ELDERLY FALL VICTIMS AND THE INHERENT RISK TO THE COMMUNITY

LEADING COMMUNITY RISK REDUCTION

By: Denise A. Giard
Albany Fire Department
Albany, Oregon

An applied research project submitted to the National Fire Academy
As part of the Executive Fire Officer Program

February 2003

Abstract

Our society is aging and over the next 50 years the number of people aged 65 - 84 is projected to triple, the number of those over the age 85 is projected to grow six-fold. The 'graying of America' has huge implications on health care and for those institutions caring for the injured in particular. In 2000 there were approximately 108 million visits to an emergency room, 15.1% of those individuals were over 65 and 65.8 percent arrived by ambulance.

Analysis of the call data for the Albany Fire Department revealed a disproportionate number of ground level fall responses to our geriatric population in comparison to other age groups. The purpose of this research project was to identify recommendations that the Albany Fire Department could employ that would lead to a reduction in ground level falls in our geriatric population.

Evaluative research analyzing department data and reviewing pertinent literature on the issue of ground level falls in the elderly population were employed to answer the following questions:

1. What conditions exist that may predispose the elderly to fall?
2. What injuries are sustained as a result of a ground level fall?
3. What are the impacts from a single ground level fall?
4. What interventions have been previously recommended to prevent ground level falls?

It is concluded that an elderly fall victim is a serious issue and with the elderly population increasing 380% by the year 2025 the impact on emergency services will be catastrophic. The impact of an injury incurred as a result of a ground level fall decreases that persons ability to maintain daily functions on their own. The fear of falling and becoming dependent on another is life altering.

The research concluded with the following recommendations:

1. Develop a coalition of interested individuals to develop a prevention program.
2. Develop and implement community-based intervention program.
3. Continue to analyze transport data to assess effectiveness of a prevention program.

Table of Contents

List of Tables

List of Figures

Introduction

Our society is aging. We are getting older at an exponential rate. The World Health Organization (WHO) (2002) predicts growth in the elderly population to reach 1.2 billion by 2025; an expansion of 380 percent since 1970. (As cited in Diamond, 2002) Much of this growth can be attributed to the, 'baby boom', population surge that started shortly after World War II and numerous advances in medical care. We are much stronger, more active, more mobile, and living longer and we hope much fuller lives. This phenomenon does not come without some risk. As our elderly population increases so do the demands on emergency services.

For the past five years the Albany Fire Department (AFD) has experienced a 15.8% increase in emergency medical responses and over 50% of those responses involved individuals over 65 years of age. Approximately 25% of those responses were trauma related, 15.7% of which were from ground level falls. (AFD, 2002) Analysis of response data indicates that a problem exists with the disproportionate number of ground level fall responses to our geriatric population in comparison to other age groups.

The purpose of this research is to identify recommendations that the Albany Fire Department may employ that could lead to a reduction in the ground level falls in our geriatric population. Evaluative research analyzing department data; and reviewing studies, articles, journals and texts on the issue of ground level falls in the elderly population were employed to answer the following questions:

1. What conditions exist that may predispose the elderly to fall?
2. What injuries are sustained as a result of a ground level fall?
3. What are the impacts from a single ground level fall?
4. What interventions have been previously recommended to prevent ground level falls?

Background and Significance

Peterson (1999) stated that over the next thirty years, global life expectancy is projected to rise by another seven or eight years. This advance alone will raise the number of elderly by roughly one-third.

Over the next fifty years, while the number of people aged 65-84 is projected to triple, the number of those aged 85 and over is projected to grow six-fold. In the United States, these old old consume twice as much hospital care per capita - and over twenty times as much nursing-home care - as elders between 65-74 (p. 14). Sterling, O'Connor, & Bonadies (2001) projected that by the year 2030 the United States population over the age of 65 will represent 25% of the total population, roughly double the current proportion (p. 116).

Clearly the 'graying of America' has huge implications on health care in general and for those institutions caring for injured patients in particular. In 2000 there were approximately 108 million visits to an emergency room, an increase of 14% since 1997. 15.1% of those individuals seen were 65 years of age or older and 65.8 percent arrived by ambulance (McCaig & Ly, 2002, p. 3). Falls constitute the most common mechanism of injury in the geriatric population, with an annual incidence of 30% in those over 65 rising to 50% in those over 80 years of age (Sterling et al., 2001, p.116). Falls are overall the largest contributor to injury-related hospital admissions and death for older Americans. Most of these falls occur at ground level and account for 87% of all fractures for people 65 years and older (CDC, 2002, p. 1). Older adults comprise 13% of the overall population, yet they account for 73% of all fall-related deaths (CD Summary, 2002). The high frequency and fatal nature of falls in the elderly are a major concern.

Since 1950 the total population for the state of Oregon has increased by over 226% but those residents over the age of 65 have increased by approximately 331%. By the year 2015 those over the age of 65 are projected to grow to an additional 168% (Portland State University, 2001). Because individuals over the age of 65 are the fastest growing segment of the population, more efforts should be directed toward education and prevention of fall-related injuries.

Over the past five years emergency medical responses for the Albany Fire Department (AFD) have increased by 15.8%. Hospital transports of those over the age of 65 have increased by 55.4% and approximately 25% of those transports are trauma related, more than one-half are due to ground level

falls. We are experiencing a trending upwards of ground level falls with the prognosis of an increased impact on AFDs ability to handle the transports that will ensue.

Each day our ability to handle emergency calls is challenged by multiple simultaneous ambulance responses, with numerous situations serious enough to warrant engine-company assists. The impact for AFD is not only the ability to have enough resources to handle the numerous transports but the ability to maintain sufficient resources to staff apparatus to handle the potential, yet infrequent, fire response. We have been very fortunate in that, on the rare occasions we have had a structure fire, at least an engine and the truck company have been able to either break away from a medical call or they have been in quarters. Our ability to combat a significant fire with adequate resources immediately is almost always impossible. We have mutual aid agreements with the neighboring communities and have had on numerous occasions needed their assistance while on-duty personnel freed themselves from existing calls or off-duty personnel returned to duty for the additional coverage needed. Like most departments our ability to get off-duty personnel back for coverage is diminishing, child care responsibilities, other employment or residing outside of the area contribute to their lack of availability.

AFD has been attempting to meet the community's needs and demands through dual trained personnel handling the emergency at hand. We have found over the past twenty plus years that the demand has shifted from traditional fire fighting responses to emergency medical treatment and transport responses. The numbers are fairly consistent throughout the nation that the shift is 80 to 90 percent EMS. Despite the shift a fire department still has the responsibility to respond to fire related emergencies.

The fire services' ability to handle the potential increase in call volume from our aging population and protect our community resources from fire incidents will be further challenged nationwide, but for Albany it will be realized much sooner.

Implementation of the recommendations from this research could result in decreasing the demand on emergency services and increase availability of resources for other emergencies, and also potentially minimize the morbidity and mortality of our elderly fall victims. Falls are preventable events and should

not be considered an inevitable outcome of the aging process. It is important to recognize that any recommendations made as a conclusion to this research will need to be shared and efforts made to get community-wide support. The issue of the elderly fall victim is not only one for the fire department but it is one for the community as well. The need to form a coalition of interested parties is paramount for any potential success to the reduction of ground level falls in our elderly population. The desirable outcome will be a prevention program that meets the needs of the community through injury prevention, risk reduction and public education which directly correlates to the mission of the Albany Fire Department and one of the operational objectives established by the United States Fire Administration. Utilizing the "Community Risk Reduction" model presented in the Leading Community Risk Reduction class as part of the Executive Fire Officer Program will assist in setting the direction for the recommendations to be facilitated (National Fire Academy, 2002).

Literature Review

The challenge of global aging, like a massive iceberg, looms ahead in the future of the largest and most affluent economies in the world. Visible above the waterline are the unprecedented growth in the number of elderly and the unprecedented decline in the number of youth over the next several decades. Lurking beneath the waves, and not yet widely understood, are the wrenching economic and social costs that will accompany this demographic transformation (Peterson, 1999, p. 3).

“In recent decades the number and incidence of injuries caused by falls among older adults have increased dramatically throughout the world, and without any population level intervention the increasing trend is likely to continue” (Kannus, 1999, p. 205). Swift, (2001) stated that each year in Britain a third of the population aged over 65 has a fall, and half of these people fall at least twice (p. 855).

Rothschild, Bates and Leape (2001) reviewed four studies conducted by colleagues between 1985 to 1996 and found that falls were a major source of morbidity and mortality in older patients. The studies looked at falls in the community, in nursing homes and in the hospital setting (p. 2719). See Table 1.

Table 1: Comparative Fall Studies

Study	Year	# of Pts.	Mean Age	Incidence	Location
Tinnetti et al	1988	336	78.3	32.00%	Community
O'Loughlin et al	1993	409	74.8	29.10%	Community
Thapa et al	1996	1,228	65-84	49%	Nursing Home
			> 85	41%	Nursing Home
Morgan et al	1985	12,218	NA	1.9% +	Hospital

Falls seem to be fairly prevalent and the situation serious enough to warrant numerous studies conducted to find out the causes for falls in hopes of identifying potential solutions to this problem. Further review of the literature assisted in answering the following questions:

1. What conditions exist that may predispose the elderly to fall?
2. What injuries are sustained as a result of a ground level fall?
3. What are the impacts of a ground level fall?
4. What interventions have been previously recommended to prevent ground level falls?

1. What conditions exist that may predispose the elderly to fall?

Older people frequently fall, causing a serious public health problem, with a substantial impact on health and healthcare costs (Feder, Cryer, Donovan, Carter, 2000, p. 1007).

Newton (2001) identified five categories of mechanisms responsible for and risk factors associated with injury in the geriatric population. Physiologic changes associated with the aging process, in combination with comorbid illness, can contribute to injury in geriatric patients. Most mechanisms can be summarized into the following:

1. A decrease in vision or hearing.
2. Changes in proprioception, decreased muscle coordination and/or strength and slowed reaction times.
3. Certain classes of medication can precipitate postural hypotension or syncope.
4. Systemic illnesses such as arthritis (p. 2).

Knudson's (1990) conclusions as to the causes of falls in the elderly are summarized in Figure 1 (p. 52).

Figure 1: Causes of Falls in the Elderly.

Reduced visual acuity
Impaired hearing
Vestibular dysfunction (dizziness)
Musculoskeletal disorders
Dementia
Postural hypotension
Syncope
Cardiac dysrhythmias
Environmental hazards
Medications (including alcohol)

Swift (2001) concurred with the risk factors as impairment of balance, gait, or mobility; polypharmacy; visual impairment; impaired cognition or depression; stroke or history of stroke; and postural hypotension (p. 856).

Rothschild et al. (2001) concluded that age, female sex, and living alone are all associated with increased rates of falling. Environmental factors are more important causes of falling for younger elderly patients; while host-related factors (decreased mobility, visual impairment, dizziness, and neurologic or cardiovascular diseases) play a more significant role for the more senior and frail elderly patients (p. 2721).

Feder et al. (2000) evaluated previous prevention of falls studies and any new evidence up to March 1998. They evaluated exercise interventions alone, multifaceted interventions, assessments in the community and in residential settings. Successful intervention programs included medical assessment and home safety assessment and advice, changes in prescribed drugs, environmental changes, tailored exercise, training in transfer skills and gait and referral of clients to relevant healthcare professionals according to need (p. 1009).

Seemongal-Dass, James, & Atherly (2001) were disappointed with the guidelines established by Feder et al. because they did not seem to include any references to the patients' visual function. They indicated that there had been several reports linking poor visual function with an increased risk of falls or fractures related to falls. Poor vision is quite common in elderly people. The causes are varied and include problems related to spectacles (not wearing them, incorrect prescription, scratched lenses, inability to afford them, inappropriate lenses), cataracts, glaucoma, age related macular degeneration, diabetic retinopathy, and other vascular abnormalities (p. 554).

Day, Fildes, Gordan, Fitzharris, Flamer & Lord (2002) conducted a randomized controlled trial of 1090 aged 70 years and over residents of Melbourne, Australia. The trial targeted the risk factors of strength, balance, poor vision, and presence of home hazards. An initial assessment was conducted and after removal of home hazards, vision exams with appropriate treatment, evaluation of prescribed and over-the-counter medications, the participants that attended a weekly exercise class of one hour for 15 weeks, supplemented by daily home exercise resulted in the most significant reduction in falls. There was a greater reduction in falls in the programs with more intense exercise regimes. Group based exercise was the most potent single intervention tested, and the reduction in falls seems to have been associated with improved balance. Home hazard management and vision screening and referral are not markedly effective in reducing falls when used alone but add value when combined with the exercise program (p. 5 & 6).

2. What injuries are sustained as a result of a ground level fall?

Rothschild et al. (2001) concluded that injuries associated with hospitalization are more frequent in older ($\geq$ 65 years) than in younger patients, and they may be more severe and more often preventable. The increasing age of the population magnifies the importance of this problem (p. 2717).

A Center for Disease Control (CDC) Research Agenda (2002) recorded that "approximately 30% of older adults and 40% of those over age 80 report having fallen in the past year. Falls account for 29%

of injury deaths among adults 65 and older and result in 300,000 hip fractures annually at a cost of more than $10 billion" (p. 21).

About two thirds of these injuries are bone fractures, the hip fracture being the most common, the most devastating, and the most expensive that our healthcare systems have to face (Kannus, Niemi, Palvanen, Parkkari, 1997, p. 1174).

Sterling et al. (2001) conducted a study of 1,512 patients, of which 333 were greater than 65 years of age with falls being the mechanism of injury in 48%. The Abbreviated Injury Scale (AIS) evaluation in Table 2, revealed that 47% of those over 65 versus 22% of those younger than 65 experienced head/neck injuries as the most prevalent injury (p. 118).

Table 2: AIS Patterns for all Falls

AIS Region	**>65 (#159)**	**<65 (#83)**
Head/Neck	75 (44%)	18 (22%)
Face	14 (9%)	10 (12%)
Chest	37 (23%	7 (8%)
Abdomen	3 (2%)	10 (12%)
Pelvis/Extremity	43 (27%)	12 (14%)
Skin/Soft Tissue	75 (47%)	50 (60%)

In Britain in 1997, 67% of accidental deaths in females aged over 65 were due to falls. Fractured femur is associated with 33% mortality within one year (Swift, 2001, p. 855).

Chakravarty & Sorman (2001) stated that falls are the most frequent cause of morbidity and mortality related to injury in elderly people and as such represent a major health problem. Injuries related to falls will pose even greater challenges to the health service with an ageing population. Hip fracture is one of the most costly and debilitating outcomes resulting from a fall but occurs in only 1% of

falls. Experts estimate that in people aged over 75 over 90% of hip fractures are attributable to fragile bones due to osteoporosis. Strategies to reduce fractures, especially of the hip, need to address both falling and bone strength (p. 554).

Loss of bone density and the presence of degenerative processes increase the likelihood of major fractures and injuries secondary to relatively minor trauma. The musculoskeletal system is the most injured system in older people. Severe cervical spine injuries should always be considered in geriatric trauma patients. Newton (2001) further mentions that high-level cervical fractures are the rule, with the odontoid being the most commonly fractured site. The distal radius is the most commonly fractured site in the upper extremity, and the hip in the lower extremity. Hip fractures are the leading cause of death within the first year after injury, most likely from complications related to long-term immobility (p. 7-8).

Newton (2001) surmised that a "head injury in older people carries an impressively high mortality rate and poor prognosis in the survivors. Complications stemming from the acute injury and from limited geriatric reserve are believed to be responsible for some of the excessively high mortality seen in older people with head injuries." (p. 5) He further concludes "patients with head injuries have a four-fold increase in their risk of dying when compared to younger cohorts. Injured elders presenting with a Glascow Coma Score (GCS) between 13 and 15, one in five had a significant bleed yet presented with only confusion. Severe neurotrauma - defined as a GCS less than 8 - carries a 70% to 90% mortality rate in the old" (p. 7).

3. What are the impacts from a single ground level fall?

Falls were the third leading cause of injury-related deaths among Americans of all ages and are the leading causes of injury-related deaths among people ages 65 and older. Of older adults who fall, 20% to 30% suffer moderate to severe injuries that reduce mobility and independence and increase the risk of premature death (CDC, 2002, p. 17).

The CDC (2001-2002) stated that in 1994, the estimated cost of fall-related injuries was $20.2 billion. By 2020, it may reach $32.4 billion. In 1998, more than 9,600 people age 65 and older died from fall-related injuries, making falls the leading cause of injury death among this age group (p. 64).

One third of the geriatric population suffers from falls each year. Swift (2001) mentioned that each year in Britain a third of the population aged over 65 has a fall, and half of these people fall at least twice (p. 855). The mortality rate is about 20 per cent in the year following a fall. Many of these individuals suffer from complications to the original injury due to reduced mobility. These complications include pneumonia, deep vein thrombosis and pulmonary emboli (Diamond, 2002, p. 6).

Swift (2001) mentioned that each year in Britain a third of the population aged over 65 has a fall, and half of these people fall at least twice. (p. 855)

With geriatric trauma accounting for a disproportionate 1/3 of all trauma-related expenses currently, it can be expected that the cost of caring for the injured elderly will rise dramatically (Sterling et al. 2001, p. 116).

Salkeld, Cameron, Cumming, Easter, Seymour, Kurrle et al. (2000), explored the perspective of older people regarding the quality of life after falls and hip fracture. Their finding supports the conclusion that hip fractures are a serious threat to the quality of life of older people. Eighty percent of the 194 women surveyed would rather be dead than experience the loss of independence and quality of life that results from a bad hip fracture and subsequent admission to a nursing home (p. 344). Among older women who have exceeded average life expectancy, quality of life is profoundly threatened by falls and hip fractures. Any loss of ability to live independently in the community has a considerable detrimental effect on their quality of life.

Older patients with preexisting illnesses do fare more poorly when injured. Preexisting illness also significantly prolongs the length of hospital stay and cost of care for older patients with injuries. The overall trauma mortality rate in geriatric patients ranges from 15% to 30%, which is

> significantly higher than the 4% to 8% mortality rate experienced by the younger trauma population. Beyond the first 24 hours, mortality commonly stems from secondary complications, including pneumonia, sepsis, and ARDS. Despite representing 12% of the nation's population, more than 800,000 older people are hospitalized annually with injuries. This group consumes nearly one third of all trauma-related hospitalization expenses, a sum of approximately $87 billion annually (Newton, 2001, p. 9 & 10).

Oreskovich, Howard, & Copass (1984) reviewed 100 patients over the age of 70 who were entered into the trauma system with multiple injuries and found that 85% of these patients survived their injuries, however only 12% were able to return to their previous level of independence (p. 565).

4. What interventions have been previously recommended to prevent ground level falls?

Successful fall prevention programs target high-risk patients and are cost effective. In the home setting, Tinetti et al. achieved a 31% reduction in fall rates by use of a multifactorial intervention program that included medication review, education, and training in gait and transfer skills, changes in environmental hazards, strengthening exercises, and behavioral modifications (Rothschild et al. 2001, p. 2724).

Kannus (1999) concluded that the bone preserving action of exercise in adulthood might be important in maintaining bone strength and preventing osteoporotic fractures. Impact type exercise that creates versatile strain distributions throughout the bone structure can best improve bone strength. Exercise can also improve gait, balance, coordination, proprioception, reaction time, and muscle strength – even in very old and frail elderly people. The effect of exercise in preventing falls and fractures in elderly people has not yet been proven, however past and current physical activity does protect against hip fracture, reducing the risk by up to 50%. Weight bearing activity seems to be most protective, and even daily walking and climbing stairs can be effective (p. 205).

Feder et al. (2000) reviewed 21 previously conducted trials on prevention of falls in older people. They grouped the intervention and trials settings in which they were testing to: exercise interventions alone, multifaceted interventions, and assessment in the community or a residential setting. The results from the trials of exercise on its own could not support a recommendation of exercise programs for preventing falls in unselected older people, with the exception of t'ai chi. A t'ai chi study found a reduction in the number of falls, by almost half compared with a control group. Individuals who received training in exercise and balance decreased their rate of falls. Interventions aimed at postural hypotension, gait, balance, transfers, strength and range of motion of the lower extremities were most associated with a reduced incidence of falls (p. 1008).

Successful intervention programs included medical assessment and home safety assessment and advice, changes in prescribed drugs, environmental changes, tailored exercise, training in transfer skills and gait, and referral of clients to relevant healthcare professionals according to need (Feder et al. p. 1009).

Swift (2001) suggested that prevention programs that target specific populations (independent of individual risk status) needed to be considered. To promote low cost measures in primary prevention the framework should address the following objectives: raised safety awareness among the public; improved environmental safety measures; lifelong healthy eating (with particular reference to calcium and vitamin D); and healthier levels of physical activity and exercise (p. 856).

Procedures

Evaluative research was employed to determine if there were any recommendations forthwith that could lead to the reduction in ground level falls in the population group over 65 years of age. Data was collected from local, state, and federal agencies for analysis of any increases of trauma related incidents in our elderly population. A literature review at the National Fire Academy, the two local Albany area hospitals and on-line through the Internet provided resources to texts, journal articles, and research studies that had been previously written on aging and the increased incidents of trauma.

Data analysis was comprised of a five-year retrospective review of transports conducted by the Albany Fire Department-Ambulance. The next step was to narrow the analysis to those patients over the age of 65 years and injuries that were trauma specific. In addition, information was requested from the Oregon Department of Health and Human Services (DHHS)-EMS Trauma Systems Section to provide a five-year history of all trauma system entries and deaths for patients over 65 years of age. Raelene Jarvis, Trauma Coordinator for the DHHS-EMS Trauma System Section, responded to my request via e-mail with attached files for the past five years of all trauma entries and deaths in each of the seven trauma system areas of the state. Additional data was obtained, via the Internet, from the Centers for Disease Control (CDC) and Oregon Public Health Services (OHS) on demographics for the United States and Oregon, and on trauma related events in the elderly population, specifically ground level falls.

The literature search at the Learning Resource Center of the National Fire Academy resulted in two articles related to trauma care in the elderly. The libraries at Good Samaritan Hospital (GSH) in Corvallis and Albany General Hospital (AGH) in Albany provided numerous articles and published studies related to the elderly ground level fall, elderly trauma, and fall prevention. A computerized search of PubMed provided numerous hits using key words of “elderly trauma”, “falls” and “accidental falls”. Specific articles and/or studies were identified in journals that were available at either GSH or AGH, not both. The resource list was narrowed to focus on recent publications, within the last ten years. A few

publications referred to previous studies that had been conducted and attempts were made to review the original document if it was available.

The literature research was employed to answer the following questions:

1. What conditions exist that may predispose the elderly to fall?
2. What injuries are sustained as a result of a ground level fall?
3. What are the impacts from a ground level fall?
4. What interventions have been previously recommended to prevent ground level falls?

Limitations to the findings and conclusions drawn from the data analysis may be affected by the documentation of the initial incident. The paramedic documenting the incident on the patient care report may have treated for a ground level fall when in fact it may have been a medical condition predisposing the victim to fall. Also, the elderly patients not meeting mandatory trauma system entry criteria may never have been entered due to the paramedic's discretion. Hospital personnel may also enter the patient into the trauma system after entry into the emergency department; however entry may be dependent on information that may or may not have been passed on from the pre-hospital care environment.

Extrapolations of the population projections may be in error because they are just those, projections. Any futuristic number is dependent on any number of variables, both negative and positive such as: disease, war, improved health, technology, medical science, and prevention programs just to mention a few.

Definitions of Terms

Area Trauma Advisory Board (ATAB) means an advisory group appointed by the Division for each established trauma area to represent providers of trauma care and members of the public. [OAR 333-200-0010(1)]

Trauma Patient. A person who at any time meets criteria for inclusion in the Oregon Trauma System, as described in Exhibit 2 of these rules. [OAR 333-200-0010(26)]

Triage Criteria. The parameters established to identify trauma patients for treatment in accordance with the trauma system plan. [OAR 333-200-0010(29)]

Results

A five-year retrospective review of Albany Fire Department-Ambulance transport data was conducted to identify the number of transports provided to patients over the age of 65 years, the percentage of those transports in relation to total number of transports provided and the specifics to type of call of those transported. Table 3 indicates the total number of patients transported in a five-year period in four separate age groups: 65-69, 70-79, 80-89, 90-109.

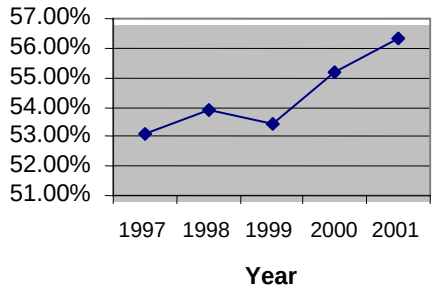
During calendar years 1997, 1998 and 1999 the total number of transports in the over 65 age group remained fairly stable and then an increase occurred in 2000 and then another significant increase in 2001. Transports for patients over the age of 65 years increased over 53% in a span of just two years.

Table 3: AFD Ambulance Transports by Age Group

Age	1997	1998	1999	2000	2001
65-69	233	209	239	309	356
70-79	461	441	401	512	565
80-89	449	496	500	551	834
90-109	124	141	143	141	212
Total	1267	1287	1283	1513	1967

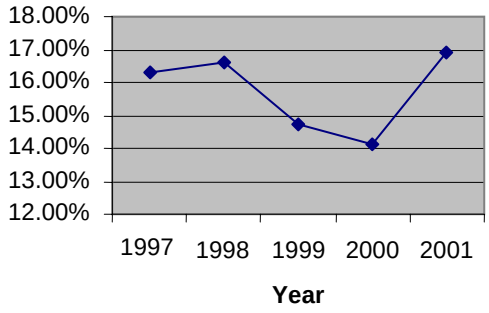
Figure 2 indicates the percentage of patients over the age of 65 years in relation to total number of patients transported. Each year the number of patients in each age category also increases, with those over 80 years of age growing at a more rapid rate.

Figure 2: AFD – Percentage of Patients ≥ 65 Years



Analysis of the data directed my focus to the significant increases in trauma related transports, specifically ground level falls. Figure 3 represents the percentage of patients transported due to falls.

Figure 3: AFD – Percentage of Transports Due to Fall



In order to see if this was unique to our area or a trend throughout the state I obtained additional data from DHHS-EMS Trauma System Section. The information provided was for patients 65 years of age and older who were entered into the trauma system due to the injuries sustained from a ground level fall. The criteria for entry into the trauma system can be found in Appendix A. [Exhibit 2 in OAR 333-200-0080(4)] A patient's entry into the trauma system can occur at the pre-hospital level at the time of transport or occur within the hospital; either in the emergency department or critical care area.

Table 4 shows the seven different trauma areas within the state of Oregon. These areas are established for the "purpose of developing, implementing and monitoring the trauma system and not for the purpose of restricting referrals." (OAR 333-200-0040(1) The transport service area for the Albany Fire Department Ambulance is within Area Trauma Advisory Board (ATAB) 2. Table 4 illustrates the

number of patients 65 years of age and older that were entered into the trauma system for injuries sustained in a ground level fall from 1997 through the first quarter of 2002. Four out of the seven trauma areas within the state show an increase for ground level fall trauma patients. ATAB 2 is showing the largest percentage increase in comparison to any other of the ATABs.

Table 4: Trauma System Entry Fall Patients > 65 Years

	1997	1998	1999	2000	2001	*2002
ATAB 1	64	117	142	155	187	91
ATAB 2	14	22	29	48	84	21
ATAB 3	16	14	17	8	15	33
ATAB 5	4	6	10	10	6	2
ATAB 6			2	2	2	3
ATAB 7		6	4	3	5	
ATAB 9	36	14	15	13	22	4
Total	134	179	219	239	321	154

*2002 (1st quarter)

Analysis of the data specific to age groups can be found in Table 5 and Table 6. Table 5 categorizes all ground level fall trauma entries into five separate age categories from 1997 through the first quarter of 2002. Each age group has realized an increase in the number of serious falls in each of the years represented. The total number of trauma entry falls has nearly tripled in less than six years.

Table 5: ATAB 2 Trauma System Entry Falls by Age Group

AGE	1997	1998	1999	2000	2001	*2002
65-69	14	19	26	29	34	11
70-75	28	36	45	24	43	21
76-80	27	40	46	42	65	38
81-85	31	32	42	56	76	36
86+	34	52	60	88	103	48
Total	134	179	219	239	321	154

*2002 (1st quarter)

Table 6: ATAB 2 Fall Deaths by Age Group

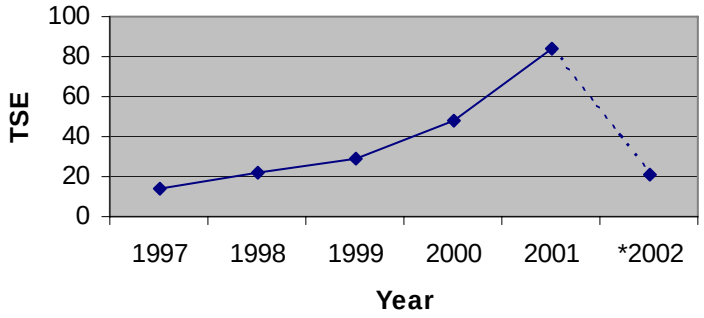
AGE	1997	1998	1999	2000	2001	*2002
65-69	3	2	3	2	5	1
70-75	3	2	3	3	4	2
76-80	5	8	7	4	5	7
81-85	4	5	6	10	14	6
86 +	4	11	10	16	10	5
Total	19	28	29	35	38	21

*2002 (1st quarter)

In addition, Table 6 indicates a steady increase in deaths resulting from ground level falls. The first quarter of 2002 already has 21 deaths due to falls, at that rate the projection for year end could be more than one and one-half times the previous year.

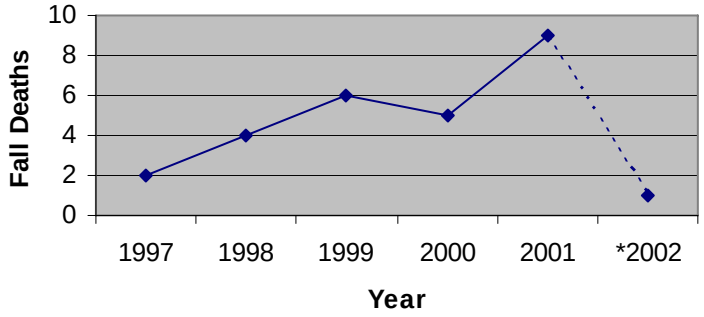
Figures 4 & 5 represent trauma entries due to falls and fall deaths specific to ATAB 2.

Figure 4: ATAB 2 Trauma System Entries (TSE) ≥ 65 Years



*2002 (1st quarter)

Figure 5: ATAB 2 Fall Deaths ≥ 65 Years



*2002 (1st quarter)

Realizing the progressive increases in the trauma system entries and the deaths resulting from ground level falls over the past few years the outlook for the future could be catastrophic for our elderly. Table 7 illustrates that the population projections for the state of Oregon show a steady increase for those 65 and older. By 2025 those 65 and older will represent 24.2% of the total population (PSU, 2001). Table 8 indicates the effect of those projections on the City of Albany. Albany currently represents approximately 3.5% of the total population for Oregon.

Utilizing rough calculations in estimating the population over the age of 65 by the year 2025, Albany would see an increase in almost 140 %. This figure does not reflect the possibility that an increased number of elderly may relocate to this area. A number of elderly residential facilities currently exist within our city and urban growth boundaries and a few more are in the process of being constructed.

Table 7: Oregon Population Projection for those 65 and Older

Year	Population	Percent of Total
1950	133,021	8.7%
1975	250,518	10.9%
1990	398,459	14.0%
2000	440,038	12.8%
2015	741,000	18.9%
2025	1,054,000	24.2%

Table 8: City of Albany Population Projections for those 65 and older.

Year	Population
2000	15,400
2015	25,935
2025	36,890

Discussion

It is evident that an elderly fall victim is a serious issue not only in Albany but also throughout the nation. The population of our elderly, those over the age of 65 years, is expected to increase by 380%

by the year 2025 (Diamond, 2002). Extrapolating that figure out would mean that the Albany senior population would increase to 19,783 by 2025. Roughly speaking that would mean that the Albany Fire Department could be transporting over 5200 senior citizens every year, and approximately 820 as result of ground level falls. Recognizing the demands on emergency services that have occurred over the past 20 years, the next twenty will be phenomenally difficult to accommodate. Kannus (1999) recognized that falls among older adults has increased dramatically (p. 205). In Britain a third of the population aged over 65 has a fall, and half fall at least twice (Swift, 2001, p. 855). The problem is significant enough that numerous studies have been conducted to find out what is causing the falls, and what interventions may be implemented to minimize the impact of ground level falls in the elderly population. Newton (2001), Knudson (1990), and Swift (2001) are in agreement that physiological and environmental factors are the causes of the majority of elderly falls. Physiological conditions that have contributed to falls are difficulties with mobility, visual impairments, polypharmacy and systemic illnesses.

Feder et al. (2000) evaluated exercise intervention studies, multifaceted interventions and community assessment studies to find the most successful. Successful intervention programs included a multifaceted approach; a medical assessment, a home safety assessment, changes in medication and tailored exercise programs (p. 1009). Seemongal-Dass et al. (2001) agreed with Feder et al. (2000) to a point but thought that poor visual function contributed greatly to the increased risk of falls and fractures resultant from falls (p. 554).

The CDC Research Agenda (2002) estimated that there are 300,000 hip fractures annually at cost of more than $10 billion (p. 21). A study conducted by Sterling et al. (2001) concluded that the most prevalent injury (ies), recognized by the AIS score, was the head/neck region in patients > 65 and skin and soft tissue in those < 65 (p. 118). Chakravarty & Sorman (2001) stated that falls are the most frequent cause of morbidity and mortality related to injury in elderly people. Hip fractures are one of the most costly and debilitating yet occurs in only 1% of falls (p. 554). Head injuries on the other hand carry an impressively high mortality rate and poor prognosis for survivors (Newton, 2001, p. 5). Sterling et al.

(2001) estimated that currently one-third of all trauma-related expenses is incurred by the geriatric population, with an expectation that the cost would rise dramatically in the future.

The intervention programs that seem to have had the best success have been multifactorial and include medication review, education, exercise, behavior modifications and changes in environmental hazards (Rothschild et al., 2001, p. 2724). With the exception of an exercise program specific to t'ai chi, exercise alone did not show a significant benefit unless it was combined with training in transfer skills and gait, and strength and range of motion (Feder et al., 2002, p. 1008). Swift (2001) suggested a successful prevention program would consist of ways to raise the awareness among the public, improve environmental measures, and establish life-long healthier eating habits and physical activity and exercise (p. 856).

Recognizing the issue that our emergency services are being challenged by the increase in call volume, we as an agency and as a nation, are experiencing a problem that is serious yet preventable. Our role as public servants is to serve and that means to take care of the emergency at hand but also educate to prevent a future incident. Years ago the fire service acknowledged this with fire related injuries and death and developed prevention programs that have educated our young children in stop drop and role, home evacuation plans and the importance of a functioning smoke detector in the home. We have been instrumental in assisting with securing legislation for building codes, seat belt laws, child safety seats, helmet use, and driving while under the influence of intoxicants, just to mention a few.

The severity of the elderly fall victim and its impact on society is an issue that deserves increased awareness, and development and implementation of programs to minimize it's frequency and life consequence. A consequence, that not only affects the victims themselves, but their families, caregivers, and friends. The medical facilities are challenged with the volume of patients they're seeing, the shortage of staff to handle those patients and the increased expense to care for these patients. Funding sources to pay for these services are disintegrating before our eyes. Medicare and Medicaid are reducing benefits in order to attempt to keep up with the trend of an increased aged population. Supplemental

insurance is becoming cost prohibitive to many and non-existent to most. The out-of-pocket expense for a single medical event could literally wipe out any savings an elderly person might possess, forcing a once very independent individual to now become dependent on someone else for their daily existence. Ground level falls in our elderly population is a societal issue and should command a societal solution.

Recommendations

Based on the data analysis and literature review the following strategies are recommended:

1. Develop a coalition of interested individuals to participate in the development of a prevention program to reduce the number elderly fall victims.

2. Develop and implement community-based intervention program to prevent elderly falls.

3. Continue to analyze transport data to assess effect of fall prevention program on the elderly population.

References

Albany Fire Department (2002). Ambulance Transport Statistics.

Centers for Disease Control (CDC) (2001, November). *Injury Fact Book 2001-2002.* National Center for Injury Prevention and Control. Atlanta, GA.: Author

CDC (2002). Falls and hip fractures among older adults. *National Center for Injury Prevention and Control.* Retrieved November 19, 2002 from http://www.cdc.gov/ncipc/factsheets/falls.htm.

CDC Research Agenda (2002). Preventing injuries at home and in the community. *Injury Research Agenda*, 17-25.

CD Summary. (2002, November 5). Preventing falls in the elderly. *An Epidemiology Publication of the Oregon Department of Human Services.* Vol. 51, No. 23.

Chakravarty, M., Sorman, A. (2001, March 3). Health improvement plans must incorporate falls and osteoporosis strategies. *BMJ*, Vol. 322, 554.

Day, L., Fildes, B., Gordon, I., Fitzharris, M., Flamer, H., & Lord, S. (2002, July 20). Randomized factorial trial of falls prevention among older people living in their own homes. *BMJ*, Vol. 325, 1-6.

Diamond, W. (2002, August-September). Geriatric trauma…a specialty within a specialty. *Canadian Emergency News.* 5-8.

Feder, G., Cryer, C., Donavan, S. & Carter, Y. (2000, October). Guidelines for the prevention of falls in people over 65. *BMJ,* Vol. 321, 1007-1011.

Kannus, P. (1999, January). Preventing osteoporosis, falls, and fractures among elderly people. *BMJ,* Vol. 318, 205-206.

Kannus, P., Niemi, S., Palvanen, M. & Parkkari, J. (1997). Fall induced injuries among elderly people. *Lancet*, Vol. 350, 1174.

Knudson, M.M., (1990, April). Trauma care in the elderly. *Emergency Medical Services,* Vol. 19, Issue 4, 52-54.

McCaig, L., Ly, N. (2002, April). National hospital ambulatory care survey: 2000 emergency department summary. *Advance Data from Vital and Health Statistics,* No. 326, 1- 32.

Newton, K. (2001, September). Geriatric trauma. *Topics in Emergency Medicine,* Vol. 23, No. 3, 1-12.

NFA. (2002). *Leading community risk reduction*. Student Manual. Federal Emergency Management Agency, United State Fire Administration. Emmitsburg, MD: Author.

Oregon Administrative Rule 333-200-0010 to 333-200-0080. *Oregon Trauma System.* http://arcweb.sos.state.or.us/banner/rules.htm

Oreskovich, M.R., Howard, J.D., Copass, M.K., et al. (1984). Geriatric trauma: injury patterns and outcome. *Journal of Trauma,* Vol. 24, 565-572.

Peterson, P.G. (1999). *Gray dawn*. New York, N.Y. Times Books Random House.

Portland State University. (2001). Center for Population Research and Census. Population Projections for Oregon. *Oregon Vital Statistics Report 2001.* Vol. 2. http://www.census.gov/population/www/projections/stproj.html

Rothschild, J.M., Bates, D.W., Leape, L.L., (2001, October). Preventable medical injuries in older patients. *Arch Intern Med.* Vol. 160, No. 18, 2717-28.

Salkeld, G., Cameron, I.D., Cumming, R.G., Easter, S., Seymour, J., Kurrle, S.E., et al. (2000, February). Quality of life related to fear of falling and hip fracture in older women: a time trade off study. *BMJ*, Vol. 320, 341-345.

Seemongal-Dass, R.R., James, T.E., Atherley, C.E. (2001, March 3). Guidelines should state that assessment of vision is important. *BMJ*, Vol. 322, 554.

Sterling, D.A., O'Connor, J.A., Bonadies, J. (2001, January). Geriatric falls: injury severity is high and disproportionate to mechanism. *Journal of Trauma*, Vol. 50, 116-119.

Swift, C.G. (2001, April). Falls in late life and their consequences - implementing effective services. *BMJ*, Vol. 322, 855-857.

Appendix A

EXHIBIT 2

Referenced in OAR 333-200-0080(4)

TRIAGE CRITERIA AND DECISION SCHEME

VITAL SIGNS & LEVEL OF CONSCIOUSNESS:
- Systolic blood pressure <90 mmHg; or
- Respiratory distress with rate <10 or >29; or
- Airway management required; or
- Glasgow Coma Scale ≤ 12.

ANATOMY OF INJURY:
- Penetrating injury of the head, neck, torso, or groin; or
- Amputation above the wrist or ankle; or
- Spinal cord injury with limb paralysis; or
- Flail chest; or
- Two or more obvious long-bone (humerus/femur) fractures.

MECHANISM OF INJURY:
- Death of a same car occupant; or
- Ejection of patient from an enclosed vehicle; or
- Heavy extrication time >20 minutes.

YES
•
MANDATORY TRAUMA SYSTEM ENTRY

TO TRAUMA HOSPITAL

NO

HIGH ENERGY TRANSFER SITUATIONS:
- Falls >20 feet; or
- Pedestrian hit at 20 mph or thrown 15 feet; or
- Rollover; or
- Motorcycle, ATV, or bicycle crash; or
- Significant impact or intrusion into occupant space of vehicle.

CO-MORBID FACTORS:
- Extremes of age <5 or >55 years; or
- Patient with bleeding disorder or patient on anticoagulants; or
- Medical illness: cardiac or respiratory disease, insulin-dependent diabetes, cirrhosis, or morbid obesity; or
- Pregnancy; or
- Immunosuppressed patients; or
- Presence of intoxicants.

YES
•
DISCRETIONARY TRAUMA SYSTEM ENTRY

These criteria shall cause a high index of suspicion that a patient may have sustained a severe injury. Trauma system entry for patients meeting two or more of these criteria is strongly encouraged.