	0.00
Gender, n (%)			0.26
Female	52 (60)	102 (53)	
Male	34 (40)	90 (47)	
Length of stay, days, mean, patients staying > 1 day	9.60	7.00	0.17
Health problems, n, mean (± SD)	5.7 (± 2.7)	4.4 (± 2.5)	0.00
Cognition, n (%)	27 (31)	27 (14)	0.00
Depression, n (%)	21 (24)	37 (19)	0.33
Nutrition, n (%)	18 (21)	29 (15)	0.23
Delirium, n (%)	10 (12)	11 (6)	0.09
Medication, n, mean (± SD)	6.3 (± 4.0)	6.5 ± 4.3)	0.72

a) p ≤ 0.05 considered significant.

TABLE 4

Follow-up data.

	Fall (N = 86)	No fall (N = 19)	p-value[a]
Length of stay, days, mean (± SD)	5.5 (± 7.2)	4.7 (± 10.5)	0.44
Acute readmission, n (%)			
1-month	19 (22)	51 (27)	0.34
3-month	29 (34)	64 (33)	0.83
Death, n (%)			
1-month	4 (5)	14 (7)	0.41
3-month	7 (8)	23 (12)	0.34

a) p ≤ 0.05 considered significant.

DISCUSSION

In the present study, we found a significant correlation between frailty and falls in elderly hospitalised patients. This fact substantiates the usability of the ISAR screening tool to identify frail elderly patients in the ED/AMU. In the study by Joosten et al [6] using the Cardiovascular Health Study index (CHS) and The Study of Osteoporotic Fractures index (SOF) as frailty indexes, no correlation between frailty and falls was found. This may be because the CHS and SOF indexes were developed for use outside the hospital and show good correlation to falls there, but are not transferrable to the hospital setting. It seems that those indexes predict severity of illness rather than frailty in hospitalised patients [6].

Another reason could be that the criteria included in the index, such as slow walking speed or chair-stand test, require physical strength. This cannot be expected from the ill elderly patients because they often suffer from acute loss of function. The ISAR screen is suitable, as it is specifically developed for use in the ED/AMU and not directly related to the measurement of physical strength. The information needed may also be obtained from family members and hospital records as described in an earlier publication [7, 8].

Regarding co-morbidity, patients who have experienced falls had a significantly larger number of health problems than those who had not experienced any falls. The only significant other correlations with falls were age and cognition, where patients with falls were significantly older and had more memory problems than those without falls (24% versus 14%; p = 0.00). This finding is similar to findings in previous studies and a new meta-analysis from 2012 [9] where it was found that impairment of global cognition was associated with an increased risk of falls, odds ratio = 2.13 [4, 9]. As far as the medication is concerned, we found no difference between the two groups. This was also seen in a study by Ziere et al [10] where elderly people's risk of falling was associated not with the actual number of drugs they received but with use of certain fall-increasing risk drugs, such as potassium-sparing agents, benzodiazepine derivatives, quinine, parcetamol, and calcium preparations [10]. A crucial part of fall assessment is thus a medication review, and as a considerable number of elderly patients receive a combination of these risk drugs, it is imperative to reevaluate the indication for these particular drugs in the future. Further research is required to explore this issue.

A large number of elderly patients' hospital admissions are related to falls (up to 40%), as shown in previous studies [2]. To prevent further falls, it is thus important also to focus on establishing a plan for follow-up as recommended by The Danish Health and Medicines Authority [1]. In our study, we found that two thirds of the patients presenting with falls and/or dizziness were

Consultation at a Geriatric Falls Clinic.

not referred for further investigation or follow-up. The fact that not enough patients are referred for further fall assessment was also found in a retrospective study by Kirchoff et al [2] presenting data from the National Database for Accidents [1, 2]. Even though some falls may be caused by a stumble, the physician should always consider the need for further fall assessment, including a critical medication review.

Despite the current national focus on falls and their relationship to adverse health outcomes, the results of the present study shows that current care falls short of adequacy and it highlights the need to supplement triage in the ED/AMU with a frailty index. Our results show that the ISAR screen could be used and would be a better choice of frailty index for acutely ill old people than the CHA and SOF frailty indexes. The longer length of stay of frail patients after falls also emphasises the need to identify these patients quickly and have them assessed by the MGT for further treatment and follow-up.

The weaknesses of the study are the small number of patients included and the fact that data from the medical journals was obtained retrospectively. The insufficient attention on falls may lead to an underreporting in the journals, which could mean that our numbers are underreporting the frequency of falls.

CONCLUSION

Several studies have established a high prevalence of falls in the population of elderly people, indicating the importance of a systematic focus on falls in relation to acutely ill, frail elderly patients.

The organisation in the acute setup of the ED/AMU is designed to primarily focus on the presenting symptoms; its aim is therefore not to provide an overall view of the patients. A considerable share of the patients assessed in/admitted to the ED/AMU are elderly, and a holistic assessment of these patients that also takes into account their social, psychological and cognitive status is important. The current one-sided emphasis on measurement of vital signs as a part of the triage is insufficient to identify frail elderly patients at risk of falling. The use of a frailty index to identify patients with multimorbidity, functional decline and cognitive problems is important to ensure that a plan for further assessment and/or rehabilitation is prepared. We suggest ISAR screening as a supplement to triage in the ED/AMU as it may predict frailty as well as falls, which should be followed by further fall assessment and intervention in geriatric fall clinics.

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