

A Stepwise Approach to a Comprehensive Post-Fall Assessment

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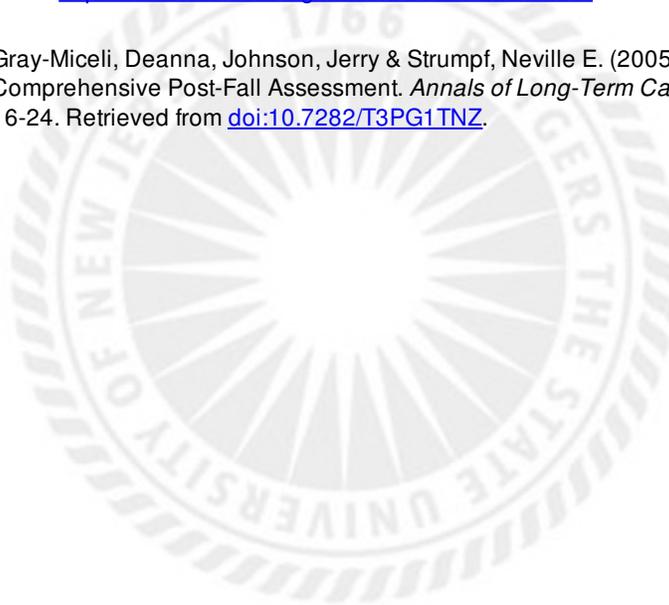
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Abstract

Post-fall assessment is an essential component of any fall prevention intervention. Typically, clinical practice recommendations for fall assessment are left to the discretion of each practitioner and miss many of the associated symptoms, situational contexts and pertinent elements required to reveal likely underlying determinants of a fall event. In order to elicit a comprehensive evaluation of a recent fall, a 5-step organizational approach is presented which allows for the consistent gathering of key information needed to determine possible underlying fall etiology while also addressing the patient's perception of their fall. Several cases will be used to illustrate this comprehensive approach to fall assessment.

Key words: Post-fall assessment; step-wise approach; fall evaluation

A Stepwise Approach to a Comprehensive Post-fall Assessment

Falling, first described in the geriatric literature by Isaacs (1985)¹ as “inadvertent landing to the lowest level” was defined as a sudden and involuntary happenstance (hence inadvertent), as in the case of an accident, and “and not the result of loss of consciousness.” Since 1985, knowledge of fall etiology has expanded beyond the assumption that falls are mainly the result of accidents. Falls are a multidimensional phenomenon, attributable to medications²⁻⁶, chronic^{7,8} and acute disease or age-related reasons⁹⁻¹², environmental^{13,14} causes, prodromal^{15,16} causes, other etiology¹⁷, or as idiopathic phenomena.

Although national guidelines (American Geriatrics Society [AGS]; 2001) for fall prevention exist¹⁸, they are incomplete with regard to a comprehensive post-fall assessment. These guidelines lead much to the discretion of each clinician. A practical organizational approach is needed that includes specific fall-related questions concerning symptoms, historical accounts and situational contexts, and a pertinent physical examination in order to distinguish among various fall etiologies. This approach is especially important given the likelihood of symptom underreporting or dismissal of falls altogether by older adults.

As a widespread, public health problem, falling has no geographic boundaries or age-criteria; but its greatest impact is among the elderly. In 2001, over 1.6 million seniors were treated in emergency departments for fall-related injuries, nearly 388,000 were hospitalized and over 11,000 elders died from fall-related injuries¹⁹. Of the 50,000 U.S deaths from traumatic brain injury, falls are the leading cause among those 75 and

older²⁰. Because falls are such a pervasive multifactorial geriatric syndrome, the types of questions posed to older adults must also reflect a multifactorial set of content by care providers serving the elderly.

The purpose of this paper is to outline a stepwise organizational approach to the fall evaluation of an older adult that identifies symptoms and contexts associated with falls, so that interventions can be tailored to likely etiologies. This approach takes into account the many interactive contexts that surround the older adults experiences, interpretations and perceptions of a fall. As a vehicle toward greater understanding of the patients' experiences and perception of the fall, it fosters opportunities for patient education, clarification of misconceptions about falling and assists in tailoring individualized plans of care.

Theoretical Foundation

The stepwise approach for post-fall assessment is derived from two models, the Medical Model and the Illness Representation Model²¹. Both models are clinically valuable in the formulation of any comprehensive fall evaluation and plan of care among individuals who are capable of discussing their thoughts. The combination of these models assists to identify the causes of falls which directs medical plans of care, while also identifying the patient's perspective of the problem which forms the basis of patient-educational initiatives like teaching the patient about causes of falling or clarifying ageist stereotypes associating falling which may exist.

The Medical and Illness Representation Models

The Medical Model of care forms the foundation for existing clinical guidelines^{18, 22} for fall prevention in the elderly. Many of these national recommendations however, do not

specify how the medical encounter is framed, or what questions are posed to older adults that can identify beliefs, attitudes or perceptions of their fall^{22, 23}. The AGS guidelines (2001) recommend clinicians to “ask about falls routinely”, as part of routine care (pp. 666, 667) or as part of the fall evaluation defined to “include a history of fall circumstances, medications, acute and chronic problems, etc...” (p. 667). This line of inquiry is limited and may only result in “yes or no” close-ended responses or skeletal circumstantial information about a fall. Entering into any medical encounter requires the practitioner to become aware of patients beliefs, attitudes and perceptions as acquired from their experiences.

Falling is a complex, and multidimensional phenomenon among older adults. One’s perception of falling is influenced by multiple factors and experiences and therefore influences what one deems important to report. Each older adult who falls possesses varied perceptions of the event based on what he/she holds as truths that have developed from their own interpretation of their experience, past and current. As well, individuals are influenced within a sociological context by myths and stereotypes about falling. Past, and current experiences of falling contain specific attributes that form a representation of what it means to fall to that individual.

Supporting the inclusion of perspectives and attitudes about falls are some research investigations suggesting older adults operative belief systems and perceptions are very important considerations in the health care encounter surrounding the fall²⁴⁻²⁸. While factors such as fear of falling²⁴, the older adults perspectives^{25,26}, knowledge²⁷ and perceptions of degrees of risk²⁸ influence older adults choice of action, these same factors can influence one’s decision to disclose information about their fall to

their care provider. Inclusion of the client's perspective and attitudes were among 8 health domains validated by a consensus group of expert practitioners to include in the standardized assessment of elderly people in primary care²⁹.

A Stepwise Approach to Fall Evaluation

Figure 1 outlines a combined approach using both the Medical Model and the Illness Representation Models in a stepwise fashion to evaluate a fall following national recommendations and clinical causes of falls derived from the geriatric literature. This approach begins with: 1) eliciting the patients experience and perception of their fall, 2) recreating the situational context of the fall, 3) identifying key acute and chronic symptoms and reviewing past medical history; 4) performing a physical examination, and 5) synthesizing relevant information, constructing a case vignette, reviewing fall etiology and determining a plan of care. Each of the five steps in this approach is described.

Step 1: How do you elicit the older adults experience and perception of their fall in the history?

Discovering the patient's experience is usually learned when the practitioner makes open-ended statements like, "tell me about your most recent fall to the ground; for instance, everything you can recall, how you were feeling"? A detailed description of the most recent fall will usually include a short story. Individuals might describe experiences ranging from "it was nothing, I just tripped, I was going along and then all of a sudden", to "I'll never forget how it made me feel, angry, frustrated and feeling like it was one downward step"²⁶. Other remarks might include, "my knees buckled again, and down I went". Listening to the older adult's reflection and response is an important part of the

history that can help to identify underlying etiologies as symptoms are disclosed. As well, responses often reveal their perception of fall causes, consequences, and other beliefs.

Step 2: Re-creating the situational context of the fall and other important historical information

The re-creation of a visual image of a fall helps the older adult to recall specific circumstantial information about the fall as well as pointing to possible underlying etiology. This is elicited by asking the older adult to recall where they were and what they recall as an activity. As recommended in national practice guidelines¹⁸, the practitioner reviews the exact circumstances of the fall, such as time of occurrence, location or activity at the time. During the discussion about activity it is helpful for the care provider to ask, and then re-create their own visual image of the events leading to the fall whereby possible etiologies can be identified. The sharing and comparison of visual images constructed by both practitioner and patient can clarify important events associated with the fall.

Considering the fall and/or associated symptoms relative to the *person's body in space* at the time of the fall may be of help in deciphering the underlying etiology. For instance, were they lying, attempting to get up or to sit down? If getting out of bed, did they need assistance? Responses may point to neuro-muscular, cardiovascular problems, or a situation related to environmental concerns. A new onset of lightheadedness with a position change such as sitting up or standing for instance may be indicative of orthostatic hypotension; whereas, lightheaded with exertion on walking may be indicative of cardiovascular involvement or a medication side effect.

Step 3: What are the key acute or chronic symptoms associated with falling to be elicited?

Imbedded in the rich descriptions and personal accounts of falling described in *Steps 1 and 2* are discernable symptoms often linked to possible underlying causes of a fall. A comprehensive review of common symptoms associated with falling arising from either acute or chronic etiologies can be elicited and determined (see Table 1). Important to note are symptom onset, duration and frequency. Because older adults may not voluntarily report these symptoms or fail to recognize their relationship to the reason for a fall, it is incumbent upon the practitioner to ask about their occurrence and association with falling. Review of past medical history and the medication regimen may also reveal the new onset or continuation of key symptoms.

Following the overarching classification presented in Table 2, falls occur from a myriad of etiologies and are often reflected as acute or chronic symptoms or in physical examination findings. Practitioners must determine whether the symptoms are of acute or chronic duration, the nature of the presentation and association with falling and other factors related to patient condition. As reflected in national recommendations for fall prevention, the primary care provider evaluates the necessity for additional work-up and/or treatment. Additional work-up may not be necessary if symptoms are of a chronic, recurrent basis; rather, the focus would shift from determining the underlying diagnosis to implementing a plan of care to modify the symptoms associated with falling. Knowledge of past medical history related to chronic and acute diseases and current medications are a critical component of any assessment of symptoms associated with a fall event. The decision for additional work-up is contingent upon not only on the

severity of symptoms, but also on the presenting physical examination. A report of a new onset of lightheadedness with standing and subsequent falling, accompanied by orthostatic hypotension, warrants further evaluation, especially if the resting heart rate is < 30 beats per minute.

Step 4. What components of the physical examination are helpful in the fall assessment?

National clinical recommendations for a post-fall evaluation for the primary and secondary prevention of falls^{18,22,23} direct the physical examination that includes assessment of vision, gait and balance, lower limb joints, and neurological and cardiovascular status. The neurological exam focuses on mental status, peripheral nerves, balance, proprioception, reflexes, and tests of cortical, extrapyramidal and cerebellar function. The cardiovascular examination includes heart rate and rhythm, postural blood pressure and pulse. Additional assessment of blood pressure response to carotid sinus stimulation might also be in order.

Many important observations of the older person are learned during selected maneuvers evaluating ambulation, transfer ability and balance and administration of tools to assess cognitive function such as the Folstein Mini-Mental State Examination (MMSE)³⁰ or the 15-item Geriatric Depression Scale (GDS)³¹. The MMSE is helpful in identifying falls associated with white matter diseases that presents with associated symptoms of memory impairment and/or gait apraxia. The GDS is a screening tool for depression, which can cause loss of awareness or attention to important environmental conditions leading to falls. As part of the physical examination, a functional assessment is performed with emphasis on transfer ability, ambulation, turning ability, and ability to sit

and stand. Performance is rated as independent or requiring assistance or supervision. The use of any mobility aides is noted in relation to enhancing function. As specified in national recommendations, the fall assessment also includes administration of selected measurement tools. Performing the recommended physical examination coupled with other pertinent history and situational context leads to detection of categories of medical events and diseases associated with falls (see Table 2) in older adults.

Step 5. Synthesis: Identifying possible underlying causes of falls

Falls can be prevented from recurrence when possible underlying etiologies are identified and treated. The organizational approach to post-fall evaluation outlined here leads to a conclusion about possible causes of the fall. Thus, after reviewing data obtained from Steps 1 through 4, the practitioner assimilates all the pertinent positive and negative findings and derives an answer to the question: why did the fall occur? Is the likely etiology from environmental or medication causes, or does it appear to be related to an acute or chronic illness?

Learned from this stepwise approach to fall evaluation is the recognition that the older adult's perception of the fall occurrence may in fact inform the practitioner as to how or why the fall occurred (*Step 1*). The clinician evaluates and weighs the development of associated symptoms and the context in which these symptoms occurred, along with situational factors operating at the time of the fall and findings on the physical examination (*Steps 2-4*). In isolation, circumstantial information (such as day, time, location, symptoms or physical exam findings) may fail to detect possible underlying etiology. But, when all relevant information is consistently gathered in an organized

fashion and then assimilated, various individual or multi-factorial conditions related to falling can be addressed.

Although falls are mostly multi-factorial in the elderly, then also occur solely from acute and chronic diseases or for no known reason, as in the cause of idiopathic falls. The construction of a case vignette helps to synthesize relevant information needed to determine possible underlying etiology for consideration. The following section details three case vignettes, which serve as examples of falling from idiopathic reasons, acute medical events and chronic diseases. Three cases are reported from primary care practice with older adults who sought a fall evaluation from a geriatric fall assessment and prevention program.

Consider the following case example of a healthy and well functioning older adult (with no prior falls or risk for falling) who fell while grocery shopping.

Case example of an idiopathic fall

A 90 year-old female reported having a slip while grocery shopping. When asked to further describe her most recent experience with the fall, everything she could recall and her thoughts, she commented, “who would believe this one! I was shopping, pushing my cart along and then suddenly I was on the ground... I looked down and I had slipped on a banana peel. There was a mom with her children I could see in the distance; I guess that was the cause and it startled me, but fortunately I did not break anything.”

This slip was actually a true fall, resulting in a landing to the lowest level, an accident that occurred for no known predictable reason or organic etiology. Not all falls with this description are due to environmental accidents. The only means of determining underlying etiology is through a thorough history, physical examination, and other tests

and procedures to rule-in or rule-out other causes. In this case, a complete review of systems and physical examination revealed a healthy 90 year-old female with no underlying medical conditions, taking no medications, and presenting with no symptoms associated with acute type of treatable falls. A fall such as this one appears to be happenstance, irrespective of any predetermined risk status, functional status or age. This type of fall could be classified “idiopathic” as there are no presenting or uncovered symptoms or physical examination findings that might lead the clinician to suspect otherwise. Note embedded in her description of the falling event was her perception of causation.

When falls are not attributed to idiopathic reasons, they occur from specific identifiable reasons. Table 1 illustrates a global categorization of falls attributable to etiologies heralded by a presenting symptom or a significant physical examination finding. This categorization of falls could be classified as secondary to acute treatable events, symptoms of chronic conditions, side effects of medications or simply from age-related physiological changes. Some falls share multiple etiologies, as in the case of orthostatic hypotension arising from volume depletion or bleeding (acute), autonomic neuropathy (chronic), or a side effect of medication (medication related). The following cases illustrate an acute treatable fall.

Case example of an acute treatable fall

An 82 year-old woman who lived alone was brought into the office for an emergency evaluation after the nephew observed a fall to the ground while she raked leaves outdoors. When the patient was asked to describe her fall experience, little information was acquired, as she commented, “I don’t know what happened”. Later learned through a comprehensive review of key associated symptoms were feelings of lightheaded and dizziness while raking. These symptoms, acknowledged to be of a new

onset, were consistent with a transitory syncopal event. There were no prior falls. In the ambulatory geriatric clinic, she underwent a complete review of medications, history and a comprehensive physical examination. Her physical examination showed a drop in systolic blood pressure of 30 mmHg from supine to standing with dizziness. There was no dizziness with head movement. Cardiovascular examination revealed a systolic murmur grade 2/6 at the apex. EKG revealed a Mobitz type II heart block, normal sinus rhythm with a rate of 40. She was transferred to the emergency room, admitted and received an emergency pacemaker. Three month follow up revealed no recurrent falls and a return to usual daily activities.

The initial description of a sudden fall for which the patient could not explain any possible causation was puzzling, especially since it was of new onset, and occurred in a healthy older adult. Significant information learned in Step 1 was the patient's inability to clearly describe her recent fall experience (suggesting a possible loss of recall). Even though a lack of recall existed, proceeding with Steps 2-4 allowed for a more precise description to be known, which later lead to a tentative diagnosis of a syncopal-fall, confirmed on the physical examination and diagnostic evaluation.

Other types of situational contexts in which falls occur include those falls that occur from symptoms associated with underlying chronic illness. Consider the following case example:

Case example of a fall associated with chronic disease

A 72 year- old female reported having multiple falls, at least 3 times weekly, of a long-standing duration when walking to the store. When asked why she frequented the store so often, she revealed a complaint of tiredness and leg heaviness that precluded her from carrying heavy groceries once per week. She perceived this to be the cause of her fall. Further history and physical examination revealed a focal lower extremity weakness of the left leg. There was no past history of arthritis, neurological or cardiovascular diseases or diabetes. Neurological evaluation and EMG revealed a pattern consistent

with post-polio syndrome. Management was directed at changing the pattern of grocery shopping and taking frequent rest periods. This combination reduced fall episodes and helped the patient to feel less fatigued in her legs.

A very important aspect of this patient's fall might have been missed if a visual recreation of the situational context was not included in the assessment (Step 2). The practitioner was able to re-create and visualize the fall occurring as the patient lifted her leg to step up onto the curb, revealing that the falls did not occur during walking. This small, but important detail added clarity to the situation and helped to explain the frequent falling in light of the symptoms elicited on history and the physical examination findings.

Discussion

Evidenced-based recommendations for evaluation of falling among adults^{19,23,24} exist to guide clinicians in practice to discern the various reasons for the fall and to determine appropriate solutions so as to prevent their reoccurrence. Their implementation is carried out through a classic Medical Model approach to history taking and physical examination, which relies in part on patients reporting important clinical information in a succinct fashion. To date, no efficient, comprehensive practice approach has been proposed in the literature, which incorporates the patient's perception of the problem along with the consensus guidelines for the recommended elements. Given the many plausible clinical explanations for patient falling²⁻¹⁸, older adults may have their own individualized perceptions of fall cause and consequences^{25,26,27}. It seems appropriate that including their view about the fall should be advantageous to the clinician and an integral component of any fall assessment or management strategy.

This paper outlines a comprehensive organized stepwise approach to assist clinicians in practice when conducting a post-fall evaluation reflective of current clinical guidelines and standards of care. A distinguishing feature of this new approach, unlike the classic history, physical examination, and functional assessment, is that it attempts to re-create a synthesis of important information into a meaningful whole, so that symptoms associated with falling are identified so that they can be managed accordingly. Including the individual's perception of the fall event and their symptoms is an important aspect of the overall care of any patient. Tinetti (2003)³² argues that disease as the focus of medical care provides the framework for diagnosis and treatment, but often negates an integrative and individualized approach to care. Certainly, when considering falls, we need to move beyond a disease focus, and integrate the perception of that fall from the perspective of the person.

Implications for Practice

In all patient settings, the goal of post-fall assessment is to identify falls amenable to intervention such as those falls occurring from key acute or chronic illness, medications, environment or other conditions. Using the stepwise approach described underlying fall etiologies can be determined and lead to targeted interventions. This approach can differentiate various types of treatable falls based on a composite synthesis of the patient's experience, situational context, medical history, and presenting symptoms. This information coupled with the patient's perception of their falls can best direct future interventions aimed at education, demystification of falls, and the secondary prevention of falls.

Attention to discerning the type of fall occurring assists greatly to a body of knowledge detailing various types of falls among older adults. Ultimately, when various types of falls are presented, case definitions can be better defined, and fall epidemiology can be more precisely determined. In the long run, falls incidences can be better tabulated, and resources for their management can be best planned by practitioners and public policy officials.

Fall prevention is a goal shared by all care providers of the elderly that begins with accurate accounts not only of the frequency of falls, but types of falls, which occur. The stepwise approach presented provides a framework for important data can be systematically collected and analyzed so that various fall incidences can be tabulated, trends analyzed, and fall prevention programs can be further individualized.

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Table 1. Key symptoms associated with falling among older adults

<u>Symptom to elicit from falling older adult</u>	<u>Possible etiology</u>
<u>Cardiovascular System</u>	
Lightheadedness	Carotid stenosis, Cerebrovascular Disease, Medications
Dizziness with standing	Orthostasis secondary to Diabetes Mellitus, volume depletion, Peripheral Vascular Disease
Dizziness with head rotation	Carotid stenosis/hypersensitivity
Shortness of breath	Arrhythmia
Syncope	Neurologic; vasovagal; carotid hyper-sensitivity
<u>Neurological/Musculoskeletal Systems</u>	
Lower extremity numbness	Neuropathy; DM; B12 deficiency; PVD
Lower extremity weakness (bilateral)	Arthritis; disuse; thyroid disease; electrolyte imbalance
Lower extremity weakness (unilateral)	CVA; arthritis
Loss of recall of the fall event	Dementia
Lower extremity joint pain	Arthritis; sprain/strain; neuropathy
Gait unsteadiness	Dementia; CVA; parkinsonism; foot problems
Sudden loss of balance	Parkinsons's Disease; CVA,
<u>General Complaints</u>	
Sudden Weakness	Frailty; Disuse; Anemia
Fatigue	Severe Anemia; CHF; infection

Table 1. Symptoms associated with falling among older adults.

<u>Symptom to elicit from falling older adult</u>	<u>Possible etiology</u>
Focal pain	Bone fracture; soft tissue injury
<u>Miscellaneous</u>	
Dizziness with head movement	Labrinthitis; cervical arthritis
<u>Pulmonary</u>	
Dyspnea on Exertion	Emphysema; pneumonia
Lightheaded with exertion	Cardiovascular disease; anemia
<u>Gentourinary</u>	
Urinary urgency, frequency	Urinary Tract Infection
Urinary Incontinence	
<u>Behavioral</u>	
Hunger, thirst	Unmet physical needs
Continuous wandering/pacing aimlessly with fatigue	Dementia with motor restlessness

Table 2- Overview of various types of medical events associated with falls among older adults

Age-related

- Dizziness with standing from physiological age related changes
- Dizziness with head rotation from physiological age-related changes

Accidental/Environmental

- Slipping or tripping on a wet/slippery surface
- Trip/slip
- Lack of support from equipment or assistive device

Acute (Treatable), sudden symptoms of:

- Mental confusion/ (Delirium)
- Heart racing or skipping a beat, palpitations (Arrhythmia)
- Dizziness with standing up (Orthostatic hypotension[OH])
- Dizziness with room or self moving (Vertigo)
- Generalized weakness (Infection/Sepsis)
- Involuntary movement of limbs accompanied by confusion, unresponsiveness or absent facial features report (Seizure)
- Lower extremity weakness (Electrolyte imbalance)
- Gait ataxia associated with ETOH ingestion
- Feeling faint or dizzy or unable to sustain consciousness (Hypoglycemia)
- Blacking out or loss of recall (Syncope)
- Unilateral weakness, sudden speech change or facial droop (TIA)

Chronic (Manageable) gradual or recurrent symptoms of:

- Lower extremity numbness (Neuropathy; Diabetes; B12 deficiency; PVD)
- Lower extremity weakness (Arthritis; CVA; Thyroid disease)
- Fatigue (Anemia; CHF)
- Dyspnea on exertion (emphysema; pneumonia)
- Weakness (Frailty; Disuse; Anemia)
- Lightheadedness (Carotid stenosis; Cerebrovascular disease; emphysema)
- Dizziness with standing (OH secondary to Diabetes, fluid volume deficits)
- Dizziness with head rotation (Carotid Stenosis/hypersensitivity)
- Dizziness with movement (Labrinthitis);
- Forgetting the fall (Dementia)
- Don't know responses (Depression)
- Lower extremity joint pain (Arthritis)
- Unsteadiness with walking (Dementia; CVA/MID)
- Poor balance (Parkinson's Disease)

Idiopathic/Happenstance

- No known reason, no acute or chronic symptoms

Figure 1: Stepwise Processes involved in the clinical approach of falls evaluation

