Comparing reported falls between adult and older adult inpatients at a university hospital

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ABSTRACT

This study aimed to compare the circumstances, risk factors, and background/causal factors of inpatient falls between adults (aged 15-64 years) and older adults (aged over 65 years). A retrospective review of incident reports of falls occurred between April 1, 2013 and March 31, 2014 was conducted in a Japanese university hospital. Only falls by inpatients who were aged≧15 years were included. Near falls and falls that occurred out of the hospital were excluded. Two-hundred nineteen reports (adults: n=77, older adults: n=142) were included for analysis. Older adults had a significantly greater proportion of elimination-related falls than adults did (p=0.007); however, there were no significant differences between the two age groups regarding time (day/night), location, discovery, mechanism, fall-related injury, or reported physicians' or nurses' prediction. Among the 47 risk factors assessed post-fall, adults demonstrated a higher proportion of a history of lost consciousness than older adults did; however, older adults showed a significantly higher proportion than adults did on eight other items: hearing impairment, muscle weakness, mobility assistive devices, requiring mobility assistance, decreased strength, impaired judgment, dementia, and requiring toileting assistance). Improper assessment and/or observation were the most frequently reported background and causal factors of the falls in both age groups. The circumstances of inpatient falls except the purpose of action, majority of risk factors, and background/causal factors did not differ between adults and older adults. Further studies are needed to identify risk factors of adult inpatients. *Ryukyu Med. J., 37* (*1~4*) *19~28, 2018*

Key words: accidental falls, incident reporting, inpatients, risk assessment

INTRODUCTION

Falls account for 23.1%-32.3% of the adverse events that occur in hospitals [1, 2]. The reported rate of hospital falls ranges from 3.5 to 8.4 per 1000 patient-days [1, 3, 4], corresponding to up to 29 falls every week in a 500-bed hospital. Despite enormous efforts to prevent hospital falls in healthcare facilities and plentiful research conducted on risk factors, risk assessment, and interventions worldwide, in-hospital fall rates in Australian public hospitals increased from 0.41 to 0.88 falls per 1000 patient-days between 1998 and 2008 [5]. Moreover, the rate of fall-related major injuries in Danish hospitals increased an average of 11.4% annually between 2007 and 2012 [6]. The number of falls resulting in death or permanent loss of function reported to the Joint Commission

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increased from 76 in 2012 to 95 in 2015 [7].

Numerous studies have described the circumstances of falls that occur in hospital settings [8-11]. Approximately 85% occurred in the patients' room [8, 10], 71%-77% of the patients were found on floor [8, 9], more falls occurred at night (1900-0659) than in the day (0700-1859) [8, 9], and 36%-50% were elimination-related [8, 11]. Between 26.4% and 41.5% of inpatient falls resulted in injury [8, 10, 12]. Nearly half of the fallers were under 65 years old [8, 10]. Hitcho and colleagues reported that fallers aged 65 years or older were more likely to have an elimination-related fall than those less than 65 years old [8]; other circumstances of in-hospital falls were not compared by age group.

A study of community dwellers in the United States compared the circumstances of falls in young (aged 20-45 years), middle-aged (aged 46-65 years), and older (aged>65 years) people [13]. Results revealed significant differences between the three age groups in number of falls, activity, perceived cause, and location of the falls; however, no difference was found in the proportions of injuries across age groups. Moreover, a Korean study of community dwellers revealed that the proportions of falls that resulted in necessary medical treatment, hip fractures, or difficulties with activities of daily living were greater among adults (aged 45-65 years) than among older adults (aged>65 years), although only the proportions of hip fractures were statistically significant [14]. While we tend to think that older adults are more prone to injury than adults if they fall, these results suggest that adults could face the same injuries as older adults if they fell. Previous studies of hospital falls and best-practice guidelines in Australia and the U.K. [15, 16] have focused on older adults. Numerous studies have described the circumstances, risk factors, and background factors of the falls of hospitalized patients, yet no study compared the results between hospitalized adults and older adults.

This study aimed to compare the circumstances, risk factors, and background and causal factors of falls between adult inpatients (aged 15-64 years) and older adult inpatients (aged 65 years and older).

METHODS

Study design and setting

This was a retrospective observational study of inpatient falls that occurred between April 1, 2013 and March 31, 2014. The hospital was a 600-bed university hospital in Japan and was accredited by the Japanese Council for Quality Health Care. The average duration of hospital stay in the study period was 16.1 days. The inpatient rooms were typically four-bed rooms, and each ward had a few private or two-bed rooms. Most patients used shared restrooms/shower rooms.

Inclusion and exclusion criteria of the incident reports

We included incident reports submitted for falls by inpatients aged 15 years and older based on the World Health Organization's age classification of adults [17]. Among the 14 wards in the hospital, the neuropsychiatry and pediatric ward and intensive care unit were excluded. We also excluded falls that did not meet our definition of falls, near falls, and falls that occurred outside of the hospital. If multiple reports were submitted for the same incident, the report from the primarily-involved hospital staff was included.

Fall definition and identification

A fall was defined as "inadvertently coming to rest on the ground, floor, or other lower level, excluding intentional change in position to rest in furniture, wall, or other objects" [18]. The researchers (Higaonna & Toubaru) independently reviewed the free-text descriptions of the fall events to determine the inclusion of the incident reports.

Data collection

Information concerning average hospital stay and cumulative total number of inpatients during the study period was obtained from hospital administration. All other information used in this study was obtained from the incident reports submitted electronically by hospital staff, who were following the hospital's incident-reporting protocol. Reporters typed in the patient's age, primary diagnosis, and fall-risk assessment score. The fall-risk assessment score was calculated using the modified Japanese Nursing Association fall-risk assessment tool adopted at the hospital. This tool consists of 35 items including age, fall history, sensory impairment, motor functions, mobility, cognition, medications, elimination, treatment stage, personality, and environment. It demonstrated good predictive validity (sensitivity 0.82, specificity 0.71) [19]. The reporters chose the following information from the reporting system: incident classification, reporters' occupation and prediction of the incident,

patients' sex and mobility, patient movement-monitor use, fall-risk factors, and background/causal factors. We identified the following information from free-text descriptions of the fall: location, discovery, mechanisms, and purpose of action. We discovered several inconsistencies in injury level between the level selected by the reporters and their description of the falls. Therefore, we decided to collect the injury level information from the free-text description.

Statistical analysis

Fall rate was calculated as 1000 patient-days. Nominal variables were described using frequencies and proportions. Age, with skewed distribution, and fall-risk assessment score were described using median, range, or first and third inter-quartiles. Additionally, age was classified by 20-year increments. Primary diagnosis was defined according to the International Statistical Classification of Diseases and Related Health Problems, 10th revision [20]. Time of the falls was examined hourly and categorized into two time ranges: day (0700-1859) and night (1900-0659) according to previous studies [8, 9]. Injuries due to the falls were categorized as no injury, minor (application of a dressing, ice, cleaning of a wound, limb elevation, topical medication use, pain, bruise, or abrasion), moderate (suturing, application of steri-strips, splinting, or muscle/joint strain) or major (surgery, casting, fractures). Elimination-related falls included falls that occurred when using the toilet and on the way to/from the restroom. The fall-risk assessment scores were classified into high and low risk at the optimal cut-off point of ≧6, as recommended by the previous study [19].

Circumstances of the falls, risk factors, and background and causal factors were compared between adults and older adults using Pearson's chi-square test with Yate's correction applied when expected frequencies were less than 5 in more than 20% of the cells (where applicable) [21]. Fall risk assessment scores between the two age groups were examined using Mann-Whitney's U-test. All statistical analyses were conducted using SPSS version 19, and p-values less than 0.05 were considered statistically significant.

Ethical consideration

This study was conducted following the Ethical Guidelines for Clinical Studies by Japan's Ministry of Health, Labour and Welfare [22] and was approved by the ethics committee for clinical research of the university.

RESULTS

Faller characteristics

Of 283 incident reports submitted to the categories of falls, 219 were included in this study (Fig. 1). All falls were reported by nurses except one by a physician. Fall rates for inpatients aged≧15, 15-64, and≧65 years were 1.36, 0.86, and 1.98 falls per 1000 patient-day, respectively.

Faller characteristics are presented in Table 1. The median age of the fallers was 71 years (range 21-90 years), and those aged 60-79 years exhibited the highest proportion of fallers (60.7%). Nearly one in two fallers was primarily diagnosed with neoplasms and required minimum or stand-by assistance for mobility. Among the 219 reports, 77 (35.2%) were adults, and 142 (64.8%) were older adults. The most common primary diagnosis was neoplasms in both adults (54.5%) and older adults (43.7%). More adult fallers were independent in their mobility (61.0%) compared to older adults (30.3%).

Fall circumstances

Falls occurred most frequently at 7 am (n=16, 7.3%) in all groups, 11 am in adults (n=8, 10.4%), and 7 am and 1 pm in older adults (n=10, 7.1%; Fig.2). More falls occurred during the daytime in both adults (62.3%) and older adults (56.7%) than at nighttime; however, this difference was not significant (Table 2).

Falls occurred in the patients' rooms (62.6%), in other ward areas (32.9%), and outside the ward (4.6%). No statistical differences were found on these classifications by age group. Most falls occurred at the patients' bedsides in both age groups (adults: 51.9%; older adults: 52.1%). Restrooms were the most common location for falls in the other ward areas in both age groups (adults: 11.7%; older adults: 14.1%).

Half of the falls were discovered by hospital staff finding patients laying or sitting on the floor. The proportion of falls discovered by the report of patients or family was higher in adults (32.9%) than older adults (25.7%); however, the difference was not statistically significant.

The most frequently described mechanisms were lost balance, dizziness/vertigo, and tripped/slipped in both age groups; leaning against an unstable object was only reported by older adults.

The purpose of action right before the falls was elimination in half of the falls. The proportion of

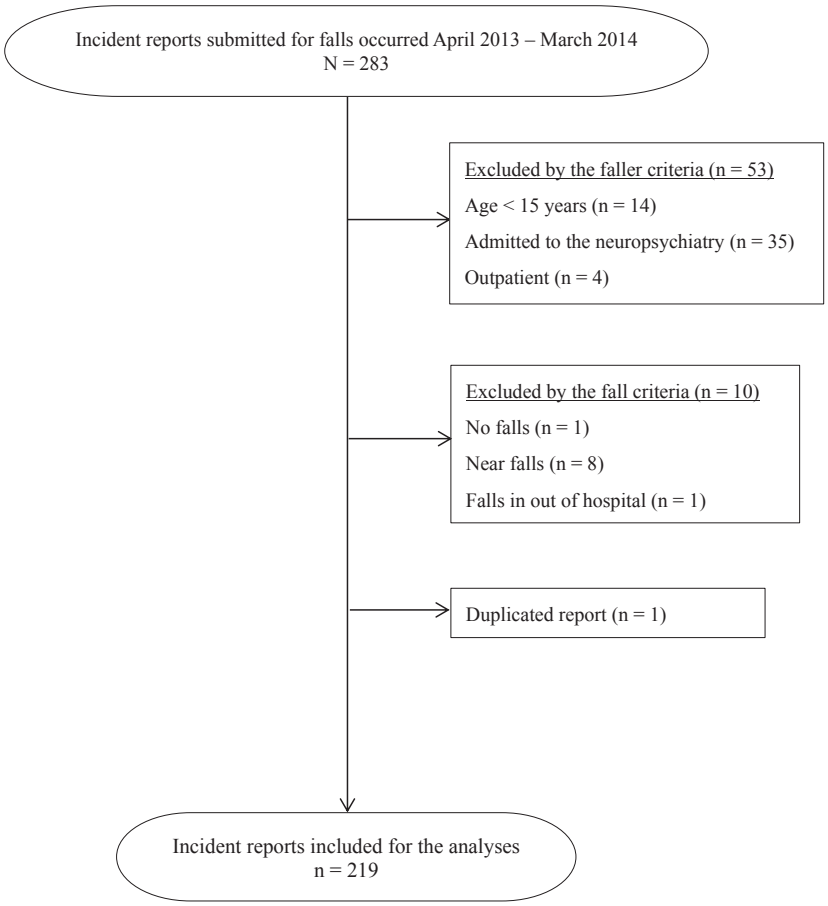

Fig. 1 **Flowchart of incident report selection**

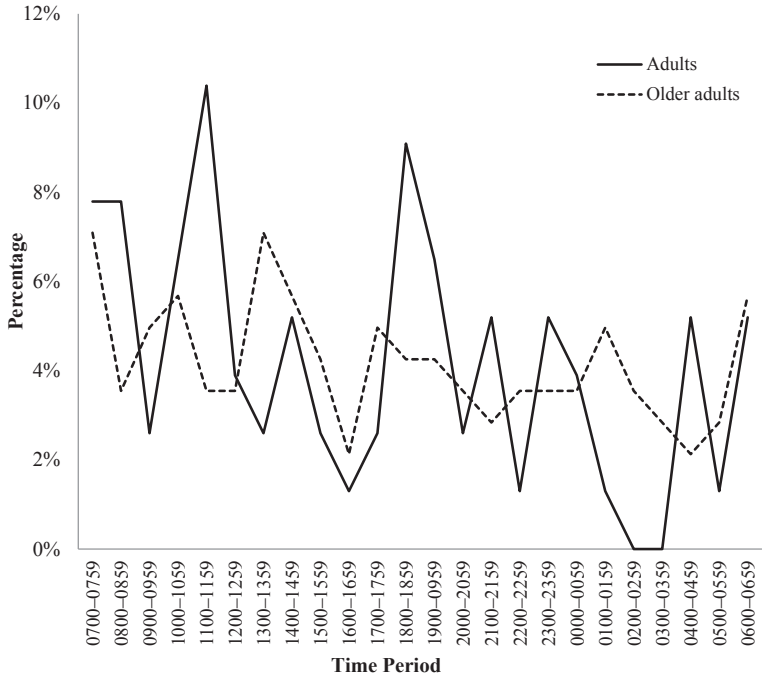

Fig. 2 **Time of the falls for the adults (aged 15–64 years) and older adults (aged ≧ 65 years)**

Table 1 **Characteristics of the fallers**

Characteristics	Total (n=219)	Adults (n=77)	Older adults (n=142)
Age (years), median (Q1, Q3)	71 (61, 77)		
Age, 20-39 years, n (%)	14 (6.4)		
Age, 40-59 years, n (%)	35 (16.0)		
Age, 60-79 years, n (%)	133 (60.7)		
Age, 80-99 years, n (%)	37 (16.9)		
Male, n (%)	122 (55.7)	43 (55.8)	79 (55.6)
Primary diagnosis, n (%)			
Neoplasms	104 (47.5)	42 (54.5)	62 (43.7)
Disease of the circulatory system	31 (14.2)	6 (7.8)	25 (17.6)
Disease of musculoskeletal system and connective tissue	11 (5.0)	7 (9.1)	4 (2.8)
Disease of the respiratory system	10 (4.6)	2 (2.6)	8 (5.6)
Endocrine, nutritional and metabolic diseases	9 (4.1)	4 (5.2)	5 (3.5)
Disease of the nervous system	9 (4.1)	2 (2.6)	7 (4.9)
Disease of the eye and adnexa	9 (4.1)	3 (3.9)	6 (4.2)
Disease of the digestive system	7 (3.2)	1 (1.3)	6 (4.2)
Disease of the genitourinary system	6 (2.7)	1 (1.3)	5 (3.5)
Disease of the skin and subcutaneous tissue	5 (2.3)	0 (0.0)	5 (3.5)
Others[a]	18 (8.2)	9 (11.7)	9 (6.3)
Mobility, n (%)			
Independent	90 (41.1)	47 (61.0)	43 (30.3)
Require minimum assistance or stand-by assist	105 (47.9)	25 (32.5)	80 (56.3)
Able to sit up	17 (7.8)	3 (3.9)	14 (9.9)
Unable to maintain siting up position	7 (3.2)	2 (2.6)	5 (3.5)
Patient movement monitor, n (%)	58 (26.5)	11 (14.3)	47 (33.1)

[a] Others include injury, poisoning and certain other consequences of external causes (3); disease of the ear and mastoid process (2); pregnancy, childbirth and the puerperium (2); certain infectious and parasitic diseases (1); mental and behavioral disorders (1); congenital malformations, deformations and chromosomal abnormalities (1); symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified (8).
Q1: First inter-quartile, Q3: Third inter-quartile

Table 2 **Circumstances of the falls**

Circumstances	Total n (%)	Adults n (%)	Older adults n (%)	p
Time	**n=218**	**n=77**	**n=141**	
Day (0700-1859)	128 (58.7)	48 (62.3)	80 (56.7)	0.42
Night (1900-0659)	90 (41.3)	29 (37.7)	61 (43.3)	
Location	**n=219**	**n=77**	**n=142**	
Patient room	137 (62.6)	47 (61.0)	90 (63.4)	0.24
Other ward area	72 (32.9)	24 (31.2)	48 (33.8)	
Out of the ward	10 (4.6)	6 (7.8)	4 (2.8)	
Discovery	**n=209**	**n=73**	**n=136**	
Found on floor laying/sitting	117 (56.0)	38 (52.1)	79 (58.1)	0.55
Witnessed	33 (15.8)	11 (15.1)	22 (16.2)	
Patient/family reported	59 (28.2)	24 (32.9)	35 (25.7)	
Mechanism	**n=136**	**n=54**	**n=82**	
Lost balance	35 (25.7)	14 (25.9)	21 (25.6)	
Dizziness/vertigo	33 (24.3)	12 (22.2)	21 (25.6)	
Tripped/slipped	30 (22.1)	11 (20.4)	19 (23.2)	
Lean against unstable object	5 (3.7)	0 (0.0)	5 (6.1)	
Lost consciousness	5 (3.7)	4 (7.4)	1 (1.2)	
Others	27 (20.0)	12 (22.0)	15 (18.0)	
Purpose of action	**n=166**	**n=57**	**n=109**	
Elimination-related	88 (53.0)	22 (38.6)	66 (60.6)	0.007
Others	78 (47.0)	35 (61.4)	43 (39.4)	
Injuries	**n=192**	**n=68**	**n=124**	
None	129 (67.2)	44 (64.7)	85 (68.5)	0.59
Injured	63 (32.8)	24 (35.3)	39 (31.5)	
Slight/moderate injury	60 (31.3)	23 (33.8)	37 (29.8)	
Major injury	3 (1.6)	1 (1.5)	2 (1.6)	
Physicians/nurses' prediction	**n=219**	**n=77**	**n=142**	
Predicted fall	129 (58.9)	41 (53.2)	88 (62.0)	0.21

P-values＜0.05 were considered statistically significant by Pearson's chi-square test.

elimination-related falls was significantly higher in older adults (60.6%) compared to adults (38.6%). Elimination-related falls occurred more on the way to the restroom (adults: 50%, older adults: 34.9%) than in the restroom (adults: 18.2%, older adults: 21.2%) or returning from the restroom (adults: 18.2%, older adults: 12.1%).

Information on injury status was not provided in 27 reports (12.3%). One in three falls resulted in injuries, and 1.6% resulted in major injuries: fractured rib (1), clavicle (1), or patella (1). Nurses or physicians who reported the incidents classified 58.9% of the falls as predicted falls. The proportion of predicted falls was higher in older adults (62%) than in adults (53.2%); however, the results between the two groups were not significantly different.

Fall-risk assessment results and risk factors

The modified Japanese Nursing Association fall risk assessment tool identified 194 (89.4%) of the fallers as high-risk for falls, and this proportion was higher in older adults (95.7%) than adults (77.6%, $p<0.001$). The fall-risk assessment score was significantly higher in older adults (median 10 points) than in adults (median 8 points; $p<0.001$).

Risk factors with≧10 total fallers are shown in Table 3. More than half of the fallers had the following

Table 3 **Fall risk factors**

Fall risk factors	Total n (%)	Adults n (%)	Older adults n (%)	p
History (n=219)				
History of falls	84 (38.4)	28 (36.4)	56 (39.4)	0.66
Sensory functions (n=217)				
Pain	66 (30.4)	26 (34.2)	40 (28.4)	0.37
Hearing impairment	17 (7.8)	1 (1.3)	16 (11.3)	0.01
Dysphonia	14 (6.5)	5 (6.6)	9 (6.4)	1.00
Visual impairment	13 (6.0)	6 (6.6)	8 (5.7)	1.00
Sensory impairment	10 (4.6)	2 (2.6)	8 (5.7)	0.50
Motor functions (n=214)				
Numbness	30 (14.0)	13 (17.3)	17 (12.2)	0.31
Paralysis	21 (9.8)	10 (13.3)	11 (7.9)	0.20
Impaired extremities	13 (6.1)	7 (9.3)	6 (4.3)	0.24
Mobility (n=219)				
Muscle weakness	162 (74.0)	49 (63.6)	113 (79.6)	0.01
Use of mobility assistive devices	122 (55.7)	32 (41.6)	90 (63.4)	<0.01
Requiring mobility assistance	108 (49.3)	27 (35.1)	81 (57.0)	<0.01
Unstable when standing/walking	105 (47.9)	35 (45.5)	70 (49.3)	0.59
Decreased strength	65 (29.7)	14 (18.2)	51 (35.9)	<0.01
Intravenous treatment	60 (27.4)	25 (32.5)	35 (24.6)	0.22
Cognition (n=218)				
Impaired judgment	68 (31.2)	16 (21.1)	52 (36.6)	0.02
Impaired understanding	56 (25.7)	17 (22.4)	39 (27.5)	0.41
Impaired memory	26 (11.9)	6 (7.9)	20 (14.1)	0.18
Disorientation	23 (10.6)	6 (7.9)	17 (12.0)	0.35
Difficulty learning	16 (7.3)	6 (7.9)	10 (7.0)	0.82
Dementia	15 (6.9)	0 (0.0)	15 (10.6)	<0.01
Confused	12 (5.5)	2 (2.6)	10 (7.0)	0.29
Delirium	11 (5.0)	3 (3.9)	8 (5.6)	0.83
Treatment stage (n=219)				
Admitted within a week	48 (21.9)	16 (20.8)	32 (22.5)	0.76
Began rehabilitation recently	26 (11.9)	6 (7.8)	20 (14.1)	0.17
Medications (n=216)				
Analgesics	63 (29.2)	25 (32.9)	38 (27.1)	0.37
Hypnotics/tranquilizers	49 (22.7)	20 (26.3)	29 (20.7)	0.35
Laxatives	47 (21.8)	18 (23.7)	29 (20.7)	0.61
Anti-anxiety	37 (17.1)	13 (17.1)	24 (17.1)	
Narcotics	33 (15.3)	19 (25.0)	14 (10.0)	0.99
Chemotherapy	19 (8.8)	10 (13.2)	9 (6.4)	0.10
Impaired elimination (n=178)				
Toileting at night	101 (56.7)	33 (56.9)	68 (56.7)	0.98
Requiring toileting assistance	90 (50.6)	22 (37.9)	68 (56.7)	0.02
Incontinence (urinary, bowel)	45 (25.3)	12 (20.7)	33 (27.5)	0.33
Room distant from the toilet	44 (24.7)	12 (20.7)	32 (26.7)	0.39
Commode chair use	23 (12.9)	9 (15.5)	14 (11.7)	0.47
Polyuria	22 (12.4)	9 (15.5)	13 (10.8)	0.37
Continuous urinary catheter	18 (10.1)	5 (8.6)	13 (10.8)	0.65
Personality (n=218)	68 (31.2)	24 (31.6)	44 (31.0)	0.93

Risk factors with a total number of fallers <10 were not included in the table: history of lost consciousness, atopognosia, non-weight bearing order, clouding of consciousness, released from bedrest recently, antiarrhythmic, antiparkinsonian, continuous urge to void.
Examined by Pearson's chi-square test. P-values <0.05 were considered statistically significant.

risk factors: muscle weakness (74.0%), use of mobility assistive devices (55.7%), toileting at night (56.7%), and requiring toileting assistance (50.6%). Risk factors with significantly higher proportion among older adults than adults were hearing impairment, muscle weakness, mobility assistive devices, requiring mobility assistance, decreased strength, impaired judgment, dementia, and requiring toileting assistance. A history of lost consciousness demonstrated a higher proportion among adults (7.8%) compared to older adults (2.1%; p=0.04).

Fall background and causal factors

Fall background and causal factors are shown in Table 4. Frequently reported background and causal factors were improper assessment and/or observation (50.7%), biased by the wrong impression (46.1%), misjudgment (35.2%), and patient and/or family factors (31.1%). There was no statistical difference in background and causal factors between the two age groups.

DISCUSSION

This study demonstrated that fall circumstances did not differ significantly between adults and older adults except that older adult inpatients were more likely to have an elimination-related fall than were adult inpatients. This result was consistent with a study conducted in a teaching hospital[8]. We initially thought that this was because older adults tend to urinate more often than adults; however, the proportion of polyuria in this study was actually higher in adults than in older adults, although this difference was not statistically significant. Only 21% of the elimination-related falls by older adults occurred in the restroom; more falls occurred when going to the restroom. A possible explanation is that most older adults only mobilized for elimination. This may indicate the importance of assessing toileting schedule and planning an intervention to make elimination-related activity safer for older adults. However, a recently published randomized controlled trial conducted in six Australian hospitals found that their fall prevention program, consisting of a fall-risk assessment tool and six interventions (toileting regimen, bathroom supervision, fall alert sign, walking aids within reach, low-low bed, bed/chair alarm), was not effective in preventing falls or fall-related injuries [23]. Barker and colleagues suggested that the two intervention components—use of a low-low bed and a bed/chair alarm—may not be effective in fall prevention as reported by recent studies and influenced the effectiveness of their program [23].

Table 4 **Background and causal factors of the falls**

Background and causal factors	Total (n=219)	Adults (n=77)	Older adults (n=142)	p
Action of the person involved, n (%)				
Improper assessment/observation	111 (50.7)	36 (46.8)	75 (52.8)	0.39
Misjudgment	77 (35.2)	25 (32.5)	52 (36.6)	0.54
Inadequate explanation to patient	54 (24.7)	21 (27.3)	33 (23.2)	0.51
Neglect to check	44 (20.1)	17 (22.1)	27 (19.0)	0.59
Inadequate communication	26 (11.9)	6 (7.8)	20 (14.1)	0.17
Delayed evaluation of morbid status	23 (10.5)	11 (14.3)	12 (8.5)	0.18
Human factors, n (%)				
Biased by the wrong impression	101 (46.1)	36 (46.8)	65 (45.8)	0.89
Carelessness	47 (21.5)	15 (19.5)	32 (22.5)	0.60
In a hurry	6 (2.7)	3 (3.9)	3 (2.1)	0.74 [a]
Lack of knowledge	5 (2.3)	1 (1.3)	4 (2.8)	0.81 [a]
Deficiency of technique/skill	2 (0.9)	2 (2.6)	0 (0.0)	0.24 [a]
Inexperienced with medical devices	2 (0.9)	1 (1.3)	1 (0.7)	0.58 [a]
First or inadequate experience	1 (0.5)	1 (1.3)	0 (0.0)	0.76 [a]
Fatigue/ lack of sleep	1 (0.5)	1 (1.3)	0 (0.0)	0.76 [a]
Environment/facility/devices, n (%)				
Patient/family factors	68 (31.1)	22 (28.6)	46 (32.4)	0.56
Hospital environment	2 (0.9)	1 (1.3)	1 (0.7)	1.00 [a]
Medical supplies	1 (0.5)	1 (1.3)	0 (0.0)	0.76 [a]

Single fall event could have more than one background and causal factors chosen.
[a] Pearson's chi-square test with Yate's correction applied. P-values less than 0.05 were considered statistically significant.

Among the six interventions, toileting schedule was the second least frequently documented intervention. It is unknown if there were a few patients requiring scheduled toileting or if barriers existed to implement the intervention. Tzeng and Yin discovered that nurses perceived increased toileting needs as a frequently observed risk factor for injurious falls while interventions related to patient's toileting was not included in the top 20 of the most frequently adopted interventions [24]. Studies are needed to determine if scheduled toileting could effectively prevent patient falls. Furthermore, a large number of elimination-related falls in older adults may be caused by the low mobility of this age group during hospitalization, as reported by Brown and colleagues [25].

The proportion of injurious falls did not differ by age group; nearly one in three falls resulted in some level of injury. This finding is consistent with a study of community dwellers in the United States indicating that the proportions of injurious falls did not differ significantly in three different age groups: aged 20-45, 46-65, >65 years [13].

In this study, both adults and older adults most frequently fell at their bedsides. This could indicate that adult inpatients are as frail as their older counterparts. The National Institute for Health and Care Excellence guideline suggests that all inpatients aged 65 years and older to be assessed for multiple risk factors; however, it depends on the clinicians' judgment to assess inpatients aged 50 to 64 years [16]. Although the difference was not significant, this study found that the proportion of falls reported as unpredicted was larger among adults compared to older adults. Similarly, the proportion of falls classified as low risk was higher among adults than older adults. However, the assessment tool identified more adult fallers as having high risk of falling (77.6%) than clinicians' predictions (53.2%). This raises a concern about relying completely on an individual clinician's judgment rather than conducting multiple risk assessments that could lead to better preventative care. A history of lost consciousness was the only risk factor for which adults showed a higher proportion than older adults. However, only 8.7% of the adult fallers had this risk factor. The fall risk factors of adults must be explored further in future studies.

The risk factors that demonstrated a higher proportion in older adults compared to adults (i.e., hearing impairment, muscle weakness, decreased strength, impaired judgment, and dementia) might reflect population differences. Because of these trends in older adults, they were more likely to require mobility-assistive devices and assistance from others for mobility and toileting.

The reported background and causal factors of falls did not differ by age group, and improper assessment and/or observation was most frequently reported in both age groups, consistent with the Sentinel event reports of the Joint Commission [26]. While communication was the second leading root cause of falls in the Joint Commission report [26], it was reported in only 10% of the reports. Nearly half of the reporters were biased by a wrong impression of their patients; however, the characteristics and/or behavior of the patients that determined the healthcare professionals' impressions of them being a high or low fall risk are unknown. Discovering this thought process will aid in improving healthcare professionals' clinical judgment on fall risks.

LIMITATIONS

First, this study was conducted in a single hospital in Japan; therefore, the findings cannot be generalized to other patient groups or settings. Second, the falls were only identified by incident reports; therefore, approximately 28-40% of the falls were missed [27, 28]. Third, missing a patient identification number in the incident reports made us unable to differentiate first and repeated falls. This could create bias as some of the fallers' characteristics may have been entered more than once. Finally, the amount of information included in the free-text description of the incident reports varied and could influence the study's results.

CONCLUSION

Hospitalized older adults demonstrated a higher proportion of elimination-related falls than adult inpatients. Other circumstances of the falls and background and causal factors did not differ significantly according to age group. More attention should be directed toward examining the fall risks of adult inpatients because more of their falls were not predicted by healthcare professionals even though their proportion of injury due to falls did not

significantly differ from older adults.

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