Toileting-Related Inpatient Falls In Adult Acute Care Settings

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A toileting-related fall was associated with history of a previous fall, use of physical restraints, and risk for falling in hospital settings. This study provided insights to be used to prioritize patient fall prevention strategies.

A fall is described as a sudden, unintentional, downward movement of the body to the ground or other surface; when a patient falls, he or she is at risk of serious injury, disability, and possibly death (National Quality Forum [NQF], 2009; U.S. Department of Veterans Affairs, 2004). A fall may lead to a poorer recovery due to increased fear of falling again, as 30% of patients who fall experience minor injuries and 5% have major injuries (Schwendimann, Bühler, De Geest, & Milisen, 2008). NQF (2009) emphasized all types of clinical care settings should take actions to prevent patient falls and reduce fall-related injuries by implementing evidence-based intervention practices. However, literature reviews of hospital falls and injurious falls have not found consistent evidence for effective preventive interventions (Clyburn & Heydemann, 2011; Currie, 2008; NQF, 2009; Spoelstra, Given, & Given, 2012). In addition, limited research (e.g., Ko et al., 2012; Tzeng, 2010) has addressed patient safety issues related to toileting and toilet transfers systematically in adult acute inpatient care settings. The recent study conducted by Ko and associates (2012) determined the predictive value of a two-item inpatient self-reported questionnaire regarding toileting behavior for predicting falls in older patients during hospital stays.

Literature Review

Risk Factors for Falls

Causes of falls are multi-factorial. In April 2008, the Agency for Health Care Research and Quality (AHRQ) published its three-volume "*Patient Safety and Quality: An Evidence-Based Handbook for Nurses*." In this book based on published studies, Currie (2008) summarized risk factors for falls and injurious falls in acute and long-term care settings. Currie categorized fall risk factors into extrinsic risk factors (e.g., staffing, time of day, electroconvulsive therapy in behavioral health settings, being physically challenged for rehabilitation patients) and intrinsic factors. Intrinsic risk factors included male sex, cognitive functions (e.g., agitation, anxiety, cognitive impairment, impulsivity, inability to follow instructions, short-term memory loss), physical functions (e.g., fall history, fatigue, gait problems, impaired muscle strength, impaired physical functioning, toileting needs increased, postural hypotension, visual impairment), physiologic status, co-morbidities, and medication usage. Identified injury risk factors (all intrinsic risk) included older age, female sex, symptoms of agitation, fall history, parathyroid hormone deficiency, prolonged bleeding time, vitamin D deficiency, and use of anticoagulants. In short, risk factors for falls in acute care units consistently identified across studies include increased age, history of falls, mental status changes, sensory/communication deficit, toileting/elimination needs, mobility (including desire for autonomy), and use of medications (e.g., sedatives, opioids, psychotropics, anticonvulsants, cardiovascular medications, antihypertensives, diuretics, laxatives, antihistamines) (Currie, 2008; Inglesby, 2012; Weinberg et al., 2011).

Practice Recommendations for Fall Prevention

In the AHRQ publication, Currie (2008) recounted evidence-based practice recommendations for inpatient fall and injury preventions for acute care settings. Fall prevention strategies included educating staff about safety care, training the medical team for fall-injury risk assessment and assessment after the fall occurred, using alarm devices, monitoring medication side effects and adjusting doses as needed, adopting environmental adjustments (e.g., room design) to promote safe patient movement, providing a toileting regimen for confused patients, and treating the patient's underlying dis-

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orders (e.g., syncope, diabetes, anemia). Injury prevention recommendations included limiting use of restraints, lowering bedrails, using hip protectors for older adult patients, using floor mats, ensuring assessment after the fall, monitoring prothrombin time for patients at risk for falling, and using bisphosphonate medications for patients with documented osteoporosis.

NQF (2009) also provided sample implementation approaches to reduce the risk of patient harm resulting from falls. These included effective environmental adjustments (e.g., room designs to promote safe patient movement, clean dry floors, personal articles within reach), alternative patient management strategies (e.g., low beds, safe transfer training, alarm devices, walking aids to assist mobility), and monitoring activities (e.g., offering physical assistance to high-risk patients while they are ambulating or attempting difficult maneuvers such as toileting and transfers, a toileting regimen, limiting use of restraints). A number of fall prevention interventions have been proposed or are available (Currie, 2008; Gray-Micelli, 2008; Inglesby, 2012), but most of the interventions have never been tested adequately. Clyburn and Heydemann's (2011) analysis and comprehensive review of fall prevention methods used in hospital settings concluded there is no sufficient evidence that evidence-based guidelines are effective in fall prevention.

Types of Falls

Previous studies on the circumstances surrounding patient falls in U.S. hospitals showed 38%-47% of falls were associated with toilet-related activities that occurred in the bathrooms (Krauss, Evanoff, & Hitcho, 2005; Krauss et al., 2007). About 80% of falls occurred in patient rooms, 11% in patient bathrooms, and 9.5% in places other than patient rooms (e.g., hallways, in examination or treatment rooms, or by the nurses' stations) (Krauss et al., 2007). Hitcho and associates (2004) found patient falls occurred primarily while ambulating (19.1%), getting out of bed (10.9%), sitting down or standing up (9.3%), using a bedside commode or toileting (4.4%), standing or sitting without trying any other actions (3.8%), reaching for an object (3.3%), sleeping or repositioning in bed (2.2%), getting into bed (1.1%), using the bathtub (0.5%), and dressing or undressing (0.5%), or for "unknown" reasons (33.3%). Hignett and Masud (2006) concluded the first hazard interaction was the layout of and equipment in a patient's room. In the summary of analyses of reported fall-related sentinel events in the United States, environmental safety was cited as the main cause of 42% of patient falls between 1995 and 2004, and for 49% of patient falls in 2005 (Porché, 2007).

Purpose of this Study

This exploratory study intended to determine the significant predictors of different types of falls with a focus on toileting-related falls occurring in adult acute inpatient care settings. This study answered three research questions as follows:

1. What were the significant predictors of a toileting-related fall?
2. What were the significant predictors of a bed- and toileting-related fall?
3. What were the significant predictors of a bathroom/bedside commode- and toileting-related fall?

Toileting refers to all activities intended to address elimination needs, including getting out of bed, walking from the bed to bathroom, entering the bathroom, using the toilet/stand-to-sit and sit-to-stand movements, walking from the bathroom to bed, and getting back to bed. Toileting involves issues related to the settings of patient rooms and bathrooms, hospital equipment, and staffing effectiveness (Tzeng & Yin, 2009; Tzeng, 2010). Toileting-related falls were identified previously on the basis of content analyses of the same set of fall incident reports as this current study to identify the scenarios/themes of toileting-related falls and fall injuries occurring in adult acute inpatient care settings (Tzeng, 2010).

On the basis of previous studies (Currie, 2008; Weinberg et al., 2011) and available information included in the tabulated fall incident report forms, eight predictor variables were proposed. These predictor variables could be categorized into intrinsic risk factors (patient age in years, having a previous fall, and being at risk for falling) and extrinsic risk factors (the fall being observed, the fall being assisted, having a fall risk assessment completed, having a fall protocol in place, and having physical restraints in use). Sex was not included because this information was not reported in the incident reports. The three predictor variables of (a) using a fall assessment, (b) being at risk for falling, and (c) having a fall protocol/care plan in place in the chart were included because they may reflect nurses' efforts in fall and injury prevention.

Methods

Design

This study used a retrospective research design and was conducted in four adult acute inpatient units within a community, not-for-profit, suburban hospital located in Michigan. The study hospital has 109 medical beds (two units), 53 surgical beds (one unit), and 34 beds in a combined medical-surgical unit. This research used the archived fall incident reports over 3 years; it included reports of 547 fall incidents that occurred in the study units between July 1, 2005, and June 30, 2008. Data on the fall incident reports associated with individual patients were de-identified before being forwarded to the researcher for analyses. This project was approved by the institutional review boards of the study hospital and the author's employer university.

Data Source

Toileting-related falls were identified previously and reported in the study conducted by Tzeng (2010). All falls were classified first as being toileting-related or not, then further

grouped into different themes based, for example, on the patient's activities and the location of the fall. The theme of each fall incident was coded into a single-choice variable (see Table 1). The theme variable then was recoded into three *yes/no* variables as the dependent variables for regression analyses: (1) being a toileting-related fall (1=yes [A. Fall identified as toileting-related, 45.2%], 0=no), (2) being a bed- and toileting-related fall (1=yes [A2. Getting out of or getting back to the bed, 12.8%], 0=no), and (3) being a bathroom/bedside commode- and toileting-related fall (1=yes [A3. Slipping off the toilet or the bedside commode, 10.1%], 0=no).

Eight predictor variables were proposed. They were patient age in years, having a previous fall (1=yes, 0=no), being at risk for fall (1=yes, 0=no), the fall being observed (1=yes, 0=no), the fall being assisted (1=yes, 0=no), having a fall risk assessment completed (1=yes, 0=no), a fall protocol in place (1=yes, 0=no), and physical restraints in use (1=yes, 0=no). These variables were defined operationally by the study hospital's electronic incident reporting system.

TABLE 1.
Themes of Fall Incidents with an Emphasis on Toileting-Related Falls (*n*=547)

Types of Falls	Frequency (Percentage)
A. Falls identified as toileting related	**247 (45.2%)**
A1. On the way from the bed or bedside chair to the bathroom, or from the bathroom back to the bed or bedside chair	87 (15.9%)
A2. Getting out of or getting back to the bed	70 (12.8%)
A3. Slipping off the toilet or the bedside commode	55 (10.1%)
A4. Moving from the bed to the bedside commode or from the bedside commode back to the bed	27 (5.0%)
A5. Using urinal while standing or sitting on the bed edge or the chair	8 (1.4%)
B. Falls not specified as toileting related	**300 (54.8%)**
B1. Getting out of or getting back to the bed	211 (38.6%)
B2. Standing or walking in the patient room, being found on the floor of the patient room	39 (7.1%)
B3. Slipping off the chair or wheelchair, getting out of or into the chair or wheelchair	22 (4.0%)
B4. Moving from the bed to the bedside chair/wheelchair or from the chair/wheelchair back to the bed	16 (3.0%)
B5. Standing or walking in the hallways	6 (1.1%)
B6. Standing or walking in the lounge, exam room, or therapy room	5 (1.0%)
B7. Standing or walking in the bathroom	1 (0.2%)

Data Analyses

SPSS software (16.0 Window version; SPSS Inc., Chicago, IL) was used for data analyses. Three binary logistic regression analyses were conducted to answer the research questions. The respective dependent variable for each of three regression models was: (a) being a toileting-related fall, (b) being a bed- and toileting-related fall, and (c) being a bathroom/bedside commode- and toileting-related fall. All eight proposed predictor variables were entered into each one of the binary logistic regression models at the same time. The alpha value was set at 0.05.

Results

Descriptive Information

Analyses were conducted of 547 falls. The mean age of patients who fell was 75.59 (SD=15.13; range: 20-103), with 428 patients (78.2%) age 65 or older. No apparent injury was noted in 369 patients (67.5%) while 153 (28.0%) had minor injuries, 9 (1.6%) had moderate injuries, and 16 (2.9%) had major injuries. No falls resulted in death. As reported by nurses, the most often identified issue related to the fall (a single-choice item) was the patient's mental status (*n*=215, 39.7%), followed by the patient being nonadherent to nursing staffs' instructions (e.g., calling for toileting assistance by pushing the call button) (*n*=107, 19.7%). Thirteen falls (2.4%) were associated with medications. Additional descriptive characteristics of these fall incidents are included in Table 2.

Findings of the Regression Analyses

Three binary logistic regression models were constructed, with model 1 as a toileting-related fall, model 2 a bed- and toileting-related fall, and model 3 a bathroom/bedside commode- and toileting-related fall. Table 3 shows a toileting-related fall tended to be associated with having a previous fall (B=0.45, p=0.03), having physical restraints in use (B=1.65, p=0.01), and being at risk for falling (B=0.72, p=0.02) (model 1). A bed- and toileting-related fall tended to be an observed fall (B=1.93, p=0.02) (model 2). A bathroom/bedside commode- and toileting-related fall tended to occur with a patient who had a previous fall (B=0.99, p=0.01) and had been previously identified as being at risk for falling (B=1.09, p=0.01) (model 3).

Discussion

This exploratory study determined the significant predictors of different types of falls with a focus on toileting-related falls occurring in adult acute inpatient care settings. Results showed a toileting-related fall tended to be associated with having a previous fall, having physical restraints in use, and being at risk for falling (the answer to research ques-

TABLE 2.
Descriptive Characteristics of Fall Incidents (*n*=547)

Characteristics	Frequency (Percentage)
The location where falls occurred	
Medical unit	319 (58.4%)
Surgical unit	102 (18.6%)
Medical-surgical unit	126 (23.0%)
The shift when falls occurred (23 missing values)	
7 a.m. – 11 a.m.	67 (12.2%)
11 a.m. – 3 p.m.	69 (12.6%)
3 p.m. – 7 p.m.	66 (12.1%)
7 p.m. – 11 p.m.	95 (17.4%)
11 p.m. – 3 a.m.	117 (21.4%)
3 a.m. – 7 a.m.	109 (19.9%)
Missing value (not indicated on the reports)	24 (0.4%)
Predictor Variables	
Having a previous fall	
Yes	187 (34.2%)
No	360 (65.8%)
Being at risk for fall	
Yes	391 (71.5%)
No	156 (28.5%)
The fall being observed/fall reported with witnesses	
Yes	68 (12.4%)
No	479 (87.6%)
Assisted fall (fall assisted by staff or family visitors)	
Yes	42 (7.7%)
No	505 (92.3%)
Having a fall risk assessment completed prior to the incident	
Yes	450 (82.3%)
No	97 (17.7%)
Having a fall prevention protocol in place	
Yes	384 (70.2%)
No	163 (29.8%)
Physical restraints in use when the fall occurred	
Yes	55 (10.1%)
No	492 (89.9%)

tion 1). A bed- and toileting-related fall tended to be an observed fall (the answer to research question 2). A bathroom/bedside commode- and toileting-related fall tended to occur with a patient who had a previous fall and had been identified previously as at risk for falling (the answer to research question 3).

The findings of this study added to the current literature on risk factors for falls (Currie, 2008). It was confirmed that improper use of mechanical restraining devices often is involved in toileting-related falls. In addition, a history of falling or having been identified previously as at risk for falling often described the patient who experienced a toileting-related fall or a bathroom/bedside commode- and toileting-related fall. However, having a fall assessment completed and having a fall protocol in place were not significant predictors of any of the dependent variables. This finding also concluded that having a fall assessment completed or having a fall protocol in the chart (or both) would not make a difference in preventing toileting-related falls. However, this retrospective research was unable to examine nurses' efforts in completing fall risk assessments or having a fall protocol in place and implemented as a study limitation. Future research is needed to examine whether these insignificant relationships are treatment fidelity issues (e.g., Did nurses initiate the fall protocol/plan suggested on the basis of the fall assessment findings? Did nurses implement the expected fall protocol/plan?).

Nursing Implications

Fall prevention strategies should have a priority in addressing patients' needs related to toileting because 45.2% of falls were toileting related (see Table 1). Quigley and associates (2009) emphasized assessing risk for fall-related injury could contribute evidence for nurses to provide specific interventions to reduce injury. Fall risk assessment tools may remind nurses of patient characteristics that should be evaluated. However, fall risk assessment tools should not replace nurses' unique critical thinking skills and holistic assessment capabilities. To improve the efficiency and effectiveness of nursing interventions for fall prevention, front-line nurse managers should periodically audit, among other measures: (a) nurses' completion rates for conducting fall assessment and reassessment, (b) the accuracy of the documented information, and (c) nurses' adherence to initiating and implementing the fall protocol/plan as suggested based on the fall assessment findings (Inglesby, 2012).

Conclusion

This exploratory study concluded a toileting-related fall tended to be associated with having a previous

TABLE 3.
Summary of the Results of the Binary Logistic Regression Analyses

Dependent Variable/Independent Variable	Cox & Snell R^2	Nagelkerke R^2	Percentage Correct[a]
Model 1: Being a toileting-related fall (1=yes, 0=no)	0.08	0.11	61.8%
Model 2: Being a bed- and toileting-related fall (1=yes, 0=no)	0.03	0.05	87.3%
Model 3: Being a bathroom/bedside commode- and toileting-related fall (1=yes, 0=no)	0.06	0.13	89.7%
Model 1: Being a Toileting-Related Fall	**B**	**Wald**	**Significance**
Patient age in years	-0.01	3.61	0.06
Having a history of falling (1=yes)	0.45	5.53	0.03*
An observed fall (1=yes)	0.07	0.05	0.83
An assisted fall (1=yes)	-0.06	0.02	0.89
Physical restraints in use (1=yes)	1.65	16.31	0.00**
Having a fall risk assessment completed (1=yes)	0.51	1.56	0.21
Being at risk for falling (1=yes)	0.72	5.49	0.02*
Having a fall protocol in place (1=yes)	0.34	1.30	0.25
Constant	-1.81	4.24	0.04
Model 2: Being a Bed- and Toileting-Related Fall	**B**	**Wald**	**Significance**
Patient age in years	-0.01	0.57	0.45
Having a history of falling (1=yes)	0.26	0.78	0.38
An observed fall (1=yes)	1.93	5.59	0.02*
An assisted fall (1=yes)	-0.56	0.76	0.38
Physical restraints in use (1=yes)	0.50	0.98	0.32
Having a fall risk assessment completed (1=yes)	0.77	1.00	0.32
Being at risk for falling (1=yes)	0.04	0.01	0.93
Having a fall protocol in place (1=yes)	0.12	0.07	0.79
Constant	-4.05	7.99	0.01
Model 3: Being a Bathroom/Bedside Commode- and Toileting-Related Fall	**B**	**Wald**	**Significance**
Patient age in years	-0.01	0.87	0.35
Having a history of falling (1=yes)	0.99	8.46	0.01**
An observed fall (1=yes)	0.62	1.18	0.28
An assisted fall (1=yes)	-0.66	1.22	0.27
Physical restraints in use (1=yes)	7.19	0.28	0.60
Having a fall risk assessment completed (1=yes)	-0.75	1.93	0.17
Being at risk for falling (1=yes)	1.09	6.39	0.01*
Having a fall protocol in place (1=yes)	0.49	1.10	0.29
Constant	-8.89	0.43	0.51

[a] Percentage correct refers to the overall percentage of correctly predicted values reported in the classification table. The cut-off value is 0.50.
*$p < 0.05$
**$p < 0.01$

fall, having physical restraints in use, and being at risk for falling. It provided important insights to prioritizing strategies to prevent toileting-related falls. In the current cost-containment health care environment, future studies should continue to evaluate the effectiveness of a single intervention versus bundled fall prevention strategies on decreasing toileting-related falls and consequent injuries. MSN

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