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ORIGINAL RESEARCH

Inpatient falls in adult acute care settings: influence of patients' mental status

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Abstract

Aim. This paper is a report of a study of fallers' mental status as one of the patient-related intrinsic risk factors for falls.

Background. Whether confusion is one of the most important risk factors associated with risk of falling in hospital settings is unclear. Literature reviews have not identified consistent evidence for effective preventive interventions for patients with mental status deficits.

Methods. This retrospective research was conducted in six adult acute care units in a community hospital in the United States of America. The data source was the 1017 fall incidents occurring between 1 July 2005 and 30 April 2009. Descriptive statistics and Pearson chi-square tests were used to analyse the data.

Results. The presence of mental status deficits was identified as the dominant issue in 346 (34%) falls. The group of fallers with mental status deficits (32·1%, n = 111) seemed to have fewer toileting-related falls than those without mental status deficits (46·7%, n = 314). Fallers with mental status deficits tended to have more severe fall injuries than those without mental status deficits (χ^2 = 10·08, d.f. = 3, P = 0·018).

Conclusion. Risk assessment and targeted surveillance should be used as part of falls prevention policy. Involving nursing staff and family members in assessing a patient's mental status may help to prevent falls caused by mental status deficits.

Keywords: acute care, adults, falls, inpatients, mental status, nursing

Introduction

The aim to deliver safe and effective healthcare is an important driver for change internationally. Hospital-acquired harm (e.g. injurious falls) continues to be at the forefront of the news in the minds of consumers and healthcare providers (Joint Commission International 2009). The patient quality and safety movement has particular relevance to the care of older people. The prevalence of dementia in people over 80 years old is about 30% and in those over 65 years old about 5% (Ritchie & Lovestone 2002). Falls are a frequent cause of morbidity and mortality in community-dwelling older people with cognitive impairment or dementia. Risks for falls and fall-related injuries for cognitively impaired elders are influenced by the type and severity of dementia. For example, fall risk increases with the progression of a dementia syndrome, until people lose their mobility completely (Härlein *et al.* 2009).

Having mental status deficits (MSDs) refers to altered mental status, confusion, or dementia. At some point, older people with these conditions may be admitted to acute care hospitals for fall- or non-fall-related medical treatment. Confusion has been identified as the most important risk factor associated with risk of falling in hospital settings (Hendrich *et al.* 2003). Vassallo *et al.* (2004) also found that the presence of confusion and a history of falls identified patients undergoing acute rehabilitation as at greatest risk of falls. However, Krauss *et al.* (2007) did not find altered mental status to be a factor in a patient falling.

Literature reviews of hospital falls and injurious falls have not identified consistent evidence for effective preventive interventions (National Quality Forum 2009). It is possible that hospital fall prevention interventions have not effectively addressed and differentiated the needs of cognitively intact vs. impaired patients. Therefore, it is important to determine the prevalence of falls in which fallers' MSDs were documented as the dominant issue related to the falls in the fall incident reports, and to understand whether the presence of MSDs is associated with the cause of the fall and the severity level of fall injury.

Background

As indicated in the National Quality Forum's recent publication, *Safe Practices for Better Healthcare-2009 Update: A Consensus Report*, staff in all types of clinical care setting within Centers for Medicare & Medicaid Services should take action to prevent patient falls and to reduce fall-related injuries by implementing evidence-based interventions. A fall is described as a sudden, unintentional, downward movement of the body to the ground or other surface. When a person falls, they are at risk of serious injury, disability and possibly death (National Quality Forum 2009). These potentially life-threatening events due to falls still comprise the largest single category of reported incidents in hospitals in the United States of America (USA; Joint Commission 2005).

Falls may be precipitated by intrinsic or extrinsic factors relevant to the patient. Intrinsic risk factors are those integral to the patient, such as age-related changes, previous falls, reduced vision, unsteady gait, MSDs and chronic illness. Extrinsic risk factors are external to the patient and related to environmental or other hazards (Joint Commission 2005). Currie (2008) summarized the risk factors for falls in acute and long-term care settings and categorized fall risk factors into extrinsic risk factors (e.g. staffing, time of day) and intrinsic factors. Intrinsic risk factors included male gender, cognitive functions (e.g. cognitive impairment, inability to follow instructions), physical functions (e.g. fall history, fatigue, gait problems, toileting needs increased), physiologic status, comorbidities (e.g. Alzheimer disease, Parkinson disease, stroke) and medication usage (e.g. laxatives, sedatives).

As for the types of falls, Hitcho *et al.* (2004) found that in acute care settings, the top four scenarios for patient falls were while ambulating (19·1%), getting out of bed (10·9%), sitting down or standing up (9·3%), and using a bedside commode or toileting (4·4%). Tzeng (2010) concluded that 45·2% were related to toileting in inpatient acute care settings. The most common theme was falling on the way from the bed or chair to the bathroom.

The study

Aim

This study focused on fallers' mental status as one of the patient-related intrinsic risk factors for falls.

The primary aim was to determine the prevalence of falls where the faller's MSD was the dominant issue related to the fall, as documented by RNs in fall incident reports in adult inpatient acute care settings. The secondary aim was to examine the relationships between the presence of the faller's MSD at the time of falling, the reasons for the fall and the severity of injury.

Design

An exploratory study with a retrospective research design was conducted in six adult inpatient acute care units in a community, not-for-profit, suburban hospital located in Michigan, USA. The hospital has 109 medical beds (two units), 53 surgical beds (one unit), 34 combined medical-surgical beds (one unit), 21 rehabilitation beds (one unit) and 29 mental health beds (one unit).

Sample

The study sample was reports of 1017 fall incidents that occurred between 1 July 2005 and 30 April 2009.

Data collection

The data source was the study hospital's electronic incident-reporting system (the category of the report = slip/falls, defined as a patient found on the floor or lowered to the ground). Data on the fall incident reports associated with individual patients were 'de-identified' before being forwarded to the principal investigator for analysis.

The dominant issue related to the fall was operationally defined by the hospital's electronic incident reporting system. From a bank of 23 options, the RN reported the fall incident by selecting only one issue.

Ethical considerations

The study was approved by the institutional review board of the study hospital.

Data analysis

Content analyses were performed on all fall incident reports, based on the themes of falls developed in the study by Tzeng (2010). The theme of each fall incident was identified according to, for example, the patient's activities and the location where the fall occurred, and entered into an SPSS dataset as a single variable. The severity level of injury was also operationally defined by the study hospital's electronic incident reporting system, with options being 1 = no apparent injury, 2 = minor injury, 3 = moderate injury, 4 = major injury (note that no falls resulted in death).

Abstracted data were entered and analysed using SPSS 16.0 (SPSS Inc., Chicago, IL, USA) for Windows. Descriptive analyses were conducted for all study variables. Frequency tables were used to understand the prevalent themes of falls between the fallers having MSDs at the time of falling and fallers without MSDs. The Pearson chi-square test was used to test the relationship between MSDs and the severity level of fall injury. The alpha value was set at 0·05.

Results

A total of 1017 falls were included in the analyses. The presence of MSDs was identified as the dominant issue in 346 (34%) fall incident reports; 671 (66%) reports had issues other than MSDs.

The frequencies of the issues documented in the 1017 included incidents were: (1) patient mental status (n = 353, 33·7%), (2) assessment did not indicate patient risk (n = 79, 7·5%), (3) care plan for patient safety not initiated (n = 2, 0·2%), (4) care plan not followed (n = 8, 0·8%), (5) patient non-compliant (n = 210, 20·1%), (6) inadequate supervision of patient (n = 13, 1·2%), (7) patient medication (n = 23, 2·2%), (8) restraints (n = 8, 0·8%), (9) call light not answered (n = 2, 0·2%), (10) call light out of reach (n = 1, 0·1%), (11) patient needs not addressed (n = 1, 0·1%), (12) carpet (n = 2, 0·2%), (13) equipment (n = 27, 2·6%), (14) improper footwear (n = 30, 2·9%), (15) lighting (n = 0, 0%), (16) side rails down (n = 3, 0·3%), (17) web floor (n = 18, 1·7%), (18) bedside table out of reach (n = 7, 0·7%), (19) clutter (n = 6, 0·6%), (20) furniture (n = 16, 1·5%), (21) uneven floor (n = 1, 0·1%), (22) wheelchair belt not secured or used (n = 3, 0·3%) and (23) not applicable (n = 234, 22·4%). A dichotomous variable, the dominant issue-related to the fall, was created where 1 = the presence of MSDs and 0 = other issues.

Table 1 shows the theme of each fall incident used in the analyses. The group of fallers with MSDs (32·1%, n = 111) seemed to have fewer toileting-related falls than those without MSDs (46·7%, n = 314). The Pearson chi-square test also showed that whether the fallers had MSDs at the time of falling was statistically significantly associated with whether the falls were toileting-related (Pearson χ^2 = 20·32, d.f. = 1, $P < 0·001$).

For fallers with MSDs, the most prevalent theme of falls was 'getting out of or getting back to the bed (not specified as toileting-related)' (n = 156, 45·1%), followed by 'on the way from the bed or bedside chair to the bathroom, or from the bathroom back to the bed or bedside chair (toileting-related)' (n = 42, 12·1%) and 'getting out of or getting back to the bed (toileting-related)' (n = 38, 11%). For the fallers without MSDs, the most prevalent theme was 'getting out of or getting back to the bed (not specified as toileting-related)' (n = 170, 25·3%), followed by 'slipping off the toilet or the bedside commode (toileting-related)' (n = 121, 18%) and 'getting out of or getting back to the bed (toileting-related)' (n = 99, 14·8%).

Table 2 shows the severity of the fall injury and the shift on which the fall occurred among fallers with MSDs and those without MSDs; this is only one way in which the types of falls could have been grouped. Of all falls, 716 patients (70·4%) had no apparent injury, 255 (25·1%) had minor injuries, 22 (2·2%) had moderate injuries and 24 (2·4%) had major injuries; no falls resulted in death. The Pearson chi-square test showed that whether the fallers had MSDs at the time of falling was statistically significantly associated with the severity level of the fall injury (Pearson χ^2 = 10·08, d.f. = 3, P = 0·018). The group of fallers with MSDs seemed to have a higher percentage of minor injury (n = 105, 30·3%) than those without MSDs (n = 150, 22·4%), and fewer falls with no apparent injury (n = 223, 64·5%) than the other group (n = 493, 73·5%).

For exploratory purposes, additional analyses were conducted on the relationships between having MSDs, fallers' age and the shift on which the fall occurred. The rationales were that fallers who were 85 years or older may have a higher tendency to MSDs and thus may develop 'sunset syndrome', or altered mental status during evening or night shifts. Including all falls, the mean age of patients who fell

Table 1 Themes of fall incidents for all falls, falls with the presence of mental status deficits (MSDs) and falls without the presence of mental status deficits at the time of falling

Types of falls*/prevalence, *n* (%)	All cases (*n* = 1017) Freq. (%)	Presence of MSDs (*n* = 346) Freq. (%)	No MSDs (*n* = 671) Freq. (%)
(A) Falls identified as toileting-related	425 (41·7)	111 (32·1)	314 (46·7)
On the way from the bed or bedside chair to the bathroom, or from the bathroom back to the bed or bedside chair	141 (13·8)	42 (12·1)	99 (14·8)
Slipping off the toilet or the bedside commode	141 (13·8)	20 (5·8)	121 (18)
Getting out of or getting back to the bed	102 (10)	38 (11)	64 (9·5)
Moving from the bed to the bedside commode or from the bedside commode back to the bed	32 (3·2)	8 (2·3)	24 (3·5)
Using urinal while standing or sitting on the bed edge or the chair	9 (0·9)	3 (0·9)	6 (0·9)
(B) Falls *not* specified as toileting-related	592 (58·3)	235 (67·9)	357 (53·2)
Getting out of or getting back to the bed	326 (32·1)	156 (45·1)	170 (25·3)
Slipping off the chair or wheelchair, getting out of or into the chair or wheelchair	87 (8·6)	32 (9·2)	55 (8·2)
Standing or walking in the patient room, being found on the floor of the patient room	75 (7·3)	32 (9·2)	43 (6·4)
Standing or walking in the hallways	39 (3·8)	8 (2·3)	31 (4·6)
Standing or walking in the lounge, exam room, or therapy room	32 (3·2)	2 (0·6)	30 (4·4)
Moving from the bed to the bedside chair/wheelchair or from the chair/wheelchair back to the bed	24 (2·4)	4 (1·2)	20 (2·9)
Standing or walking in the bathroom(e.g. using the bathroom for the reasons other than toileting, such as, combing and changing clothes)	9 (0·9)	1 (0·3)	8 (1·1)

*Types of fall were adopted from Tzeng (2010).

was 72·81 years (SD = 16·19; range: 17–103 years; skewness = −0·98; kurtosis = 0·48; median = 78). The mean age was 75·67 years (SD = 14·93; range: 20–99; median = 80) for fallers with MSDs and 71·32 years (SD = 16·62; range: 17–103; median = 76) for those without MSDs. An independent *t*-test showed that fallers with MSDs were statistically significantly older than those without MSDs ($t = 4{\cdot}152$, $P < 0{\cdot}001$, mean for those with MSDs = 75·67, SD = 14·93, mean for those without MSDs = 71·32, SD = 16·63, mean difference = 4·35). As shown in Table 2, 45·7% (*n* = 445) of falls occurred during the period from 0700 to 1900 hours Patients with MSDs seemed to have higher chance of falling during the period from 2300 to 0700 hours (*n* = 142, 42·6%) than the other shifts. Those patients without MSDs seemed to fall relatively evenly across the six shifts.

Table 2 Severity level of fall injury and shift on which the fall occurred for all falls, falls with the presence of mental status deficits (MSDs) and falls without the presence of MSDs at the time of falling

Severity level of fall injury/ prevalence, *n* (%)	All cases (*n* = 1017) Freq. (%)	Presence of MSDs (*n* = 346) Freq. (%)	No MSDs (*n* = 671) Freq. (%)
No apparent injury	716 (70·4)	223 (64·5)	493 (73·5)
Minor injury	255 (25·1)	105 (30·3)	150 (22·4)
Moderate injury	22 (2·2)	8 (2·3)	14 (2·1)
Major injury	24 (2·4)	10 (2·9)	14 (2·1)
The shift on which the fall occurred/ prevalence, *n* (%)	**All cases (*n* = 975), Freq. (%)**	**Presence of MSDs (*n* = 333), Freq. (%)**	**No MSDs (*n* = 642), Freq. (%)**
0700–1100 hours	146 (15)	45 (13·5)	101 (15·7)
1100–1500 hours	149 (15·3)	45 (13·5)	104 (16·2)
1500–1900 hours	150 (15·4)	41 (12·3)	109 (17)
1900–2300 hours	178 (18·3)	60 (18)	118 (18·4)
2300–0300 hours	183 (18·8)	73 (21·9)	110 (17·1)
0300–0700 hours	169 (17·2)	69 (20·7)	100 (15·6)

Discussion

Study limitations

The tabulated form for reporting fall incidents used by the study hospital captures only whether having 'mental status deficit' is a dominant issue related to the fall, rather than specifying whether fallers have confusion or dementia. All the incidents were reported by the RNs who cared for the fallers, and the reported information may reflect these RNs' perceptions and interpretations of the fallers' medical conditions. The content related to cognitive functions was limited in the reports (no standardized mental status assessment instrument was included), and the content was not verified against other sources, such as medical charts. In other words, appropriate use of fall incident forms as a dataset for analysis should be acknowledged as a limitation this study. In addition, for the fall

What is already known about this topic

- Literature reviews of hospital falls and injurious falls have not identified consistent evidence for effective preventive interventions.
- Whether confusion is one of the most important risk factors associated with the risk of falling in hospital settings is unclear.
- A suitable assessment instrument to measure cognitive function or mental status deficits is not routinely used in falls risk assessment.

What this paper adds

- A clinically significant proportion of falls (34% of all falls) occurred in patients with mental status deficits.
- Fallers with mental status deficits tended to have more severe levels of fall injury than those without such deficits.
- Fallers with mental status deficits seemed to have fewer toileting-related falls than those without such deficits.

Implications for practice and/or policy

- Nurses should play a key role in detecting risk factors for falls in patients showing signs of cognitive impairment.
- Involving assistant nursing personnel and family members in assessing a patient's mental status may help to prevent falls due to the individual's mental status deficits.
- Risk assessment of falls and targeted surveillance should be used as part of falls prevention policy for cognitively impaired older patients, and such surveillance should be available during night shifts.

incidents where 'not applicable' was indicated, the researcher was unable to know whether these falls were not due to MSDs. This was not a case-control study (fallers vs. non-fallers). Consequently, it was not possible to determine whether having a fall assessment completed or having a fall protocol in place would effectively lead to fewer falls or injurious falls for patients with MSDs and those without MSDs.

Discussion of results

A statistically significant proportion of falls in patients aged 65 years or older occurred in those with MSDs. Fallers with MSDs also tended to have a more severe level of injury than those without MSDs. These findings add to the current literature (e.g. Currie 2008) on factors contributing to level of fall injury and provide information for those seeking a focus for preventive strategies, such as investigating the efficacy of sitter programmes (e.g. Tzeng *et al.* 2008). More research on fall prevention interventions is warranted, and studies such as this offer opportunities to target prevention efforts effectively.

The lack of a suitable assessment instrument to measure patients' cognitive functions or the level of MSDs has meant that nurses must use their clinical judgment in detecting cognitive impairment as a fall risk factor (Härlein *et al.* 2009). As a future research direction, researchers might use three straightforward questions from the *Folstein Mini-Mental State Examination* or use tools such as the *Confusion Assessment Method* (CAM) (e.g. Ely *et al.* 2001) to assess patients' cognitive function. It is essential to use an assessment instrument routinely to measure level of MSD as part of the falls risk assessment.

Conclusion

Risk assessment of falls and targeted surveillance should part of fall prevention policies for cognitively impaired older patients during hospital stays. Such surveillance should be available during night shifts. Future researchers could build on the information from studies such as this. The evidence that confirms particular risk factors may assist them to evaluate the cost-effectiveness of interventions such as targeted surveillance for cognitively impaired older patients by using sitters or adding a fall risk assessment tool to assessments of cognitive impairment.

Conflict of interest

No conflict of interest has been declared by the authors.

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