

CHAPTER FIVE: FALLS

Highlights

- Falls are the leading cause of injury hospitalization in Colorado. Each year, approximately 13,000 Coloradans are hospitalized for fall-related injuries, accounting for 45 percent of all injury hospitalizations.
- The majority of hospitalizations for fall-related injuries (62 percent) involve individuals ages 65 and older. More than one-third of these individuals (38 percent) sustain a hip fracture and almost 10 percent sustain a traumatic brain injury.

Overview and trends

While “falls” may not evoke the same level of concern as “drowning” or “fire,” the reality is that falls are the leading cause of injury hospitalization and the fourth leading cause of injury death in Colorado. Each year, nearly 13,000 Coloradans are hospitalized for a fall-related injury, accounting for 45 percent of all injury hospitalizations. On average, 306 Coloradans die each year from falls, with higher death rates seen among the elderly. Nationally, falls are the leading cause of injury death for people ages 65 and older¹ and the leading cause of non-fatal unintentional injury and emergency department visits for children ages 0-14.² Falls from an elevation are the fourth leading cause of work-related deaths in the U.S.³

The “falls” mechanism of injury category encompasses many different types of events, including falls on stairs or steps; from ladders; out of buildings; into holes; from one level to another such as from playground equipment, cliffs, or furniture; and falls on level ground as a result of slipping, tripping, or stumbling. Also included are sports injuries involving falls due to slipping, tripping, or pushing, and collisions due to pushing or shoving by another person. This category does not include falls from bicycles or from riding animals (see Chapter Four: Other Transportation), but does include falls while using recreational equipment such as scooters, in-line skates or skateboards, or while participating in such activities as skiing or snowboarding.



1. Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. (2005). *Web-based Injury Statistics Query and Reporting System (WISQARS)*. Retrieved February 28, 2005, from <http://www.cdc.gov/ncipc/wisqars/>.

2. Ibid.

3. National Institute for Occupational Safety and Health. (2005). *Traumatic Occupational Injuries - Falls from Elevation*. Retrieved March 16, 2005, from <http://www.cdc.gov/niosh/injury/traumafall.html>.

Deaths

Each year, approximately 306 Coloradans die from injuries sustained in a fall, resulting in an age-adjusted fall death rate of 8.4 per 100,000 (Table D3).⁵ Almost half of the deaths due to falls (48 percent) result from traumatic brain injury.⁶

In Colorado, from 1980 to 2003, the death rate from unintentional falls has remained relatively unchanged at 8 to 10 deaths per 100,000 population. Little progress has been made in reducing the rate of death from fall-related injuries (Table D4).

Fall-related death rates vary by both age and sex. For individuals ages 15 and older, males are more likely than females to die from a fall (Tables D9, D10).

Fall-related death rates increase with age but remain relatively low until age 65. The death rate for Coloradans ages 65-74 is 2.4 times the rate for those ages 55-64, and the death rate for those ages 85 and older is 41 times the rate for 55-64 year olds (Table D8). Coloradans ages 65 and older experience 75 percent of all fall-related deaths. Falls are the leading cause of injury death among Coloradans ages 75 and older (Table D18).

Figure 60: Age-adjusted death rates due to falls Colorado residents, 1980-2003

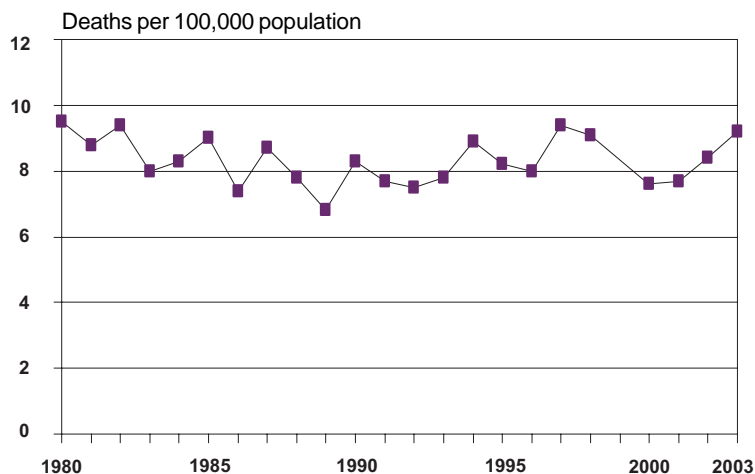
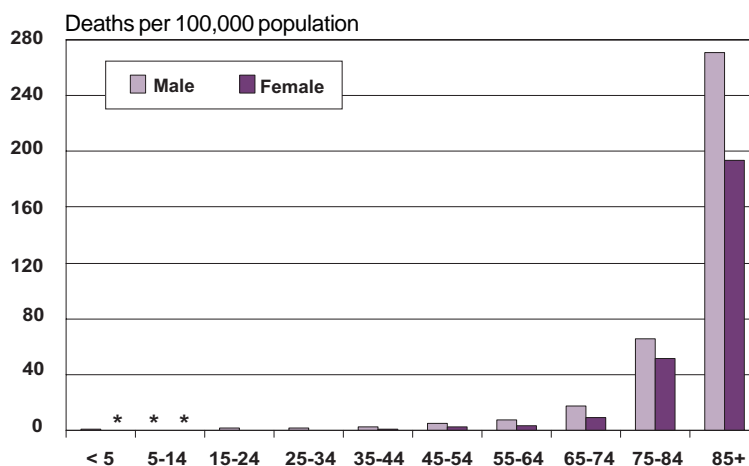


Figure 61: Death rates due to falls by age and sex Colorado residents, 2001-2003



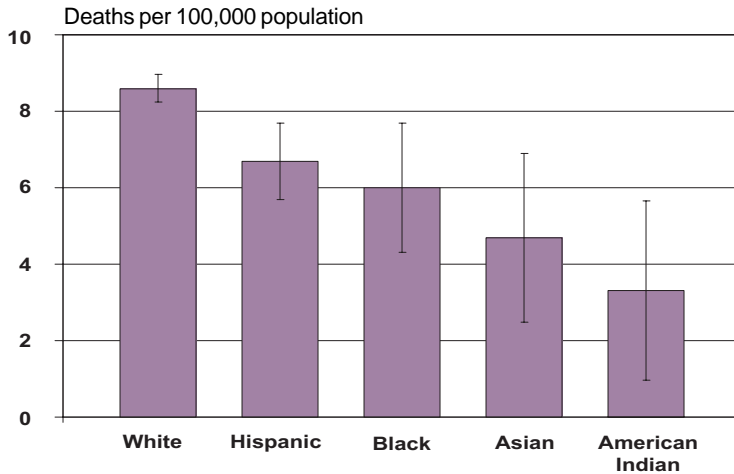
*Fewer than three deaths in this age/gender group.

5. Death tables are found in Appendix A. Hospitalization tables are found in Appendix B. Traumatic brain injury tables are found in Appendix C.

6. Traumatic brain injuries include concussions, skull fractures, and intracranial injuries due to an external impact or forces of acceleration/deceleration.

Deaths due to falls vary by race/ethnicity. As shown in Figure 62, the age-adjusted death rate for falls is significantly higher for whites than for other racial/ethnic groups.

Figure 62: Age-adjusted death rates due to falls by race/ethnicity, with 95 percent confidence intervals Colorado residents, 1994-2003



The lines on the bars indicate the possible error in the estimate of the rate. The longer the line, the more variation there may be in the rate. For more information on confidence intervals, please see Appendix D: Technical Notes.

Major causes of fall-related deaths include falls from stairs or steps (8 percent); falls from bed, chairs or other furniture (7 percent); falls from ladders, scaffolding or buildings (6 percent); and slipping, tripping, or stumbling on the same level (4 percent). Unfortunately, most death certificates (68 percent) do not specify the circumstances of the fall (Table D22).

Almost 50 percent of fatal falls occur in the home, 25 percent occur in residential institutions (including nursing homes), 6 percent in public buildings and 5 percent occur in recreational settings. Information on where the fall occurred is lacking for 6 percent of fatal falls (Table D21).

“A rock climber died Saturday afternoon while falling near mile marker 34 in Boulder Canyon . . . Witnesses told officials the male climber fell 20 to 25 feet.”

The Denver Post, 4/3/05

Hospitalizations

Each year approximately 13,000 Colorado residents are hospitalized for fall-related injuries, resulting in an age-adjusted hospitalization rate of 340.6 per 100,000 (Table H3). Fall-related injuries account for 45 percent of all injury hospitalizations in Colorado. Approximately 12 percent of the individuals hospitalized for injuries resulting from a fall have a traumatic brain injury.

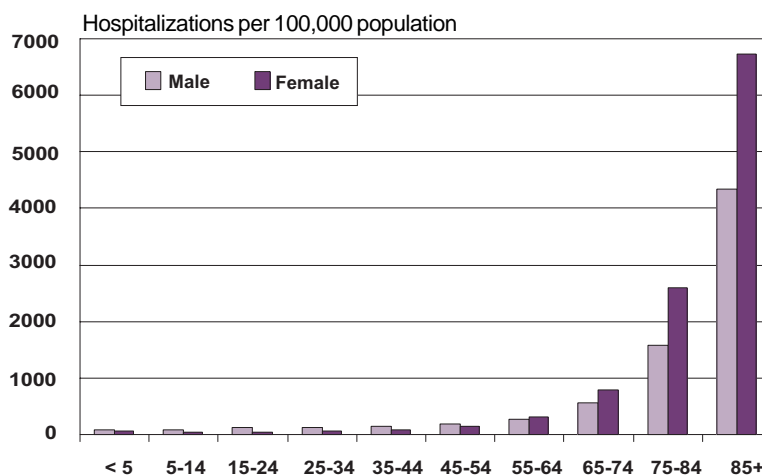
As with deaths, the rate of hospitalization for a fall-related injury is highest in the oldest age groups, with more than 8,000 Coloradans ages 65 and older hospitalized for fall-related injuries each year (Table H7).

Up to age 54, hospitalization rates are significantly higher for males than for females. After age 54, fall-related hospitalization rates for females surpass the rates for males (Table H10).

The circumstances of the fall are generally distinct for each age group. Falling on stairs or from furniture or beds are the most common causes of hospitalization for children under age one. For children ages 1-4, the leading causes of fall-related hospitalizations are falls from furniture or beds; falls from slipping, tripping, or stumbling; falls from playground equipment; falls out of or from buildings; and falls on stairs or steps. Falls from playground equipment and falls from slipping, tripping, or stumbling are significant causes of injuries for 5-14 year olds (Table H17).

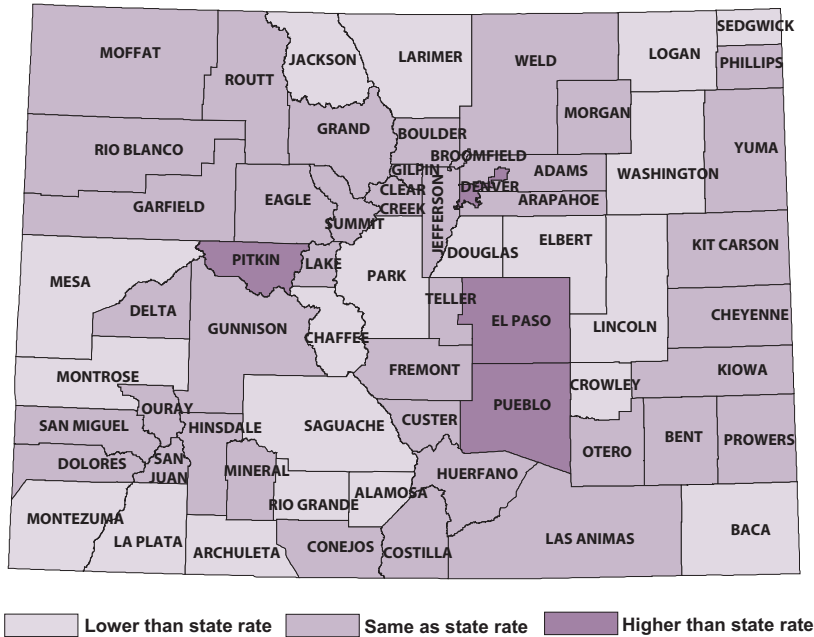
Among individuals ages 14 and older, falls from slipping, tripping, or stumbling cause the greatest number of fall-related hospitalizations. For individuals ages 15-64, other typical causes are falls from stairs, steps, ladders, scaffolding, buildings or other structures. After age 64, there are increasing numbers of injuries due to falls from furniture and beds and fewer falls from ladders or buildings (Table H17).

**Figure 63: Hospitalization rates due to falls by age and sex
Colorado residents, 2001-2003**



Four counties have elevated rates of hospitalization for falls. These include Denver, El Paso, Pitkin and Pueblo counties. Many rural counties have fall-related hospitalization rates that are below the state rate (Table H18).

Figure 64: Age-adjusted hospitalization rates due to falls by county of residence, 2001-2003



Data for Broomfield County are for 2003 only.

Of concern with fall-related injuries is the large number of people who do not return directly to home after hospitalization. For fall-related hospitalizations, only 51 percent of individuals are discharged directly to home after hospitalization, whereas for all other unintentional injuries, 70 percent to 80 percent are able to return directly to home (Table H13). One-third of the individuals hospitalized for a fall are discharged from the hospital to a skilled nursing facility. This may be due to the high percentage of falls occurring in the older adult population.

Traumatic Brain Injury Facts

On average, each year more than 1,500 Coloradans are hospitalized for a traumatic brain injury sustained in a fall (Table T5). This represents a nearly 40 percent increase in 2001-2003 compared to 1997-1999.

- Falls are the second leading cause of hospitalized traumatic brain injuries in Colorado (Table T7).
- Falls are the leading cause of hospitalized traumatic brain injuries for children ages 5 and younger and for adults ages 65 and older (Table T7).
- The rate of hospitalization for traumatic brain injury resulting from a fall is significantly higher for males (46.1 per 100,000) than for females (30.9 per 100,000) (Table T6).

Traumatic brain injuries include concussions, skull fractures, and intracranial injuries from an external impact or forces of acceleration/ deceleration. Traumatic brain injury data tables are found in Appendix C.

Childhood fall injuries

Nationally, falls are the leading cause of non-fatal unintentional injuries for children ages 0-14. Each year more than 2.3 million children ages 14 and younger are treated in hospital emergency departments for fall-related injuries.⁷

In Colorado, falls are also the leading cause of injury-related hospitalization for children ages 1-14. Falls account for 28 percent of the injury hospitalizations for children under age 1, 37 percent for children ages 1-4, 42 percent for children ages 5-9, and 27 percent for children ages 10-14 (Table H11).

The types of falls resulting in hospitalization mirror the developmental stages and activities of growing children. Infants are at greatest risk of falls from beds and other furniture (30 percent) and falls on stairs (16 percent). Falls on stairs sometimes involve an adult who falls while carrying the child. Toddlers ages 1-4 experience falls from beds and other furniture (25 percent), from buildings or structures (9 percent), and from playground equipment (10 percent). Falls resulting in hospitalization for children ages 5-14 are most often due to slipping, tripping, or stumbling, including in sports or recreational activities (29 percent), and playground injuries (22 percent) (Table H17).

Although falls are the leading cause of U.S. emergency department visits for injuries associated with nursery products, the number of visits decreased nearly 30 percent from 1995 to 2003, primarily due to a decrease in injuries resulting from baby walkers. Other nursery products linked to fall-related injuries are cribs, playpens, high chairs, strollers, baby gates, changing tables and infant carriers.⁸

Playground falls

On average, 120 Coloradans are hospitalized each year for injuries due to falls from playground equipment (Table H16). The vast majority (92 percent) are children ages 1-14. Over half (59 percent) of the hospitalizations involve children ages 5-9 (Table H17).

Nationwide, many childhood injuries occur on playground equipment. Each year, more than 200,000 children ages 14 and younger are treated in U.S. hospital emergency departments for injuries from playground equipment. About 75 percent of the injuries involve public equipment in schools or parks. Most playground injuries are associated with climbing equipment, slides and swings.⁹

7. National SAFE KIDS Campaign. (2003). *A Report to the Nation: Trends in Unintentional Childhood Injury Mortality, 1987-2000*. Retrieved March 16, 2005, from http://www.safekids.org/content_documents/nskw03_report.pdf.

8. U.S. Consumer Products Safety Commission. (2001). *Nursery Product-Related Injuries and Deaths to Children Under Age Five*. Retrieved March 16, 2005, from <http://www.cpsc.gov/LIBRARY/FOIA/FOIA05/os/nursery03.pdf>.

9. Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. (2004). *Playground Injuries*. Retrieved March 16, 2005, from <http://www.cdc.gov/ncipc/factsheets/playgr.htm>.

Home playground equipment also poses risks to children. About 70 percent of the 147 playground-related deaths in the U.S. from January 1990 through August 2000 occurred in home locations, generally as a result of strangulations and falls. The majority of home playground injuries seen in hospital emergency departments resulted from falls, most frequently from intentional jumping or dismounting from equipment such as swings.¹⁰

Falls due to skiing and snowboarding

In 2001, codes were added to the *International Classification of Diseases* to identify injuries resulting from falls while skiing or snowboarding.

From 2001 through 2003 in Colorado, 1,960 skiers and 769 snowboarders were hospitalized for injuries due to falling while skiing or snowboarding (Table H15). These numbers do not include skiers/snowboarders who were injured by striking a tree or other object. For Colorado residents, the rates of skiing-related fall injuries were similar for all age groups from 20-74, however the rates of snowboard-related fall injuries were highest for young adults ages 15-24 (Table H17).

Of the 769 snowboarders hospitalized for a fall-related injury in Colorado in 2001-2003, 70 percent were Colorado residents. In contrast, during that same time period, only 36 percent of the 1,960 skiers hospitalized for a fall-related injury were Colorado residents.

The numbers above are underestimates of the total number of injuries due to skiing or snowboarding since not all skiing/snowboarding injuries are captured by looking just at falls. National data on skiing- and snowboarding-related injuries treated in U.S. emergency departments found that falls were the mechanism of injury for 70 percent of skiing injuries and 76 percent of snowboarding injuries.¹¹

Head injuries are an important consideration in skiing/snowboarding. Among Colorado residents, a higher percent of hospitalized snowboarders (18 percent) had a traumatic brain injury compared to skiers (9 percent). In other studies, severe head injuries account for almost 15 percent of all skiing/snowboarding injuries, and head injury is the most frequent cause of death.¹² Use of a helmet while skiing or snowboarding is estimated to reduce the risk of head injury by 29 percent to 56 percent.¹³ Studies show that the use of helmets for winter sports has been increasing. Based on a survey at ski resorts in the western U.S. and Canada, helmet use by adult skiers/snowboarders rose from 12 percent in 2001 to 20 percent in 2002. Helmet use at the ski areas in Colorado that participated in the study was 22 percent. Overall, helmet use was slightly higher for adults ages 55 and older (27 percent) compared to younger adults ages 18-25 (23 percent). One-third of snowboarders wore helmets compared to one-sixth of skiers.¹⁴

10. U.S. Consumer Product Safety Commission. (2001). *Home Playground Equipment-Related Deaths and Injuries*. Retrieved March 20, 2005, from <http://www.cpsc.gov/LIBRARY/playground.pdf>.

11. Xiang, H., Kelleher, K., Shields, B.J., et al. (2005). *Skiing- and Snowboarding-related Injuries Treated in U.S. Emergency Departments, 2002*. *J. Trauma* 58: 112-118.

12. Anderson, P.A., Buller, D.B., Scott, M.D., et al. (2004). *Prevalence and Diffusion of Helmet Use at Ski Areas in Western North America in 2001-2002*. *Injury Prevention* 10: 358-362.

13. Hagel, B.E., Pless, I.B., Goulet, C., et al. (2005). *Effectiveness of Helmets in Skiers and Snowboarders: Case-control and Case Crossover Study*. *British Medical Journal* 330: 281-285.

14. Anderson, P.A., Buller, D.B., Scott, M.D., et al. (2004). *Prevalence and Diffusion of Helmet Use at Ski Areas in Western North America in 2001-2002*. *Injury Prevention* 10: 358-362.

Falls among older adults

In the U.S., more than one of every three adults ages 65 and older fall each year, and falls are the leading cause of injury death in this age group. Of all fractures from falls, hip fractures cause the greatest number of deaths and lead to the most severe health problems. Approximately 25 percent of community-dwelling older adults hospitalized for hip fractures remain in a health care facility for at least a year after the injury. For adults ages 65 and older in the U.S., one-half to two-thirds of falls occur in or around the home.¹⁵

Falls are a fairly common occurrence. In 2003, 14 percent of Coloradans over age 45 reported that they had experienced a fall in the past three months. Almost 40 percent reported that their fall-related injury limited their activities for at least one day or led them to seek medical attention. Coloradans ages 65 and older were just as likely to experience a fall as adults ages 45-64, but individuals ages 75 and older were significantly more likely to report a fall than those ages 65-74.¹⁶

Each year, an average of 230 Coloradans ages 65 and older die from falls. For Coloradans ages 65-74, falls are the third leading cause of injury death, and for those ages 75 and older, falls are the number one cause of injury death. For Coloradans ages 85 and older, falls cause 47 percent of all injury-related deaths (Table D18).

Each year, an average of 8,026 Colorado adults ages 65 and older are hospitalized for fall-related injuries, and many of these individuals (38 percent) sustain a hip fracture. The majority of hospitalizations for fall-related injuries (62 percent) involve adults ages 65 and older. Each year, one of every 17 Coloradans ages 85 and older is hospitalized for a fall-related injury (Table H7).

The leading causes of fall-related hospitalizations for adults ages 65 and older are falls on the same level by slipping, tripping, or stumbling (36 percent), falls from stairs or steps (7 percent), and falls from beds or other furniture (6 percent) (Table H17). Details regarding the circumstances of the fall are not available for 47 percent of the medical records and death certificates for this age group.

Fall-related injuries for older adults are costly and have a major impact on families. The average length of stay for older Coloradans hospitalized for a fall-related injury is 4.7 days, with an average total hospitalization charge of \$15,073.¹⁷

15. Centers for Disease Control and Prevention. (2004). *Falls and Hip Fractures Among Older Adults*. Retrieved March 20, 2005, from <http://www.cdc.gov/ncipc/factsheets/falls.htm>.

16. Colorado Department of Public Health and Environment, Health Statistics Section. (2005). *Falls Among Older Adults in Colorado*. Retrieved March 30, 2005, from <http://www.cdph.state.co.us/hs/pubs/falls2.pdf>.

17. Colorado Department of Public Health and Environment, Injury, Suicide and Violence Prevention Section. (2002). *Injuries Due to Falls Among Older Adults*. Retrieved March 30, 2005, from <http://www.cdph.state.co.us/pp/injepi/elderfalls.pdf>.

Falls can be prevented

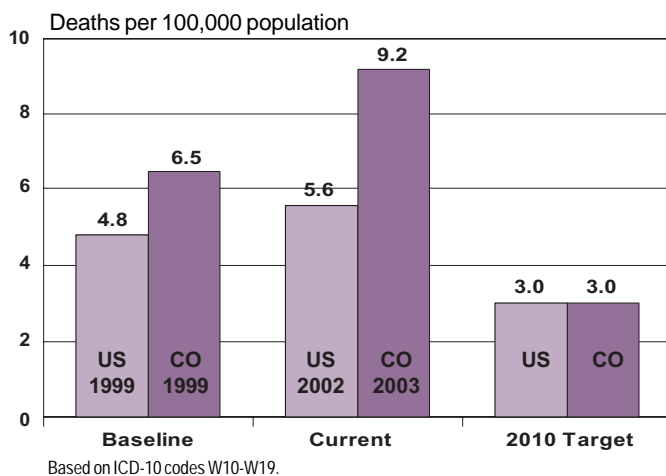
Preventing childhood falls

Nationally, the death rate from falls for children ages 0-14 has declined 51 percent from 1987 to 2000. Prevention efforts that have been proven effective in reducing injuries include environmental changes, such as the use of window bars, and product modification, such as the redesign of baby walkers.^{18,19} Home safety counseling has resulted in improvements in safety practice to reduce childhood falls, but it has not been shown to decrease the number of injuries requiring medical attention.²⁰

Prevention strategies should target the particular risks and types of falls for each age group. A successful community program to prevent childhood fall injuries should include a combination of the following strategies:

- Encourage adult supervision of children, especially when children are on playgrounds or engaged in outdoor play, or when small children are on a changing table, bed, or sofa.
- Provide home checklists to assess the home environment and provide or promote home modifications. A variety of checklists are available (see www.cpsc.gov, www.safekids.org, and www.homesafetycouncil.org).
- Provide parents and others with current information on safe furniture and other home products for children. The Consumer Product Safety Commission lists recalls of consumer products (www.cpsc.gov). A home playground safety checklist is available at www.cpsc.gov/CPSCPUB/PUBS/Pg1.pdf.

**Figure 65: Healthy People 2010 Objective 15-27
Reduce deaths from falls**



- Develop community and school playground safety programs (see www.uni.edu/playground and www.cpsc.gov) that includes:

- Supervision of all children on all playgrounds
- Age-appropriate playground equipment
- Falls cushioned with proper surface material
- Equipment maintenance

18. National SAFE KIDS Campaign. (2003). *A Report to the Nation: Trends in Unintentional Childhood Injury Mortality, 1987-2000*. Retrieved March 16, 2005, from http://www.safekids.org/content_documents/nskw03_report.pdf.

19. U.S. Consumer Products Safety Commission. (2001). *Nursery Product-Related Injuries and Deaths to Children Under Age Five*. Retrieved March 16, 2005, from <http://www.cpsc.gov/LIBRARY/FOIA/FOIA05/os/nursery03.pdf>.

20. Watson, M., Kendrick, D., Coupland, C., et al. (2005). *Providing Child Safety Equipment to Prevent Injuries: Randomized Controlled Trial*. *British Medical Journal* 330: 178-181.

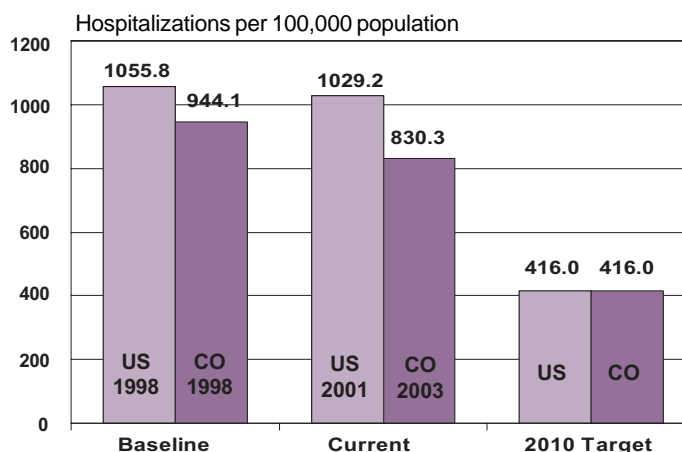
- Ensure that personnel involved in school and recreational programs are aware of proper safety equipment and procedures. Promote school-based injury prevention programs (see www.cdc.gov/HealthyYouth/Index.htm).
- Develop school and community programs that focus on safe use of equipment and promote the use of helmets and other safety gear.

Preventing falls among older adults

Health agencies and safety advocates can assist in prevention by participating in community coalitions that promote public awareness and development of effective educational and skill-building strategies. A successful community program should include a combination of the following strategies:

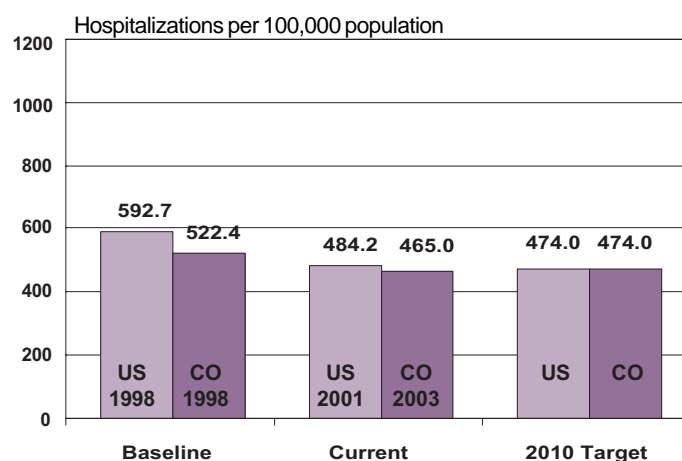
- Promote regular physical exercise. Exercises that improve balance and coordination (such as Tai Chi) have proven to be especially helpful.²¹
- Encourage older adults to review their medications with their health care provider and/or pharmacist and to have their vision checked regularly.
- Older adults should be evaluated by health care providers to identify and address any health conditions that might increase their risk of falling.
- Use a home safety checklist to examine the home environment and promote or provide home modifications. Good checklists are available at www.cpsc.gov and www.aarp.org.
- Support osteoporosis screening and prevention and older adult physical activity and nutrition programs to promote healthy aging.

Figure 66: Healthy People 2010 Objective 15-28a Reduce hip fractures among females ages 65 and older



Based on ICD-9-CM code N820 as the principle diagnosis.

Figure 67: Healthy People 2010 Objective 15-28b Reduce hip fractures among males ages 65 and older



Based on ICD-9-CM code N820 as the principle diagnosis.

21. Centers for Disease Control and Prevention. (2004). *Falls among older adults – Summary Research Findings*. Retrieved March 20, 2005, from <http://www.cdc.gov/ncipc/pub-res/toolkit/SummaryOfFalls.htm>.

For more information

- The Injury and Suicide Prevention Program at the Colorado Department of Public Health and Environment at www.cdphe.state.co.us/pp/injuryprevention/
- *Injury Prevention Strategic Plan 2003-2008* from the Injury, Suicide and Violence Prevention Section at the Colorado Department of Public Health and Environment at http://www.cdphe.state.co.us/em/SEMTAC/ipac/IP_03-08finalstrategicplan.pdf
- Centers for Disease Control and Prevention, National Center for Injury Prevention and Control at www.cdc.gov/ncipc
- National SAFE KIDS Campaign at www.safekids.org
- *Children's Health Topics* from the American Academy of Pediatrics at www.aap.org
- The National Program for Playground Safety at www.uni.edu/playground
- Consumer Product Safety Commission at www.cpsc.gov
- *Risk Watch* educational curriculum at www.riskwatch.org
- Older Adult Initiative Resource Kit from the Colorado Physical Activity and Nutrition Program at the Colorado Department of Public Health and Environment at www.cdphe.state.co.us/pp/COPAN/grants/OAResourceKit.pdf
- *A Tool Kit to Prevent Senior Falls* at www.cdc.gov/ncipc/pub-res/toolkit/toolkit.htm
- *Falls Free: Promoting a National Falls Prevention Action Plan* from the Center for Healthy Aging at www.healthyagingprograms.org
- National Resource Center for Safe Aging at www.safeaging.org
- AARP at www.aarp.org
- Brain Injury Association of America at www.biausa.org
- Home Safety Council at www.homesafetycouncil.org
- National Safety Council at www.nsc.org