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Falls among older adults seen at a São Paulo State public hospital: causes and consequences

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ABSTRACT

Objective

To investigate the history of accidental falls reported by older adults, identifying possibly related factors, as well as place of occurrence, causes, and consequences.

Methods

The sample investigated included 50 older adults, of both sexes, ages 60 years or older, living in the city of Ribeirão Preto, Southeastern Brazil, who had been seen at two inpatient units of a public hospital. Patient records were examined and household visits carried out for the application of a structured questionnaire including open, closed, and mixed questions related to the fall.

Results

Data obtained show a reality not substantially different from that observed in other countries. Most events occurred among older women (66%), with mean age 76 years, and at home. Causes were mainly related to physical environment (54%), and brought serious consequences to the subjects, fractures being the most common outcome (64%). Falls had a great impact on subjects' lives in terms of activities such as: lying down/getting up, walking on plain surfaces, cutting toenails, bathing/showering, walking outside home, taking care of financial issues, shopping, using public transportation, and climbing stairs.

Conclusions

The study demonstrated that falls occurred among older adults have serious physical, psychological, and social consequences, reinforcing the need for fall prevention, in order to ensure greater quality of life, autonomy, and independence for the elderly.

Keywords

Aged. Accidental falls. Cost of illness. Quality of life. Aging health.

INTRODUCTION

Aging may be influenced by biological factors, disease, and other external causes. Falls are included among the latter, according to the International Statistical Classification of Diseases and Related Health Problems (ICD-10).¹⁵ They pose a problem of great importance to gerontologists, and are a source of concern for researchers in the field, especially when they are considered as normal and proper of the ageing process.

A fall can be defined as "an unintentional event resulting in a change in the individual's position from a higher to a lower level".¹⁴ According to Cunha & Guimarães⁷ (1989), falls are the result of a total loss of postural balance, and may be related to a sudden insufficiency of neural and osteoarticular mechanisms involved in posture maintenance. A number of authors^{6,13,18} consider accidental falls as a geriatric syndrome, due to their multifactorial and heterogeneous character.

Individuals of all ages are at risk of falling. For older adults, however, falls have a much greater relevance, for they can lead to disability, injuries, and death. The social cost of falls is enormous, and becomes even greater when the aged victim suffers reductions in autonomy and independence, or needs to be institutionalized.

In US emergency services, falls are frequent injury-causing events, and constitute the most important etiology of accidental death among individuals over age 65 years.⁸ Accidental lesions are the sixth greatest cause of mortality in the >75 years age group, accounting for 70% of this mortality.¹⁰ According to German government data, in 1996, 11/100,000 individuals died after suffering injuries caused by accidental falls¹. In Brazil, according to data from the Ministry of Health's Medical Information System, between 1979 and 1995, approximately 54,730 people died due to falls, of which 52% were older adults and 39.8% were in the 80-89 years age group. Still according to data from this

institution, the nosocomial mortality rate due to falls in February 2000 was 2.58%. The greatest rate was observed in the Southeast Region, followed by Northeast, South, and Center-West. In Finland, Kannus et al⁹ (1999) observed an 80% increase in the number of fall-related between 1971 (441 deaths) and 1995 (793 deaths).

Surveys conducted in US communities show that 30% of people over age 65 years fall at least once a year. Of these, 40% are over 80 years old. Furthermore, these surveys show that 50% of elderly people who live in residential or nursing homes have already suffered falls.¹⁹ Kannus et al⁹ (1999), in a study carried out in Finland among individuals older than 50 years, reported a significant increase (284%) in the number of injuries among older adults between the years of 1971 and 1995. The authors argue that two factors may have contributed towards this increase: demographical alterations (a continuous increase in older-adult population) and an increase in the number of falls in this age group.

Despite the evidence supporting an increase in the number of falls among older-adult population, Brazilian geriatric and gerontological literature contains few epidemiological studies on the subject. According to Becker et al¹ (1999), the same problem is observed in Germany. In order to allow potential preventive interventions to be indicated by further studies, the present study deepens the investigation of falls among older adults. Thus, our aim is to investigate the history of falls reported by elderly subjects, considering place of occurrence, causes, and consequences, and to describe any changes occurred in subjects' daily lives, after the fall, including those related to functional capabilities: alterations in basic daily life activities (BDLA) and in instrumental daily life activities (IDLA).

Methods

Study population was composed of individuals over age 60 years, of both sexes, with fixed residence in the city of Ribeirão Preto, Southeastern Brazil, who were seen, due to external causes of accidental trauma – Falls – ICD-10 (W00 – W19),¹⁵ at two inpatient units of a university hospital in the same city in 2000. Data on the older adults seen at the above mentioned units who had Falls diagnosed in their records were provided by the hospital's Medical Data Department. Following the identification of study population, older adults who did not live in Ribeirão Preto or who had also been seen at the hospital's Emergency Unit and then transferred within the same hospital for a longer admission period were excluded. Study population thus comprised 251 older adults seen in 2000, from which a 50-subject sample was systematically drawn (random start one, skip five). Information including name, age, fall history, inpatient admission were obtained from the hospital records of the selected subjects in order to verify the information concerning the fall obtained through these files. Name and address were recorded for subsequent household interviews.

Figure 1 – Medication used by older adults prior to suffering falls, Ribeirão Preto, Brazil, 2000.

Subjects were visited at their homes, where structured interviews, including closed, open, and mixed questions, were carried out in order to obtain additional information such as: subject identification, detailed reports on the fall, and any changes in lifestyle occurred following the incident. The latter included functional capability restrictions observed in BDLA (eating, lying down/getting up, walking on plain surfaces, bathing/showering, dressing up, combing hair, cutting toenails, brushing teeth, and difficulties using the lavatory) and IDLA (taking medicine at the right time, climbing stairs, walking outside home, taking care of financial issues, shopping, using public transportation, and preparing

meals). The present study adopts the protocol proposed by Yuaso & Sguizzatto²¹ (1996), elaborated based on the Katz and Lawton scales, for daily activity evaluation purposes. Subject interviews were performed in the presence of a family member (or caretaker), who confirmed and helped clarify the data obtained. When the subject suffered from any cognitive dysfunction that impeded questionnaire answering, questions were asked to the family member/caretaker.

A number of subjects had died or moved to different addresses before interview scheduling. In case of death, questions were answered by a family member/caretaker that could provide information about the incident. In case of change of address (when a new address could not be found) the lost subject was replaced by another subject of same sex and age, according to the general patient listing. A total 26 subjects were replaced.

This research project was approved by the *Hospital das Clínicas* of the *Faculdade de Medicina de Ribeirão Preto/Universidade de São Paulo* Ethics Committee.

Results

Of the selected subjects, 66% were female and 34%, male. Mean age was 76 years. 54% of the subjects interviewed had a history of previous falls, of which 48% were in the 80-89 years age group and 66% were women. Inadequate surroundings were the main cause of falls (54%), followed by neurological disease (14%) and heart disease (10%). The cause for 10% of all falls was ignored. Most falls were from the subject's own height, and related to problems in the surroundings, including: slippery surfaces (26%), objects on the floor (22%), bumping into other people (11%), climbing on objects in order to reach for things (7%), problems with steps (7%), and others, in lesser degree.

After the incident, a number of subjects reported the appearance of diseases such as: cerebrovascular accident (10%) osteoporosis, (4%), pneumonia (4%), arthritis (2%), urinary tract infection (2%) and cardiopathy (2%). Sensorial diseases were also reported, of which 36% were related to visual problems, and 14% to hearing problems.

No direct relationship was observed between medication use and falls. However, data collection revealed that 70% of subjects were on some type of medication prior to the incident, all of which were physician-prescribed. No significant difference was found in terms of medication use between men (70%) and women (72%).

Figure 1 shows that most frequently used medication were anti-hypertensive drugs (34%), followed by glyceimic control drugs (14%) and others. A large number of subjects used several drugs simultaneously. The use of multiple drugs was verified in 42% of the subjects who used medication prior to the fall.

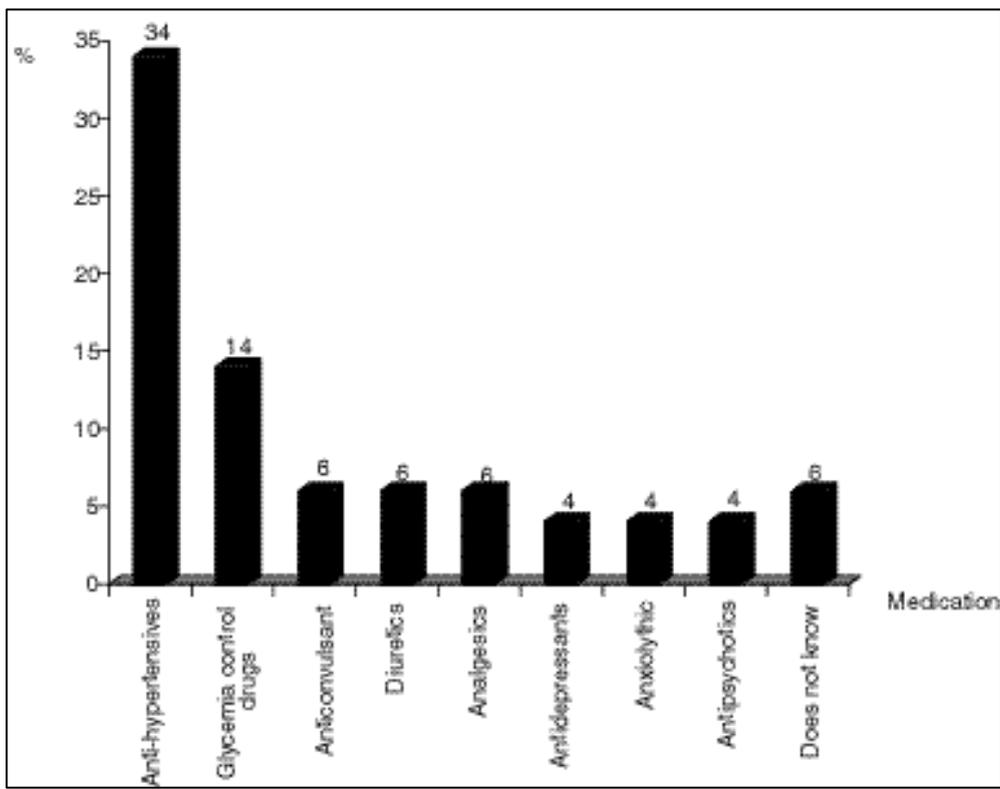


Figure 1 – Medication used by older adults prior to suffering falls, Ribeirão Preto, Brazil, 2000.

66% of falls occurred in the subjects own home, and 22% out of doors. The remainder occurred in the houses of relatives or friend's.

The consequence most commonly observed in this study were fractures (64%), occurred in 53% of men and 70% of women. Most common fractures were of the femur (62% of total fractures), followed by radius (12.5%), clavicle (6.25%), and others (spinal column, ulna, scapula, patella, and nose). Following the occurrence of fractures, consequences most reported were fear further falls (44%) and others presented in Figure 2.

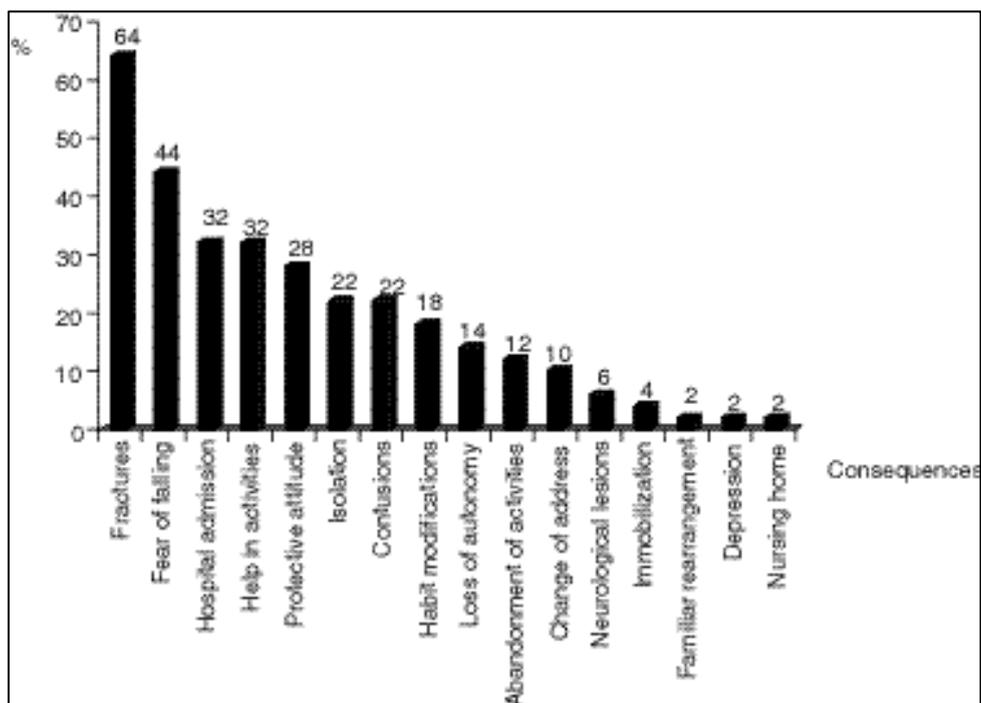


Figure 2 – Consequences presented by older adults after falls, Ribeirão Preto, 2000.

According to subject and family member/caretaker reports, falls also promoted increases in difficulty and dependence for the performance of daily-life activities (DLA). The Table shows the number of subjects who carried out these activities before and after the fall, according to the levels of difficulty presented by them. DLAs most affected were lying down/getting up, walking on plain surfaces, bathing/showering, walking outside home, taking care of financial issues, cutting toenails, shopping, using public transportation, and climbing stairs.

Table – Percentage of older adults, according to level of difficulty in performing daily life activities, before and after fall, Ribeirão Preto, 2000.

Level of difficulty	Levels of difficulty													
	Without difficulty		With difficulty, without help		With partial help		With total help		Someone else does it		Cannot perform consequence		Does not do it	
	B	A	B	A	B	A	B	A	B	A	B	A	B	A
AVDDLA														
Walking on plain surfaces	68	19	19	36	9	23	2	15	-	-	2	4	-	2
Lying down/getting up	79	28	13	36	4	13	2	15	-	-	2	6	-	2
Bathing/showering	70	30	15	28	4	17	6	17	-	-	4	6	-	2
Cutting toenails	17	8	21	11	2	2	4	9	15	15	36	49	4	6
Walking outside home	53	11	19	25	19	17	2	23	-	-	4	17	2	6
Taking care of finances	53	38	15	11	2	2	6	11	6	8	11	21	6	8
Shopping	42	17	9	9	9	4	15	19	13	11	6	32	6	8
Using public transportation	42	11	11	15	6	8	9	11	-	-	19	40	13	15
Climbing stairs	55	11	17	23	13	15	8	28	-	-	4	17	2	6
Brushing teeth	74	60	2	4	4	6	4	8	-	-	11	15	4	6
Difficulty going to the lavatory	77	55	8	13	4	6	4	6	-	-	6	17	-	2
Combing hair	83	72	4	4	4	6	2	6	-	-	6	9	-	2

Eating	89	79	4	9	2	4	4	2	-	-	-	4	-	2
Taking medication	57	45	2	-	6	6	11	17	2	2	17	23	4	6
Preparing meals	36	19	8	6	2	-	4	4	19	17	19	38	11	15
Housecleaning	34	4	6	15	-	6	2	2	17	17	21	34	19	21

B – before the fall.

A – after the fall.

DLA – daily life activities.

As mentioned before, falls may cause the death of older adults. Fourteen (28%) subjects in the sample had died, of which 78.5% were women and 21.5% men. 42.8% of deaths occurred less than one month after the fall, i.e., due to consequences directly related to the incident, including femur fracture-related embolism (50%) and neurological lesions due to intense trauma after the fall (50%). The other 57.2% of deaths occurred less than one year after the fall. Many of the subjects were bedridden, and presented mental confusion, pneumonia, and pressure ulcers.

Discussion

The greater frequency of falls observed among women is consistent with data presented by Berg et al² (1997). These authors include among the variables which may account for this difference advanced age, lower frequency of external activities, use of large quantities of drugs, use of psychotropic drugs, and decreased prehensile strength.

The causes of falls among older adults are several and may be associated among themselves. Factors responsible for these falls have been classified in the literature as intrinsic – i.e., due to physiological alterations related to the aging process, disease, and to medication effects – and extrinsic – i.e., factors that depend on social and environmental circumstances that are challenges for the elderly. In general, environment-related problems are caused by occasional events that pose risks to older adults, especially to those who already present difficulties in balance or gait. Situations that favor slipping, tripping, false steps, or bumping (into objects, animals, or other people) must be considered. Such problems will be more dangerous the greater the individual's vulnerability and the greater the instability that the problem may cause. Generally speaking, older adults do not fall as a consequence of dangerous activities (climbing ladders or on chairs) but as a result of routine activities. In the present study, only two cases of falls were due to risky activities (one due to climbing on a chair to reach for something, and another due to climbing on scaffolding). Problems related to the environment were also the most frequent causes in the study by Berg et al² (1997). In this study, tripping and slipping accounted for 59% of falls, and problems with steps for 12%.

Among intrinsic factors, the appearance of diseases that cause reductions of physical capabilities may affect postural control or balance. Major pathological conditions leading to falls, according to Kay et al¹⁰ (1995) and Lipsitz,¹² (1996), are: *cardiovascular, neurological, endocrinologic, musculoskeletal, genitourinary, psychiatric, and sensorial diseases*. Several studies in the literature show the relationship between falls and sensorial deficits.^{10,13} In the present investigation, however, there were no reports of direct relationships between visual or hearing problems and falling. This may be due to subjects' difficulty in admitting such deficiencies or in seeing a relationship between these difficulties and the fall.

In addition to presenting a relationship to previously diagnosed diseases, some authors suggest that falls may be a predictor for other health problems, and may indicate the imminence of a disease not yet diagnosed.¹⁰ Many infectious diseases are clinically atypical in older adults, and falls may be the first sign of illness.³

Several studies found in the literature concerning medication use – also considered as a potential intrinsic cause of falls, and investigated in the present study – report that drug use may be a risk factor, especially if multiple drugs are used. Brito et al³ (2001) report that medications such as diuretic, psychotropic, anti-hypertensive, and antiparkinsonian drugs may be considered as liable to cause falls. This is often due to diminutions in motor function, muscular weakness, fatigue, vertigo, or postural hypotension, all of which may be caused by these drugs. The findings related to the use of multiple drugs in the present study are in agreement with those of Robbins et al¹⁶ (1989). These authors state that the use, by older adults, of four or more associated drugs may lead to a greater risk of falling, due to the strong association between different drugs, or to the precarious health status implied by treatment with multiple drugs. Thus, it is essential that professionals, upon prescribing medication, thoroughly evaluate the real need for the drugs prescribed, given the close relationship between the use of new drugs, or even of dosage adjustment, and increased risk of falling.

The site of the fall is also important for environment-related factor identification purposes. In a retrospective study carried out in Ribeirão Preto with older women of the community who had suffered falls, a larger proportion of falls in the subject's own home was also verified.¹⁷ Campbell et al⁵ (2000), in an investigation of accidents among older adults living in a community, found that falls accounted for 51% of the accidents registered, and that they occurred mostly inside the subject's own house (44% of falls). These data are extremely elucidative for the planning of preventive measures for falls among the elderly.

Among the subjects of the present study, fractures were the most common consequence of falls. However, the fact that the individuals participating in the study were recruited at inpatient hospital units may have interfered in these results, since these are the individuals that present the severest consequences immediately after the fall. Kannus et al⁹ in Finland and Becker et al¹ in Germany also identified fractures, especially of the femur, as the most frequent consequence of falls among older adults.

Fear of further falls, also known as the "post-fall syndrome" (the second consequence most reported by study subjects), was also reported by several authors^{1,16,20} Post-fall fear may imply fear not only of further falls, but also of injuries, hospital admission, immobilization, declining health, and of dependence on other people for self-care or for daily life activities, or, in other words, of the consequences inherent to falling.¹¹ The cumulative effect of such feelings may bring about important emotional, psychological and social changes, such as: loss of autonomy and independence for BDLA and IDLA, reduction of social activities, and feelings of fragility and insecurity.

For DLAs walking on plain surfaces, lying down/getting up, and bathing/showering, subjects presented loss of independence after the fall, mostly due to impaired functional capabilities (Table 1). Such activities, previously carried out with less difficulty, became problematic after the fall. For DLAs shopping, using public transportation, and climbing stairs, subjects presented greater locomotion dependence after the fall. Climbing stairs was one of the activities most affected. Housecleaning, preparing food, and taking medication were already performed fairly rarely by subjects even before the fall, and were usually done by other persons, mostly relatives. Brushing teeth, getting to the lavatory in time, combing hair, and eating were the activities least affected by falling.

Carvalho et al⁶ (1998) report that individuals in the 75-84 years age group that require help in order to perform DLAs are at a 14-fold risk of falling if compared to independent individuals.

Refraining from carrying out such activities, or even requiring help for such purposes, may cause immobility and consequent muscular dystrophy, thus facilitating the occurrence of falls. When older adults fall, there is a trend towards diminution of daily activities, be it due to fear of exposure to risk of further falls, be it due to protective attitudes on the part of society and family members/caretakers. Other people may consider the older adult that falls as weak, often withdrawing him or her from such activities.

All the difficulties presented by the subjects of the present study were in some way related to consequences of fall, be they physical, psychological, or social. The impact upon DLA performance increased subject dependence on other persons, especially for IDLAs. Changes were observed even in activities previously performed with ease and without external help. The inability to perform DLAs due to fall-related immobility may, in the long run, have consequences not only for the older adults themselves, but also for their families – who must mobilize themselves in order to provide treatment and promote the recovery of the older adult – and for health services.

Accidental injuries are the sixth most important cause of death among individuals aged 75 years or older, and falls account for 70% of this mortality.¹² The importance of falls must not be underestimated, since they may result in death. In the present study, death following a fall occurred more frequently among women, in disagreement with data presented by Campbell et al⁴ (1985) in a prospective study in which a greater risk of mortality was ascribed to male subjects. The greater mortality among women in the present study may be related to the greater absolute number female fallers. Fractures, one of the consequences of falls that may lead to death, may be related to the greater frequency of osteoporosis among older women, in light of the strong association between this disease and fractures.

It is important to emphasize that falls are a real event in older adult life, bringing about a number of consequences, sometimes irreversible. Therefore, the approach to fall victims must include a broad and complete evaluation. Healthcare professionals must thus carry out thorough anamneses of the causes of the incident. At this time, knowing about the existence of any previous falls may direct evaluation. A detailed investigation of the role of extrinsic factors (environment, clothing) is important. Such evaluation may prevent further incidents, as well as promote a better understanding of the present fall.

Another form of dealing with falls is their prevention by means of household visits. The Brazilian National Older-Adult Healthcare Policy is already considering this type of assistance. To this end, it will be necessary for states and municipalities to train healthcare professionals and to organize healthcare services so that older adult assistance becomes a governmental policy. Healthcare programs must establish protocols for the identification of potential intrinsic and extrinsic risk factors for falling. A further aspect is to reinforce the importance of self-care and to alert family members/caretakers so that they may actively participate in the prevention of falls among older adults.

REFERENCES

1. Becker RC, Gebhard F, Mucher R, Scheible S, Nikolaus T. Epidemiologie von stürzen älterer. *Z Orthop* 1999;137:482-5.

2. Berg WP, Alessio HM, Mills EM, Tong C. Circumstances and consequences of falls in independent community – dwelling older adults. *Age & Ageing* 1997;26:261-8.
3. Britto FC, Costa SMN. Quedas. In: Papaleo Netto M, Brito FC. Urgências em geriatria. São Paulo: Ed. Atheneu; 2001. p. 323-35.
4. Campbell AG, Diep C, Reinken J, McCosh L. Factors predicting mortality in a total population sample of elderly. *J Epidemiol Comm Health* 1985;39:337.
5. Campbell EM, Carter SE, Sanson-Fisher RW, Gillespie WJ. Accidents in older people living at home: a community-based study assessing prevalence, type, location and injuries. *Australian Zeland J Public Health* 2000;24:633-6.
6. Carvalhaes N, Rossi E, Paschoal S, Perracini N, Perracini M, Rodrigues RAP. Quedas. In: Congresso Paulista de Geriatria e Gerontologia 1, São Paulo, 24 a 27 de junho de 1998. Consensos de gerontologia. São Paulo: Sociedade Brasileira de Geriatria e Gerontologia; 1998. p. 5-18.
7. Cunha UG de V, Guimarães RM. Sinais e sintomas do aparelho locomotor. In: Guimarães RM, Cunha UG de V. Sinais e sintomas em geriatria. Rio de Janeiro: Revinter; 1989. p. 141-54.
8. Fuller GF. Falls in the elderly. *Am Family Physician* 2000;61:2159-68.
9. Kannus P, Parkkari J, Koskinen S, Niemi S, Palvanen M, Järvinen M, Vuori I. Fall – induced injuries and deaths among older adults. *JAMA* 1999;281:1895-9.
10. Kay PD, Tideiksaar R. Quedas e distúrbios de marcha. In: Abrams WB, Berkow R. Manual Merck de Geriatria. São Paulo: Ed Roca; 1995.
11. Kong KS, Lee F, Mackenzie AE, Lee DTF. Psychosocial consequences of falling: the perspective of older Hong Kong chinese who had experienced recent falls. *J Advanced Nursing* 2002;37:234-42.
12. Lipsitz LA. An 85 years -old woman with a history of falls. *JAMA* 1996;276:59-66.
13. Martins VMC. Quedas em pacientes geriátricos. Rio de Janeiro: Escola Nacional de Saúde Pública - Fundação Oswaldo Cruz; 1999. p. 51.
14. Moura RN, Santos FC dos, Driemeier M, Santos LM dos, Ramos LR. Quedas em idosos: fatores de risco associados. *Gerontologia* 1999;7(2):15-21.
15. Organização Mundial da Saúde. CID-10. São Paulo; 2000. p. 1017-9.
16. Robbins AS, Rubenstein LZ, Josephson KR, Schulman BL, Osterweil D, Fine G. Predictors of falls among elderly people. Results of two population based studies. *Arch Intern Med* 1989;149:1628-33.
17. Rocha FL, Cunha UG de V. Aspectos psicológicos e psiquiátricos das quedas do idoso. *Arq Bras Med* 1994;68:9-13.
18. Studenski S. Quedas. In: Calkins E, Ford AD, Katz PR. *Geriatria Prática*. 2ª ed. Rio de Janeiro: Revinter; 1997. p. 227-3.

19. Tinetti ME, Speechley M. Prevention of falls among the elderly. *N Engl J Med* 1989;330:1055-9.
20. Vellas BJ, Wayne SJ, Romero LJ, Baumgartner RN, Garry PJ. Fear of falling and restriction of mobility in elderly fallers. *Age & Aging* 1997;26:189-93.
21. Yuaso DR, Sguizzatto GT. Fisioterapia em pacientes idosos. In: Papaleo Neto M. Gerontologia. São Paulo: Atheneu; 1996. p. 331-3.

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