

Falls Among Older Adults

Definition: Unintentional fall-related events for people ages 65 and older. Nonfatal fall hospitalizations for 1989–2005 include hospital discharge records with a principal diagnosis code of ICD 9 E880-E886 or E888 if the patient was alive at time of discharge.

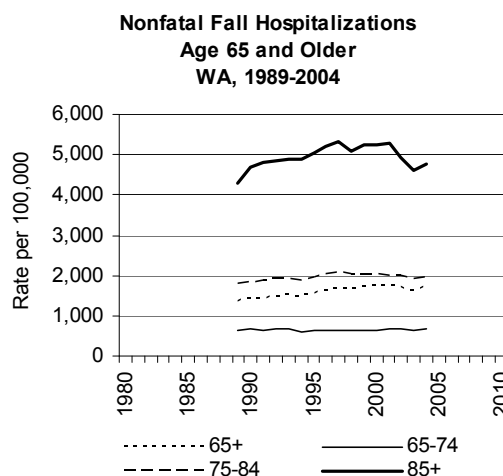
Summary

In Washington State in 2005, there were 12,200 [hospitalizations](#) due to falls among people age 65 and older. Falls are the leading cause of injury-related hospitalizations in Washington. One of every three people age 65 and older living in the community falls each year. Fall-related injuries cause significant mortality, disability, loss of independence, and early admission to nursing homes. Fall rates increase sharply with advancing age due to age-related health risk factors. Health care costs associated with fall-related injuries exceed \$19 billion nationally, more than the cost for treating motor vehicle crash injuries.

Many falls are preventable. Because older adults' risk of falling increases with the number of risk factors, a multifactorial risk assessment and management program is the most effective intervention to reduce falling among this group. Exercise incorporating strength and balance training is an essential component of such programs. Insufficient funding is a barrier to implementing and sustaining fall prevention programs.

Time Trends

Falls are the leading cause of injury-related hospitalizations in Washington. In 2005 in Washington, there were 12,200 hospitalizations for fall injuries among people ages 65 and older. The rate of hospitalizations from falls increased from 1,387 per 100,000 in 1989 to 1,804 per 100,000 in 2000. The 30% increase during this period reflects an increase in the rate of hospitalizations among people ages 75 and older. Rates have been stable since 2000. There are no national hospitalization data for falls for comparison.



Year 2010 Goals

The *Healthy People 2010* goal most closely related to falls among older adults is reducing the incidence of hip fracture, the most serious and costly fall injury. The national goal is to reduce [age-adjusted](#) hip fracture rates among people age 65 and older to no more than 416 per 100,000 for women and 474 per 100,000 for men.

Washington has experienced a significant decline in hospitalization rates for hip fractures, although the rates do not yet meet the *Healthy People 2010* goal. The number of hospitalizations increased until 1996 and has been stable since then. In 2005, there were 4,962 hospitalizations for hip fractures among people age 65 and older, 93% of which were caused by a fall.

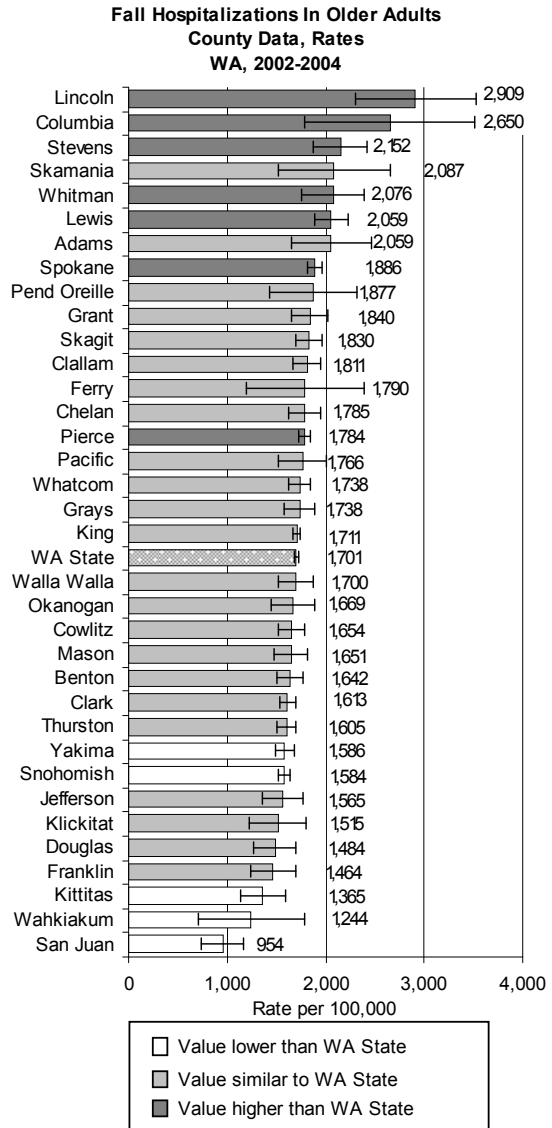
Washington has consistently met the *Healthy People 2010* goal for men but not for women. In 2003, Washington's age-adjusted hip fracture rates were 912 for women and 521 for men, while the national rates were 886 for women and 584 for men. Washington has a higher percentage of white females ages 85 and older compared to the nation as a whole. White women ages 85 and older have

substantially higher rates of hip fracture compared to women of other races or of Hispanic origins.¹ This partially explains the difference between the rates for Washington and the United States.

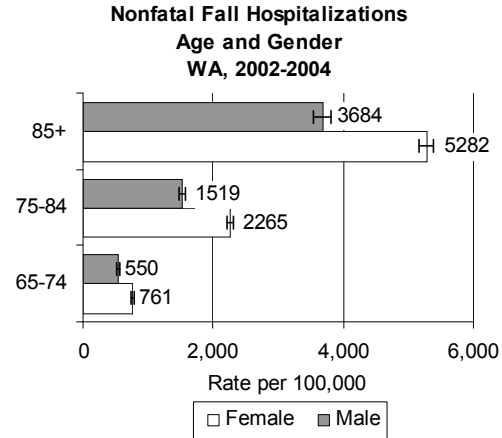
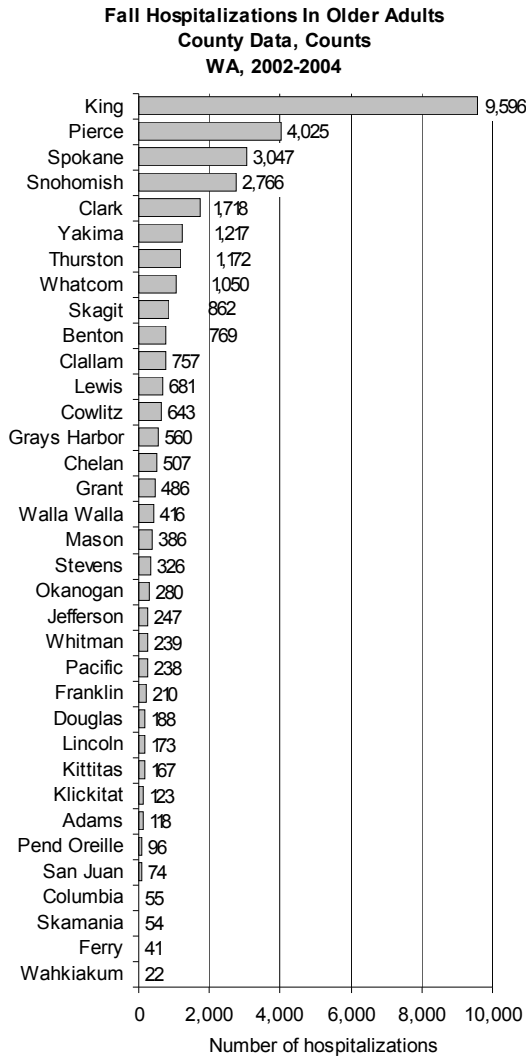
Nationally, there was a significant decline in the hospitalization rate for hip fractures from 1993 (918 per 100,000) to 2003 (776 per 100,000), however the number of hospitalizations increased by 19%.² The decline occurred only among women and may be the result of bone density screening and effective treatments for osteoporosis.²

Geographic Variation

Seven counties in 2002–2004 had fall hospitalization rates higher than the state rate. These were Lincoln, Columbia, Stevens, Whitman, Lewis, Spokane, and Pierce counties. Four counties—Yakima, Snohomish, Kittitas, and San Juan—had fall hospitalization rates lower than the state rate.



From 2002–2004, King, Pierce, Spokane, and Snohomish counties had the highest number of fall hospitalizations among older adults.



The high rate of fall-related injury in people age 65 and older is related to the high prevalence of chronic diseases (e.g., osteoporosis) combined with age-related physiologic changes (e.g., slowed protective reflexes).³ Age-related risk factors for falls include decreased muscle strength and mass, certain chronic diseases, impaired gait and balance, reduced visual acuity and depth perception, and mental confusion.

Race and Hispanic Origin

Data on the race and ethnicity of people hospitalized for falls in Washington State are not available. In 2005, U.S. white women had the highest hospitalization rate following emergency department treatment for falls (1,136 per 100,000) compared to black women (894 per 100,000) and women of Hispanic origin (236 per 100,000).¹

Income and Education

There are no state data on the income or education levels of people who fall. Low income is highly associated with poor health status and disability, and these factors, in turn, are associated with increased fall risk.⁴

Other Measures of Impact and Burden

Mortality. In 2005 in Washington, 491 people age 65 and older died from falls. The age-adjusted fall death rate among older adults in Washington doubled from 1990 to 2005 from 29 to 60 per 100,000. Nationally, from 1993 and 2003, the age-adjusted rate of fatal falls among older adults increased from 24 to 37 per 100,000, a 55% increase.² The reasons for the widening gap between U.S. and Washington fall death rates are not clear.

Age and Gender

Fall-related injuries occur at all ages but are significantly more frequent among adults ages 65 and older. This group made up about 11% of the 2005 state population but accounted for 68% of all fall-related hospitalizations. Fall hospitalization rates are highest among women age 85 and older. The risk of falling increases rapidly with age. Nationally, a major risk factor for falling is being a female, age 80 or older.³

Emergency department visits. In 2002, for every older adult who died from fall-related injuries in the United States, 183 were treated in an emergency department.⁵

Cost. Nationally, the direct medical costs for treating falls among older adults in 2000 were estimated at \$19 billion, making it the most costly injury. Motor vehicle crashes were the second most costly injury at an estimated \$14 billion. In 2000, falls accounted for 23% of all injuries but 34% of injury-related medical costs.⁶

Quality of life. More than a third of older adults fall each year, and fall-related injuries cause significant disability, loss of independence, and nursing home admissions.⁵ Of those who fall, 20% to 30% suffer moderate to severe injuries that reduce mobility and independence and increase the risk of premature death.⁵ According to Washington Comprehensive Hospital Abstract Reporting System (CHARS) data, only 22% of Washington residents ages 65 and older who were hospitalized for falls in 2005 were able to return home. Another 11% went home with the care of a home health service. The remaining 67% were transferred to a skilled nursing, intermediate care, or other type of facility. While many nursing home placements are temporary, and people return home after two to three months of rehabilitation, falls are still a strong predictor of long-term placement in a nursing home.⁷

Population trends. Forecasts of the state's age composition are available through 2030. The Washington State Office of Financial Management projects a 72% increase in the percent of the population ages 65 and older. By 2030, 19%—one in five people—will be 65 years old and older.⁸ As our population ages, the number of fall injuries is expected to increase.⁵

Risk and Protective Factors

The major risk factors for falls among older adults include a history of falls, muscle weakness, certain chronic conditions, gait deficit, balance deficit, use of assistive devices, taking four or more medications or any psychotropic medications, cognitive impairment, visual deficit, sensory impairments, postural hypotension, depression, and being 80 years old or older.^{3, 5, 9} Leg weakness is the strongest risk factor for falls and increases fall risk by more than four times.³ Osteoporosis, while not a risk factor for falling, increases the likelihood of a fracture in the event of a fall.¹⁰ The risk of falling

increases with the number of risk factors present, and the number of risk factors increases with age.³ Fall risk factors can be classified as non-modifiable (e.g., age) or modifiable (e.g., lower-body weakness).⁵

Environmental risk factors include tripping hazards such as throw rugs and clutter in walkways, lack of stair railings and grab bars, slippery surfaces, unstable furniture, and poor lighting.⁵

Intervention Strategies

A multi-factorial falls risk assessment and management program is the most effective intervention.^{3, 11} An exercise program with strength and balance exercises is the next most effective intervention component. Exercise is effective in reducing falls when used alone and when included as part of a multi-component intervention.

Multi-factorial risk factor assessment and intervention. Multi-factorial interventions were significantly associated with both a reduced risk of falling and with a reduced number of falls per person.¹¹ Studies suggest we cannot eliminate falls among older adults, but can reduce them by 15%–25%.¹¹

Interventions that focused on those who had already fallen were more likely to be effective than those that targeted older people based on age or other risk factors.^{11, 12} People who have already fallen may be more receptive to information about fall prevention. The most effective multi-factorial interventions generally include risk assessment; tailored exercise or physical therapy to improve gait, balance, and strength; medication review and modification; and other elements such as education about fall risk factors, referrals to health care providers for treatment of chronic conditions that might contribute to fall risk, and having vision assessed and corrected.^{3, 13} Multi-factorial interventions are less effective in older adults with cognitive impairment and dementia.¹⁴

To identify individuals 65 or older who are at high risk for falls, the American Geriatrics Society issued evidence-based clinical guidelines⁹ that recommend a comprehensive clinical assessment for people who are being seen as the result of a fall, have experienced two or more falls in a six-month period, or have gait or balance abnormalities. The assessment includes testing gait, balance, and neurological function, reviewing all medications, and asking about the circumstances of the fall. The health care provider develops a tailored medical management approach based on this assessment,

suggests appropriate intervention strategies, and refers the patient to appropriate specialists such as physical therapists or gerontologists.

Exercise interventions. Exercise can improve important fall risk factors such as muscle weakness, poor balance, and gait problems in both healthy and frail older adults.³ Group exercise programs designed as fall prevention interventions typically meet two or three times per week for about an hour and are supervised by a physical therapist or trained exercise instructor. Most group programs include a combination of exercises to improve flexibility, strength, balance, and aerobic conditioning. Progressive strength training generally focuses on lower and upper extremity large muscle groups using body weight, ankle weights, elastic bands, or weight machines for resistance. Balance training often includes a range of static and dynamic exercises and functional exercises. The physical therapist or exercise instructor usually tailors exercises to fit the participant's abilities. Trained exercise professionals also supervise home exercise programs, but participants perform the exercises alone in their homes. *Tai chi* is another type of exercise that improves strength and balance and reduces the risk for falling.³

Exercise interventions overall are effective in reducing falls when used alone and when included as part of a multi-factorial intervention.¹¹ Balance training should be an important component of any exercise program designed to decrease falls.¹⁵ Exercise should be regular and sustainable. While exercise overall is effective, more studies are needed to define the type of exercise, frequency, duration, and intensity that is most effective for different groups of older people. Exercise interventions should be progressive and are inadequate if they do not lead to significant improvements in balance, strength, and endurance.¹⁵

Older adults are motivated more by messages that promote strength and balance training and emphasize enjoyment and maintaining health, mobility, and independence than by messages that emphasize fall risk.¹⁶ Adherence to group exercise interventions improves if programs provide strong social support. Home-based exercise adherence improves goal setting, self-monitoring, and reinforcing progress. The long-term success of unsupervised home exercise programs appears to depend on older adults' initial level of functioning and overall fall risk.

Achieving long-term adherence among high-risk groups may require either regular telephone contact or visits by a trained volunteer for in-home programs or supervisor oversight for a group intervention.¹⁴

In 2002, Washington received a grant from the Centers for Disease Control to develop and evaluate a community-based targeted injury prevention intervention for falls in older adults. Under this grant, the Washington State Department of Health conducted a randomized controlled trial of a fall risk assessment, exercise, and education program in Pierce and Spokane counties. The study showed improvements in strength, balance, and mobility, which are the primary risk factors for falls in older adults. There was a 25% reduction in falls in the intervention group, but this did not reach statistical significance.¹⁷

Home modification. Few falls result from environmental hazards alone but are the result of interactions between the environment and individual fall risk factors related to the accumulated effects of aging and disease. Age-associated changes in posture control, muscle strength, and step height can impair a person's ability to avoid a fall after an unexpected trip or while reaching or bending.³

Some of the most common environmental factors affecting the risk of falling include:

- Poor or inadequate lighting
- Changes in floor surface or slippery surfaces (e.g., wet or polished floors and non-slip-resistant bathtub surfaces)
- High-gloss floors and/or walking surfaces
- Problems associated with stairs (e.g., lack of handrails)
- Inappropriate chair or cabinet heights
- Clutter, storage problems, and tripping hazards such as furniture or throw rugs
- Poor sidewalk and pavement conditions.¹⁸

Multi-component interventions that include home modification are effective particularly among people with a history of previous falls.⁵ Prevention strategies included removing tripping hazards, using non-slip mats in the bathtub and on shower floors, installing grab bars next to the toilet and in the tub or shower, putting handrails on both sides of stairways, and improving home lighting.⁵

Medication reviews. People ages 65 and older use about 30% of all prescription and over-the-counter medications sold in the United States.¹⁹ The risk of

falling increases with the number of prescription medications taken.¹⁹ In addition, certain classes of medications increase the risk of falling.¹⁹ Drug side effects and interactions that contribute to falls include blurred or impaired vision, hypotension leading to dizziness and lightheadedness, sedation, decreased alertness, confusion and impaired judgment, delirium, compromised neuromuscular function, and anxiety. Review and modification of medication regimens by health care providers to reduce medication-related fall risk factors can frequently reverse these effects.¹⁹

In general, aging affects the absorption, distribution, metabolism, and elimination of medications. Age can also increase people's sensitivity to side effects. Medications that increase the risk of falling include benzodiazepines that are prescribed to treat anxiety, insomnia, and seizure disorders; antidepressants; antipsychotics; antihypertensive medications; cholesterol-lowering medications; cardiac medications; and painkillers.¹⁹ Clinical practice recommendations⁹ include reviewing the medications of patients who have fallen. Medications may be altered or stopped as appropriate to reduce the risk of future falls. Medication reviews for people taking four or more medications and those taking psychotropic medications are recommended.

Funding constraints. A survey of health professionals in Washington identified lack of funding as the key factor limiting development and implementation of fall prevention programs for adults ages 65 and older.²⁰ In Washington, funding is not yet available to begin and sustain statewide community-based interventions, such as strength and balance exercise programs for older adults.

Current underutilization of health care reimbursement mechanisms and lack of professional fall prevention education constrain fall risk factor assessment and interventions by health care providers. Increased awareness and utilization of Medicare reimbursement mechanisms for these assessments and increased availability of fall prevention professional education for health care providers would remove this barrier.

Data Sources (For additional detail, see [Appendix B](#).)

Washington State Death Certificate Data: Washington State Department of Health, Vital Registration System

Annual Statistical Files, Deaths 1980–2005, released December 2006.

Washington Hospitalization Data: Dataset compiled by the Washington State Department of Health, Center for Health Statistics from the Washington Comprehensive Hospitalization Abstract Reporting System (1989–2005), Oregon Hospital Discharge data (1989–2004), and Veterans Hospital Administration (VA) datasets (2000–2004), December 2006. In this chapter, 2005 data are for Washington only, time trend data are for Washington and Oregon, and data in other charts are for Washington, Oregon, and VA facilities. External cause codes are missing more frequently from the Oregon and VA data, likely causing underreporting of fall hospitalizations.

For More Information

California Blueprint For Falls Prevention
http://www.archstone.org/publications2292/publications_show.htm?doc_id=246660

Department of Health Injury and Violence Prevention Program, (360) 236-2855
<http://www.doh.wa.gov/hsqa/emstrauma/injury/>

National Council on Aging, Center for Healthy Aging,
<http://www.healthyagingprograms.org>. Search falls.

Office of the Provincial Health Officer (2004) Prevention of falls and injuries among the elderly. British Columbia, Ministry of Health Planning
<http://www.healthservices.gov.bc.ca/pho/pdf/falls.pdf>

Endnotes

¹ U.S. Centers for Disease Control and Prevention, National Centers for Injury Prevention and Control. (2007). *Web-based Injury Statistics Query and Reporting System (WISQARS)*. Retrieved April 27, 2007 from www.cdc.gov/ncipc/wisqars.

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⁷ Kenny, R. A., & O'Shea, D. (2002). Falls and Syncope in Elderly Patients. *Clinics in Geriatric Medicine*, 18(2), xiii–xiv.

⁸ Office of Financial Management. (2006, November). *Forecast of the State Population by Age and Sex: 1990-2030*. Olympia, WA: Office of Financial Management. Retrieved May 8, 2007 from <http://www.ofm.wa.gov/pop/stfc/default.asp>.

⁹ American Geriatrics Society, British Geriatrics Society, and American Academy of Orthopaedic Surgeons Panel on Falls Prevention. (2001). Guideline for the prevention of falls in older persons. *Journal of the American Geriatrics Society*, 49(5), 664-672.

¹⁰ Nguyen, N. D., Pongchaiyakul, C., Center, J. R., Eisman, J. A., & Nguyen, T. V. (2005). Identification of high-risk individuals for hip fracture: A 14-year prospective study. *Journal of Bone and Mineral Research*, 20(11), 1921-1928.

¹¹ RAND Report. (2003). *Evidence report and evidence-based recommendations: fall prevention interventions in the Medicare population*. Contract number 500-98-0281. RAND Corporation Southern California Evidence-Based Practice Center.

¹² Gillespie, L. D., Gillespie, W. J., Robertson, M. C., Lamb, S. E., Cumming, R. G., & Rowe, B. H. (2003). Interventions for preventing falls in elderly people. *Cochrane Database of Systematic Reviews*, 4, CD000340.

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¹⁴ Rose, D. J. (2005). *The role of exercise in reducing falls and fall-related injuries in older adults*. *Falls Free: Promoting a National Falls Prevention Action Plan*. Research Review Papers. National Council on Aging (pp. 19-27). Retrieved on December 20, 2006 from http://www.healthyagingprograms.org/resources/FallsFree_ReviewPaper_Final.pdf.

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¹⁹ Cameron, K. A. (2005). *The role of medication modification in fall prevention*. *Falls Free: Promoting a National Falls Prevention Action Plan*. Research Review Papers. National Council on Aging (pp. 29-39). Retrieved on December 20, 2006 from

http://www.healthyagingprograms.org/resources/FallsFree_ReviewPaper_Final.pdf.

²⁰ Social Marketing Services, Inc. and Gilmore Research Group. (2004). *Senior falls knowledge, attitude and practice study: Key informant interviews*. Seattle, WA: Gilmore Research Group.