<table>
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<th>Introduction Information</th>
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<tr>
<td>Tinetti ME, Speechley M, Ginter SF. Risk factors for falls among elderly persons living in the community. <em>N Engl J Med</em>. 1988; 319:1701–1707</td>
<td>A fall is defined as an event which results in a person coming to rest unintentionally on the ground or other lower level, not as the result of a major intrinsic event (such as stroke) or overwhelming hazard.</td>
<td>In studies falls are required to be unintentional, and requires contact with the ground or an object. Falls caused by syncope or intrinsic factor are also often excluded.</td>
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<tr>
<td>Nevitt MC, Cummings SR, Hudes ES. Risk factors for injurious falls: a prospective study. <em>J Gerontology</em> 1991; 46: 164-170.</td>
<td>Fall definition: involves a person falling all the way to the floor or ground, or falling and hitting an object like a chair of stair.</td>
<td></td>
</tr>
<tr>
<td>Guilbert P, Gautier A. <em>Barometre Sante</em>’2005: Premiers Re’sultats. Paris, France: Institut National de Pre’vention et d’E’ducation Pour la Sante’; 2006.</td>
<td>24% of the population between the ages of 65 and 75 report one or more falls in a year</td>
<td>Literature reveals that age is not the cause but it is illnesses and conditions that occur in the elderly that cause the falls. Individuals ≥ 80 years of age are the most prone to falls which are probably due to age related illness.</td>
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<tr>
<td>Henrich, A., Nyhuis, Kippenbrock, and Soja, M.E., (1995) Hospital Falls: Development of a predictive model for clinical practice. <em>Applied Nursing Research</em>, 8, 129-139</td>
<td>Even without a physical cause for falling, the fear of falling can produce increased deconditioning, lead to other morbidities, disabilities, and even death.</td>
<td>Individuals who are fearful of falling are more likely to become more sedentary and have increased levels of deconditioning. For this reason exercise programs are vital in maintaining and improving muscular strength, balance, and coordination.</td>
</tr>
<tr>
<td>Oliver, D., Britton, M., Seed, P., Martin, F.C., &amp; Hopper, A.H. (1997). Development and evaluation of evidence based risk assessment tool (STRATIFY) to predict which elderly inpatients will: case-control and cohort studies [papers]. <em>British Medical Journal</em>, 315(7115), 1049-1053.</td>
<td>Falls are common among elderly hospital inpatients. Consequences of falls may include fracture, fear of falling, anxiety and depression, and loss of confidence, all of which lead to greater disability. Falls by inpatients are associated with increased duration of stay in hospital and a greater chance of unplanned readmission or of discharge to residential or nursing home care.</td>
<td>Elderly patients who experience falls not only experience physical injuries but also psychological disabilities that cause them to have reduced mobility. Developing an increase in strength and coordination will decrease fear, depression, and anxiety. This will assist a patient in increasing mobility and maintaining independence.</td>
</tr>
<tr>
<td>Ermanel C, The’lot B, Jougla E, Pavillon G. Fatal home and leisure accidents in metropolitan France, 2000–2004. <em>Bull Epide’miol Hebd.</em> 2007;37–38:318–322.</td>
<td>Statistics have shown that more than three quarters of deaths from falls occurred in people aged 75 years and older.</td>
<td>Most deaths result from complications after fractures incurred by falls i.e. hip fractures. These individuals are more likely to become bedfast and develop pneumonia.</td>
</tr>
<tr>
<td>Rapport LJ, Webster JS, Flemming KL, Lindberg JW, Godlewski MC, Brees JE, et al. Predictors of falls among right-hemisphere stroke patients in the rehabilitation setting. <em>Arch Phys Med Rehabil</em> 1993;74:621-6.</td>
<td>In stroke rehabilitation units, falls have been reported in up to 47% of patients.</td>
<td>This increase in percentage of falls is primarily due to paralysis, loss of strength and coordination caused by the stroke. This loss typically brings on depression and loss of confidence which makes rehabilitation difficult.</td>
</tr>
<tr>
<td>Grenier-Sennelier C, Lombard I, Jeny-Loeper C, Maillet-Gouret M, Minvielle E. Designing adverse event prevention programs using quality management methods: the case of falls in hospital. <em>Int J Qual Health Care</em> 2002;14:419-26.</td>
<td>Patients who fall incur physical injuries (up to 70% of falls result in injuries), 10% result in fractures, 4 of 5 experience psychological effects, and have longer lengths of hospital stay. Inpatient falls therefore result in substantial morbidity and additional healthcare costs and are a viable target for interventions.</td>
<td>Reducing the occurrence of falls will reduce morbidity and healthcare costs. There is a need to develop strategies that will assist this population in the reduction of falls.</td>
</tr>
<tr>
<td>Blake AJ, Morgan K, Bendall MJ, Dallosso H, Ebrahim SB, Arie TH, et al. Falls by elderly people at home: prevalence and associated factors. <em>Age Ageing</em> 1988;17: 365-72.</td>
<td>Of 1042 individuals aged 65 years and over who were successfully interviewed in a community survey of health and physical activity, 35% (n=356) reported one or more falls in the preceding year. Although the overall ratio of female fallers to male fallers was 2.7:1, this ratio approached unity with advancing age.</td>
<td>This is one of the studies that found a difference in gender and the percentage of falls. It also found that as age was increased the number of falls became similar between male and female.</td>
</tr>
<tr>
<td>O’Loughlin JL, Robitaille Y, Boivin JF, Suissa S. Incidence of and risk factors for falls and injurious falls among the community-dwelling elderly. <em>Am J Epidemiol</em> 1993;137: 342-54.</td>
<td>Interview data was collected on 409 individuals over 65 to determine fall occurrence. Twenty-nine percent of the subjects fell; 17.6% fell once, and 11.5% fell two or more times.</td>
<td>The numbers in this study were fairly consistent with other similar studies. The numbers in the studies ranged from 24% to 35% of individuals over 65 who had fallen at least once.</td>
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</table>
As we age the loss of mobility is one of the greatest factors contributing falls and injuries sustained by falls. The literature suggests that over half of patients in nursing homes and long term care facilities will suffer a fall or multiple falls. As the numbers of falls increase so will mortality and morbidity. Findings have shown that approximately 30% of adults over the age of 65 will suffer a fall and about half of those will experience a subsequent fall.

Falls rob older individuals of quality of life by reducing mobility and independence. This occurs because of physical injury as well as psychological factors that preclude an individual from reaching their existing potential. These individuals develop anxiety from the fear of subsequent falls. This fear is paralyzing and leads to decreased activity and isolation. The decreased activity will then lead to physical ailments such as muscle atrophy, decreased strength and decreased range of motion. Falling and the fear of falling will lead to a reduction in the ability to perform the activities for daily living which in turn will lead to a loss of independence.

Physical injury sustained from a fall is also a factor that will reduce the quality of life and limit the performance of ADL’s. Fractures and head injuries are some of the more serious injuries that victims of falls. In the case of hip fractures the majority of patients will have restricted movement and require a higher level of care or die. Victims who sustain such injuries from falls are more likely to experience longer hospital stays or to be transferred to long term care facilities. Therefore it is imperative that strategies be developed to reduce the number of falls and reduce the secondary problems that occur because of the fall.

Individuals who have experienced a stroke or a lengthy illness that requires a long hospital stay are at increased risk for falls. As age increases the possibility of fall also increases. This is likely not due to age but is more likely attributed to illness or other issues with which the older adult might be dealing. As age increases however, it is more likely that falls or complications from falls become fatal.
Fall Risk Assessment Tools
The following tests are utilized to assess the risk of patient fall:

Timed Up and Go
A simple office based test used to identify persons at risk of falling due to balance or gait problems. Individuals should be instructed to rise from a straight backed chair without using their arms. Observe this person walking 10 feet, turning, and returning to their chair. This event should be timed. It has been found that adults without balance problems can perform this test in under 10 seconds. Alternatively, samples of adults with mobility difficulty or ADL dependence require more than 30 seconds.


Shumway-Cook, A., Brauer, S., & Woollacott, M. Predicting the probability for falls in community-dwelling older adults using the timed up & go test., Physical Therapy, 2000, 80 (9): 896-903.

Berg Balance Scale (BBS)
This assessment tool measures the ability of an individual to maintain balance while performing Activities of Daily Living related tasks. Components include balance, lower and upper extremity strength. 14-item scale designed to measure balance of an adult in a clinical setting. It requires 15 to 20 minutes to administer. Training is required to administer this test.


Dynamic Gait Index

This test assesses the likelihood of falling in adults. It is used to evaluate the ability of an individual to modify gait in response to changing task demands. It is designed to test eight facets of gait and requires 15 minutes to administer. Clinician training is required to administer this test.


Tinetti Performance Oriented Mobility Assessment (POMA)

Easily administered task-oriented test that measures an adult’s gait and balance abilities. Rates the ability of an individual to maintain balance while performing Activities of Daily Living related tasks. Components include balance, lower and upper extremity strength. Requires 10 to 15 minutes to administer. Training is required to administer this test.


Activities-specific Balance Confidence (ABC) Scale

The ABC is a 16-item scale. Adults are asked to rate their confidence that they will lose their balance or become unsteady in the course of daily activities. The ABC can be self-administered or administered via personal or telephone interview. Regardless of method of administration, each respondent should be queried concerning their understanding of instructions, and probed regarding difficulty answering specific items.

Falls Efficacy Scale (FES)
FES is a 10-item rating scale to assess confidence in performing daily activities without falling.


Depression
Developed as a basic screening measure for depression in adults.


Morse Fall Scale
National Center for Patient Safety recommended risk assessment tool for inpatients. The Morse Fall Scale (MFS) is used widely in acute care settings, both in hospital and long-term care inpatient settings. The MFS requires systematic, reliable assessment of a client’s fall risk factors upon admission, after a fall, with a change in status, and at discharge or transfer to a new setting. It is a reliable and valid measure of fall risk.


Hendrich Fall Risk Assessment
National Center for Patient Safety recommended risk assessment tool for inpatients. Used in some long-term care settings. This assessment is not as researched as the Morse Fall Risk Assessment.


St. Thomas Risk Assessment Tool (STRATIFY)
Well supported tool that identifies risk factors and creates a risk profile score. This test is used to identify clinical fall risk factors in the elderly and to predict the potential for falling.


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<th>FALL/RISK ASSESSMENT TOOLS</th>
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<td>From <em>Applied Nursing Research</em>, Vol. 16, No. 1 (February), 2003: pp 9-21. Validation of the Hendrich II Fall Risk Model: A Large Concurrent Case/Control Study of Hospitalized Patients by Ann L. Hendrich, Patricia S. Bender and Allen Nyhuis</td>
<td>This tool exhibits brevity and accuracy identifying correctly 74.9% of high risk patients. It also predicted 73.9% of patients that were not at high risk of falling. It considers a limited number of factors.</td>
<td>Combines functional and non-functional information and awards a point system. &gt; 5 points showed a person to be at high risk of falls. The following areas were considered: Confusion 4 Symptomatic Depression 2 Altered Elimination 1 Dizziness/Vertigo 1 Gender (male) 1 Antiepileptics 2 Benzodiazepines 1 (drugs were considered because of their side effects) Get up and go Test was the functional test that was awarded 0-4 points (0=single movement to stand; 4=unable to rise without assistance. This tool is accurate and easy to administer.</td>
</tr>
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</table>

VanSwearingen JM, Paschal KA, Bonino P, Yang JF The modified Gait Abnormality Rating Scale for recognizing the risk of recurrent falls in community-dwelling elderly adults. Phys Ther. 1996;76(9):994–1000. | The GARS was designed to provide a simple clinical assessment of gait abnormalities and for implementation in a nursing home setting where there are time constraints, limited instrumentation, and minimal financial resources available for assessment. The GARS is supposed to include variables that are intended to provide a description of gait abnormalities. | This tool considers only gait abnormalities as a function of falls. It does not look at factors that may be the cause of gait abnormalities such as disorientation, medications, or infection. |
associated with an increased risk of falling. In this assessment tool the patient was video
taped while walking and the tape was later
reviewed and the gait of the person assessed
and scored. Seven items were scored on a
scale of 0-3, variability, guardedness,
staggering, foot contact, hip ROM, shoulder
extension, and arm-heel-strike synchrony. The
results indicated that this tool was reliable and
provides a valid measure of some gate
variables and abnormalities that are
associated with the increased risk of falling.
Inter-rater reliability was higher than previous
studies due to raters participating in a training
session.

| 1002. W.-N. W. Huang, J. M
| VanSwearingen, and J. S Brach
| Gait Variability in Older Adults: Observational Rating Validated by
| Comparison With a Computerized Walkway Gold Standard Physical
| Therapy, October 1, 2008; 88(10): 1146 - 1153. |
| Used a computerized walkway to measure the
| characteristics of gait. Validated the use of
| GARS in the assessment of gait for the
| prediction of falls. |
| Required the use of expensive equipment.
But validated GARS as a useful tool in
determining abnormal gait for the prediction
of falls. |

| Stephen R Lord, Hylton B Menz and
| Anne Tiedemann A Physiological
| Profile Approach to Falls Risk
| Assessment and Prevention
| The maintenance of balance depends on the
| interaction of multiple sensory, motor, and
| integrative systems.¹ The physiological factors
| that are the primary contributors to stability
| are; reaction time (hand and foot), vestibular
| function, vision, peripheral sensation,
| muscular force. Functioning of these factors
declines with age and impairments of these
| factors cause an increase in the risk of falling.
The PPA fulfills these criteria by utilizing
validated assessments and normative data
from large-scale studies to identify key
physiological risk factors (impairments) that
| This test is simple to administer, takes little
time, is easy for older adults to perform, low
tech, provides a valid and reliable
measurement and provides a quantitative
measurement. It requires a light weight
portable apparatus that can be taken
anywhere. It is functional and does not take
into consideration psychological factors (eg,
dementia; depression; cognitive ability,
including the ability to divide attention and
successfully perform dual tasks), adverse
effects of psychoactive medications, and all
aspects of medical conditions such as |
can be targeted with interventions. The PPA has been devised to complement the medical assessment and management of older people who are at risk for falling.

Parkinson disease, stroke, lower-limb amputation, postural hypotension, and vestibular disease.

<table>
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<tr>
<th>Author</th>
<th>Title</th>
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<tr>
<td>E. Nordin, N. Lindelof, E. Rosendahl, J. Jensen, and L. Lundin-olsson</td>
<td>Prognostic validity of the Timed Up-and-Go test, a modified Get-Up-and-Go test, staff’s global judgement and fall history in evaluating fall risk in residential care facilities</td>
<td>The purpose of this study was to determine whether the Berg balance test could be used to predict an elderly person’s risk of falling. The Berg balance test consists of 14 functional subtests. There was a difference between the subjects who were prone to falling and those who were not prone to falling, but the test demonstrated poor sensitivity for predicting who would fall. No relationship was noted between increasing age and decreasing performance on the Berg balance test. The results support the test developers’ use of 45 (out of 56) as a generalized cutoff score. Older adults who scored higher than the cutoff score on the test were less likely to fall than were those adults who scored below the cutoff score. Decreased scores, however, did not predict increased frequency of falls.</td>
</tr>
<tr>
<td>Bogle Thorbahn LD, Newton RA</td>
<td>Use of the Berg Balance Test to predict falls in Elderly Persons.</td>
<td>This is a functional exam that assesses strength, gait, balance and coordination. It does identify specific factors that may be the cause of the fall.</td>
</tr>
<tr>
<td>Conley Donna BSN RN, Schultz Alyce A. PHD RN, Selvin Rhonda MSN RN</td>
<td>The Challenge of Predicting Patients at Risk for Based on a review of the literature they derived 10 indicators that were placed into 4 categories; history of falls, altered elimination, immobility, and cognitive impairment. Three of these indicators were used to develop the scale. The scale takes only 1-2 minutes and is easy to administer. Information was obtained strictly by interview and observation and there was no functional component to the</td>
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<td>Source</td>
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<tr>
<td>Falling. MEDSURG Nursing, December 1999 Vol. 6 No. 6 pp. 348-354.</td>
<td>the categories were based on patient report and one on nursing assessment and observation.</td>
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<tr>
<td>Schwendimann, R., Evaluation of the Morse Fall Scale in hospitalised patients. Age and Ageing Advance Access originally published online on March 9, 2006 Age and Ageing 2006 35(3):311-313; doi:10.1093/ageing/afj066</td>
<td>Morse Fall Scale showed a low ability to discriminate between patients who fell and those who did not fall. This scale proved to have and 82% false positive rate.</td>
<td></td>
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<tr>
<td>Morse, J.M., Morse, R.M., and Toylko, S.J. (1989) Development of a scale to identify the fall-prone patient. Canadian Journal on Aging, 8, 366-377.</td>
<td>It was designed to identify individuals who are at risk for anticipated physiological falls. There are 6 assessment items; history of falling, secondary diagnosis, use of ambulatory aid, intravenous therapy, gait and mental status.</td>
<td></td>
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<tr>
<td>Oliver, D., Britton, M., Seed, P., Martin, F.C., &amp; Hopper, A.H. (1997). Development and evaluation of evidence based risk assessment tool (STRATIFY) to predict which elderly inpatients will: case-control and cohort studies [papers]. British Medical Journal, 315(7115), 1049-1053.</td>
<td>St. Thomas’s risk of assessment tool is used to identify clinical fall risk factors in the elderly adult and to predict the chance that a fall will occur. A risk assessment score (range 0 – 5) is derived by rating 1 for presence or 0 for absence of 5 fall risk factors (fall as a presenting complaint, a transfer and mobility score of 3 or 4+, agitation, frequent toileting, and visual impairment). The transfer and mobility score is (range 0-6) is obtained by combining the transfer and mobility sections of the Barthel index (each with ranges 0-3). A risk score of 2 or more (cut-off or high risk score) was calculated for 66 (93%) of the 71 fallers and for only 40 (12%) of the 324 non-fallers. A score of three or more identified 49 (69%) of the fallers and 12 (4%) of the non-fallers (i.e. sensitivity of 69% and specificity 96%)</td>
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It is useful in the hospital setting and is recommended by different groups. The scales greatest fault is the high number of false positives.

It requires yes/no answers and is quick and easy to administer. It is done by interview and an audit of the patient records.

This simple risk assessment tool predicted with clinically useful sensitivity and specificity a high percentage of falls among elderly hospital inpatients.
Reducing falls among adults requires completing a comprehensive falls risk assessment and identifying the risk factors that may put an individual at risk of falling. Following the identification of risk factors, a health care professional can recommend intervention strategies and actions that address each risk factor and the unique situation of the adult. It is imperative that a complete and comprehensive assessment be performed in order to implement adequate treatment and prevention strategies. In the literature review 38 assessment tools were identified however not all tools were considered to be valid or reliable.

It is imperative to note that falls are often the result of multiple factors related to the patient and their environment, therefore, a tool that considers both intrinsic and extrinsic factors should be utilized. Studies have shown that the risk of falling increases dramatically as the number of risk factors increases. Researchers in the area of falls prevention, found that the percentage of persons falling increased from 19% for those with one risk factor to 78% for those with four or more risk factors. Therefore it is important to adequately assess a patient to identify all existing risk factors to appropriately identify patient risk of falling. It is imperative to assess all of the factors and no one tool is equipped to include all factors. It may be necessary to utilize multiple tools in an attempt to identify all of the existing risk factors. One of the most disturbing issues is that only 34% of older patients receive any fall evaluation at all.

The most common risk factors identified through the above mentioned assessment tools are: muscle weakness, prior falls, balance deficit, gait deficit, use of and assistive device, visual deficit, arthritis, activities of daily living deficit, depression, cognitive deficit, age greater than 80 years old.

An assessment should be performed by a professional with appropriate skills and training. In hospitals and long term care facilities nurses are most often responsible for the assessment of patients for falls. The following factors should be a part of the assessment of patients to determine fall risk:

- History of Falls
- Frequency of falls
- Symptoms at the time of the fall
- Previous injuries and consequences
- Review of patient medications (prescribed and over-the-counter medications)
- Visual Acuity Testing
- Gait and Balance Assessment
- Examination of gait, balance and lower extremity joint function
**Functional Assessment**
- Limitations of activities of daily living
- Limitations of instrumental activities of daily living

**Physical Examination**
- Examination of basic neurological function (mental status, muscle strength, proprioception, reflexes, test of cortical, extrapyramidal, and cerebellar function)
- Assessment of basic cardiovascular status including heart rate and rhythm and orthostatic blood pressure

**Laboratory Testing** (dictated by suspected illness or disorder)

**Environmental Assessment**

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<tr>
<td>VanSwearingen JM, Paschal KA, Bonino P, Yang JF The modified Gait Abnormality Rating Scale for recognizing the risk of recurrent falls in community-dwelling elderly adults. Phys Ther. 1996;76(9):994–1002.</td>
<td>Among frail older adults, an increased risk for falling has been associated with decreased walking speed, decreased step or stride length, increased step width, and increased variability of stride length and width.</td>
<td>The literature reveals that while all parts of the gait cycle are important it is the variability of stride length and width that play the most important role in falls.</td>
</tr>
<tr>
<td>Hausdorff JM, Rios DA, Edelberg HK. Gait variability and fall risk in community-living older adults: a 1-year prospective study. Arch Phys Med Rehabil. 2001;82:1050–1056</td>
<td>Determined that gait variability played a role in balance, mental and functional status, and it limits the quality of life. The study showed that stride time variability correlated significantly with multiple factors including strength, balance, gait speed, functional status, and</td>
<td>Gait variability is the end result of a combination of deficiencies and does predict the possibility of a fall. However because it is a functional factor there are many variables that are excluded with this measure. For that reason gait variability is differentiate between</td>
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<tr>
<td>Reference</td>
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<td>Clinical Implications</td>
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<td>Brach JS, Berlin JE, VanSwearingen JM, et al.</td>
<td>Too much or too little step width variability is associated with a fall history in older persons who walk at or near normal gait speed. J Neuroeng Rehabil. 2005;2:21</td>
<td>Walking speed does not cause a person to fall. However, it is step variability that causes balance difficulties and unsteadiness that may eventually lead to a fall.</td>
</tr>
<tr>
<td>Stephen R Lord, Hylton B Menz and Anne Tiedemann</td>
<td>Stroke, Parkinson disease, a history of falls, the presence of impaired gait, muscle weakness, arthritis, foot problems, impaired cognition, abnormal neurological signs, and the taking of psychoactive medications and multiple medications have been shown to be important predictors for falls. However, attributing a degree of falls risk to a specific medical diagnosis is problematic because the relative severity of the above conditions may vary considerably among individuals. Furthermore, declines in sensory motor function associated with age, inactivity, medication use, or minor pathology may be evident in older people with no documented medical illness.</td>
<td>The Physiological Profile Approach assesses a variety of physiological and functional factors. It produces reliable and valid results. However, it fails to take into consideration any psychological considerations.</td>
</tr>
<tr>
<td>Tinetti ME, Speechley M, Ginter SF.</td>
<td>Determined standardized measures of mental status, strength, reflexes, balance, and gait. The risk of falling increased linearly with the number of risk factors, from 8 percent with none to 78 percent with four or more risk factors. About 10 percent of the falls occurred during acute illness, 5 percent during hazardous activity, and 44 percent in the presence of environmental hazards. We conclude that falls among older persons living in the community are common and that a</td>
<td>This study evaluated a variety of risk factors. The most important finding was that as the number of risk factors increased so did the incidence of fall.</td>
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A simple clinical assessment can identify the elderly persons who are at the greatest risk of falling.


After adjusting for potential confounders (age, sex, health status, depression, dementia, incontinence, ambulatory status, gait and balance problems, length of stay and use of other medications), the use of antipsychotics was found to be an important risk factor for falls. The results support the conclusion that antipsychotic medications increase the risk of falls among the elderly living in nursing homes. Health professionals should minimize the use of these medications.

This study found that there is a defined relationship between the use of antipsychotic drugs and falls.


Impaired contrast sensitivity was associated with postural instability, slower walking velocity, increased step width, and reduced stride length. Impairments in either contrast sensitivity or visual fields were associated with increased double-support time. This result suggests that loss of contrast sensitivity and visual fields in patients with ARM can lead to balance and mobility problems.

This study focused on vision impairments and determined that issues with vision will cause a patient to have problems with balance and mobility which can lead to falls. Problems with vision can lead to apprehensiveness and fear during ambulation which will also and increased incidence of fall.


Falls are the most common cause of injury in old age. Older people living in residential care facilities experience falls three times as frequently as older people living in the community. Although falls can be caused by multiple factors, mobility impairments such as gait and balance disorders are among the most common predisposing factors.

Methodologies in this study focused on mobility and gait issues. Therefore it should be expected that findings would show mobility and gait to be common factors in predicting falls.

**Conley Donna BSN RN, Schultz Alyce A. PHD RN, Selvin Rhonda MSN RN, The Challenge of**

Determined that history of falling and impaired judgment were the most reliable factors in predicting patients who were candidates for

If a person has fallen once they are more likely to fall again. They also determined cognitive factors were very reliable in the
<table>
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<tr>
<th>Predicting Patients at Risk for Falling. MEDSURG Nursing, December 1999 Vol. 6 No. 6 pp. 348-354.</th>
<th>Falls. Determined that age and gender were not factors in the predicting of falls.</th>
<th>Prediction of falls.</th>
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<tr>
<td>Oliver D, Daly F, Martin FC et al. Risk factors and risk assessment tools for falls in hospital in-patients: a systemic review. Age and Ageing 2004; 33: 122–30.</td>
<td>Risk factors that predispose a patient to falls include gait instability, agitated confusion, urinary incontinence, urinary frequency, falls history and drugs, particularly sedatives and hypnotics. It has been suggested that these common risk factors for falls should be identified and acted upon when formulating a care plan for all patients who have those factors.</td>
<td>This study focused on hospital in-patients and the variety of factors encountered by that population that would predispose them to falls. This population has a wide variety of medical problems which created a vast array of risk factors that would predispose a patient to falls. This is one of the most difficult populations to assess. The use of multiple assessment tools is required.</td>
</tr>
<tr>
<td>Blake AJ, Morgan K, Bendall MJ, Dallosso H, Ebrahim SB, Arie TH, et al. Falls by elderly people at home: prevalence and associated factors. <em>Age and Ageing</em> 1988;17: 365-72</td>
<td>In this study interviews were performed on elderly adults who lived at home. The study revealed mobility was significantly impaired in those reporting falls. When asked to provide a reason for their falls, 53% reported tripping, 8% dizziness and 6% reported blackouts. A further 19% were unable to give a reason. There was no association between falls and the use of diuretics, antihypertensives or tranquilizers, but a significant association between falls and the use of hypnotics and antidepressants was found.</td>
<td>This study focused on adults over 65 who lived at home. These individuals were relatively healthy and able to live independently.</td>
</tr>
<tr>
<td>O'Loughlin JL, Robitaille Y, Boivin JF, Suissa S. Incidence of and risk factors for falls and injurious falls among the community-dwelling elderly. <em>Am J Epidemiol</em> 1993;137: 342-54.</td>
<td>Multivariate analyses showed that the following factors were statistically significantly associated with an increased rate of falls: dizziness, frequent physical activity, having days on which activities were limited because of a health problem, having trouble walking 400 m, and having trouble bending down.</td>
<td>This study focused on individuals living in retirement communities. The most interesting finding was that frequent physical activity was a cause of falls.</td>
</tr>
<tr>
<td>Tinetti, M. E., Kumar, C. (2010). <em>The Patient Who Falls: It's Always a Trade-off</em>. JAMA 303: 258-266</td>
<td>Previous falls; strength, gait, and balance impairments; and medications are the strongest risk factors for falling.</td>
<td>This study looked at a variety of causes of falls and found that the four factors listed were the most likely to predict falls.</td>
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Associations between walking speed and other variables have been investigated in a group of 67 women and 58 men aged between 65 and 90 years and living independently. In men, walking speed was related positively to calf strength, step-score (a measure of customary physical activity), hours spent in active leisure, height and weight, and negatively to age and the presence of health problems. In women, the relations were the same, with the exception of weight, and reported leg pain was negatively associated with walking speed. Multiple regression analysis showed that in men 44% of the variance in walking speed was accounted for by height, calf strength and the presence of health problems, and that in women 42% of the variance was accounted for by height, calf strength, step-score and the presence of leg pain limiting mobility.


Changes in gait have been related to a history of falls among frail older adults (adults over 60 years of age with difficulty in one to three activities of daily living).


Risk factors for having a single fall were few and relatively weak, but multiple falls were more predictable. In multivariate analyses, we found increased odds of two or more falls for persons who had difficulty standing up from a chair, difficulty performing a tandem walk, arthritis, Parkinson's disease, three or more falls during the previous year, and a fall with injury during the previous year. It was also determined that as the number of risk factors increased so did the possibility of a subsequent fall.

Across all of the studies reviewed there was consensus that while predictors of first time falls are relatively weak.
<table>
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<tr>
<th>Reference</th>
<th>Description</th>
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<tbody>
<tr>
<td>Leveille SG, Bean J, Bandeen-Roche K, Jones R, Hochberg M, Guralnik JM. Musculoskeletal pain and risk for falls in older disabled women living in the community. <em>J Am Geriatr Soc.</em> 2002 Apr;50(4):671-8.</td>
<td>Musculoskeletal pain, particularly widespread pain, is a substantial risk factor for falls in older women with disabilities. These findings add an important dimension to our understanding of the multifactorial processes leading to falls in older persons. Among women with musculoskeletal pain, risk for falls was lower in those who used daily analgesic medication. Risk for recurrent falls and self-reported fractures due to falls was also elevated in women with musculoskeletal pain, most consistently in women with widespread pain.</td>
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<tr>
<td>Pain restricts movement, affects gait, coordination and balance. This pain is then directly related to falls and recurrent falls.</td>
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<td>Leveille SG, Jones RN, Kiely DK, Hausdorff JM, Shmerling RH, Guralnik JM, Kiel DP, Lipsitz LA, Bean JF. Chronic musculoskeletal pain and the occurrence of falls in an older population. <em>JAMA.</em> 2009 Nov 25;302(20):2214-21.</td>
<td>Chronic pain measured according to number of locations, severity, or pain interference with daily activities was associated with greater risk of falls in older adults. Patients with two or more sites of musculoskeletal pain were associated with a greater occurrence of falls. Similarly, more severe or disabling pain at baseline was associated with higher fall rates. The association persisted after adjusting for multiple confounders and fall risk factors. The greatest risk for falls was observed in persons who had 2 or more pain sites, and those in the highest tertiles of pain severity and pain interference with activities compared with their peers with no pain or those in the lowest tertiles of pain scores.</td>
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<tr>
<td>This was one of a few studies that linked pain to the incidence of falls. More specifically chronic pain that was occurring in more than one joint. This is one of the risk factors that can be addressed with the use of modalities to reduce pain.</td>
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</tr>
<tr>
<td>Masud, T. Morris, R. Epidemiology of Falls. <em>Age and Aging</em> 2001; 30-S4: 3-7.</td>
<td>Cause of falls: accident/environment related; Gait, balance disorders, or weakness; dizziness/vertigo; drop attacks; confusion; postural hypotension; visual disorder, syncope.</td>
</tr>
<tr>
<td>Masud, T. Morris, R. Epidemiology of Falls. <em>Age and Aging</em> 2001; 30-</td>
<td>Risk factors: weakness, balance deficit, mobility limitation, gait deficit, visual deficit,</td>
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</table>
S4: 3-7. cognitive impairment, impaired ADL, postural hypotension.

The review of literature has exposed hundreds of diseases and ailments that are considered to be causes and risk factors for falls. In most studies these causes and risk factors have been divided and assigned to broad categories to simplify the assessment process. These categories are then assigned to be either intrinsic (patient related; illness or disease, hearing and vision problems, and age) or extrinsic (environment related; living environment and medications) in nature.

As we age there are many changes that occur slowly over time. The musculoskeletal system will atrophy and lose strength; neurologically we lose balance, coordination and reaction time is reduced; and hearing and vision are compromised. All of these things will cause the older adult to move more slowly and be unsteady during ambulation. Difficulty in moving and walking are closely related to falls as they contribute to the unsteadiness of an individual. This unsteadiness creates fear and anxiety which will cause some individuals to become more sedentary and lead to reduced mobility. These individuals will then become more dependent on others for their ADL’s and require assistance during movement.

In most cases falls are not the result of a single factor or cause, they occur because of multiple factors. The greater the number of risk factors the more likely the person is to suffer a fall. A person with 4 or more risk factors has a 78% chance of falling. Risk factors include but are not limited to gait instability (especially step variability), muscle weakness, balance deficit, visual deficit, arthritis (especially pain in more than one joint), depression, cognitive impairment, postural hypotension, history of falls, use of assistive walking device (walkers, canes), confusion, impaired ADL’s, disease (parkinson’s, alzheimer’s) medications (sedatives, anti-depressants, hypnotics), continence issues, environment, patient’s dependence level, and age related changes. The literature review of the most common risk factors revealed that muscular weakness was significantly related to fall events and a history of fall was consistently associated with the risk of recurrent falls.

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<th>Prevention/Treatment</th>
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<tr>
<td>T. P Haines, K. L Bennell, R. H Osborne, and K. D Hill Effectiveness of targeted falls prevention program in subacute hospital setting: randomised controlled trial BMJ (2004) 328(7441): 676-</td>
<td>This study has shown that a program of education and exercise had a significant effect in reducing falls, which may be because of the targeted multiple intervention strategy, where each intervention intentionally addressed one or more of various risk factors for falls. There</td>
<td>The most common prevention and treatment technique for falls across all studies was exercise and education.</td>
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may also have been some unintended benefits, such as increased surveillance while participants were taking part in the exercise or education programs. Targeting of interventions also meant that falls prevention strategies could be tailored to individual participants.


Effective single interventions include exercise and physical therapy, cataract surgery, and medication reduction. Evidence suggests that the most effective strategy for reducing the rate of falling in community-living older adults may be intervening on multiple risk factors.


Supervised group exercise is more effective at reducing the risk factors related to falling among older adults living in a nursing home than is unsupervised home exercise.


Results indicate a two pronged approach to falls prevention. Implementing a multifactorial falls risk assessment and management program would be most feasible by targeting selected people, such as those with a history of falls. Exercise programs, however, could feasibly be implemented to a general population of older adults. Future research should focus on making these programs most cost effective by directly assessing which components of a multifactorial falls risk assessment and what characteristics of exercise programs, including level of supervision and intensity, are essential. These steps should help older adults to preserve two of their most valuable assets, function and independence. Exercise programs included both general and specific physical activities.

After specific risk factors are identified and treated then the addition of exercise and physical therapy should be implemented.

It is understandable that patients would be more compliant with group exercise than exercising alone. The social aspect of group exercise would also be more beneficial.
Examples of general physical activity included walking, cycling, aerobic movements, and other endurance exercises. Specific physical activity included training targeted towards balance, gait, and strength.

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<td>In view of the high incidences, the many risk factors for falls among the elderly and the high risk of injury caused by a fall, efforts should be made in general practice to prevent falls among the elderly as much as possible. Preventive strategies should be based on the outcomes of investigations.</td>
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<tr>
<td>The risk of hip fracture due to falls can be reduced in frail elderly adults by the use of an anatomically designed external hip protector. The risk reduction was significant when the patient wore the pads, however patient did not wish to wear the pads and compliance was low.</td>
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While literature review reveals multiple studies on risk factors and assessment tools it is very limited in the areas of prevention and treatment. Most treatments involve identifying the specific cause and employing interventions to address the cause. For example, if medications are found to be the cause then they are removed or more closely regulated. When making assessments and determining the appropriate intervention, it is imperative that each intervention be tailored to each individual and their needs. If causes are identified and the appropriate treatment is implemented then the clinician will be the most effective in reducing fall rates. For muscle weakness and unsteadiness, exercises that include gait and balance activities as well as lower body strengthening have been proven to reduce falls in adults. It is very interesting that there was very little or no mention of flexibility exercises to assist in the prevention and treatment of falls.
When developing treatment strategies it is imperative to treat injuries and medical conditions first. For example, a person who has a urinary infection may exhibit confusion and unsteadiness, therefore if the condition is treated with antibiotics then the confusion and unsteadiness caused by the infection will be remedied. Other prevention and treatment strategies found in the literature include: assessment and removal of inappropriate medications, correcting visual and hearing impairments, assessment and treatment of osteoporosis, implementing the proper use of assistive ambulatory devices, implementing rehabilitation exercises to target strength loss and balance impairments, and evaluating the living environment for hazards and making modifications to improve safety.

The following are prevention and treatment strategies as found in the literature review:

For gait and balance impairments the patients should be referred for appropriate rehabilitative therapy that includes strengthening, balance, and gait exercises. The patient should be instructed on the proper use of ambulatory assistive devices and the living environment should be evaluated to reduce hazard and promote safety.

Muscle weakness: the patient should be referred for appropriate rehabilitative therapy that will enhance coordination, balance and gait. The rehabilitative program should also include a strengthening and flexibility component.

Environmental hazards: the living environment should always be evaluated to identify hazards. These hazards should be removed in an attempt to create a safer environment.

Limitations in the ADL’s will restrict a patient from independent living. The specific impairment should be identified and rehabilitative activities employed to address the patient’s deficit. If ambulation is impaired then an assistive walking device may be indicated.

Review the medications of the patient. At times patients may be taking multiple medications which may interact and have detrimental effects on the cognition of the patient. Also if patient confusion is an issue it is possible that they are overmedicating because they can’t remember if they have taken their medication. All medications should be reviewed to insure that they are being properly utilized. Whenever possible the number of medications taken by the patient should be reduced. The patient should be monitored for side effects to determine any adverse effects.

Low blood pressure upon standing (postural hypotension) is an issue for some patients. Standing too quickly can cause a drop in blood pressure resulting in dizziness and a fall.

All patients should be evaluated for cognitive impairments and appropriately treated. Impairments may be caused by medications, infection, or disease. It is imperative to identify these factors and have the patient treated appropriately.
Visual and hearing impairments should be addressed. It may be as simple as glasses or a hearing aid, however some impairments do require surgery.

The use of therapeutic modalities should be employed when treating the patient for musculoskeletal disorders and pain syndromes that may cause problems with strength, gait and balance. Electrotherapy may be used in the reduction of pain and the strengthening of weakened muscle. Diathermy may be used to reduce pain and make tissue more compliant to stretch which may lead to increases in flexibility and coordination. These modalities and others are tools that should be implemented to develop rehabilitation programs that will address the problems of the patient and assist them in the prevention of falls.