

SUMJ Clinical Feature

Approaching Geriatric Patients: The Frequent Fallers

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ABSTRACT

Falls and fall related injuries are common medical problems experienced by older adults. Most falls have multiple causes resulting from a complex interplay of predisposing and precipitating factors in a person's environment. Recurrent falls, defined as more than two falls in a six-month period, should be evaluated for treatable causes using effective fall prevention strategies. The frequency of falling is related to the accumulated effect of multiple disorders superimposed on age-related changes. Multi-factorial interventions targeting identified risk factors, exercises for muscle strengthening combined with balance training, and withdrawal of psychotropic medication are among the most effective fall prevention strategies.

Key Words: Falls; risk; prevention and intervention.

Introduction

A fall, in simple terms, is an involuntary event producing a change in posture resulting in the individual adopting an unplanned supine position. It is defined as 'inadvertently coming to rest on the ground or other lower level without loss of consciousness and other than as a consequence of sudden onset of paralysis, epileptic seizure, excess alcohol intake or overwhelming physical force'. Falls are a major health problem for older people, through both immediate effects such as fractures and head injuries and longer terms problems such as disability, fear of falling, and loss of independence¹. In the United Kingdom the national service framework for older people, published in 2001, required the National Health Service (NHS) to establish specialised programmes for fall prevention². The National Institute for Health and Clinical Excellence (NICE) clinical practice guideline for the assessment and prevention of falls in older people recommended that multi-factorial risk assessment and individualised interventions should be undertaken³. Such services, including specialist falls clinics, have now been introduced throughout the UK NHS but in the absence of any evidence about the optimum configuration, they have varied in location, skill mix, assessments, and interventions offered⁴.

Epidemiology

Falls are a common and serious problem in older people. One in four adults aged over 70 fall each year and nearly one in two are aged over 80, half of whom fall again in the following year⁵. Ambulance services are often called as an emergency to assist older people who have fallen⁶. In some countries all people who call an ambulance are taken to hospital but in others, such as the United Kingdom and United States, between 30% and 50% of such people are not taken to hospital⁵. An emergency ambulance crew will assess the extent of injury and need for acute medical care, but this service will not assess the underlying risk factors for falling nor attempt to ameliorate them. The policies of the ambulance service in the United Kingdom encourage an increase in the proportion of such people managed at

home to reduce demand on hospital emergency *departments*⁷. In England and Wales, trips and falls are the commonest causes of patient safety incidents reported by NHS organisations, according to the figures from the National Patient Safety Agency (NPSA)⁸. Figures for England show an increase in reports of incidents, while there has been a decrease in Wales⁸. They constituted 28% of incidents in England and 39% in Wales; and less than 1% of incidents led to severe harm or death⁸.

Aetiology

Most of the falls result from a complex interplay of predisposing and precipitating factors in a person's environment. One half to two thirds of falls occur in or around the patient's home⁹. Environmental hazards are the leading cause of falls, accounting for about 25 to 45 percent in most studies⁹. Gait disturbance and muscle weakness also are common causes. Dizziness, vertigo, drop attacks, postural hypotension, visual impairment, and syncope also are known to cause falls⁹. For an individual a fall (or falls) is generally a symptom of underlying problem not an explicit diagnostic sign. That is not to diminish the sentinel importance of falls but to understand that they represent a symptom needing the same clinical approach perhaps as delirium, not presuming to attribute specific cause, blame or remedy but to trigger a careful individual investigation and management plan¹⁰. Falls in older people are sensitive to at least 4 spheres of influence¹⁰:

1. The physical status of the individual (ranging from disease related disability, physical fitness and nutritional and hydration status)
2. The mental state of the individual (a range of mental illness, dementias, confidence and (for want of a better term) attention seeking behaviour)
3. The influence of environmental factors (ranging from design of hospital or care setting through to care regime)
4. The impact of medication, adverse or beneficial.

Falls Risk Factors

The risk of sustaining an injury from a fall depends on the individual patient's susceptibility and environmental hazards. The frequency of falling is related to the accumulated effect of multiple disorders superimposed on age-related changes. Those with recurrent falls, *defined as more than two falls in a six-month period, are sometimes described as "frequent fallers"*. The literature recognizes a myriad of risk factors for falls (Table 1)¹¹. The likelihood of falling increases with the number of risk factors¹². The falls risk factors can be intrinsic (i.e., age-related physiologic changes, diseases and medications) or extrinsic (i.e., environmental hazards). It is essential to remember that a single fall may have multiple causes, and repeated falls may each have a different aetiology. Thus, it is critical to evaluate each occurrence separately.

A). Intrinsic Factors

Normal physical and mental changes related to ageing, but not associated with disease, can decrease functional reserve. As a result, older patients become more susceptible to falls when they are confronted with any challenge. Some age-related changes are not necessarily "normal," but they are modifiable. When possible, these conditions should be treated. Virtually any acute or chronic disease can cause or contribute to falls¹¹.

B). Extrinsic Factors

In a fall, more active persons are likely to be exposed to high-intensity forces at impact, whereas the risk of injury in less active persons depends more on their susceptibility (i.e., the presence of fragile bones or ineffective protective responses)¹³. Frail older persons tend to fall and injure themselves in the home during the course of routine activities. Vigorous older persons are more likely to participate in dynamic activities and to fall and be injured while challenged by environmental hazards such as stairs or unfamiliar areas away from home¹⁴. A variety of extrinsic factors, such as poor lighting, unsafe stairways and irregular floor surfaces, are involved in falls among the elderly. Many of these factors can be modified¹¹. The most common aetiologies of falls are listed in Table 1.

Table 1 . Most common aetiologies of falls among older adults

Aetiology (s)	Examples	
Intrinsic Factors	<ul style="list-style-type: none"> ▪ Gait disturbance & balance disorders 	<ul style="list-style-type: none"> ▪ Neurological disorder, muscle weakness, or pain related to arthritis
	<ul style="list-style-type: none"> ▪ Cardiovascular disorder 	<ul style="list-style-type: none"> ▪ Postural hypotension [Excluding: Severe aortic stenosis, arrhythmia, or carotid hypersensitivity]
	<ul style="list-style-type: none"> ▪ Chronic diseases 	<ul style="list-style-type: none"> ▪ Neurological: Central nervous system disorder, stroke and Parkinson’s disease [Excluding: drop attacks, epilepsy] ▪ Musculo-skeletal: Arthritis, myopathies. ▪ Visual disorders
	<ul style="list-style-type: none"> ▪ Acute illness 	<ul style="list-style-type: none"> ▪ Acute infection ▪ Acute metabolic disorder
	<ul style="list-style-type: none"> ▪ Cognitive disorder 	<ul style="list-style-type: none"> ▪ Acute confusion, delirium and significant memory impairment
	<ul style="list-style-type: none"> ▪ Medications or alcohol 	<ul style="list-style-type: none"> ▪ Sedatives, hypotensive agents and hypoglycemic agents ▪ Anti-psychotics ▪ Poly-pharmacy
	<ul style="list-style-type: none"> ▪ Age-related changes 	<ul style="list-style-type: none"> ▪ Loss of mobility, impaired balance
Extrinsic Factors	<ul style="list-style-type: none"> • Accident or fall from bed • Environmental hazard (uneven pavement, steep staircase or slippery floor). • Poor lighting • Footwear problems 	

Clinical Consequences

Falls and fall related injuries are among the most serious and common medical problems experienced by older adults. Nearly one-third of older persons fall each year, and half of them fall more than once¹⁵. Because of underlying osteoporosis and decreased mobility and reflexes, falls often result in hip fractures and other fractures, head injuries and even death in older adults. Accidental injuries are the fifth most common cause of death in older adults¹⁵. In around 75% of hip fracture patients, recovery is incomplete and overall health deteriorates¹⁵. The most consistently proven predictors of fall risk are history of a fall during the past year and gait and balance abnormalities¹⁶. Some studies indicated that impaired vision, certain medications, especially psychotropic drugs, decreased activities of daily living and impaired cognition are associated with a higher risk of falls¹⁷. The contribution of orthostatic hypotension to fall risk remains uncertain¹⁶.

Falls Assessment

A single fall is not always a sign of a major problem and an increased risk for subsequent falls. The fall may simply be an isolated event. However, recurrent falls, defined as more than two falls in a six-month period, should be evaluated for treatable causes. An immediate evaluation is required for falls that produce injuries or are associated with a new acute illness, loss of consciousness, fever or abnormal blood pressure¹¹.

1. History

A thorough history is essential to determine the mechanism of falling, specific risk factors for falls, impairments that contribute to falls and the appropriate diagnostic work-up. Many patients attribute a fall to “just tripping,” but physicians and General Practitioners (GPs) must determine if the fall occurred because of an environmental obstacle or another precipitating factor. The physician should ask about the activity the patient was engaged in just before and at the time of the fall, especially if the activity involved a positional change. The location of the fall should be ascertained. It is also important to know whether anyone witnessed the fall and whether the patient sustained any injuries. The patient and, if applicable, witnesses or caregivers should be asked in detail about previous falls and whether the falls were the same or different in character¹¹. The physician also needs to determine who is available to assist the patient and the duration of being on the floor. A critical element of the targeted history is a review of medications, including prescription, over-the-counter, herbal and illicit drugs. Red flags are polypharmacy (four or more prescription medications), the initiation of a new drug therapy in the previous two weeks and the use of any drug known to enhance the risk of falling¹¹. Tricyclic antidepressants and other heterocyclic antidepressants have long been associated with an increased risk for falls¹¹.

2. Physical Examination

Physical assessment of patients following a fall should focus on three aspects:

- a. Assessment of fall-related injury
- b. Identification of fall risk factors, particularly the reversible ones (such as postural hypotension).
- c. Identification of falls consequences or complications (such as fear of falling syndrome)

This approach may focus the physician's attention on common problems that are likely to respond to treatment. Most falls have multiple causes and only rarely are all of the causes fully reversible. Nonetheless, a partial positive impact on one or a few causes often makes a major difference in quality of life for the patients and carers¹¹.

3. Further assessment:

- Home and environmental visit:** A home visit is invaluable for assessing modifiable risk factors and determining appropriate interventions. A home safety checklist can guide the visit and ensure a thorough evaluation¹⁸. It is particularly important to assess caregiver and housing arrangements, environmental hazards, alcohol use and compliance with medications¹⁹.
- Balance and Gait Testing:** Several simple tests have exhibited a strong correlation with a history of falling. One-leg balance is tested by having the patient stand unassisted on one leg for five seconds. The timed “Up & Go” test evaluates gait and balance provides more detailed assessment (Table 2)²⁰. A score of 30 seconds or greater indicates that the patient has impaired mobility and requires assistance (i.e., has a high risk of falling). This test has been shown to be as valid as sophisticated gait testing²⁰. In watching patients perform the test, the physician should also consider the following questions: How safe does this activity appear for this patient? Are there any tip-offs to remediable causes of impaired mobility?¹¹.

Table 2: Timed “Up & Go” Test

Components	Explanation	
Task	<ul style="list-style-type: none"> The patient gets up out of a standard armchair (seat height of approximately 46 cm [18.4 in.]), walks a distance of 3 meter (10 ft.), turns, walks back to the chair and sits down again. The patient wears regular footwear and, if applicable, uses any customary walking aid (e.g., walking stick or frame). No physical assistance is given. 	
Requirements	<ul style="list-style-type: none"> Armchair, stopwatch (or wristwatch with a second hand) and a measured path 	
Assessment	<ul style="list-style-type: none"> The physician/Falls-nurse uses a stopwatch or a wristwatch with a second hand to time this activity. 	
Results	Time (seconds)	Functional rating
	▪ < 10	▪ Freely mobile
	▪ < 20	▪ Mostly independent
	▪ 20 to 29	▪ Variable mobility
	▪ > 30	▪ Impaired mobility

Screening

Older patients with known risk factors for falling should be questioned about falls on a periodic basis. Many falls may never come to the physician’s attention because the patient may not volunteer the information. Specific inquiry is necessary because of the fears many older persons harbour about being institutionalized. Thus, these patients are unlikely to give falling as a chief complaint¹¹.

Investigations

The role of laboratory testing and diagnostic evaluation for fall prevention has not been well studied. It is reasonable to perform tests to determine complete blood count, and thyroid function, electrolytes, blood urea, creatinine, glucose, and vitamin B12 levels. The results can help rule out potentially treatable causes for falls such as anaemia, dehydration, hypoglycaemia, or hyperglycemias. There is an association between falls and syncope, and older persons who fall may not be aware of episodes of loss of consciousness²¹. Syncope

evaluation should be considered in older persons who have unexplained falls, possibly in consultation with their cardiologist²¹. This could include ambulatory electrocardiography (Holter monitor), tilt-table test and an echocardiogram. Brain imaging and other relevant studies may be considered based on abnormalities suggested by the history and physical examination.

Falls Management and Prevention

Prevention of falls and injuries has been a major focus of research, stimulated by ageing populations and by growing awareness of the mortality and morbidity resulting from falls. Earlier reviews of randomised controlled trials of fall prevention interventions concluded that several types of intervention are effective, including training in strength and balance, modification of hazards at home, and withdrawal of psychotropic drugs²². Multi-factorial risk assessment of falls followed by targeting of interventions to an individual's risk factors is an attractive strategy as it could reduce several components of fall risk and would be expected to lead to greater reductions in falls than dealing with risk factors in isolation. Earlier reviews suggested that this type of intervention may be among the most effective, and it is recommended as a primary treatment strategy in the guideline for prevention of falls published by the American Geriatrics Society and British Geriatrics Society²²⁻²⁴. Several studies have examined single risk-factor modification and multi-factorial interventions, and have found that both can prevent falls in older patients, table 3⁹. For example, when the assessment indicates gait and balance disturbance, interventions should include management of underlying medical conditions, modification of medication that impairs balance, and referral to a physical therapist for gait and balance exercises and assistive devices⁹. Patients with orthostatic (postural) hypotension can be helped with the use of compensatory strategies, such as rising slowly or sitting on the side of the bed for several minutes before standing, review and reduction of medications, adequate hydration, and use of elastic stockings to minimize venous pooling in the legs. Liberal use of salt and pharmacologic therapy with fludrocortisone or midodrine can help maintain normal blood pressure⁹. Cardiac arrhythmias or syncope clearly associated with a fall should be treated with anti-arrhythmic agents or a pacemaker in consultation with a cardiologist⁹.

Conclusion

Falls are one of the most common geriatric syndromes threatening the independence of older persons. Most falls have multiple causes. Risk factors for falls include muscle weakness, a history of falls, use of four or more prescription medications, use of an assistive device, arthritis, depression, age older than 80 years, and impairments in gait, balance, cognition, vision, and activities of daily living. Physicians caring for older patients should ask about any falls that have occurred in the past year. Assessment should include evaluating the circumstances of the fall and a complete history and physical examination, looking for potential risk factors. Falls are associated with increased morbidity, mortality, and nursing home placement. The most effective fall prevention strategies are multi-factorial interventions targeting identified risk factors, exercises for muscle strengthening combined with balance training, and withdrawal of psychotropic medication. Home hazard assessment and modification by a health professional also is helpful.

Table 3: Single and multi-factorial interventions in falls management

Single Interventions	Multi-factorial Interventions
<ul style="list-style-type: none"> • Exercise and Physical Therapy. Such programs significantly decreased the number of individuals experiencing a fall over one year when compared with a control group that received no intervention. These include balance retraining, a 15-week tai chi group exercise • Home Safety Assessment and Modification. In patients with a history of falling, home hazard assessment and modification by a trained health professional reduced falls. • Medication Withdrawal. Withdrawal of psychotropic medications, other sedatives or hypnotics, neuroleptic agents, or antidepressants resulted in reduction in risk of falling (for about 14 weeks only). • Cardiac Pacemaker. Those with unexplained or recurrent falls who had dual-chamber pacemaker implantation for cardio-inhibitory carotid sinus hyper-sensitivity, had a reduction in total number of falls at one year. • Hip Protectors. They do not reduce the risk of falling, but aim to reduce the impact of a fall, and may help in the prevention of hip fractures for persons at high risk of falls or those living in an institution. 	<p>I. Multidisciplinary, multi-factorial health and environmental screening and intervention programs in community-dwelling older adults found a significant reduction in falls.</p> <ul style="list-style-type: none"> ▪ The components of this programme include: <ol style="list-style-type: none"> 1) Exercise programs incorporating gait and balance training; 2) Advice on appropriate use of assistive devices by an occupational therapist; 3) Review and modification of medications; 4) Evaluation and treatment of postural hypotension; 5) Removal or modification of environmental hazards; 6) Targeted medical and cardiovascular assessment and treatments. <p>II. Multidisciplinary, multi-factorial health and environmental screening and intervention programs among those in residential care facilities have been successful in preventing falls in these setting.</p> <ul style="list-style-type: none"> ▪ The components of this programme include: <ol style="list-style-type: none"> 1) Comprehensive individual assessment with specific safety recommendations targeting environmental and personal safety (e.g., improvement in room lighting, flooring, and footwear); 2) Wheelchair use 3) Review of psychotropic drug use; 4) Exercises for strength, balance, transfer, and ambulation; 5) Provision and repair of aids; 6) Providing hip protectors; 7) Facility-wide educational programs 8) Post-fall problem-solving conferences.

Learning Points

Key Learning Points

- Falls are a common and serious problem in older people
- Falls are the result of a complex combination of several intrinsic and extrinsic factors
- For an individual a fall is generally a symptom of underlying problem not an explicit diagnostic sign
- Environmental hazards are the leading cause of falls and most falls occur in or

around the patient's home

- The most consistently proven predictors of fall risk are history of a fall during the past year and gait and balance abnormalities
- *The risk of sustaining an injury from a fall depends on the individual patient's susceptibility and environmental hazards*
- A thorough history is essential to determine the mechanism of falling and to identify any contributing risk factor
- Recurrent falls, defined as more than two falls in a six-month period, should be evaluated for treatable causes.
- The most effective fall prevention strategies are multidisciplinary/ multi-factorial interventions targeting identified risk factors.

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