

MAGNITUDE OF THE PROBLEM

Nation

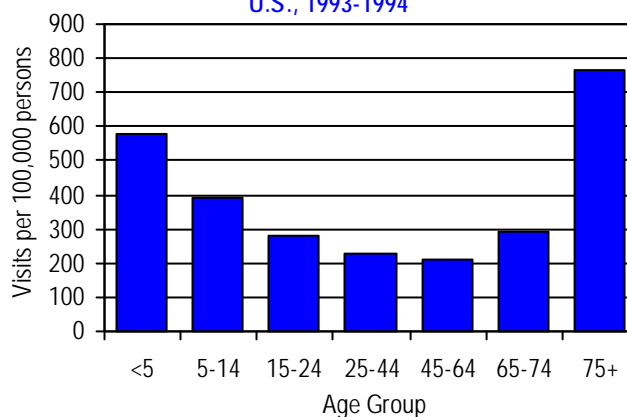
Falls are the second leading cause of unintentional injury deaths and the most common cause of injuries and hospital admissions for trauma.¹ In 2001, 15,764 persons died as the result of falls (10% of all injury deaths).² Falls are the leading cause of nonfatal injury in the United States, accounting for 783,357 hospitalizations and an estimated 11.5 million minor injury cases that are not hospitalized.³ Data reported from emergency departments (EDs) indicated that falls were the leading cause of injury treated in EDs.⁴ Age-specific visit rates for falls were “U-shaped” with rates higher for the young, and older adults (Figure 1). One in ten children aged 1-3 years are treated in the ED each year from falls; of these one-fourth are hospitalized.⁵ In 1994, the estimated cost of fall-related injuries was \$20.2 billion; by 2020, it may reach \$32.4 billion.³

Healthy People 2010 reported a national rate of 4.7 deaths per 100,000 population for 1998 with whites and Native Americans, males, and persons over 65 years experiencing higher death rates. Incidence of falls and the severity of fall complications increase after age 60 years; among persons 65 years and older, incidence increases by 35%. One of three ED visits result in hospitalization for persons 75 years and older compared with less than 3% for persons less than 25 years.³

About 800 work-related falls occur annually.⁶ More than 1400 fatal falls occur in nursing homes and other residential institutions.³ Incidence rates of falls in nursing homes and hospitals are almost three times the rates for persons living at home.³

In 1997, nearly 9,000 persons 65 years and older died of a fall; 82% of these occurred in persons 75 years and older.³ Falls are also the source of 87% of all fractures in the elderly. About 212,000 traumatic hip fractures occur each year in persons 65 years and older in the U.S.; 75% to 80% are sustained by females.³ In the elderly, 60% of fatal falls occur at home, 30% in public places, and 10% in institutions.³

Figure 1. Emergency Department Visits for Falls, U.S., 1993-1994



Source: Health, United States 1996-1997, NCHS

Numerous risk factors contribute to falls including physical, physiological, medical, and behavioral elements. The most common physical factors include age, height, weight,

obesity, estrogen deficiency, problems with gait, balance, vision, muscle strength and mobility, frailness, and history of stroke or falls. Physiological factors include decreased reflex reaction time, neurological/musculoskeletal conditions, bone fragility, and dementia. Medical factors include the effects of medications and mix of drugs, vertigo, poor depth perception, depression and anxiety about falling. Behavioral factors include substance abuse, judgmental error, lack of awareness of risks, and risk-taking. Other risk factors relate to the person's environment, including the home, hospitals, institutions, and other public places, and those less controllable such as roads, walks, parking lots, and outside public places.^{7,8} Also, older persons who have experienced trauma are at increased risk of recurrent trauma. Demographic, medical, and functional factors are potential contributors to the risk of subsequent trauma.⁹ Specific controllable factors include slippery surfaces, uneven floors and covering, wires and cords across floors, loose rugs, unstable furniture, lack of handrails on stairs, poorly protected surfaces on playgrounds, unsafe stairs, cluttered floors, and confined spaces. Specific noncontrollable factors include adverse weather conditions, rain-slippery

roads and driveways, ice covered pavements/roads, poorly maintained streets, and absence of handrails on stairs at public places (churches, buildings, sports arenas).

Oklahoma

In 1999, 224 Oklahomans died from falls (death rate 6.8 per 100,000 population); 82% were 65 years and older (death rate 45.0 per 100,000) and 53% were female (death rate 13.8 per 100,000). Although data on all fall injuries that occur each year in Oklahoma are not available, a total of 3597 people were hospitalized for falls during 1999 (Table 1).

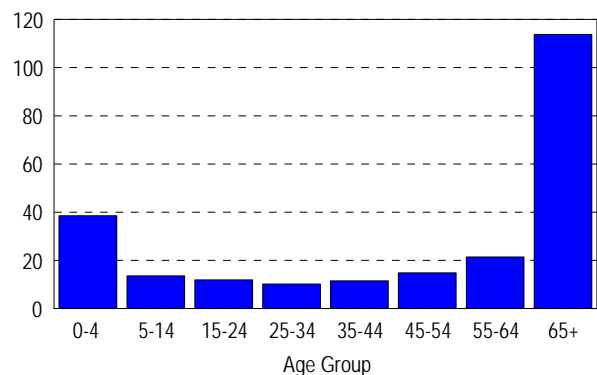
Persons aged 80 years and older comprised 49% of hospitalized cases (rate 1505.7 per 100,00 population) followed by 23% for persons 70-79 years (rate 409.5 per population).

From 1992 to 2001, 32,267 persons were hospitalized or died from traumatic brain injuries in Oklahoma; 9,450 persons (29%) sustained fall-related injuries. Trends showed a steady increase in fall-related injuries each year from 764 cases in 1992 to 1,254 cases in 2001 (Figure 2). During 1992 to 2001, falls accounted for 25% of spinal cord injuries; among persons 65 years and older, falls accounted for 58% of spinal cord injuries.

Table 1. Discharges Due to Fall-Related Injuries
(E codes: 833, 834, 835, 880-888)
OSDH Hospital Discharge Data, 1999

Age Group (years)	# of Discharges	Percent
< 10	41	1%
10-19	63	2%
20-29	52	1%
30-39	93	3%
40-49	166	5%
50-59	235	7%
60-69	333	9%
70-79	837	23%
80-89	1245	34%
>=90	532	15%
Total	3,597	100%

Figure 2. Traumatic Brain Injuries Due to Falls by Age, Oklahoma, 1992-2001



Source: Injury Prevention Service Surveillance System

YEAR 2010 OBJECTIVES

1. Reduce deaths and injuries from unintentional falls to 2.9 deaths per 100,000 population.

Baseline for deaths: 4.6 deaths per 100,000 population were caused by falls in 1999.

Data source - OSDH Vital Statistics data, 1999 (includes ICD-10 codes: W00-W19, comparable to E codes 880-888)

2. Reduce rate of hip fracture among older adults

Reduce hip fracture among females aged 65 years and older to 1214 per 100,000

Reduce hip fracture among males aged 65 years and older to 538 per 100,000

Baseline : Hip fracture in females aged 65 years and older was 1518 per 100,000 in 1999.

Hip fracture in males aged 65 years and older was 673 per 100,000 in 1999.

PREVENTION STRATEGIES

There is a plethora of fall-related studies and prevention projects that describe the mechanisms and contributory factors of fall injuries, and the implementation and evaluation of fall prevention activities with recommendations for reducing the number, severity, and consequences of falls. The great majority of these projects focus on the most susceptible (and most costly) population – older adults. Rarely are fall-related studies and programs focused on the general population unless they are addressing a special circumstance such as escalators. Projects for preventing injury in young children often center on the risks of multiple story dwellings or playgrounds.⁵ Programs and curricula developed for children 5 to 14 years usually focus on hazards in and outside the home, in sports, and recreational activities.¹⁰ Fall-related injuries require multifaceted interventions that should match the multiple risk factors.¹¹

The following strategies to reduce falls and fall-related fractures represent the broad array of recent programs, clinical trials, and other studies that have either proven effective or show promise, or postulate why they are not effective. The strategies include projects conducted in health care systems, institutions, community dwellers, and community-based programs such as those described in *U.S. Fall Prevention Programs for Seniors: Selected Programs Using Home Assessment and Modification*, published by the National Center for Injury Prevention and Control of the Centers for Disease Control and Prevention.^{12,13,14}

Multifactorial Interventions

The most successful interventions to delay initial fall, and reduce the risks, number of falls, and fall-related injuries in the elderly are the use of multidisciplinary, multifactorial strategies conducted in facilities, communities, or homes.^{14,15,16} Typically, multicomponent interventions include exercise, gait training, improvements to home safety, review and modification of medications with adverse effects, treatment of health problems associated with falling, and education.¹⁷ Cluster randomized trials with multiple strategies for preventing falls in residential care facilities have demonstrated a significantly reduced number of residents who fell, total number of falls, time to first fall, and number of hip fractures.¹⁶ A health care based multicomponent strategy resulted in estimated risk reductions of 14%-27% for balance, gait training and strengthening exercise, 19% reduction in home hazards, 39% for discontinuation of psychotropic medication, and 25%-49% for multifactorial risk assessment with targeted management.¹⁴ Risk of falling can be reduced by modifying known risk factors, including fear of falling.^{18,19} Multiple risk factor intervention strategies have resulted in a significant reduction in the risk of falling among elderly persons in the

community, including low-cost, home-based fall reduction programs.^{20,21} Also, the proportion of those who had the targeted risk factors for falling was reduced – thus risk factor modification may partially explain the reduction in the risk of falling.¹⁶ The success of any intervention depends in part on the client's mental status. One multifactorial intervention was not effective in preventing falls in older people with cognitive impairment and dementia. Further study is required of patients with cognitive impairment and dementia to determine optimal interventions and to identify the most important modifiable risk factors.²²

Home Assessment and Safety Programs to Prevent Falls

Numerous programs directed to people age 65 years and older provide materials on how to live more safely, including fall prevention. Written information includes tips for barrier-free house design, how to injury proof the home, ideas for independent living, and a home safety checklist.²³ Some programs have physicians available to conduct geriatric assessments concerning medications and risks for falls. Aging agencies or insurance providers may cover the costs for the program where information and resource referrals are free. However, seniors must often independently seek repair services to correct identified hazards and, in some cases, reference lists are available to help locate materials and labor. These programs usually provide a comprehensive assessment of home hazards and recommend safety changes such as removing loose rugs, and installing grab bars, toilet rails and handrails.²⁴

Exercise-Based Falls Prevention Programs

Exercise programs for older adults commonly address the three major areas of strength, balance, and endurance and appear to lower

the risk of falling. Successful home-based exercise programs usually test the clients and tailor the regimen with necessary physical capacity and health considerations to result in a positive response to exercise. Trained physical therapists or health professionals implement the programs and incorporate exercises of increased difficulty to accommodate initial improvement in strength and balance. The individual's progress is checked two or three times a year. A walking program to increase physical capacity usually complements the strength and balance program.²⁵ A review of controlled clinical trials to define indices of frailty and potential occurrence of falls²⁶ and to assess the effectiveness of exercise programs in preventing or lowering the risk of falls and related injuries concluded that exercise was effective in lowering the risk of falling in the intervention groups and that exercise should form part of falls prevention programs.^{25,26,27} Community-based balance and strength exercise programs have reported a 29%-49% estimated risk reduction for falls.¹⁴

Modification/Withdrawal of Medications with Fall-Contributing Adverse Effects

The most complicated element of a strategy to prevent falls involves reduction in the use of medications; falling is one of the most common adverse events related to drugs.¹⁴ One study reviewed frequently prescribed medications for adverse effects on nervous, circulatory, and muscular systems that have the potential to cause fall injuries.²⁸ Other studies have shown a clear relation between falling and the use of a higher number of medications (more than four).^{14,29} There is strong evidence that the use of psychotropic drugs is linked to the occurrence of falls.^{29,30} Interventions that have focused on the reduction or withdrawal of psychotropic medications, have resulted in substantial reductions in fall rates.^{30,31} The evaluation of all medications, including over-the-counter medications, is a necessary component of fall risk assessments, especially

in the elderly population. Assessment, modification, and monitoring of prescription medications are an integral part of most multidisciplinary, multifactorial interventions to reduce risk of falls and fall injuries.^{32,33}

Hip Protectors to Prevent Hip Fracture

Randomized controlled trials to examine the effectiveness of external hip protectors in reducing the incidence of hip fractures during a fall have mixed results. Clinical trials targeted to individuals at high risk due to osteoporosis or frail elderly in institutions found that appropriate hip protectors, designed to divert direct impact away from the hip during a fall, could result in reduced incidence of hip fracture.³⁴ Studies have found that fracture may be reduced by 80% among the high-risk frail elderly³⁵ or those living in institutional care with a high background incidence of hip fracture³⁶ with the use of a protector. Numerous clinical trials where randomization of individuals in institutions or living in their own homes were conducted showed no evidence that hip protectors were effective in preventing hip fractures.³⁷

Safety Programs for People with Disabling Conditions

This type of program is directed to people age 60 years and older or younger patients with lifelong disability conditions. Safety issues for each patient and family are addressed, in collaboration with local home health and aging organizations. They provide a comprehensive assessment of home hazards, and offer free labor and assistance in locating resources and obtaining materials needed to correct hazards. The local health department conducts initial training and education programs, registered nurses or allied health professionals conduct the home safety survey. Materials include a checklist and survey forms, presentations about falls awareness, a video, and patient/family education pamphlets. Evaluation results

show reductions in the incidence of falls as well as an increased awareness by staff, patients, and families of the importance of monitoring patients at risk for falls.³⁸

Remembering When: A Fire and Fall Prevention Program for Older Adults

This program is directed to groups 65 years and older. The core of "Remembering When" utilizes 16 key messages, using fun and interaction themes developed by a technical advisory group of experts and practitioners from national and local safety organizations. The fire messages address ashtrays, space heaters, kitchen/cooking hazards, stop/drop/and roll, smoke alarms, and escape planning considering persons with disabilities. Fall messages include: 1) regular exercise; 2) take your time; 3) clear the way; 4) look out for yourself; 5) slippery when wet; 6) throw rugs; 7) tread carefully; and 8) best foot forward (suitable footwear). The program utilizes group presentations (3 lessons), home visits, and the smoke alarm installation and fall intervention program. Materials include a guidebook, message cards, trivia game, home safety checklist, brochures, a fire and fall prevention reminder sheet, prevention tips for people with disabilities, other forms, certificate of recognition, and evaluation card.³⁹ Reports on the effectiveness of the program is mixed. The program is difficult to organize and sustain over time.

Prevention of Falls in Facilities

Falls among hospitalized persons has increased steadily over the past three decades.¹¹ Typical injury rates for residents of geriatric or rehabilitation facilities range from 25% to 50%; of every 100 falls a fracture occurs in 1 to 6 falls.¹¹ Many interventions aimed at reducing the frequency of falls require limitations or close supervision of the patient's activities which is both costly and interferes with the patient's functional autonomy and

quality of life. Studies of risk factors for falls and fractures lead to knowledge of which patients are most likely to sustain injury so that adaptations to prevent falls and measures to optimize patient safety in the hospital environment can be implemented.

Standardized assessment of home hazards along with specific recommendations after discharge have been associated with a 20% reduction in the risk of falling.¹¹ Many elements of the following programs are planned to carry on to the home environment at discharge.

Comprehensive Fall Prevention and Awareness Programs

A typical hospital-based fall prevention program depends on integrated medical and managerial strategies,⁴⁰ that begin with a functional assessment. Functional assessment evaluates the patient's physical and psychosocial functioning as a measure for outcome, planning care, payment, and as a predictive tool in programs aimed at prevention.⁴¹ Each patient admitted to the hospital is assessed for risk of falls considering cognition, ambulatory status, fall history, sex, age, and medication regimen. Ideally, a multidisciplinary team conducts the comprehensive examination of the patient's affective, medical, pharmacological, physical

and psychological function, and an audiology assessment.^{42,43,44,45,46} The results are discussed and protocols for safety outlined to be followed by all staff who advise patients and their families about the patient's risk for falls and interventions they may use.

Interventions targeted to patients at risk include: 1) the use of geriatric chairs which hold the patient securely in place; 2) application of "posey vests" which help secure the patient without constricting any part of the body; and 3) more licensed staff to meet the needs of patients in toileting, feeding and ambulating. During hospitalization, the protocols are reviewed and modified as needed. A record of the number and time of falls, diagnoses and level of activity privileges is kept to ascertain cause of the fall. These programs are successful in reducing the number of deaths and injuries over the years from falls. As preparation begins for discharge, the staff, patient and family meet to discuss the regimen to be followed at home given the status of the six elements. Falls assessment/prevention programs designed to reach a broad base of clients requires a simple screening procedure where those at increased risk of falling are assessed and others given fall-prevention information only.

RECOMMENDED STRATEGIES FOR THE PREVENTION OF FALL INJURIES

RECOMMENDATION

1. Determine the incidence and circumstances of fall-related injuries in Oklahoma.

2. Promote fall prevention, education and public awareness campaigns among persons 65 years and older.

IMPLEMENTATION PLAN

- 1a. Obtain hospital discharge data to determine fall-related injury data by 2005.

- 1b. Produce an epidemiologic profile of all fall injuries that includes high risk populations, length of stay in a hospital, costs, and outcomes for persons 65 years of age and older by 2005.

- 2a. Review existing home hazard checklists from other OSDH program areas, agencies, and other states. Develop and disseminate a fall-specific home hazard checklist to older adult groups, organizations, and county health departments with a guide to correcting hazards by 2005.

- 2b. Conduct targeted education regarding environmental hazards and correction of such hazards by 2006.

- 2c. Conduct public awareness campaign regarding risk factors such as home hazards, medication, and fall protection equipment for persons 65 years and older by 2005.

- 2d. Train long-term care and assisted living facility staff regarding risk factors and prevention of senior falls by 2006.

- 2e. Disseminate information to physicians by 2006 regarding:
 - 1) The magnitude, costs, causes, and prevention of falls among seniors;
 - 2) The importance of drugs and adverse drug reactions as contributing factors to senior falls; and
 - 3) Counseling seniors on home hazards.

- 2f. Work with agencies to disseminate information on the risks and prevention of falls among seniors (Areawide Aging, DHS, EMSA, OKC firefighters) by 2006.

- 2g. Coordinate with the OUHSC Department of Rehabilitation Science to provide regular instruction about the physiologic and safety aspects of exercise and fall prevention to activity directors from community senior centers.

RECOMMENDATION

2. Promote fall prevention, education and public awareness campaigns among persons 65 years and older.
(continued)

3. Promote exercise among persons 65 years of age and older.

4. Promote fall prevention education among children and their caregivers.

5. Reduce risk factors for falls in homes and other dwellings.

6. Increase availability of information about fall risks with hospitals and other facilities.

IMPLEMENTATION PLAN

- 2h. Collaborate with area senior centers to publicize annual screening and to increase awareness of screening benefits to seniors.

- 2i. Publicize a web-based resource for activity directors of community senior centers and consumers that recommends exercise modification to address specific falls risks.

- 3a. Research and distribute best practices regarding implementing physical exercise programs among seniors 65 years and older to providers, family members and caregivers by 2006.

- 3b. Conduct public awareness and education campaign regarding the benefits of exercise in the prevention of falls and fall-related injuries by 2005.

- 3c. Promote physical exercise programs among seniors 65 years and older by 2006.

- 4a. Integrate the Injury Prevention Program (TIPP) fact sheets into CHD clinic encounter visits by 2005.

- 4b. Promote distribution of fall prevention educational materials to childcare facilities, head starts, and school-based early childhood classes by 2006.

- 4c. Encourage physicians to educate parents and caregivers regarding the causes and prevention of falls among young children by 2005 and ongoing.

- 4d. Promote use of helmets while riding bicycles and tricycles for children by 2005.

- 5a. Develop education material specific to reducing risk factors for falls and distribute to county health departments, senior citizen centers, Turning Point partners, nursing homes, and DHS by 2006.

- 6a. Review existing information for reducing risk of falls in hospitals and other facilities to assess need for additional materials by 2007.

- 6b. Work with health professionals in selecting/developing information materials on fall prevention in facilities and community dwellers 2007.

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