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Falls in elderly patients are not treated according to national recommendations

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ABSTRACT

INTRODUCTION: The aim of this study was to evaluate health professionals' compliance with recommendations from the Danish Health Authority (DHA) concerning falls, to study the prevalence of acute hospital visits due to falls, and to compare characteristics of fall patients in two geographically and socioeconomically different areas of Denmark.

METHODS: The study was conducted in the emergency departments (ED) of Slagelse Hospital (SH) and Nykøbing Falster Hospital (NFH), both located in Denmark. Included were individuals > 50 years visiting the EDs from January 1 to March 31, 2014 who reported a fall. Information concerning demographic data and comorbidity in fall patients was retrieved from the medical records of the patients. **RESULTS:** A total of 2,664 individuals > 50 years visited the EDs during the study period. In all, 1,100 individuals (41.2%) reported a fall. In the NFH 236 (44%) and in the SH 223 (39%) of the fall patients had a fracture (p = 0.049). Patients in the more socioeconomically deprived area covered by the NFH were younger and had higher fracture and heart failure rates. Only 2% of the medical records contained answers to all four questions recommended by the DHA for risk screening in fall patients. The number of medical records containing answers to any of the four questions ranged from 17.5% to 25.8%.

CONCLUSIONS: Only few fall patients were screened according to DHA recommendations. ED staff's adherence to guidelines concerning fall risk assessment is poor. Fall patients in a socioeconomically deprived area were younger and had higher fracture and heart failure incidences. **FUNDING:** This study received funding from the public Regional Research Foundation, Region Zealand, Denmark. **TRIAL REGISTRATION:** not relevant.

A fall is a common reason for elderly patients to visit the emergency department (ED) [1, 2]. The consequences of a fall may include fractures, institutionalization, a decreased level of functioning, and death. Studies have shown that every third person above 65 years of age have experienced at least one fall during the past year, of which 10% caused severe injuries and 5% caused fractures [3]. The prevalence of falls and fall-related deaths is expected to increase due to aging populations [4, 5].

In order to prevent falls in elderly people, numerous intervention programmes have been investigated. Two Cochrane reviews [6, 7] concluded that multifactorial interventions may reduce falls in hospitals as well as in the community.

Fall is a marker of frailty [8, 9]. Frailty is associated with socioeconomic factors, and we therefore hypothesized that fall patients in populations characterized by different socioeconomic situations may have different characteristics concerning comorbidity and age [10].

In 2006, the Danish Health Authority (DHA) published recommendations on diagnostic work-up in fall patients, recommending that risk assessment be performed in all patients above 65 years of age, who had contact to an ED due to falling. The DHA recommended that fall patients be asked the following questions: 1) Did the patient lose consciousness in connection with the fall? 2) Does the patient experience dizziness? 3) Does the patient experience daily problems in walking, gait or balance? 4) Has the patient experienced more than one fall within the past year? [11]. If a patient answers yes to at least one question, basic assessment of the risk of future falls is recommended (Figure 1). The primary aim of the present study was to evaluate the health professionals' compliance with DHA recommendations. The secondary aim was to study the frequency of acute hospital-visits due to falling and to describe characteristics of fall patients in two geographical areas in Denmark. The two areas were chosen because researchers from these areas planned the study. The hospitals both cover mostly rural areas, and they are clearly, but not extremely different with respect to socioeconomic conditions. We therefore found it interesting to study if there would be any difference in the characteristics of fall patients in these two rural areas because if we could identify differences, they would possibly be due to differences in socioeconomic conditions rather than degree of urbanization.

METHODS Settings

The study was conducted in two EDs in Region Zealand; in Slagelse Hospital (SH) and in Nykøbing Falster Hospital (NFH). The SH has 315 beds and covers an area with

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FIGURE 1

Recommendations for assignment and management of people who have experienced a fall. From the Danish Health Authority.



TABLE 1

Nykøbing Falster Slagelse Hospital p-value Hospital (N = 527) (95% CI) (N = 573) Demography Age, yrs, mean (± SD) 72.7 (± 12.59) 74.3 (± 12.8) 0.039 (-3.09--0.08) 391 (68.2) Female gender, n (%) 356 (67.6) NS Fractures. n (%) 236 (44) 223 (39) Any fracture 0.049 (0.0003-0.12) Hip 53 67 NS 49 76 0.002(-0.1-0.02)Arm Pelvis 8 13 NS 0.045 (-0.02--0.0002) Column 6 1 Other fracture 77 80 NS Multiple fractures 16 13 NS Comorbidities. n 77 Dementia 66 NS Depression 53 42 NS Parkinson's 12 14 NS 65 NS Stroke 66 57 65 NS Diabetes Heart failure 38 25 0.04 (-0.06--0.001) 47 Ischaemic heart failure 51 NS NS 180 192 Hypertension 0.08 (-0.062-0.004) COPD 53 41 Osteoporosis 45 48 NS Alcoholism 53 50 NS

CI = confidence interval; NS = non-significant; SD = standard deviation.

140,197 inhabitants. The NFH has 268 beds and covers an area with 103,853 inhabitants [12].

The area covered by the NFH and the area covered by the SH both comprise rural areas and few major towns, and the area covered by the NFH is generally considered to be socioeconomically deprived compared with the rest of Denmark.

Design

The study was conducted from 1 January 2014 to 1 April 2014. Data were collected from medical records from patients above 50 years of age (n = 2,664) who visited the EDs in Slagelse or Nykøbing. Patients for whom a fall was the reason or part of the reason for the emergency contact were included in the study. We excluded patients with a fall from a level higher than ground level, a fall due to traffic or sports, a fall due to syncope when sitting, a fall due to external influence (i.e. assault) and a fall due to epilepsy.

Data on socioeconomic factors in the areas covered by the NFH and the SH were retrieved from public registers.

Variables recorded

The health professionals' compliance with DHA recommendations was assumed if the records contained information that gave answers to the recommended DHA questions (dizziness, falls in the past year, loss of consciousness and daily walking disability, problems with gait or balance). The answers to these questions were looked for in notes from doctors, nurses and physiotherapists. Furthermore, data on sex, age, existing comorbidity (dementia, Parkinson's disease, stroke, diabetes, heart failure, ischaemic heart disease, hypertension, COPD, osteoporosis, alcoholism), and consequences of a fall (fractures, further diagnostic referral, duration of hospitalization) were retrieved from the medical records. Concerning comorbidity, not only the record from the index admission but also all records from earlier admissions were used as were the patients' electronic medicine records. If, for instance, a patient had a loop diuretic in the electronic medicine record, the records were further scrutinized in order to establish which diagnosis led to the prescription of loop diuretics.

Statistics

Normally distributed continuous variables are presented as means \pm standard deviation. Differences between groups were analysed with the chi-squared test for categorical variables, and continuous variables were analysed using the analysis of variance test. All tests were two-sided, and statistical significance was defined as a p-value < 0.05. Student's t-test was used to com-

Baseline characteristics and consequences of the fall.

pare means. All statistical analyses were made using the IBM SPSS Statistics Data Editor version 21.

Ethics

The study was approved by the Danish Data Protection Agency. The Danish Health Authority gave permission to collect information from the medical records. No further ethics approval is required for retrospective registerbased studies in Denmark.

Trial registration: not relevant.

RESULTS

Socioeconomic characteristics

The expected mean living age was 77.3 years in the area covered by the NFH and 78.9 years in the area covered by the SH (p = 0.039). The mean household income in the area covered by the NFH was 85% and in the area covered by the SH 96% of the mean household income in the whole country (344,847 DKK/year) [12].

Fall patients at the NFH had a mean age of 72.7, and at the SH the mean age was 74.3 years (p = 0.039), **Table 1**.

Number of fall-related emergency department contacts

Overall, 2,664 patients > 50 years visited the two EDs in the study period. Of these, 1,100 (41%) visited the EDs due to a fall. In the SH, 573 out of 1,392 (41.2%) and in the NFH, 527 out of 1,272 (41.4%) patients visited the ED due to or, among others, due to a fall. Some patients (n = 35) came to the ED due to a fall more than once during the project period.

Comorbidities

In 36.6% of the fall patients, no comorbidities were registered in the medical records, 27.8% had one, 19.9% had two, 10.3% had three, and 5.7% had more than three comorbidities. There was a significant difference in the prevalence of heart failure between the SH and the NFH (p = 0.04). There were no significant differences regarding other comorbidities, Table 1.

Compliance with Danish Health Authority recommendations

Only 2% of the medical records contained answers to all four recommended questions, **Figure 2**.

The number of records containing answers to any of the four questions ranged between 17.5% and 25.8%, see **Table 2**.

Consequences of falls

A fracture was incurred by 236 (44%) patients in the NFH and by 223 (39%) the SH (p = 0.049). The prevalence of different types of fractures is presented in Table 1.

Most patients (n = 790) were discharged directly from the ED. Overall, 310 (28.2%) were admitted from the ED to a hospital ward; of these, 72.6% were admitted to an orthopaedic ward and 27.4 % were admitted to an internal medicine ward. Patients admitted to a hospital ward stayed a median of 7.5 days in hospital. Of the 790 patients who were not admitted, only 22 patients (2.8%) were referred to their general practitioner (13 patients) or to a hospital ambulatory service for further diagnostic evaluation.

DISCUSSION

The present study demonstrates that only very few patients were offered a risk assessment according to national recommendations. We cannot fully exclude that some patients were actually asked the four recommended questions, but that this was just not documented in the record. However, the fact that only 2.8%

FIGURE 2

Percentage of patients who were asked either none, one, two, three or all four questions recommended by the Danish Health Authority as part of their risk assessment.



TABLE 2

Risk assessment: the number of patients' records (out of all 1,100 patient records), which contained answers to the recommended Danish Health Authority questions, and whether the answers were positive.

Question	n (%)	Positive, n (% positive of those asked)
Loss of consciousness	215 (19.6)	35 (16.3)
Dizziness	192 (17.5)	68 (35.4)
Walking disability	205 (18.6)	174 (84.9)
> 1 fall during the last year	281 (25.5)	271 (96.4)

of the patients were referred for further evaluation points to a true lack of sufficient risk assessment. This is unfortunate, especially because Cochrane reviews have concluded that multifactorial interventions can reduce the rate of falls in hospitals and in a community setting. However, before intervention can be initiated, identification of high-risk patients is necessary. A possible explanation for the lack of adherence to guidelines is that health professionals do not have sufficient knowledge of the current recommendations. To resolve this problem, more education of the health professionals in the emergency department is needed. Furthermore, instruments that support referral for further diagnostic evaluation in outpatient services could be developed. The emergency department could, for instance, have a printed formula with an algorithm containing a checklist with the four questions and possible clinical pathways when one or more questions were answered affirmatively. In 2013. the National Institute for Health and Care Excellence published guidelines for assessment and prevention of falls in older people. Much like the Danish recommendations, these guidelines state that older people who present for medical attention due to a fall, report recurrent falls in the past year, or demonstrate abnormalities of gait and/or balance should be offered a multifactorial falls risk assessment [13].

The prevalence of comorbidity was high with 63.4% of the patients having one or more comorbidities. This is in accordance with other studies showing that occurrence of falls is associated with frailty [10]. This also means that if fall risk assessment is properly conducted, it may help identify other aspects of frailty as well. Data on comorbidity were extracted retrospectively from medical records and we cannot totally exclude that we may have missed some diagnoses. However, all existing electronical patient records were scrutinized for diagnoses, which meant that we had information from more than ten years leading up to the index fall.

The NFH and the SH were chosen because researchers working there planned the study. The hospitals both cover mostly rural areas; and with respect to socioeconomic conditions they are clearly, but not extremely different. We therefore found it interesting to study if there would be any difference in the characteristics of falls patients in these two rural areas, because if we could identify differences, they could be due to differences in socioeconomic conditions rather than to differences in degree of urbanization.

We found that patients in the NFH were younger, had a higher fracture rate and a significantly higher prevalence of heart failure, and we also observed a trend towards a higher prevalence of chronic obstructive lung disease compared with patients in the SH. We can-

not exclude that this may partly be due to differences in the patients' propensity to go to a hospital after a fall, i.e. that people in the NFH area were more likely to go to hospital than people in the SH area. However, the fact that patients in the NFH also had higher fracture rates indicates that there may be at least some other reasons than a difference in propensity to go to the hospital. The fact that the expected mean living age in the area covered by the NFH is lower than that of the SH may partly explain the younger age of the fall patients in the NFH. Since death is the ultimate loss of function, it would be expected that persons with a lower expected length of living would experience loss of function, i.e. loss of the ability to walk safely, at a lower age. Another Danish study from 2003 reported an increased incidence rate of falls in women after the age of 50 years. After the age of 70 years, the incidence of falls increased exponentially. Therefore, the authors recommended that fall-prevention programmes be directed towards the population aged 70 years and older [2]. However, our study indicates that this recommendation should be judged in the context of socioeconomic factors that may influence the risk of falls in a given population.

Strengths and limitations

The main strength of this study is that we had medical records with detailed clinical information about the patients who visited the emergency departments, and therefore had valid information about the prevalence of falls leading to ED contacts, which allowed us to compare characteristics of fall patients in different socioeconomic areas. The main limitations are those inherent to retrospective studies since only information already collected due to clinical needs was available. Furthermore, the numbers of included fall patients from the areas compared are small, which may lead to underestimation of differences in demographic characteristics and comorbidities. The socioeconomic situation of the areas compared is characterized only by mean income in the whole population and expected mean living age. More detailed information, for instance on educational level and income among persons at risk (> 50 years), was not available.

CONCLUSIONS

Judged by information from electronic patient records, only few fall patients were screened according to DHA recommendations. ED staff's adherence to guidelines concerning fall risk assessment is poor. Socioeconomic conditions may influence the prevalence of falls and the characteristics of fall patients, indicating that a higher risk of frailty is present in a socioeconomically deprived area. CORRESPONDENCE: Marie Lillevang-Johansen.

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