

Prevention of Falls in a Geriatric Ward

P K Lieu,*^{MBBS, M Med (Int Med)}, N H Ismail,**^{MBBS, MRCP (UK)}, P W J Choo,***^{FAMS, MRCP (UK), DGM}

P E Kwek,****^{SRN}, L C Heng,†^{SRN}, K Govindaraju,†^{SRN}

Abstract

Falls occurring in the hospital are significant events because of the injuries sustained, extended hospital stay and potential medico-legal implications. We conducted a 3-year study to determine the characteristics of fallers in a geriatric ward and assess the effectiveness of lectures and nursing assessments in the prevention of falls. In the first year of the study we found that the rate of falls was 9% of all patients admitted. About 85.7% of falls occurred at the bedside and 41.4% happened while getting in and out of bed. Most falls occurred between 4pm and 8pm and half of the fallers had no preceding symptoms. In the second year, a series of lectures and educational material were given to the same nursing staff and the prevalence of falls was reduced to 7% ($P > 0.05$). However, the implementation of a nursing assessment protocol in the third year of the study achieved a marked reduction in prevalence of falls to 5.9% from the initial 9% (Chi-square $X^2 = 4.19$, $P = 0.04$). Thus, the vigorous administration of a nursing assessment protocol can reduce falls in a geriatric ward.

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Introduction

Falls and fall-related injuries are major concerns to patients, their families and the hospital. For the faller, a fall has an adverse effect on the person's health, independence and functional ability.¹ Falls lead to fear of falling,²⁻⁶ decreased mobility and depressed mood,⁷ and restriction of activities.⁸ Falls in the hospitalised patients will extend hospital stay and may pose potential medico-legal problems.

The risk of falls increases with age.⁹⁻¹¹ About 30% of people over 65 years of age who live in the community fall each year.^{12,13} In long-term care institutions, 45% to 70% of residents fall annually.^{14,15} In Singapore, it is estimated that 10.5% of people aged 60 years and above living in the community had a fall in the previous year. However, there is a paucity of information on the incidence of falls in our local hospitals and no previous intervention programmes to reduce the number of falls during the hospital stay.

Thus, the objectives of this study were to identify the characteristics of fallers in a geriatric ward and to understand the circumstances surrounding the fall. It also compared the effectiveness of two methods of intervention towards the prevention of falls. One was

the education of nursing staff on fall prevention by lectures and the other was the implementation of a nursing assessment fall protocol.

Patients and Methods

The study was conducted in three phases over three years in a 28-bedded geriatric ward at Tan Tock Seng Hospital. The case-mix of patients remained the same. Generally, 53% of admissions were directly from the Accident and Emergency Department, 18% from the specialist's outpatient clinics, 28% from internal hospital referrals and 1% directly from general practitioners. Seventy-six per cent had acute medical emergency, 19% had a stable medical condition which required further adjustment of treatment, and 5% were undergoing rehabilitation. As for the functional status, 62% were ambulant, 24% were semi-ambulant needing supervision and 14% were non-ambulant (either chair or bed bound). The nursing staff complement consisted of 6 nurses during the morning shift from 7 am to 2 pm, 5 nurses in the afternoon shift from 2 pm to 9 pm and 2 nurses during the night shift from 9 pm to 7 am. This nursing complement remained unchanged over the course of the study.

* Senior Registrar

** Registrar

*** Consultant and Head

**** Nursing Officer

† Senior Staff Nurse

Department of Geriatric Medicine

Tan Tock Seng Hospital

Address for Reprints: Dr P K Lieu, Department of Geriatric Medicine, Tan Tock Seng Hospital, Moulmein Road, Singapore 308433.

In phase one, from 8 June 1993 to 7 June 1994, a retrospective review of the various characteristics of 70 falls occurring in this ward with 770 patient admissions was made. All known falls in this ward witnessed by the staff, other patients or other witnesses were recorded by the nursing staff in an incident report book. In this study, a fall was defined as an uncontrolled and undirected event reported either by the faller or a witness, in which a patient inadvertently came to rest on the ground or another lower level, with or without loss of consciousness. The characteristics studied were age, sex, time of fall, place of fall, the activity preceding the fall, any preceding symptoms, the manner the fall was discovered, the ability to get up, the type of injuries and the date of the fall. The results of the first phase of the study were made known to all the staff working in the ward and a series of lectures were conducted to educate the ward staff on the prevention of falls.

In phase two of the study conducted prospectively between 8 June 1994 and 7 June 1995, the data of 62 falls occurring in the same ward with 831 patients admitted were analysed. Subsequently, after the analysis of the phase two data, the staff of the ward designed a simple and practical nursing assessment protocol which could be easily administered for each patient admitted to the ward.

This instrument consisted of two parts (Annex I). In part one, the patients admitted were assessed for the risk of falls. They were considered to be at high risk if they had lower limb weakness or hemiparesis, impaired vision, history of frequent falls, unsteady gait, acutely ill, immediate postoperative patients and those requiring preoperative preparation. This risk assessment was reviewed by the nursing staff every three days during the patient's stay in the ward. Part two of the protocol consisted of a checklist of actions to be taken to try to minimise fall occurrence. The nursing staff in each of the three shifts would ensure that the checklist was carried out for the high risk patient.

In the final phase of the study conducted prospectively between 8 June 1995 and 7 June 1996, the data of 30 falls seen in 505 patients admitted were analysed. The Chi-square test was used to test for statistical significance for the two different methods of intervention.

Results

In phase one from 8 June 1993 to 7 June 1994, there was a total of 70 falls out of 770 patients giving a fall rate of 9.1% or 68.5 falls per 10 000 patient days. The mean age of the patients was 78.3 years [standard deviation (SD) 8.4 years] and the male to female ratio of fallers was 9:5 because of the faster turnover of male patients. With increasing age, more falls were observed (Fig. 1).

The majority of falls occurred between 4 pm and

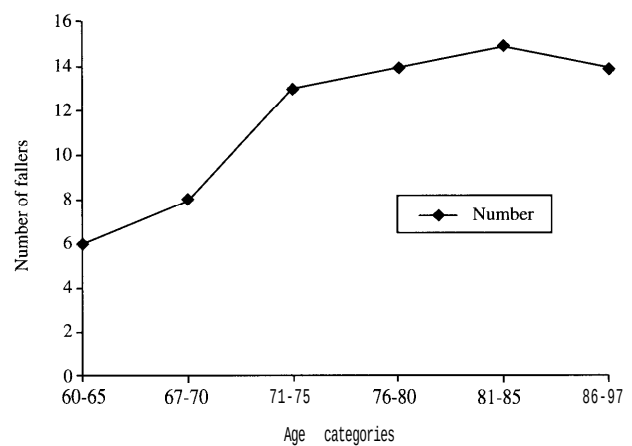


Fig. 1. Number of fallers with age.

TABLE I: NUMBER OF FALLS AT DIFFERENT TIMES OF THE DAY

Time of day	Percentage of falls (%)
12 am to 4 am	14
4 am to 8 am	11
8 am to 12 pm	13
12 pm to 4 pm	16
4 pm to 8 pm	32
8 pm to 12 am	14

8 pm (Table I) and this coincided with the evening mealtime and visiting hours when activity was high. The bedside was the commonest place of fall (85.7%), followed by the ward aisle (7.1%), toilets (4.3%) and other places (2.9%). The most frequent activities preceding a fall were standing up from bed (41.4%), chair (18.6%) or commode (8.6%), walking (11.4%) and sitting (7.1%). Three patients could not remember the activity before the fall.

Thirty-four (48.6%) patients did not have any symptoms before the fall. Twenty-four (34.3%) patients complained of postural instability, 4 had weakness of the limbs (5.7%), 3 had confusion (4.3%) and 2 with dizziness (2.9%) prior to the fall.

Fourteen patients (20%) had recurrent falls during their stay and one patient had up to 6 falls despite vigorous efforts made to help him. About a third of falls caused a loud sound (34.3%) which alerted the nursing staff to the occurrence of the fall and 55.7% of falls were witnessed by the nurses. The remaining 10% of falls were reported by other patients, patient's relatives and ward doctors.

The three commonest injuries were contusion of the trunk (38.1%), haematoma (21.1%) and contusion of the head (17.1%). No fractures were reported but 14.4% sustained lacerations requiring suturing. Although most of the injuries sustained were minor, 71.4% of the patients were unable to get up from the floor and needed help from the nurses. Immediate attention was

received in 88.6% of the cases but 1 patient had to wait 5 minutes in the toilet and 2 patients waited 10 minutes because they had fallen outside the ward. Majority of the falls occurred within the first two weeks of hospital stay.

In phase two of the study from 8 June 1994 to 7 June 1995, 62 falls occurred in the same ward with a total annual admission of 831 patients. The fall rate was 7.5% or 60.7 falls per 10 000 patient days. This reduction of falls was not statistically significant (Chi-square $\chi^2 = 1.19$, $P = 0.28$).

In phase three of the study from 8 June 1995 to 7 June 1996, 30 falls were noted with a total annual admission of 505 patients giving a fall rate of 5.9% or 29.4 falls per 10 000 patient days. This reduction of falls when compared to phase one was statistically significant (Chi-square $\chi^2 = 4.19$, $P = 0.04$).

Discussion

This study showed that about 6% to 9% of elderly patients admitted to an acute geriatric ward may sustain a fall during their stay. Although the number of falls could be reduced by educating the ward staff, this study proved that the implementation of a nursing fall assessment protocol is a more effective way to tackle the problem.

Nickens¹⁶ found that in a geriatric institutional setting, the rate of fall was 42.7 falls per 10 000 patient days. Initially, our study in the acute geriatric ward setting revealed a higher rate of 68.5 falls per 10 000 patient days. However, with the education of nurses and the subsequent implementation of a nursing fall assessment protocol, the fall rate was halved to 29.4 falls per 10 000 patient days. This was not due to an increase in the ward staffing because it had remained unchanged over the last three years. The case-mix of the study patients also remained the same. Although the total number of admissions in the third year was less than the first and second year, the total patient days remained the same as the ward had a 100% occupancy rate.

In the West, the annual incidence rates of falls in institutional settings ranged from 0.6 to 3.6 per bed with a mean of 1.7 falls/bed.¹⁷ Our initial annual incidence rate of falls was 2.5 falls/bed but with the efforts and vigilance of the nursing staff it was successfully reduced to 1.07 falls/bed.

The timing of falls was highest between 4 pm and 8 pm which was similar to a study done by Vermeulen.¹⁸ The nursing complement during this period could not account for the increase in falls during this time. We postulated that it was most likely related to the increase in activities that occurred during that period (namely mealtimes and visitations by relatives). However, other investigators had reported that falls increased with lower staffing levels and during staff shift changes.^{19,20}

Our study also collaborated with other studies that the greatest number of falls occurred around the bedside, where patients spent most of their time.²⁰ Therefore, in our nursing protocol it was important to ensure that the nursing staff identify and remove possible hazards from each patient's immediate environment. One interesting fact of our study was that a third of the falls was detected by the sound of the patient hitting the floor. This was an unfortunate and unnecessary occurrence. We felt that the use of a bedside alarm which will alert the ward staff when a person tries to get out of bed might be useful here. A small trial with such a device showed a reduction in falls which was not statistically significant.²¹

Falls were more frequent during transfers and with change of position or posture.²² In our study, 68.6% of patients were trying to stand up just before they fell and with that information, we included the surveillance of high risk patients during activity as part of the nursing protocol.

The injuries sustained were mainly soft tissue injuries. We did not have any fractures probably because of the small number of fallers. However, one patient did sustain a fracture neck of the femur one week after the study was completed. Generally, about 10% to 25% of falls in institutions result in a fracture or laceration.¹⁸

The efforts of the nurses in the implementation of the nursing protocol were crucial in reducing the number of falls. The protocol design was the collective efforts of the ward staff and we relied on known data from other previous studies on the risk factors found to be associated with falls.^{3,23,24} It was important that the assessment be made at the time of patient's admission because most falls occurred within the first two weeks of admission. The checklist had to be reviewed every three days as patients' clinical and functional status might change with time. We found no difficulties in implementing the protocol amongst nurses during the study. On the average, the nurses took less than 5 minutes to complete the protocol and this did not increase their workload significantly.

Although one of the measures in the fall precaution checklist involved the use of body restrainer if necessary, we do not advocate its indiscriminate use to immobilise patients so as to prevent falls. This would not be beneficial for the patients. Generally, about 5% of all our patients admitted would require the use of the body restrainer for a few days and the use of the body restrainer is then reviewed. It is the policy of our department to minimise the use of body restrainers as much as possible. The implementation of the nursing protocol did not increase the use of restrainers significantly.

There were some limitations in this study. Ideally, a randomised controlled trial would be the best way to

ANNEX I: FALL PRECAUTION CHECKLIST

	Date																				
	Shift	A	P	N	A	P	N	A	P	N	A	P	N	A	P	N	A	P	N		
1. Bed, wheel-chair and commode kept locked when used																					
2. Cot side up																					
3. Floor dry at all times																					
4. No overcrowding furniture																					
5. Assist when walking, transferring																					
5. Call bells at bed sides																					
7. Do not leave patient unattended when sitting on commode																					
3. Apply seat belt when on wheelchair																					
2. Body restrainer if necessary																					
0. Urinal and commode easily accessible																					
Signature																					

Review checklist for high risk patients every 3 days

High Risk Patients

1. Lower limb weakness or one-sided weakness
2. Impaired vision
3. History of frequent falls
4. Unsteady gait

5. Immediate postoperative patients
6. Acutely ill patients
7. Preoperative preparation needed

A: Morning shift; P: Afternoon shift; N: Night shift

demonstrate the effectiveness of the nursing assessment protocol in preventing falls but due to ethical reasons, we felt that it was difficult to withhold the assessment protocol that was potentially beneficial to the control group within the same ward as well. Thus, we chose to use historical controls where comparisons were made between the different phases of the study done over different years. We realised the limitations of such a method. However, there was no change in the ward admission criteria, the number of nursing staff and the case-mix were similar in the different years. It was also not possible to use patients from other wards as controls because the case-mix would be different. We also realised that there may be possible bias in the study because the nurses both record and prevent falls.

In summary, falls in a geriatric ward could be successfully reduced with the cooperation of the nursing staff through education on the importance and consequences of falls, and the vigorous administration of the nursing assessment protocol. Perhaps, such efforts could also be extended to other wards with high prevalence of falls.

REFERENCES

1. King MB, Tinetti ME. Falls in community-dwelling older persons. *J Am Geriatric Soc* 1995; 43:1146-54.
2. Nevitt MC, Cummings SR, Hudes ES. Risk factors for injurious falls: a prospective study. *J Gerontol Med Sci* 1991; 46:M164-70.
3. Tinetti ME, Speechley M, Ginter SF. Risk factors for falls among elderly persons living in the community. *N Engl J Med* 1988; 319:1701-7.
4. Walker JE, Howland J. Falls and fear of falling among elderly persons living in the community: Occupational therapy interventions. *Am J Occup Ther* 1991; 45:119-22.
5. Maki BE, Holliday PJ, Topper AK. Fear of falling and postural performance in the elderly. *J Gerontol Med Sci* 1991; 46:M123-31.
6. Tinetti ME, Mendes de Leon CF, Doucette JT, Baker DI. Fear of falling and fall-related efficacy in relationship to functioning among community-living elders. *J Gerontol Med Sci* 1994; 49:M140-7.
7. Arfken CL, Lach HW, Birge SJ, Miller JP. The prevalence and correlates of fear of falling among elderly persons living in the community. *Am J Public Health* 1994; 84:565-70.
8. Kosorok MR, Omenn GS, Diehr P, Koepsell TD, Patrick DL. Restricted activity days among older adults. *Am J Public Health* 1992; 82:1263-7.
9. Feist RR. A survey of accidental falls in a small home for the aged. *J Gerontol Nursing* 1978; 4:15-7.
10. Overstall PW, Exton-Smith AN, Imms FJ. Falls in the elderly related to postural imbalance. *BMJ* 1977; 1:261-4.
11. Sheldon JH. Effect of age on control of sway. *Gerontol Clin* 1963; 5:129-38.
12. Prudham D, Evans JG. Factors associated with falls in the elderly: a community study. *Age Ageing* 1981; 10:141-6.
13. Campbell AJ, Reinken J, Allan BC, Martinez GS. Falls in old age: a study of frequency and related clinical factors. *Age Ageing* 1981; 10:264-70.
14. Gryfe CI, Amies A, Ashley MJ. A longitudinal study of falls in an elderly population: I. Incidence and morbidity. *Age Ageing* 1977; 6:201-10.

15. Tinetti M E. Factors associated with serious injury during falls by ambulatory nursing home residents. *J Am Geriatr Soc* 1987; 35:644-8.
 16. Nickens H. Intrinsic factors in falling among the elderly. *Arch Intern Med* 1985;145:1089-93.
 17. Josephson K R, Fabacher D A, Rubenstein L Z. Home safety and fall prevention. *Clin Geriatr Med* 1991; 7:707-31.
 18. Vermeulen H B M. Vallen en valpreventie in het verpleeghuis (Falls and prevention of falls in the nursing home) [thesis]. The Netherlands: University of Nijmegen, 1994.
 19. Blake C, Morfitt J M. Falls and staffing in residential home for elderly people. *Public Health* 1986; 100:385-91.
 20. Dimant J. Accidents in the skilled nursing facility. *NY State J Med* 1985; 85:202-5.
 21. Tideiksaar R, Feiner C F, Maby J. Falls prevention: The efficacy of a bed alarm system in an acute-care setting. *Mt Sinai J Med* 1993; 60:522-7.
 22. Berry G, Fisher R H, Lang S. Detrimental incidents, including falls, in an elderly institutional population. *J Am Geriatr Soc* 1981; 29:322-4.
 23. Nevitt M C, Cummings S R, Kidd S, Black D. Risk factors for recurrent non-syncopal falls. *JAMA* 1989; 261:2663-8.
 24. O'Loughlin J L, Robitaille Y, Boivin J, Suissa S. Incidence of and risk factors for falls and injurious falls among the community-dwelling elderly. *Am J Epidemiol* 1993; 137:342-54.
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