

Current Approaches to Post-fall Assessment in Nursing Homes

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Current Approaches to Post-fall Assessment in Nursing Homes

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Introduction

Falling is a common problem among older adults residing in nursing homes. Falls often recur or result in injury, hospitalization and even death. Nationwide, nursing home residents fall almost daily, with annual conservative incidences ranging up to 50 percent¹. The emotional, physical, social, spiritual and economic toll of falling places it among the top leading health conditions targeted for reduction in Healthy People 2010.

Reduction of falls in nursing homes also relates generally to the Healthy People Objective to reduce hip fracture as well as the specific Healthy New Jersey 2010² objectives related to reduction of falls in nursing homes. Using an epidemiological framework for injury prevention, it is widely assumed that modification of risk factors of the host, agent and environment reduces falls. Nevertheless, in numerous clinical trials, this assumption is not necessarily borne out (see Table 1³⁻¹⁹). Furthermore, in addition to the limitations alluded to above, there are a paucity of successful interventions studies specific to long-term care setting²⁰. Although useful, a traditional epidemiological framework cannot always yield a complete understanding of casualty for every type of fall. When risk factor assessment alone is employed in these circumstances, essential etiologies for the fall often go undetected. Therefore, uncovering essential mechanisms requires an augmented strategy to better identify such factors through post-fall assessment in nursing homes. This approach entails expanded integration of clinical information with additional data derived through qualitative as well as quantitative research techniques.

Existing clinical approaches to fall assessment and prevention

Three distinct clinical approaches to fall assessment, prevention and management are common in nursing homes in the United States. The first is to screen all newly admitted residents for a history of falls and to then estimate current fall risk based on an algorithm of conditions believed to predict falls. These fall risk factors are then noted and utilized in a plan of care. A second approach is to match specific interventions to a set of risk factors for those with a history of falling, as well as those who have never fallen. Examples of specific interventions for identifiable risk factors include lower extremity exercises for persons with lower extremity weakness, or low rise beds for persons with a history of falls from bed. Yet a third approach is to implement multiple strategies simultaneously for persons deemed at high risk, e.g., medication modification, exercise and hip protectors.

Each of these clinical approaches has legitimacy for baseline fall assessment, prevention and management. What becomes problematic, however, is use of the standard epidemiological approaches for a post fall assessment. Unfortunately, the customary incident report completed at the time of a fall is based largely on risk factor determination, location and associated injury, and environmental circumstances related to the fall. In general, incident reports vary greatly among facilities and do not provide for a comprehensive post-fall assessment. The Minimum Data Set (MDS) and Resident Assessment Protocol (RAP)²¹ are also useful tools to identify fall triggers and to follow a predetermined resident assessment protocol, but do not provide adequate guidance for post-fall assessment.

Fall triggers identified on the RAP reflect a limited range of potential underlying fall etiologies. The RAP questions consist of: 1) fall within 30 days, 2) fall between 31- to 180 days, 3) wandering, 4) dizziness, 5) use of trunk restraint or 6) anti-anxiety or anti-depressant medications. The presumed purpose of these specific questions are to identify temporal aspects of a fall, to identify if the fall is related to wandering behavior, use of physical restraints or certain medications, or to identify if the fall is a result of a specific complaint. These six parameters are generally associated with falls either through case report or through clinical research. In fact, much of the data obtained from the MDS, RAP, or from the incident report itself, rest on conditions linked to fall risk.

Tinetti's²² landmark study on fall risk factors leading to serious injury (e.g., gait or balance impairment, cognitive decline, presence of certain medications), and other research correlating risk factors to a higher incidence of falling^{23,24} provide the foundation for the MDS and RAP reporting mechanisms. Tinetti's research is largely a retrospective process, and therefore lacks the necessary specificity to determine fall etiology. Additionally, the underlying etiology of falls is not limited to the six parameters on the MDS/RAP. In fact, there are many etiologies for falls that are not identified on the MDS, RAP, or incident reports.

Recommendations for post-fall assessment have been proposed both by the US Preventative Services Task Force, Guide to Clinical Preventive Services, the American and British Geriatrics Societies and the American Academy of Orthopedic Surgeons Panel on Falls Prevention²³, the American Medical Directors Association²⁵ and by Rubenstein²⁶ in their specification of the essential elements of a post-fall evaluation (see Table 6). None of these recommendations, however, have been converted into a

standard methodology for post-fall assessment. An examination of these recommendations demonstrated five areas with a subset of content, if a comprehensive post-fall assessment is to be carried out.

Purpose of the study

Given the lack of standardization or codification for post -fall assessment in nursing homes, the purpose of this study was to survey how such assessments are currently handled in New Jersey nursing homes. New Jersey was selected because its Department of Health and Senior Service (DHSS) ²⁷ is committed to a special initiative on fall reduction in nursing homes and state officials were willing to provide access to nursing homes in the state.

Methods

A letter on DHSS letterhead, signed by the Director of Long-Term Care Surveys (LTCS), was sent to the Nursing Home Administrator or CEO of all 379 long-term care facilities, with a cumulative census of over 40,000 residents. The homes included a broad range of profit and not-for profit homes, and a resident and staff mix similar to many nursing homes throughout the United States (see Table 2 ²⁷). Most facilities provided long-term care (96.8%) and about one-third had capacity for 101-150 beds (33.6%, see Table 2). The request from the Director of LTCS was for a copy of any post-fall evaluation/assessment tools used by the facility. Surveys were returned to the Office of Long-Term Care Survey Systems and then sent on to the investigators for tabulation and analysis. This consisted of an analysis of the types of post-fall assessment tools used by the participating homes.

Results

Of 379 facilities solicited, 149 responded, for a rate of nearly 40 percent.

From these 149 homes, a wide array of fall risk assessment tools, fall prevention programs, policies and procedures for fall management, copies of incident report forms and admission assessment forms were received. These materials were coded as to one of the following categories: 1) fall risk assessment short form; 2) fall risk assessment long form; 3) fall prevention protocol including policies and procedures for falls, specific fall programs, post-fall assessments, incident report forms and/or fall risk assessment tools; 4) incident report forms; and 5) other.

Table 3 presents frequencies for the types of inventories utilized by the sample of nursing homes. More than one-third (38.9%; n= 58) used fall risk assessment short forms (as seen in Table 4²⁸) on admission, quarterly, and following a fall. Another 23% (n= 34) used longer forms of fall risk assessment that included more diseases and conditions associated with fall risk.

The remaining one-third of facilities used a combination of fall risk assessment, post-fall assessment, policies and procedures and specific fall related protocols or fall prevention programs as part of the overall assessment and response to falls (36.2% n= 54; see Table 5). Within this group, only 37% (n=20) included a specific post- fall assessment evaluation. Other tools included incident reports (n=2) and a checklist for mobility and safety (0.9%; n=1).

While some facilities developed fall prevention programs or protocols to be implemented following a post-fall assessment, most did not; instead, fall risk assessment tools were used most for post-fall assessment. A few facilities used a post- fall assessment inventory (n=20; 13.4%), but most relied on risk assessment tools for evaluation following a fall (n=95; 63.7%).

Subset of Surveys

In the group of 20 facilities using a specific post-fall assessment, the inventories were further analyzed for content recommended by researchers and national and professional organizations. These inventories had titles like “post- fall assessment,” “fall evaluation,” “fall analysis,” and/or “fall investigation.” Incident report forms and incident investigations were not included in this subset. The recommended content for post-fall assessment spans five areas: history of the falling event, including environmental issues; physical examination, functional assessment, laboratory tests, and other diagnostics^{23,25,26} A summary of data are given in Table 6.

Overall, the data from this analysis indicated that many of the recommended items within the five categories for post-fall assessment were not included. Of note, environment was included among all tools reviewed (100 %). Parameters less frequently included were: time of the fall (n=14; 70%), mobility (n=14; 70%), footwear (n=14; 70%), location of the fall (n=12; 60%), use of diuretics (n=11; 55%), mental status (n=9; 45%), and ambulation status, e.g., “walking” (n=9; 45%). Very few, and sometimes none, of the post-fall assessments included the hallmark symptoms of treatable falls, such as palpitations, vertigo or syncope at the time of the fall.

Summary of results from within each recommended category

Fall circumstance

Information about the fall circumstance is important to decipher potentially preventable falls (see Table 6). In this study, environmental conditions were always identified, but other relevant information about fall circumstance were omitted. These included activity at the time of the fall and location and time, all which could be associated with underlying etiologies. Time of

the fall may be related to physiological events, such as post-prandial hypotension, or a normal age-related change. None of the inventories asked about trips or slips on the floor, which frequently occur as the result of environmental hazards. Parkinson's disease or parkinsonism, peripheral neuropathy of the lower extremities and/or significant dependent edema are conditions leading to trips and/or falls. The presence of an antecedent cough or sneeze, suggesting an upper respiratory infection or a pulmonary or cardiovascular problem, as the cause of the fall, was rarely included in the inventories. A cough can be associated with congestive heart failure, as well as pneumonia. Thus, a post-fall assessment goes well beyond traditional questions about the environment. Overall, of the 11 recommended questions about fall circumstance, environmental hazards were the only included parameter included on all 20 tools.

Associated symptoms at the time of the fall

Ten key symptoms are useful in ascertaining the underlying etiology of a fall. Nevertheless these symptoms rarely appeared on inventories reviewed for this study. Vertigo, tongue biting, (associated with seizure activity) or behavioral problems were not included on any of the inventories. Lightheadedness (n=3; 15%); fainting or syncope (n=3; 15%), and confusion or incontinence (n=3; 15%) appeared most often.

Co-morbid conditions

Both the American Medical Directors Association²⁵ and the American Geriatrics Society²³ recommend review of any acute or sub-acute medical illnesses as part of a post-fall assessment. Again analysis of the inventories demonstrated that co-morbid diseases were infrequently noted (n=3;15%; see Table 6a) including cardiac disease (n=4; 20%), seizure disorder (n=3;15%), pacemaker (n=3; 15%), dementia (n=3; 15%) previous stroke (n=2; 10%), Parkinson's disease (n=2;10%) and osteoporosis (n=1; 5%). Pacemakers may be associated

with arrhythmias or changes in heart rate indicative of a malfunctioning pacemaker. Gait changes and associated falls are common with dementia. Osteoporotic individuals may suffer a fracture of the bone spontaneously or from minor trauma that precipitates a fall.

Medication review

It is essential to review drugs for hypotensive or psychoactive effects, which may precipitate falling (see Table 6a). Most inventories did include the use of diuretics (n=11; 55%) and anti-hypertensives. Less frequently included were psychotropics (n=8;40%), antidepressants (n=7; 35%), anxiolytics (n=7; 35%) or hypnotics (n=7;35%).

Physical examination

The physical examination is key to determination of the underlying etiology, as well as the presence of any injury. Less than half of the inventories included assessment for postural hypotension (n=6; 30%), mental status (n=9;45%), or joint trauma (n=5;25%). Head injury appeared on only one post-fall assessment tool. Fever, nystagmus, cardiac arrhythmia, focal neurological deficits, cerebellar function, muscle weakness, limitation in motion, podiatric problems, and deformities or instability were not included, despite their usefulness in determining fall etiology.

Functional assessment

Functional assessment is a broad category usually assessed by direct observation or questioning, and includes walking, sitting, and standing transferring, as well as the ability to provide personal care (see Table 6c). Changes in mobility are an early marker of frequent falling²⁹. In this sample of post-fall assessment inventories, the most frequently included categories of functional assessment were mobility and footwear (n=14;70%), ambulation status, such as walking (n=13;65%), followed by the use of a

wheelchair or recliner (n=10; 50%). Rising from a chair, turning and sitting down, bathing, dressing and continence were not included on any of these inventories. A few tools included gait and balance (n=6; 30%), and ability to transfer (n=2;10%). Restraint use and the status of side-rails were also included on many tools (n=8; 40%).

Laboratory and diagnostics

Falls are associated with specific deficiencies in circulating blood volume, blood glucose or electrolytes. A low glucose, hemoglobin and hematocrit, serum sodium or potassium causes fatigue, general weakness, and even lower extremity weakness which, with exertion such as walking, could cause a fall. Arrhythmias are common causes of falls, and an electrocardiogram or a Holter monitor may be warranted following a fall. None of the inventories dealt with laboratory or diagnostic tests (see Table 6c) possibly due to challenges associated with obtaining recent laboratory or diagnostic results from the health care record, or ordering such tests to be done.

Conclusions

Based on this analysis of post-fall assessment in 149 New Jersey nursing homes, core areas recommended in current guidelines for post-fall assessment are commonly missing. Furthermore, approaches to post-fall assessment are inconsistent, varying from fall risk assessment procedure, incident reports, or fall protocols to partial post-fall assessment guidelines. At best, data collected for the post-fall assessment are skeletal and clearly inconsistent to determine possible underlying etiologies for the fall.

Fall risk assessment tools are useful, especially at the time of admission or as part of a baseline history and physical examination. Fall risk has little to do with fall etiology. Without an adequate post fall assessment, it is unlikely that etiology will be uncovered or that subsequent

interventions will be entirely effective. Among the available post-fall assessment tools sampled in this study, critical data on fall circumstance, associated symptoms at the time of the fall, physical examination findings, functional assessment and laboratory/diagnostics were often missing.

Unfortunately, fall risk determination and post-fall assessment continue to be treated as one and the same. While risks for falling and actual causes for falling share similarities, the post-fall assessment is designed to determine specifically fall etiology. At present no uniform, empirically tested and validated post-fall assessment tool exists. Thus, the current approach to post-fall assessment usually focuses on risk rather than underlying etiology. Frequently care plans and interventions may have little to do with the actual causes of the fall.

A validated, standardized and practical post-fall assessment, which includes the relevant history and physical examination, functional assessment, and appropriate laboratory and diagnostic information is urgently needed. Until then, falls arising from delirium, pain, dementia, seizures or cardiac arrhythmias may go undetected, leading to less effective management of falls in the nursing home.

In the absence of such a post-fall assessment, any assessment following a fall should expand the history to include associated symptoms at the time of the fall, such as weakness or tiredness, pain, sudden dizziness or unilateral upper or lower extremity weakness. The health care record should also be reviewed for significant laboratory abnormalities in hemoglobin, blood glucose, and pulse oximetry. Many falls occur as a result of anemia, which is often associated with congestive heart failure. A glucose level of less than 60mg/dl, can lead to sudden weakness and fainting, often without outright

syncope. Pulse oximetry gives an indication of overall oxygenation, which is important given that many chronic conditions result in hypoxia.

Post-fall assessment inventories need to address the six core areas of fall circumstance, associated symptoms, functional assessment, past medical history, physical examination, laboratory and diagnostics if clinicians are to become more skilled in identifying the underlying etiology of an actual fall and determining an appropriate plan of care. Without such comprehensive assessment, misdiagnosis and mismanagement may occur. The rate of recurrent falls is likely to be lowered through more carefully prescribed post-fall assessments, determination of likely etiology, and appropriately tailored individualized care plans.

Table 1 Fall Intervention Studies (1990-2000) ³⁻¹⁹.

Category	Author	Year	Setting	Study design	Type of intervention	Percent fall reduction
Assistive device	Dean	1993	Community	Descriptive	Cane use/measurements	0
Behavioral/ Educational	Tennstedt	1998	Community	RCT	Group intervention to	0
Environmental Modifications	Cumming	1999	Community	RCT	Home visits	36%
Environmental Modifications	Plautz	1996	Community	Pre/posttest	Counseling and education on risk factors, medications and home hazards	59%
Environment Modifications	Thompson	1996	Community	Pre/posttest	Interview and home safety inspection; installation of environmental modifications	58%
Exercise	McMurdo	1994	LTC	RCT	Risk factor modification & seated balance exercises	0
Exercise	Mulrow	1994	LTC	RCT	Physical rehabilitation	0
Exercise	Lord	1995	Community	RCT	Uniform exercise program	0
Exercise	Wolf	1996	Community	RCT	Tai Chi classes	47.5%
Exercise	Campbell	1999	Community	RCT	Exercise at home	significant

Table 1 continued. Intervention Studies on Falls (1999-2000) ³⁻¹⁹.

<u>Category</u>	<u>Author</u>	<u>Year</u>	<u>Setting</u>	<u>Study design</u>	<u>Type of intervention</u>	<u>% reduction in fall vs. control</u>
Multifactorial	Rubenstein	1990	LTC	RCT	Comprehensive assessment	9%
Multifactorial	Hornbrook	1994	Community	RCT	Home visits/recommendation	7%
Multifactorial	Gallagher	1996	Community	RCT	Risk assessment and education	30%
Multifactorial	Tinetti	1996	Community	RCT	Targeted intervention with risk factor modification	39%
Multifactorial	Ray	1997	LTC	RCT	Individual assessment with safety recommendations	19%
Multifactorial	Campbell	1999	Community	RCT	Home visits; medication withdrawal and exercise	66%
Restraints	Evans	1997	LTC	RCT	Restraint education plus consultation	41.5%/42.5% (3m) 32.2%/32.8% (6m)

Table 2 Characteristics of New Jersey Nursing Homes (n=379) ²⁷

<u>Characteristic</u>	<u>Frequency</u>
Size of facility by beds:	
<50	8%
50-100	13.9%
101-150	33.6%
151-200	24.1%
>200	20.4%
Ownership	
Corporation	37.8%
Government	5.0%
Hospital-based	6.1%
Non-Profit	27.2%
Other	23.9%
Case Type	
Long-term Care	96.8%
Sub-acute Care	3.2%

Table 3. Categories of Post-Fall Assessment Inventories (N=149 Nursing Homes)

<u>Category</u>	<u>No. responses</u>	<u>Percentage</u>
1. Fall risk assessment- 8 parameters(short form)	58	38.9%
2. Fall risk assessment- > 8 parameters (long form)	34	22.8%
3. Fall prevention programs/multiple assessments	54	36.2%
4. Incident report	2	1.3%
5. Other	1	0.6%

Table 4- Parameters assessed on short form fall risk assessment inventories²⁸

Description of Parameter

1. Level of consciousness/mental status
2. History of falls
3. Ambulation/elimination status
4. Vision status
5. Gait/balance
6. Systolic blood pressure
7. Medications
8. Predisposing diseases (hypotension, vertigo, cerebrovascular accident, Parkinson's disease, loss of limb, seizure, arthritis, osteoporosis and fracture)

Table 5- Fall Prevention Programs/Multiple Assessments (n=54)

Components	No. responses	Percentage of Programs (n=54)
1. Fall potential/initial assessment	15	28%
2. Fall risk assessment inventory	34	62.9%
3. Post-fall assessment/evaluation inventory	20	37%
4. Accident/incident report/investigation	20	37%
5. Facility wide incident tracking form	13	24%
6. Fall monitoring sheet	2	3.7%
7. Policy & procedure- assessment/management	18	33.3%
8. Fall related plan of care- RAP or other	3	5.5%
9. Fall program/intervention/safety committee	34	62.9%

Table 6- Comparison of post-fall assessment tools (N=20) with the recommendations for a post-fall assessment

Parameter assessed _____ No. responses/(%)

History taking:

Fall circumstances

Environmental hazards*	20 (100%)
Location of fall**	12 (60%)
Other- time of fall+	14 (70%)
Antecedent urination or defecation*	10 (50%)
Other activity *	10 (50%)
Previous fall **	8 (40%)
Recent meal*	7 (35%)
Head turning- looking up/sideways* (reaching+)	6 (30%)
Postural change- sudden rise from sitting/lying*	4 (20%)
Trip or slip*	1 (5%)
Antecedent cough/sneeze*	0
Length of time on ground *	0

Other- increased agitation+ (1); pain+ (2)

Associated symptoms at the time of the fall

Lightheadedness/giddiness*	3 (15%)
Fainting/black out/loss of consciousness*	3 (15%)
Dyspnea*	3 (15%)
Confusion*	3 (15%)
Incontinence*	3 (15%)
Chest pain*	2 (10%)
Other (hunger/thirst)+	2 (10%)
Palpitations*	1(5%)
Weakness*	1(5%)
Symptomatic weakness/unilateral weakness+	1 (5%)
Tongue biting*	0
Vertigo*	0

Other: doesn't recall+ (1); behavior change+ (1); legs gave out+ (1); lost balance + (1); visual change+ (1); slurred speech + (1); aura+ (1)

Other: residents explanation+ (7)

Other: behaviors- wandering+ (2); decline in cognition+ (1)

Table 6a- Comparison of post-fall assessment tools (N=20) versus the recommendations
For a post-fall assessment

<u>Parameter assessed</u>	<u>No. responses/(%)</u>
<u>Relevant co-morbid conditions:</u>	
Cardiac disease*	4 (20%)
Seizure disorder*	3 (15%)
Acute/subacute medical illness**; ***	3 (15%)
Previous stroke*	2 (10%)
Parkinson's disease*	2 (10%)
Osteoporosis*	1 (5%)
Other: Syncope+ (2); Pacemaker+ (3); Infection+ (3); Hypotension+ (3); Dementia+ (3)	
<u>Medication review***: note drugs with hypotensive or psychoactive effects:</u>	
Diuretics,*	11 (55%)
Psychotropics*	8 (40%)
Antidepressants*,	7 (35%)
Anxiolytics*,	7 (35%)
Hypnotics*,	5 (25%)
Anti-hypertensives*,	4 (20%)
Analgesics,*	1 (5%)
Autonomic blockers*,	0
Other- Cardiovascular medications+ (6)	
Medication change+ (10); Hypoglycemics+ (3)	

Table 6b- Comparison of post-fall assessment tools (N=20) versus the recommendations
For a post-fall assessment

<u>Parameter assessed</u>	<u>No. responses/(%)</u>
<u>Physical examination:</u>	
Neurological signs: mental status***,	9 (45%)
BP changes*	6 (30%)
Joint trauma ** (injury)	5 (25%)
Vital signs- not postural+	4 (20%)
Vital signs: postural pulse*; **	4 (20%)
Head and neck: visual impairment*; ***	3 (15%)
Hearing impairment	2 (10%)
Head injury **	1 (5%)
Motion-induced imbalance	1 (5%)
Nystagmus*	0
Fever or hypothermia*	0
Bruit	0
Heart: arrhythmia* or	0
Valve dysfunction*	0
Focal deficits, (reflexes) ***	0
Peripheral neuropathy,	0
Proprioception***	0
Cerebellar function***	0
Muscle weakness; ***,	0
Instability,	0
Rigidity or	0
Tremor*	0
Musculoskeletal signs: arthritic changes,	0
Motion limitations,	0
Podiatric problems,	0
Deformities*	0
Other: sensory loss+ (2); injury+ (4); sit/standing balance+ (1)	

Table 6c- Comparison of post-fall assessment tools (N=20) versus the recommendations for a post-fall assessment

<u>Parameter assessed</u>	<u>No. responses/(%)</u>
<u>Functional assessment- observe or inquire about:</u>	
Mobility: use of assistive device+ (cane, walker, crutch, merry walker)	14 (70%)
Other: footwear+	14 (70%)
(Device: wheel chair+, recliner+)	10 (50%)
Other: ambulation status+ (walking)	9 (45%)
Restraint use*	8 (40%)
Functional gait/balance*	6 (30%)
Walking*,	4 (20%)
Transferring,	2 (10%)
Observe rising from chair*,	0
Turning*,	0
Sitting down *	0
Extent of ambulation	
Bathing,	0
Dressing and	0
Continence*	0
Personal assistance,	1
Other: decision-making capacity+ (1); safety awareness (1); safety devices+ (1); safety belt+ (1); lap buddy+ (1)	
Other: status of side-rails +(3)	
<u>Laboratory</u>	
CBC *	0
Electrolytes- sodium, potassium *	0
Glucose *	0
Creatinine levels*	0
<u>Diagnostic</u>	
Ekg*	0
Holter monitor*	0

References: *²⁷ **²⁶ ***²³

+ parameters extrapolated from sample survey

References

1. Cutson, T.M. (1994). Falls in the elderly. *American Family Physician* 49:1, 149-56.
2. Healthy New Jersey 2010 (2001). *US Department of Health and Human Services*, Volume 1.
3. Dean, E., Ross, J. (1993). Relationships among cane fitting, function and falls. *Physical Therapy* 73: 494-504.
4. Tennstedt, S., Howland, J., Lachman, M., Peterson, E., Kasten, L., Jette, A. (1998). A randomized controlled trial of a group intervention to reduce fear of falling and associated activity restriction in older adults. *Journal of Gerontology B Psychological Sci Soc Sci* 53 (6): P384-392 .
5. Cumming, R.G., Thomas, M., Szonyi, G., O'Neill, E., Westbury, C., Frampton, G. (1999). Home visits by an occupational therapist for assessment and modification of environmental hazards: a randomized trial of falls prevention. *Journal of the American Geriatrics Society* 47(12): 1397-402.
6. Plautz, B., Beck, D.E., Solmar, C., Radetsky, M. (1996). Modifying the environment: a community based injury-reduction program for elderly residents. *American Journal of Preventative Medicine* 12 (4 Suppl); 33-38.
7. Thompson, P.G. (1996). Preventing falls in the elderly at home: a community based program. *Med J Aust* 164: 530-32.
8. McMurdo, M.E.T., Millar, A.M., Daly, F. (2000). A randomized control trial of Fall prevention strategies in old peoples' homes. *Gerontology* 46: 83-87.
9. Mulrow, C.D., Gerety, M.B., Kanten, D., Cornell, J.E., DeNino, L.A., Chiodo, L., Aguilar, C., O'Neil, M.B., Rosenberg, J., and Solis, R.M. (1994). A randomized trial of physical rehabilitation for very frail nursing home residents. *JAMA* 271: 7, 519-524.
10. Lord, S.R., Ward, J.A., Williams, P., Strudwick, M. (1995). The effect of a 12-month exercise trail on balance, strength, and falls in older women: a randomized controlled trial. *Journal of the American Geriatrics Society* 43: 1198-206.
11. Wolf, S.L., Barnhart, H.X., Kutner, N.G., McNeely, E., Coughler, C., Xu, T. (1996). Reducing frailty and falls in older persons: an investigation of Tai Chi and computerized balance training. *Journal of the American Geriatrics Society* 44 (5): 489-497.
12. Campbell, A.J., Robertson, M.C., Gardner, M.M., Norton, R.N., Buchner, D.M. (1999). Psychotropic medication withdrawal and a home-based exercise program to prevent falls: a randomized controlled trail. *Journal of the American Geriatrics Society* 47 (7): 850-53.
13. Rubenstein, L.Z., Robbins, A.S., Josephson, K.R., Schulman, B.L., et al. (1990). The value of assessing falls in an elderly population: a randomized clinical trial. *Annals of Internal Medicine* 113: 308-316.
14. Hornbrook, M.C., Stevens, V.J., Wingfield, D.J., Hollis, J.F., et.al. (1994). Preventing falls among community dwelling older persons: results of a randomized controlled trial. *Gerontologist* 34 (1): 16-23.

15. Gallagher, EM, Brunt, H. (1996). Head over heels: impact of a health promotion program to reduce falls in the elderly. *Canadian Journal on Aging* 15 (1): 89-96.
16. Tinetti, ME., McAvay, G., Claus E. (1996). Does multiple risk factor reduction explain the reduction of fall rate in the Yale FISCIT trials? *American Journal of Epidemiology* 144: 389-399.
17. Ray, WA, Taylor, J.A., Meador, K.G., Thapa, P.B., et.al. (1997). Evaluation of a falls consultation service. *JAMA* 278:7, 557-562.
18. Campbell, AJ., Robertson, MC., Gardner, MM., Norton, RN., et al. (1999). Psychotropic medication withdrawal and a home-based exercise program to prevent falls: a randomized controlled trial. *Journal of the American Geriatrics Society* 47 (7): 850-853.
19. Evans, L.K., Strumpf, N.E., Allan-Taylor, S.L. (1997). A clinical trial to reduce restraints in nursing homes. *Journal of the American Geriatrics Society* 45: 675-681.
20. Kron, M., Loy, S., Sturm, E., Nikolaus, Tb., et al. (2003). Risk indicators for falls in institutionalized frail elderly. *American Journal of Epidemiology* 158:645-653.
21. Resident Assessment Protocols. (2002-revised). CMS RAI Version 2.0 Manual, Appendix C., 1-4, 59-62.
22. Tinetti, ME. (1987). Factors associated with serious injury during falls by ambulatory nursing home residents. *Journal of the American Geriatrics Society* 35: 644-8.
23. American Geriatrics Society, British Geriatrics Society and the American Academy of Orthopedic Surgeons Panel on Fall Prevention (2001). Guidelines For the prevention of falls in older persons. *Journal of the American Geriatrics Society* 49: 664-672.
24. Ray, WA., Griffin, MR, Schaffner, W. (1987). Psychotropic drug use and the risk of hip fracture. *New England Journal of Medicine* 316: 363-369.
25. Falls and Fall Risk. Clinical Practice Guidelines (1998). *American Medical Director Association*, 1-11.
26. Rubenstein, LZ, Josephson, KR, Robbins, AS. (1994). Falls in the nursing home. *Annals Internal Medicine* 121: 442-451.
27. Selecting a Long-Term Care Setting: A Guide for NJ Consumers. New Jersey Department of Health and Senior Services, Trenton, NJ., 2002.
28. Fall risk assessment. Briggs Corporation, CFS 6-17HH.
29. Gray-Miceli, D., Waxman, H., Cavalieri, T., Lage, S. (1994). Prodromal falls among older nursing home residents. *Applied Nursing Research* 7:1, 18-27.

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