Falls Amongst Institutionalised Psycho-Geriatric Patients

K D Lim, K C Ng, S K Ng, L L Ng

ABSTRACT

Falls are common among the elderly patients in the psycho-geriatric wards and yet they have been understudied. A fall is a multi-factorial syndrome involving the patient and the environment. Psycho-geriatric patients who fall may suffer serious physical injuries that result in morbidity, further institutionalisation or even mortality. This study aims to examine the contributing factors to, and morbidity and outcome of falls among institutionalised psycho-geriatric patients so that preventive strategies can be refined. Data of patients who fell over a year's period in four psycho-geriatric wards were collected retrospectively and compared with those who had not fallen within the same period. The general profile of the psycho-geriatric patient who falls is one who is: above seventy-five years old; on three or more medications; and having recent changes in medication and mental status. About one in three fallers fell repeatedly. The rate of serious injury and mortality was low. In conclusion, while many factors are attributable to the common effects of aging and physical illnesses; psychotropic medication, change in mental state and specific environmental factors also play significant contributory roles to falls in this group of patients.

Keywords: falls, factors, outcome, psycho-geriatric wards, prevention

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INTRODUCTION

Falls are among the most common, yet potentially preventable, adverse events experienced by patients in hospitals. It is estimated that one-third to half of the population aged sixty-five years and above falls each year, sometimes with serious physical and psychological consequences[1]. These morbidities cost in terms of hospitalisation and rehabilitation, and expose hospitals and their staff to liability[2,3,29]. As the elderly population continues to increase it is imperative that falls and associated complications be prevented whenever possible. Falling is often a multi-factorial syndrome that can be viewed from several perspectives including pathophysiologic, biomedical, functional and environ-mental models. The interaction of intrinsic, situational and environmental factors is often complex[4,5].

Although many more studies have been done on falls in the elderly in the general hospitals and in the community[7,9,25,28], relatively fewer studies examine falls in psycho-geriatric patients in comparison. Psycho-geriatric patients are a unique group of patients who are hospitalised for treatment or rehabilitation of their psychiatric illnesses which are often heterogeneous. Among these, patients with dementia and depression are associated with increased falls[19]. Due to their advanced age, these patients often have co-existing medical, surgical or degenerative problems. In addition, many of them require psychotropic drugs which further predispose them to falls in the ward[22]. Elderly psycho-geriatric persons who fall may suffer serious physical injuries that result in morbidity, further institutionalisation or even mortality. The design of the ward is therefore of importance in order to minimise environmental factors and hazards.

The aim of this study is to examine the demography, the various contributing factors to falls and the consequences of the falls among these elderly geriatric patients in such an institutionalised psychiatric setting. Comparison between the fallers and recurrent fallers were further studied to allow preventive strategies to be refined.

METHODS

In our study, a fall was defined as a recorded event when the subject unintentionally came to rest on the ground or at some other lower level. The fall incidents over a year's period were collected retrospectively from four psycho-geriatric wards in Woodbridge Hospital (Singapore) which were of similar structural design and patient characteristics. All patients admitted to the wards had to be reviewed by a psycho-geriatrician to ascertain the diagnoses and management issues. All fall incidents known to the

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staff in each ward were recorded in a fall incident book from which the ward staff and doctors were to produce an incident report. Sources of information corroborated included the patients' medical records, nursing notes, medication charts and findings on the incident reports.

The data were collected by a standard questionnaire and analysed for common contributory factors affecting falls in the elderly. The effects and consequences of falls; and further investigations and treatment of the fall-subjects were also analysed. A change in medication was defined as change of dosage or medication(s) or both in the preceding one month of the fall event; while a change in mental state was defined as any documented change in the mental state examination in the preceding one month to the fall incident. A total number of 384 patients were studied. Subjects included were above 65 years old and with psychiatric morbidity. A comparison group of 102 patients was obtained by excluding patients who fell and going through the rest of the case records of patients who did not fall throughout the study period. These patients further met the following criteria: they were above 65-years-old, had stable mental state and stayed throughout the study period in the ward. Similar data on factors contributing to falls were collected from this comparison group.

STATASTICAL ANALYSES

All statistical analyses were done on Statistical Package for Social Sciences (SPSS) Version 7.5 program. The differences between the fall group and control group in terms of age, race, sex, medical diagnoses, psychiatric diagnoses and medications taken by the patients were determined by using Chi-square Goodness-of-Fit test. To study whether the different types of handicaps contributed to the falls, the Chi-square Test for Association was used.

The patients who fell were further subdivided into two groups consisting of those with one fall and those with recurrent falls respectively. The significance of the differences in age, sex, races, types of medications, medical and psychiatric illnesses were determined using Chi-square Goodness-of-Fit test and Test for Associations.

RESULTS

Demography

A total number of 102 falls were recorded during the study period. The number of patients who fell during the one-year study period in the four psycho-geriatric wards was 67, with 22 of them having recurrent falls. Most of the patients were Chinese (88.1%). Thirty-five patients were below 75 years old while 32 patients were 75 years old and above. Twenty one were male patients and 46 females. There were no significant differences in the number of falls amongst the four wards.

Timing, places and common routines at the time of fall

Seventy percent of the falls occurred in the day between 0600 to 1759 hours, and the remaining occurred in the evening and night. The falls took place mainly in the following areas: day area, toilet or washroom and dormitory in descending order. About 23% of the falls occurred during leisure time while 24% were associated with meals, bath and toileting. In terms of the number of falls per hour, the most vulnerable period of patient falling actually occurred during meal and bath/toileting times. Half of the falls occurred in the absence of a staff member.

Physical illnesses

The rate of concomitant medical illnesses was high, as 52 of the 67 patients had medical illnesses (77.6%), and 46.1% had more than two concomitant physical illnesses. The commonest medical or surgical illnesses were: cardiovascular disorders, existing fractures and respiratory disorders. Two-thirds of fallers have at least one physical handicap such as lower limb problems, visual or other sensory deficits.

Psychiatric illnesses

Patients with psychosis (mainly schizophrenia) formed the commonest psychiatric diagnostic category, followed by patients with dementia and depression. In terms of the number of co-existing psychiatric illnesses, 53 patients had only one, 12 had two concomitant psychiatric disorders and two patients had three. Twenty-three patients (35.4%) had documented change in mental state within one month prior to the fall.

Precipitating events to falls and direct consequences

The commonest precipitating events before the falls were tripping whilst walking (35.5%), followed by patient getting out from a chair and feeling giddy or blackening out. On physical examination, 46 (68.7%) had abnormal physical findings, mainly cardiovascular abnormalities (70%), side-effects related to medications (23.9%) and neurological abnormalities (6.5%). Sixty-two percent of the falls resulted in some form of soft-tissue injuries such as haematomas and abrasions; and 18.6% were suspected to have fractures. About 70% of the falls resulted in some form of head injuries, but only one fall resulted in loss of consciousness. There was no mortality.

Table I. Summary of Demographic data, precipitating events, physical and psychiatric morbidity, consequences and management of falls.

		Study Population % (N)	Comparison Population % (N)
Age	<75 years old	52 (35)	63.7 (65)
	75 years and above	48 (32)	36.3 (37)
Sex	Male	31.3 (21)	40.2 (41)
	Female	68.7 (46)	59.8 (61)
Race	Chinese	88.1 (59)	90 (92)
	Malay	3 (2)	3 (3)
	Indian	7.5 (5)	5 (5)
	Others	1.5 (1)	2 (2)

		% (N)			% (N)
Time of falls	0600-1159	40	Physical illnesses	CVS	22.4
	1200-1759	30		Fractures	10.2
	0000-0559	16.5		Respiratory	6.1
	1800-2359	11.7		Stroke	5.1
				Diabetes Mellitus	5.1
Places of fall	Toilet or washroom	14.7	No. of physical handicaps	None	33.0 (22)
	Dormitory	14.7		One	36.0 (24)
	Day area	25.5		Two or more	31.0 (21)
	Corridor	1			
Time of fall	Leisure time	22.5 (23)	Psychiatric illness	Psychosis	62
	Meals	11.8 (12)		Dementia	17.7
	Bath/toileting	11.8 (12)		Depression	11.4
	Sleep	6.9 (7)			
	Medication time	2.9 (3)			
No. of falls/hour	Leisure time	4.75	Precipitating events to falls	Walking	35.3 (36)
	Meals	20		Getting out from chair	16.7 (17)
	Bath/toileting	16		Giddy/ black out	8.8 (9)
	Sleep	0.85		Assaulted/ pushed	6.9 (7)
	Medication time	4		Getting out of bed	5.9 (6)
Medications	Anti-psychotics	74.6 (50)	No. of medications	None	22.4 (15)
	Cardio-vascular	23.9 (16)		One	38.8 (26)
	Anti-anxiety	20.9 (14)		Two	22.4 (15)
	Anti-depressants	17.9 (12)		Three or more	17.9 (12)
	Anti-epileptics	7.5 (5)			
Abnormal physical findings	CVS	70	Other consequences	Head injuries	69.6
	Side-effects	23.9		Loss of consciousness	1
	Neurological	6.5		Mortality	0
	Soft-tissue injuries	62			
	Suspected fractures	18.6			
Actions taken	No investigations	47.6	Treatment	Symptomatic	88
	Need investigations	50		Surgery	9
	Managed in Woodbridge	74.5			
	Transferred out	25.5			
	Further investigated	18.6			

Drugs and medications

Anti-psychotic medications were most commonly prescribed to the patients, followed by cardiovascular agents, anti-anxiety medications, antidepressants and anti-epileptics. Polypharmacy was common with 38.8% of patients having two or more medications. Fifteen patients (22.3%) had documented change in medication within one month period prior to the fall.

Actions taken and outcome

Half of the fallers needed investigations. Most (74.5%) were managed within Woodbridge Hospital

Table II. Significant contributory factors to falls.

Significant Contributory Factors to Falls	X^2	P Value
Study population vs comparison population		
Age >75 years old	4.322	<0.05
Lower Limb problems	13.43	<0.001
Eye illnesses	14.19	<0.001
Higher no. of handicaps	16.63	<0.001
Presence of concomitant medical illnesses	63.70	<0.001
More than one medical illnesses	20.57	<0.001
Taking three or more medications	40.10	<0.005
Other factors		
Presence of dementia and depression		
Recent change in mental state		
Recent change in medication(s)		
Single fallers vs Recurrent fallers		
Age> 75 years old	12.03	<0.05

with symptomatic treatment such as dressing, toilet and suture and simple medication. About a quarter (25.5%) were transferred to other general hospitals for further management. Seventy-three-point-one percent of those transferred out needed further investigation and treatment, including surgery.

STATISTICAL ANALYSIS

Study population vs comparison population

The 75 and above age group was more prone to having falls (X^2 = 4.322, $p<0.05$). There was no difference between the two groups in terms of sex or race.

Acute illness did not predispose patients to falls but lower limb problems (X^2 = 13.43, $p<0.001$) and eye illnesses, notably cataracts (X^2 = 14.19, $p<0.001$), were significantly associated with falls. The patients who fell also had a higher number of handicaps than the comparison group (X^2 = 16.633, $p<0.001$).

The difference in concomitant medical illnesses between the two populations was significant (X^2 = 63.698, $p<0.001$) with cardiovascular problems and epilepsy being more common among the patients with falls. Patients with more than one medical illness had significantly higher occurrence of a fall (X^2 = 20.57, $p<0.001$).

The difference in psychiatric illnesses between the two study populations was significant (X^2 = 68.439, $p<0.001$) with affective disorders and dementia being more common among the patients with falls. A change in mental state also contributed to the falls as 23 patients in the study population had a change in mental state whilst there were none in the comparison group.

No association was found between falls and the types of drugs the study population was taking. However, the patients who fell were taking more drugs than the control population (X^2 = 40.10, $p<0.005$), especially those with three or more. A recent change in medication also contributed to the falls as 15 patients in the study population had a recent change in medication whilst there was none in the control group.

Single fallers vs recurrent fallers

Comparing the two groups of fallers, no significant difference in race and sex was found but age was a significant factor in those with multiple falls; with the older patients (>75 years old) having more falls (X^2 = 12.03, $p<0.05$). Acute medical illnesses, eye illnesses and lower limb problems were not found to predispose patients to recurrent falls. A recent change in medication and the number of medications taken by the patients did not contribute to more falls. No significant association was found between the number of falls and the number of psychiatric or medical illnesses the patients had.

DISCUSSION

Although direct comparisons are sometimes difficult in view of variation in the fall-related risks in an institution related to residents and services characteristics, the rate of fall in this study, barring study and statistical limitations, appears lower compared with other psycho-geriatric setting[6]. Higher level of care and supervision in the wards may contribute to a lower fall rate compared to the community dwellers in Singapore[7]. However, some minor falls could have escaped attention and therefore went unrecorded, hence under-reporting might have occurred. The rate of recurrent falls among one-third of the patients were comparable with the local community study, so were the characteristics of fallers. They tended to have poor vision, to take two or more medications, to have hypertension or cardiovascular diseases and mobility disabilities. A local community study however indicated a higher fall rate among the females which was not shown in this study[7].

CONTRIBUTING FACTORS TO FALLS IN PSYCHO-GERIATRIC PATIENTS

General profile

The general profile of a patient who falls in our psycho-geriatric wards seems to be one who is: above 75 years of age; on three or more medications; having recent changes in medications or mental state; and having lower limb problems, eye illnesses, cardiovascular or epileptic illnesses, dementia and depression. Age above 75 was the sole significant association with recurrent falls. Most of the falls occurred during the day and with activities, in the open spaces where supervision may be less readily available, and when no staff was around. Many of these factors were similar

to those of the local community dwellers[7] save for the effects of sex and race. Age is a known risk factor to falls even among the general population[8].

Physical/medical illnesses

Many of the fall factors were attributable to the effect of aging and the presence of physical or medical illnesses. The role of these factors in causing falls among geriatric patients and those in the community has been relatively better studied. Known factors include: poor general health status[9]; pre-existing medical illness (mostly cardiovascular)[10]; peripheral neuropathy[11]; walking at a brisk pace[2]; limitations in general functioning; muscular-skeletal impairments; difficulty or dependence in activities of daily living (ADL); impairments in gait and balance; visual deficits[13,4]; orthostatic hypotension, vasovagal syncope[14,15]; hypoxaemia[4]; stroke[16]; seizures[17]; and osteoarthritis[18]. In our study, the physical characteristics of the psycho-geriatric fallers have been shown to be similar to those found by other studies involving other geriatric populations; and in particular those with a higher incidence of lower limb problems, visual handicap, a higher number of physical handicaps and the presence of medical illnesses.

Psychiatric illnesses

In our study, the commonest psychiatric illnesses were schizophrenia, dementia and depression. One-fifth of the patients had two or more concomitant psychiatric diagnoses and 32.4% documented a change in mental state within a month prior to the falls.

Anxiety or depressive states have been found to have a possible contributory role to falling[19] while the presence of depression, dementia and a poor mental state[20] are known risk factors to falls. Our study shows that a change in mental state is a likely contributing factor as well. The exact mechanism of depression causing falls is unknown although it could be secondary to impairment of cognitive function or to side-effects of medication.

Cognitive impairment and dementia alone, rather than its complications or therapy, have been found to be a potent risk factor for falls most probably due to delayed cerebral processing of sensori-motor information[20] given the fact that qualitative evaluation of vestibular function, proprioception, motor strength and postural stability may often be difficult.

Role of psychotropic medications on falls

Although this study does not allow effects of individual drugs to be examined, it nevertheless suggests the contributory roles of polypharmacy and a recent change in medication among these subjects.

Falls are potential adverse outcomes of psychotropic drugs in the elderly, even in subjects who are cognitively normal. The use of benzodiazepines, anti-depressants and antipsychotics have been associated with high risks among cognitively normal subjects[21] except for residents with restricted mobility who had been reported to have a lower tendency to fall than non-users, and being less prone to repeated falls[19].

Patients taking psychotropic medications, especially those receiving two or more, appear to have about a two- to nine-fold increased risk of falls and fractures, compared with those not taking these drugs[22,23]. Patients who fell were approximately 2.7 times as likely to have received a psychotropic drug compared to control subjects matched for age, gender and medical service[23]. The main underlying mechanism seems to be mediated by an impairment of postural stability.

Recurrent fallers

In our study, age alone was the predictor to recurrent falls. However, in other studies, a previous history of falls[20], male gender[24] and the use of restraints in confused ambulatory patients[30] were known risk factors for recurrent falls. Recurrent falls also tend to produce a higher rate of injury[24].

COMPLICATIONS AND OUTCOME

In agreement with other studies, most falls did not result in injury (62%) and required only symptomatic treatment. Our rate of eventual surgery (1.7%) was also low compared to another study[6]. However, the rate of investigations was substantial and additional costs would be incurred with the transfer of patients to other hospitals for further investigations and treatment.

FALL-PREVENTION STRATEGIES IN PSYCHO-GERIATRIC WARDS

In the strategy for the prevention of falls, both intrinsic and extrinsic factors including circumstances and consequences of falls are important considerations[25]. Management is directed toward correcting reversible problems, improving deficits amenable to partial correction and providing adaptation to fixed deficits. Other measures include strenghtening exercises, medication evaluation, environmental improvements[26-28] and patients' behavioural change[28].

Individualised, structured approach should be used to assess intrinsic risk factors for all elderly patients, especially those who are at risk[7,29-31]. Generally risk assessment, an alert system, reinforcing preventive actions, staff education and ongoing audits and feedback should lead to a reduction in fall numbers

and rates, enhanced staff morale and the fostering of a professional approach to improving the quality of patient care[18]. Our study would provide a useful risk profile that could alert the staff involved in the care of these patients.

Modification of extrinsic factors should include increased surveillance and supervision, especially during vulnerable periods such as shift-change, leisure or bathing time and at fall-prone places. Modification of environment such as installing hand grills and railings, reducing overcrowding and reducing slippery surface should also be considered. Introduction of a scale may help in reducing falls but the choice of scale may be crucial as some scales may not have predictive value of falling[32,33]. Our study could be used to develop a useful scale that could be applied clinically and restraints considered selectively for patients with high risk profile[34,35].

LIMITATIONS AND FURTHER SUGGESTIONS

This study faces the inherent limitations of a retrospective study in terms of data availability and collection. The study population was not well-characterised in terms of its psychiatric morbidity and was skewed towards psychosis. In terms of data analysis, adoption of a multivariate approach may allow stricter control of the type 1 error rate and exploration of interactions between variables.

Despite these limitations, the results of our study were valuable as they provided useful information on falls in a unique clinical setting, comparable with other studies. The results could provide useful information for further formulation of fall-prevention strategies among the psycho-geriatric patients in the institution. Further potential research can explore the individual or combined effects of psychotropic medications and the contributory role of mental states of the patients.

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