U.S. CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, D.C. 20207

Sports-Related Injuries to Persons 65 Years of Age and Older

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HIGHLIGHTS

- From 1990 to 1996, sports-related injuries to persons 65 years of age and older increased significantly, from 34,000 to 53,000. This is an increase of 54% in that 7-year period.

- The increased incidence of injury occurred not only among the youngest of the 65 and over population, but also among those 75 years and older. Sports-related injuries to persons 75 and older increased by 29%.

- Sports-related injuries increased much more to persons 65 and over than to any other age group. By contrast, they increased 18% to persons age 25-64 (vs. 54% for 65 and older).

- Sports-related injuries have increased more than other consumer-product related injuries treated in hospital emergency rooms for persons 65 and over.

- The increase in sports-related injuries is greater than the increase in the population 65 and over, so it cannot be explained solely by the increase in population of this age group. From 1990 to 1996, the population 65 and over increased by just over 8%, whereas sports-related injuries to this age group increased 54%.

- Injuries to older persons have increased the most in connection with more active sports, such as bicycling, exercise activity (with and without equipment), weight training, and skiing.

- The highest number of sports injuries to persons 65 and older were associated with bicycles and bicycling. Bicycling injuries increased 75% from 1990 to 1996. Of bicycling injuries to older persons, 30% were to persons 75 years of age and older. Most injuries resulted from falls, and head injuries were 21% of the total. Virtually none of the fall victims was wearing a bike helmet.

- The number of injuries related to exercise activity (with and without equipment) increased 173% from 1990 to 1996. The 75 and older group accounted for 40% of those injured in 1996 in this category. The most common injuries were falls, tripping and strains in normal exercise activity.

- Injuries from less active sports, such as fishing, golf, bowling and shuffleboard, increased only moderately or not at all from 1990 to 1996. For example, fishing injuries increased 6%.

- For the first time in 1996 we find a small number of injuries among the 65 and over population in very active and physically challenging sports such as snowboarding and in-line skating.

- In both 1990 and 1996, about 60% of the 65 and older victims of sports injuries were males. In both of these years, males were about 40% of the population 65 and older.

- The hospitalization rate for persons 65 and over with sports-related injuries is 10%. This is lower than the 18% hospitalization rate for injuries with all consumer products for persons in this age group.

- The average cost per injury for sports-related injuries treated in emergency rooms has declined since 1990. While more injuries are occurring, they appear, on the average, to be less costly and severe.

CONCLUSIONS

- The increase in injuries is most likely attributable to increasingly active lifestyles and to increased participation in sports activities by older Americans.

- Especially notable is the increased participation by people 65 and over in more active sports, such as bicycling, exercise (with and without equipment), weight training, and skiing.

- Americans are remaining physically active into their 70's, 80's and even into their 90's.

- The lower hospitalization rate for sports-related injuries suggests that the population participating in sports activities is healthier overall than those who are not participating in sports.

- Persons involved in activities such as bicycling can reduce their risk of injury by using bike helmets. Bicycle helmets reduce the risk of serious head injury.

- Individuals should use safety gear and take appropriate safety precautions, especially in active sports such as inline skating and use of exercise equipment and weights.

- All forms of exercise, from walking and gardening to swimming, tennis and biking, contribute to improved health and well-being. By getting regular exercise -- and doing it safely -- older Americans can enjoy a healthier life.

INTRODUCTION

Since 1990, the U.S. population 65 years of age and older has increased by approximately 2.63 million people.[1] Such a population increase could be expected to have an impact on the overall injury frequency in this age cohort, including injuries related to consumer products. Consumer product related injuries to persons aged 65 years and older were examined using the National Electronic Injury Surveillance System (NEISS), an injury surveillance network operated by the U.S. Consumer Product Safety Commission, which tracks consumer product related injuries from a national statistical sample of hospital emergency rooms. NEISS data for the years 1990 through 1996 were reviewed and injury estimates for the 65 and older age group calculated for each year. These estimates show an increase in consumer product related injuries for each year during this time period.

In 1990, there were an estimated 979,000 consumer product related emergency room (ER) treated injuries to persons 65 years of age and older. This estimate increased in 1996 to 1,322,200 consumer product related injuries. By comparison, overall frequencies of emergency room treated consumer product related injuries to those under 65 years old declined between 1990 and 1996.

Between 1990 and 1996, population based injury rates also declined in every age group except the population 65 years and older. The rate of emergency room treated injuries per 1,000 population in the age 65 and older group increased from 31.34 in 1990 to 39.04 in 1996. In 1996, the injury rate in this age group was higher than that for persons 25-44 years of age or persons 45-64 years of age. By contrast, data from analyses performed in the late 1980s[2] indicated that the population age 65 and older at that time had a lower overall injury rate than other segments of the population.

One possible explanation for this increase in consumer product related injuries is that those over age 65 are maintaining increasingly active lifestyles, resulting in greater exposures to the risk of injury. This paper looks at NEISS data on sports related injuries as a potential indicator of activity level in the population age 65 and older and describes sports related injuries seen in this growing population.

METHODOLOGY

This analysis was prepared using data from the National Electronic Injury Surveillance System (NEISS), which consists of a national probability sample of 101 hospitals, drawn from the over 5,000 hospitals with 24 hour emergency departments, nationwide. The sample includes hospitals of differing sizes and locations, as well as children's hospitals and trauma centers.

The sampling frame is divided into four size strata based on the annual number of emergency department visits reported by each hospital, and a stratum for children's hospitals. Since its inception in the 1970's, the NEISS sample has been updated several times to maintain its statistical validity.

For in-scope cases, the coder at each NEISS hospital abstracts information on as many as fourteen different variables. These variables include date of treatment, case record number, age, sex, injury diagnosis, body part injured, consumer products involved (up to two products may be specified), indicator for third product involved, disposition of the case (i.e. treated and released, hospitalized, dead on arrival) accident locale, whether fire or a motor vehicle was involved, and up to two lines of narrative to provide a brief description of the incident.

Because of the statistical design of the NEISS, sampling errors associated with NEISS estimates can be calculated.[3] A variance computation program that accounts for the stratified sample design was used to calculate variances of estimates and the associated covariance between estimates across annual time periods. To determine if the difference in annual estimates was statistically significant, student “t” tests (adjusting for the covariance between years) were performed.[4]

Because activities such as skiing (limited to a few hospitals), and bicycling (in the 65 and older age group, reported mostly from warm weather hospitals), had high variances associated with the recent injury estimates, the "t" test did not indicate significant change. A nonparametric test based on Spearman's rank correlation coefficient was used to test for trends in these sports, for which the consistency of the year-to-year increases, over the seven year period, led us to believe that there may in fact have been an increase.[5] A significance level of 0.05 was used for all statistical testing.

Injury cost estimates were based on the Injury Cost Model developed by the U.S. Consumer Product Safety Commission, Directorate for Economic Analysis. The Injury Cost Model is structured to measure eleven different types of costs separately, one component at a time, and then to add them together to establish the total cost of an injury. A variety of techniques

METHODOLOGY (Continued)

are used to estimate the eleven cost components including regression analysis, sample means from large databases, and direct analytic solution. The cost components include: medical costs, the costs of insurance, foregone earnings, pain and suffering caused by the injury, and disability costs.

RESULTS

NEISS data on product related injuries from 1990 were compared with those from 1996. Figure 1 shows an increase in the total estimated consumer product related injuries between 1990 and 1996 for the population 65 years of age and older, from 979,000 (1990) to 1,322,200 (1996), a 35% increase.

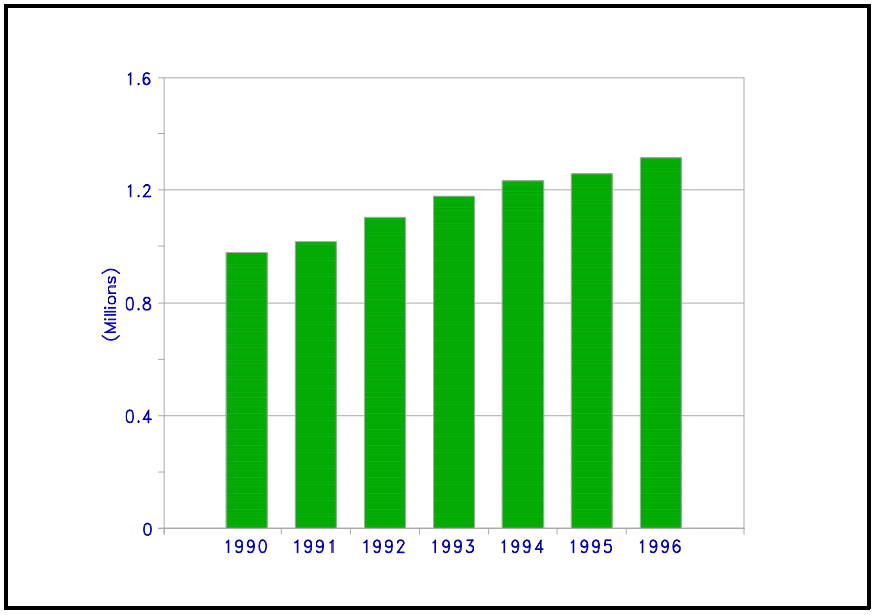

Figure 1. Estimated Product-Related Injuries to Persons 65 Years of Age and Older, Treated in Hospital Emergency Departments, 1990-1996.

There was an even greater increase in sports related injuries over that same time period. Figure 2 illustrates that in 1990, there were an estimated 34,400 sports related injuries to persons 65 years of age and over, while in 1996, the estimate increased by 54% to 53,000 injuries ($p < .05$). The rate of injury associated with sports activities in this population also increased from 1.10 per 1,000 population in 1990, to 1.57 per 1,000 population in 1996. The injury rate seen with all consumer products increased from 31.34 in 1990 to 39.04 in 1996.

RESULTS (Continued)

While there is scant data on the number of older adults participating in sports activities, one can speculate from the rising injury rate, that the increase in sports related injuries in the age 65 and older group is more likely to be due to an increased participation level than an increase in the risk of any of the sports activities themselves.

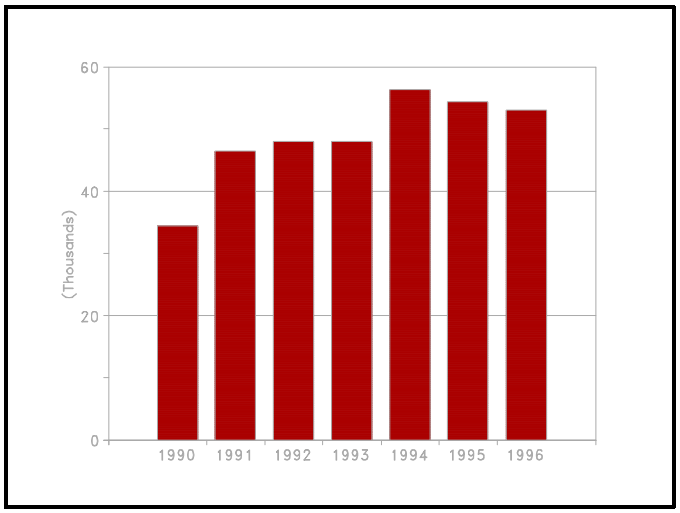

Figure 2. Estimated Sports-Related Injuries to Persons 65 Years of Age and Older, Treated in Hospital Emergency Departments, 1990-1996

To further explore sports-related injuries in the over 65 population, incidence of injury was analyzed for two subgroups comprising that population: 65 - 74 years of age; 75 years and older. Table 1 shows that within the 65 and older population, the age distribution shifted between 1990 and 1996. In 1996, there were relatively fewer injuries in the age 65-74 group than in 1990 (75.3% in 1990, 70.9% in 1996), and relatively more injuries in the 75 and older group than in 1990(24.7% in 1990, 29.1% in 1996. The proportion of the population in the age 75 and older group also increased between the two time periods from 42.1% in 1990 to 44.9% in 1996, but not enough to account for the increase in injuries. This finding suggests that sports participation is not limited to the youngest seniors, and that as the over age 65 cohort ages, they may remain active into their 70's, 80's and perhaps even 90's.

Table 1. Estimated Sports-Related Injuries to Persons 65 and Older. Estimated U.S. Population Ages 65 and Older, in (000s). By Year and Age Group.

1990

Age Group	1990 Injuries	1990 Pop. (1,000s)	1990 Percent Injuries	1990 Percent Pop.
Total	34,400	31,237	100.0%	100.0%
65-74 Years	25,899	18,098	75.3%	57.9%
75+ Years	8,501	13,138	24.7%	42.1%

1996

Age Group	1996 Injuries	1996 Pop. (1,000s)	1996 Percent Injuries	1996 Percent Pop.
Total	53,000	33,867	100.0%	100.0%
65-74 Years	37,566	18,673	70.9%	55.1%
75+ Years	15,434	15,195	29.1%	44.9%

NOTE: Population estimates are rounded and may not add to total.

RESULTS (Continued)

The types of sports activities in which seniors were injured changed somewhat between 1990 and 1996. The number of emergency room treated injuries related to active sports such as bicycling, exercise activity, and snow skiing increased significantly between 1990 and 1996, while injuries from less active sports, such as golf and fishing increased less or not at all over that time period. It is interesting to note that there were a small number of injuries seen for the first time in 1996 involving "extreme" or more physically challenging sports such as snowboarding and in-line skating.

We examined the leading groups of sports for the distribution by sex of victim. We found that almost 60% of the injuries were to males in both 1990 and 1996. Males represented about 40% of the 65 and older population in both of these years.

HIGHLIGHTS OF SPECIFIC SPORT RELATED INJURY HAZARDS

Figure 3 illustrates the distribution of sports activities associated with the highest number of injuries to the population 65 and older in 1996, and the change in distribution of injuries between 1990 and 1996. The sports activities with the largest increases in injuries in 1996 from 1990 were bicycling, exercise activity/exercise equipment/weightlifting, and snow skiing. Golf injuries also increased between 1990 and 1996, but not significantly. The smallest change in the number of injuries between 1990 and 1996 was seen in tennis and fishing. Table 2 presents 1996 data which summarizes those sports activities in which persons age 65 and older are most often injured. The injuries are broken out for the four age groups comprising the age 65 and older population. A more detailed description of the injuries associated with the top sports activities follows.

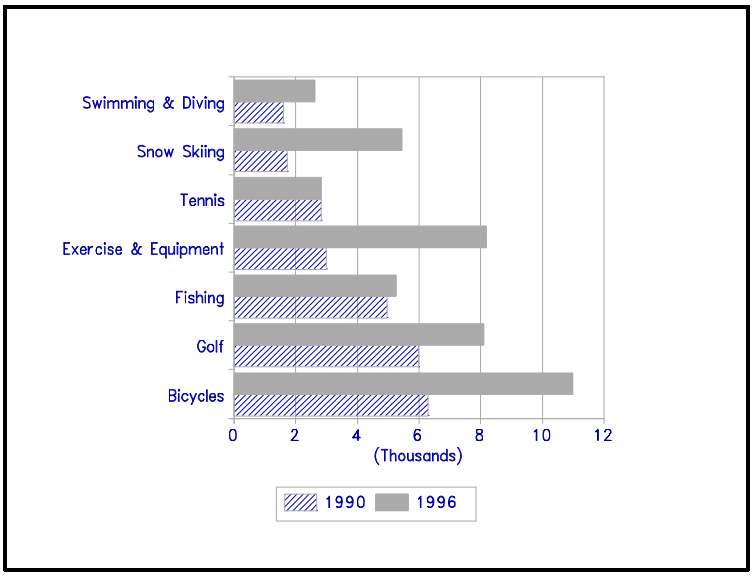

Figure 3. Estimated Emergency Room Treated Injuries to Persons 65 Years of Age and Older, Top Sports Activities, 1990-1996

Table 2. Estimated Sports Activity Related Injuries to Persons 65 Years of Age and Older. Specific Activities by 10 Year Age Groups, 1996

Sport	**Total**	**65-74**	**75-84**	**85-94**	**95+**
Total	53,033*	37,566	12,818	2,288	361
Bicycles	11,002	7,747	2,359	586	**
Exercise Activity/Equipment/ Weightlifting	8,197	4,926	2,577	677	**
Golf & Golf Carts	8,127	5,983	2,093	**	0
Snow Skiing	5,432	4,372	1,026	**	**
Fishing	5,268	3,648	1,552	**	0
Tennis	2,818	2,252	566	0	0
Swimming/Diving Swimming Pools	2,623	1,342	860	**	**
Bowling	2,326	1,478	702	**	0
Skating	1,460	1,325	**	**	0
Baseball & Softball	1,364	1,056	**	**	0
All Terrain Vehicles	818	818	0	0	0
Horseback Riding	731	529	**	0	0
Basketball	532	**	**	**	0

* Several additional products were also reported, and are included in the total, for which the total 1996 estimate was less than 500. These products were: Snowmobiles, Personal watercraft, Squash/racketball, Volleyball, Soccer, Minibikes/Trailbikes, Ball sports not elsewhere classified, Gymnastics, Go carts, Football, Billiards, Shuffleboard, Water skiing, Handball, and Sleds.

** Estimate less than 500. Sample size too small to include estimate.

SPECIFIC SPORTS (Continued)

Bicycles/Bicycling
The highest number of injuries to the age 65 and older population were associated with bicycles and bicycling, with an estimated 11,000 emergency room treated injuries in 1996. The estimated number of injuries increased significantly between 1990 and 1996 -- by 75% or approximately 4,700 injuries. Thirty percent of the injuries in 1996 occurred in persons over 75 years of age. Approximately 13% of the injured persons 65 and over were hospitalized for their bicycle related injuries.

Falls from the bike were the most frequent pattern of injury, about 60% of the total. Head injuries from either falls or motor vehicle collisions were 21% of the total injuries, and when helmet use was mentioned, *virtually none of the victims were wearing helmets.*

Exercise Activity with or without Equipment/ Weightlifting
Estimated injuries associated with these activities increased 173% from 3,007 in 1990 to 8,197 in 1996. ($p = .0001$). Forty percent of those injured in 1996 were 75 years of age or older, with nine percent of all those injured being hospitalized.

The most frequent patterns of injury associated with these activities were falling, or strains from normal exercise activity. Smaller numbers of injuries resulted from falls against the equipment and from product-related problems such as sharp parts or equipment failures.

Snow Skiing
Skiing injuries to persons 65 and older increased by 217% from 1,716 in 1990 to 5,432 in 1996. This difference between the 1990 and 1996 estimates was not significant. Because variance of NEISS estimates is strongly influenced by the number of hospitals reporting, and because the skiing cases are reported mostly from just a few hospitals, this is not an unexpected finding. When we applied the non-parametric test for consistency of year to year changes, the pattern for skiing was statistically significant. Persons 65 and over who were injured while skiing were hospitalized for their injuries in 8% of the cases. The most frequent pattern of skiing injury was a fall.

Golf
The estimated number of golf related injuries to persons 65 and older increased by 2,139, about 36%, from 1990 to 1996. However, this change was not found to be significant at the .05 level. Golf injuries were virtually all to persons under 85 years old; 26% were to persons between 75 and 84 years of age. Just under 6% of golf injury victims 65 and over were hospitalized.
Golf related injuries were most frequently strains and sprains and other minor injuries. However, there were some fractures,

primarily to ankles, mostly from falls.

Other Sports Injuries

In addition to the four sports activities which were associated with the highest number of injuries to the over age 65 cohort, Table 3 also shows a number of other sports activities and the injury incidence associated with them. There was an unexpectedly high proportion of hospitalization cases with bowling (about 20%)(not shown in table). Broken hips or femurs were the most frequent reason given for these hospitalizations.

TABLE 3. Summary of Findings. Sports Injuries to Persons 65 and Older. Estimated Emergency Room Treated Injuries,1996 for Top Seven Sporting Activities

Sports Activity	Difference 90 to 96	Significance (p = <.05) Adjusted "t" test *Non-parametric test*	1996 Age 75+	Most Frequent Body Part Injured	Most Frequent Diagnosis	Most Frequent Pattern	Percent Hospitalized 1996
Overall	+18,664 +54%	YES *YES*	15,433 29%	n/a	n/a	n/a	10%
Bicycles	+ 4,713 +75%	NO *YES*	3,255 30%	shoulder & trunk	fractures	falls	13%
Exercise Activity & Equip. Weightlifting	+5,190 +173%	YES *YES*	3,271 40%	leg & foot shoulder and trunk	fractures and dislocations	falls, tripping, strains in normal activity	9%
Golf & Golf Carts	+2,139 +36%	NO *NO*	2,144 26%	leg & foot mostly ankle	strains and sprains	normal play of the game	6%
Snow Skiing	+3,716 +217%	NO *YES*	1,060 20%	shoulder and trunk	strains and sprains	falls	8%
Fishing	+285 +6%	NO *NO*	1,620 31%	fingers	punctures	hooks in fingers	12%
Tennis	-3 --	NO *NO*	566 20%	evenly distributed, except head & face are very low	strains and sprains	falls, strains and strains in normal play	--
Swimming/ Diving/ Swimming Pools	+1,003 +62%	NO *NO*	1,281 49%	shoulder and trunk	fractures and dislocations	falls on pool decks	8%

COSTS ASSOCIATED WITH SPORTS RELATED INJURIES

The costs associated with sports related injuries to persons 65 years of age and over also were examined. In 1990, sports related emergency room treated injuries for the population 65 years and older, cost society about $364 million; in 1996, they cost about $516 million, an increase of about 42% (both expressed in 1996 dollars).[5] When the increase in sports injuries and the increase in the cost of those injuries are considered together, the average cost per injury declined from 1990 to 1996. That is, while there are more injuries occurring, on the average, they appear to be less costly and possibly less severe. The hospitalization rate for sports injuries in this population also declined from about 13% in 1990 to about 10% in 1996. Because of the changes in the health care system and the increasing emphasis on cost cutting measures and reduced hospital stays, however, it is difficult to draw any firm conclusions about the changes since 1990 in the cost and severity of these sports related injuries.

When the sports injury hospitalization rates of the age 65 and older population are compared with hospitalization rates for all consumer product related injuries for that same age group, it is apparent that the sports hospitalization rate is lower. When all product related injuries are considered for 1996, members of this population were hospitalized on average about 18% of the time for their injuries, while for sports activities, they were hospitalized approximately 10% of the time. This data hints that the population participating in sports activities might be healthier overall that the rest of the same age cohort, a subject that deserves further study.

DISCUSSION

Estimates of sports related injuries to persons 65 years of age and older have increased from 1990 to 1996. They have increased more than other product related injuries treated in hospital emergency rooms, and more than can be explained solely by the increase in population. These increases are most likely explained by greater activity and participation in sports activities among seniors. The increased incidence of sports related injuries is occurring not only among the youngest of the 65 and older population, but among the 75-84 year old and 85-94 year old age groups.

There is some indication in the data that there may also be a tendency toward increased participation in more active sports. The size of the population in the 65 and over age group has increased. However, less active sports such as fishing and golf, had only small increases in the injury estimates, while injuries associated with more active sports like bicycling, exercise equipment, and snow skiing, increased, not only in frequency, but in their share of the total of sports related injuries to this age

group.

Persons age 65 and over who suffer sports related injuries were hospitalized about 10% of the time. However, when all product related injuries are considered, this group is hospitalized about 18% of the time. From this finding, it appears that, in general, sports injuries may be less severe than many other product related injuries. This may be because the activities themselves are less dangerous, or because the population participating is healthier than those injured in other ways.

Valid data is needed on participation in sports activities by the age 65 and over population. Based on day to day observations and discussions with seniors, it appears that this population is more active and is likely to participate more in sports activities. Examined in combination with the injury data, sports participation data could help explain better the reason for the increase in these injuries.

Individuals should use the appropriate protective gear for the activity, such as bicycle helmets for bicycling and helmets and wrist guards for skating. It is very important to read and understand the instructions which come with any complex piece of equipment, and to maintain the equipment which you use for the activity in good operating condition.

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