Who, where and why: situational and environmental factors contributing to patient falls in the hospital setting

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Abstract

Falls are a significant burden on the Australian healthcare budget and can result in loss of personal independence, injury or death. A sustained high rate of inpatient falls at St George Hospital has made it imperative for nurses to identify those patients at highest risk in order to implement preventive interventions. Ninety-one inpatients fell over a ten-week period, with a total of 118 falls. Our study examined the prevalence of 'intrinsic high risk' characteristics identified in the literature in people who fell during hospitalisation. These results will be reported elsewhere. Extrinsic environmental factors contributing to falls were also identified, including time of fall, activity at time of fall and location of fall. This paper describes and discusses the study findings related to extrinsic risk factors.

Falls in hospital

An inpatient fall is defined as 'an unintentional descent to the floor or ground in a conscious patient' (Morse et al 1987). Data from the Australian Incident Monitoring System indicate that falls are a significant burden for Australian hospitals, comprising 38% of all patient incidents (Rigby et al 1999). Patients who sustain a fall, particularly the elderly, are at risk of physical harm, loss of self-esteem, loss of autonomy and depression (Rubenstein et al 1994). The consequence of injury following a hospital fall can be as extreme as death. Such an outcome can be very difficult for patients' families and healthcare professionals to accept, especially when research has shown that 62% of falls-related adverse events in Australian hospitals were preventable (Wilson et al 1995).

Falls in older people account for an estimated $406 million annually (Sewell 2000). Costs are related to increased length of hospital stay, extra nursing and other healthcare professionals' time. Non-fiscal costs sustained by the sufferer and close others are difficult to quantify and may not be captured in estimates. However, it is widely recognised that effective interventions are urgently needed. The Commonwealth Department of Health and Aged Care has prioritised the issue of falls in older people for immediate action because of a predicted increase in numbers and evidence of the significant burden of injury and escalating costs (Strategic Injury Prevention Partnership 2001). The National Falls Prevention Initiative, with policies and programs aimed at improving quality of life and health outcomes for older Australians, was announced in the

1999–2000 budget. The initiative focuses on falls prevention in acute care facilities as well as community and residential aged care settings (Sewell 2000).

The incidence of falls has been investigated across a variety of settings such as hospitals, nursing homes, hostels and the community, rendering comparisons problematic. Research data from populations similar to that of St George Hospital are scarce in the literature.

The time of day that patients fall varies between studies. A study of falls in stroke patients found that 53% occurred on the day shift (Tutuarima et al 1993). Conversely, falls in a 248-bed hospital occurred most commonly on night shift (57%) with 36% on day shift (Alcee 2000). Brown and Edelstein (2000) identified the evening as the highest risk time and identified walking or standing as the highest risk activities. Nursing shift change time was highlighted by Hakim (1998).

Patient falls in healthcare facilites are associated with ambulation, falling from the bed and visiting the bathroom (Rutledge et al 1998). Fleming and Pendergast (1993) found that the majority of falls occurred in patients' rooms. Vlahov et al (1990) report an injury rate of 13%, while Alcee (2000) found that 26% of patients sustained minor injuries and 3.5% sustained injuries categorised as moderate to grave. The latter study reported that 26% of patients who fell were taking one or more sedatives, hypnotics and analgesics, but failed to demonstrate a correlation between medications and falls.

Falls at St George Hospital

St George Hospital is a 650-bed tertiary referral facility in metropolitan Sydney. Data from the hospital's incident monitoring system demonstrate that inpatient falls are consistently the most common adverse event ahead of infection, aggressive patient incidents and medication errors. There were 876 inpatient falls recorded from July 2000 to June 2001, with a total of 188,564 occupied bed days for all patient categories. This yields a ratio of 4.65 falls per 1000 bed days. A previous audit by the Quality Improvement Coordinator indicated that approximately one third of patients who have sustained a fall in this hospital underwent treatment or investigation (sutures, fracture reduction, CAT scan, X-ray) as a direct result of falling. Over the course of 2001, four patients who fell following admission to the Hospital died as a direct consequence of injuries sustained in the fall (St George Hospital 2001). It is imperative to identify the people who have the highest risk of falling so that preventive strategies may focus on those with the greatest potential to benefit (Gillespie et al 2000; Close & Glucksman 2000).

Falls audit: description of study

Aim
This study undertook to identify intrinsic patient characteristics and extrinsic circumstances of inpatient falls, with the aim of providing evidence for nurses to target interventions appropriately. The findings related to intrinsic risk factors are reported elsewhere (Donoghue et al in press). This paper reports the latter component of the study, that is, the extrinsic factors or circumstances.

Design
This study used a prospective, descriptive survey of all patients who fell in an acute care hospital over a ten-week period in 2001. Data consisted of patient demographic variables, physical and psychological status, and circumstances of each fall including the location, time and possible reason for falling and injuries received. An enrolled nurse was recruited as a research nurse.

Sample
Patients who fell were identified through communication with ward nurses and reports from the incident monitoring system (IMS) at St George Hospital from May until the end of July 2001. Patients in the maternity

and the day-only surgery services were excluded from this survey because of their negligible falls incidence, higher volume, rapid patient turnover and younger age relative to the other inpatients.

Data collection instrument

The inpatient falls survey recorded, in addition to intrinsic patient characteristics, the circumstances of each fall including:

- Date and time of falling;
- Location of fall;
- Whether the fall was witnessed or not;
- Presence of mechanical restraint;
- Patient's activity at time of fall;
- Footwear worn by the patient at the time of falling, including socks or elastic stockings;
- Sedative, psychotropic and/or narcotic analgesia use within the last 24 hours;
- Consequences of fall (injury);
- Treatment and/or investigations required due to the fall.

Procedure

Completed IMS forms involving patient falls were put into a designated folder and kept in the nurse unit manager's office. Monday through Friday the research nurse checked the folder for IMS forms and completed the falls survey instrument using this information. Any missing information about a fall was obtained from the patient's medical record or interviews with the patient or a relative. A retrospective falls risk assessment was performed soon after the time of the fall using the standard instrument.

Results

Demographic Variables

The hospital IMS reported 91 inpatients who experienced a total of 118 falls. Forty-five percent were men and 55% women. Twelve percent were from non-English speaking backgrounds. Mean age was 75.5 +/- 16.1 SD, median 81.4, range 15-100 years. Of the 83 patients whose history could be identified, 44 (53%) were known fallers.

Patients were stratified by age according to the categories described by The Injury Risk Management Research Centre (IRMRC) at the University of NSW (NSW Health 2000). Twenty-one percent of the 91 people who fell were pre-elderly, defined as 40-65 years. Four people aged less than 40 years were included in the pre-elderly category. Fourteen percent were categorised as elderly (66-74 years), and 65% as frail elderly (75+ years). During the study period the frail elderly made up only 23% of the hospital population overall. The relative proportions of men and women in the sample of frail elderly fallers is similar to the gender ratio in the overall hospital population for that age group.

Circumstances

The time of falls is illustrated in Figure 1. Data related to time of fall were missing for 7 patients. Falls occurred most frequently between 0700-0800 hours (n=9) and 0900-1000 (n=9) with smaller peaks at 1400-1500 (n=8) and 0200-0300 (n=7). Combining the results to reflect shift times yields the following: 48.5% of falls occurred between 0700 and 1500 (n=54), 20% between 1500 and 2300 (n=22), and 31.5% between 2300 and 0700 (n=35).

Figure 1: Hour when fall occurred
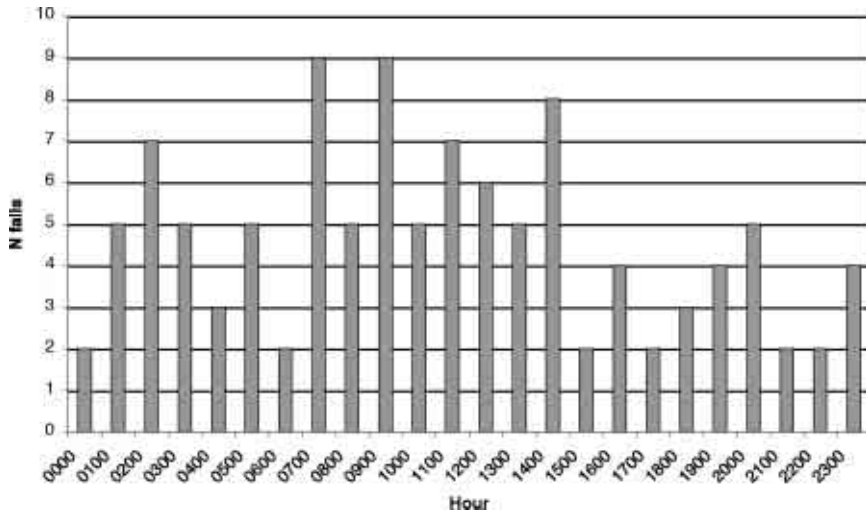
Falls most frequently occurred on a Wednesday (20%) followed by Sunday (17%) (see Figure 2).

Figure 2: Day of fall
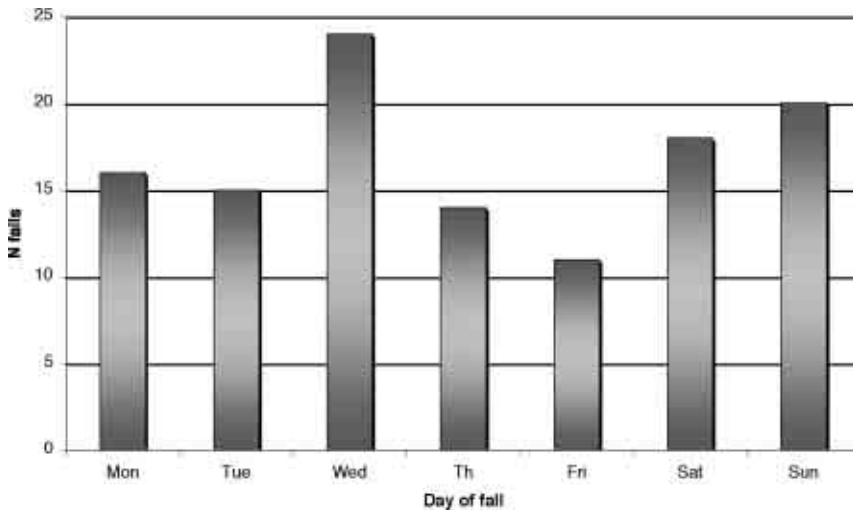
Falls occurred across all specialty areas (see Figure 3). The largest proportion of falls (31%) occurred in areas categorised as 'other'. This category included medical specialties, rehabilitation, oncology and critical care. The second highest category was aged care with 29%. The majority of fall incidents were unwitnessed by staff (68%), although 5% of falls were heard.

Figure 3: Ward where fall occurred

WARD	Count	%
Aged care	34	28.81%
Neurology	27	22.88%
Orthopedic	6	5.08%
Surgical	15	12.71%
Other	36	30.51%
Grand Total	118	100.00%

According to documentation none of the people who fell were mechanically restrained at the time of the fall. Getting out of bed was the activity most commonly associated with a fall (35%), and 18% fell while walking (see Figure 4).

Figure 4: Activity at time of fall*

Activity	Count	Valid %
Getting out of bed	41	34.8
While walking	21	17.8
Getting off toilet	12	10.2
Getting out of chair	12	10.2
While standing	11	9.3
Unable to determine	6	5.1
Getting into bed	5	4.2
Getting onto toilet	4	3.4
Getting into chair	3	2.5

* 97.5% of records had this information

Seventy-five percent of falls occurred in the patient's room (see Figure 5), with 46% of these next to the bed (see Figure 6). Eighteen percent of falls occurred when patients were wearing slippers, 4% while wearing socks or stockings, and 78% with no footwear.

Figure 5: Location on ward at time of fall *

Location	Count	Valid %
In room	89	75.4
Toilet area	20	16.95
Shower area	4	3.4
In corridor	2	1.7

* 97.45% of records had this information

Figure 6: Place of fall *

| Place	Frequency	Valid %
Next to bed	54	45.8
Beside chair	12	10.2
Near toilet	7	5.9

*62% of records had this information

Medications

Figure 7 shows that many patients who fell were not taking any sedatives, psychotropics or narcotic analgesia. In the 24 hours preceding the fall, fewer than one third of patients who fell were taking medication in any one of the three nominated categories. However, as shown in Figure 8, the largest proportion of the frail elderly group was taking none of these medications. This contrasts with the pre-elderly, where the largest proportion was taking two categories of medication, and the elderly, where more were taking a single category of medication.

Figure 7: Specified medications taken by persons who fell, by age categories

Age categories	Sedatives		Psychotropics		Narcotic analgesia	
	N	% age	N	% age	N	% age
<66 (n=19)	8	42.1	3	15.8	10	52.6
66-74 (n=13)	0	0.0	4	30.8	6	46.2
75+ (n=59)	18	30.5	12	20.3	10	16.9
All (n=91)	26	28.6	19	20.9	26	28.6

Figure 8: Multiple medications - percentage of each age category taking specified medications
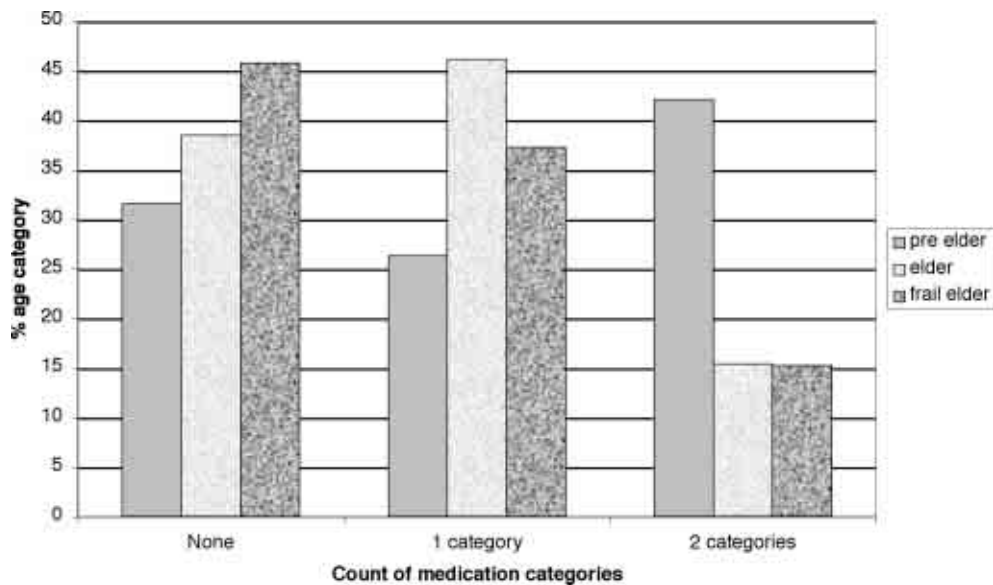
Post Fall Patient Outcomes

The majority (56%) of patients who fell did not sustain an injury. Pain was experienced by 22% of fallers with 26% suffering laceration or bruising. No fractures occurred during the study period. Additional post fall observations and investigations are listed in Figure 9.

Figure 9: Interventions and treatments

Intervention	Count	Valid %
Specific observations	14	11.9
Wound dressing	13	11.0
X-ray ordered	12	10.1
CT scan ordered	6	5.1
Sutures	1	0.85

Discussion

The main weakness of this study was related to data collection, which depended on ward staff generating the incident forms. It is possible that some falls were not reported and incident reports on weekend falls were collected retrospectively, which made verification of missing details difficult.

Our study population was heterogeneous, with an age range of 15-100 and a large variation in primary diagnosis, rendering cross-category generalisation problematic. Because 65% of the sample was aged over 65, we concluded that increasing age is a predominant risk factor. Gender, however, is not a useful predictor at this institution.

It was unexpected to find that more falls occurred on the day shift, as anecdotal evidence had suggested that night shift was the highest risk time due to factors such as reduced staff numbers and nocturnal confusion in the over 65 age group. The peaks at 0700-0800 and 1400-1500 suggest the pattern of falls at shift change described by Hakim (1998).

Falls most frequently occurred on Wednesday (n=24) closely followed by Sunday (n=20) and Saturday (n=18). The implications of these findings will vary between clinical areas. Falls in the Aged Care ward contributed to the majority of incidents on Wednesdays during the period of this survey. However, this pattern did not persist. The higher occurrence of falls on the weekend is a continuing pattern. The contribution of factors specific to weekends, such as decreased staff numbers, altered skill mix or numbers of visitors, requires further investigation.

No one group of medications, or combination of medications, was strongly associated with falls. The medication profile in our sample differed markedly across the various age groups, as demonstrated by previous audits. No individual was taking medications in all three categories. Data in Figure 8 suggest that these three medication categories might work more usefully as a falls risk factor for pre-elderly and elderly patients than for the frail elderly. For the frail elderly, it might be more sensible to assess the impact of medication on a patient's cognition, including levels of arousal, ambulatory capacity, balance and continence status.

When the timing information is combined with location (75% in the patient's room) and activity (mainly getting into or out of bed) a scenario begins to emerge from the data: it is time for breakfast or afternoon tea and there is a lot of activity in the ward. A man or woman aged 75 or older, possibly confused and probably with unstable gait, attempts to rise from their bed or a chair and is unable to attain an upright position as their centre of gravity shifts; they fall over. Meanwhile, the nurses are busy administering medications and assisting other patients to the toilet or with meals.

Forty-four percent of patients who fell during the 10 weeks of the study suffered injury of some kind, such as pain, bruising or laceration, as a consequence of their fall. Clearly there are also financial implications with 12 patients receiving an X-ray and 6 a CT scan. Fortunately there were no deaths during the 10 weeks our data were collected; however during 2001 four patients at St George Hospital died as a result of injuries sustained in an inpatient fall.

Implications

It is difficult to generalise the results due to the heterogeneity of the sample. Clinicians and managers in areas with very high-risk clients, such as aged care, may find it helpful to obtain and review only those falls data specific to their area so that preventive strategies may be more specific. Recommendations from the findings include:

- Falls risk assessment should include medication history in the pre elderly age group;

- Managers should review ward activity in light of the times of day falls most frequently occur, for example:

    – consider staggering nursing staff break times to maximise staffing at the high risk times of day such as 1400-1500;

    – optimise staffing allocation during periods of peak activity such as 0700-0800 and 0900-1000;

- For those patients identified as very high risk, consider enlisting the assistance of family and friends in a roster type arrangement to visit with their relative or friend during periods of peak ward activity.

The findings of this audit should alert nurses to the prevalence and seriousness of patient falls and serve as a catalyst for the multidisciplinary team to brainstorm creative ways to address falls incidence at the local level. Nurses' capacity for leadership in this area was demonstrated by a study of risk assessment which found that nurses' clinical judgement was as accurate as two widely-used, standardised tools in predicting which inpatients would fall (Eagle et al 1999). Despite limitations in fiscal, physical and human resources our duty of care to our patients remains paramount and presents a challenge to which all health disciplines: nursing, medicine and allied health, must rise.

Acknowledgments

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