

## HIP PADS: EFFECTIVE FRACTURE PREVENTION

### Simple intervention can reduce the risk of falls resulting in hip fracture

By George Gross, PT, Tsan-Hui Chen, OTR/L, Carolyn Flaherty

Falls are a serious problem in the elderly. One of the most significant consequences of falls is hip fracture, caused by the sudden transmission of a large, mechanical load, which damages tissues and cells. If this energy load could be dissipated over a larger area, injury could be prevented. This review examines the results of a program that used hip pads in community dwelling, frail elders and found impressive results in hip fracture prevention. There was a hip fracture rate of 0 in the study population compared to a rate of 4.3  $P=0.00089576$  and a highly significant difference.

This study examines the results of a program at the Elder Service Plan of East Boston that used HipSavers for patients with histories of frequent falls to absorb and dissipate the energy transmitted in a fall to prevent hip fractures. HipSavers are underpants with soft thin pads of laminated, shock absorbing elastomers covering each trochanter.

#### Fall Statistics

Falls are a major health hazard in the elderly. One-third of all elders older than 65 years of age fall at least once a year.<sup>1 2 3 4</sup> Loss of independence often follows a fall. Falls are a factor in 40 percent of nursing home admissions.<sup>5</sup> The more frequently falls occur, the greater the likelihood of mortality and morbidity for the older adult.<sup>6</sup> Fall related injuries are the leading cause of death from injury in people over 65.<sup>1 7</sup> Only 50 percent of individuals admitted to hospitals as a result of a fall will be alive in one year.<sup>3 8</sup>

Ten percent of falls in the elderly result in serious injury and 5 percent result in some type of fracture.<sup>4 8</sup> The rate of hip fracture as a result of falls in the elderly has been calculated between 1 percent and 2.9 percent.<sup>2 7 9</sup> Hip fractures are one of the most catastrophic, life changing and life threatening consequences of falls and frequently result in decreased mobility and loss of independence in older adults.<sup>3</sup> Hip fracture is the most common among all injuries leading to hospital admissions in the United States<sup>10</sup> and is a contributing factor in 40 percent of admissions to nursing homes.<sup>3 11</sup> One-quarter of these patients die within six months of injury and of those remaining alive, 60 percent have decreased functional mobility and 25 percent remain functionally dependent after a hip fracture.<sup>12</sup>

Rehabilitation after a hip fracture is expensive in emotional and social as well as financial costs. The Center for Disease Control and Prevention statistics for 1994 report 243,000 hip fractures per year. The cost of caring for older patients with hip fractures is \$2 billion annually.<sup>10</sup> Falls pose a particular problem for public health professionals in the development of both surveillance systems and prevention strategies.<sup>7</sup> Most falls do not result in serious injury and are therefore not reported. The absence of injury probably accounts for the poor reporting of falls and underestimation of the problem.<sup>10</sup> Adler-Trainees views injuries as predictable events that have remedial behavioral and environmental antecedents.<sup>5</sup> Therefore, they can be reduced in number and severity by proper interventions.

#### Prevention Strategies

Effective fracture prevention strategies can be cost effective and beneficent interventions. Identifying patients at risk permits interventions aimed at reducing both intrinsic and extrinsic risk factors for falls and fractures. Falls are multifactorial. The primary goal is treatment of the problem or the cause to effect clinical change. If change is not expected, the course of action is compensation. For certain patients, the risk of falling remains great despite preventive measures. For these patients, the use of padded undergarments to absorb the impact of a fall and thereby reduce the risk of a hip fracture from a fall has been advocated. Sattin<sup>7</sup> views injury as a disease with a short latency period. In a fall, a large mechanical energy load is quickly transmitted and damages cells and tissues, potentially resulting in a hip fracture. If the same energy load could be transmitted at a slower velocity or dissipated over a larger area, injury could be prevented.

#### Study

**Subjects.** The Elder Service Plan is a full-service health care program for frail elders who meet Massachusetts state requirements for nursing home care but desire to remain at home. The mean age of members is 80 years. Members require some assistance with personal care and activities of daily living (ADLs) and have some combination of acute/chronic medical conditions that requires professional monitoring or supervision. The average number of medical conditions is 9.9/member.

Members who were assessed at high risk for falls because they had two or more falls in the previous four months were evaluated for wearing padded underwear to reduce the risk of hip fracture from a fall. This was a non-random assignment of groups but was undertaken in an attempt to immediately reduce the risk of injury in the high fall risk population. Twenty-nine members wore HipSavers during the study and 438 members did not. The two groups were similar along age and sex dimensions. The mean age of the HipSaver population was 79, one year younger than the control population and there were 6 percent more males in the non HipSaver population. The HipSaver population had much higher percentages on measures of history of falls and history of prior hip fractures.

Not all 29 test subjects wore HipSavers for the entire 26-month study period. Some developed an increased risk for falls later in the test period and were prescribed HipSavers and their subsequent falls were included in the study group data. Members and/or their family/guardian consented to the use of HipSavers as an injury risk reduction intervention.

**Method.** Falls were recorded on incident report forms. Falls were defined as events resulting in a person inadvertently coming to rest on the ground. Not all falls that occur at home are reported but underreporting skews the data toward serious falls since falls with subsequent consequences are more likely to be reported than falls without injury. Members with a history of falls or high risk factors were evaluated for HipSavers. Incidence of hip fracture in the member population and the HipSaver population were calculated and compared using Fisher's exact test.

**Results.** The total falls reported were 568 in the 467 members studied over the 26-month period. The 29 members who wore HipSavers accounted for 199 falls or 3.17 falls/member/year. The 438 members who did not wear HipSavers had 369 falls or 0.3888 falls/member/year indicating that the HipSaver group was at nearly eight times higher risk for falls.

Sixteen of the 369 falls among the members not wearing HipSavers resulted in a hip fracture. None of the 199 falls among the members wearing HipSavers resulted in hip fracture. Fisher's exact test analysis comparing falls between the HipSaver and non-HipSaver populations yields a probability of 0.00089576 that this distribution is random. This is less than 0.05 and therefore a highly significant difference.

**Discussion.** Hip fractures in the elderly are devastating, costly, traumatic, life altering and life threatening events. Most hip fractures occur as a result of falls. This has logically led to strategies of risk reduction through fall prevention. "Falls don't just happen. They are predictable occurrences, the outcome of a multitude of host related and environmental factors that are potentially amenable to intervention and thereby reduction or prevention."<sup>11</sup>

Despite fall prevention efforts, some patients still experience falls and therefore remain at risk for hip fracture. For some of these patients, HipSavers are an effective injury prevention intervention. This study indicates that shock absorbing hip pads effectively reduced the risk of hip fracture in this Elder Service Plan population. Comparing the cohort of clients wearing HipSavers to those not wearing HipSavers indicates that the experimental group clients are less likely to incur a hip fracture as a result of a fall.

The sample size is small but the results were significant for the Elder Service Plan in implementing a simple, cost effective intervention to reduce hip fractures. The subjects were not randomly assigned but were selected from the same population and prescribed hip pads because of their history and risk of falls. They fell nearly eight times more frequently than the members of the control population. This would seem to make them more likely to sustain a hip fracture but in fact, no hip fractures were sustained by this group, a very promising finding. This study did not include measures of osteoporosis, bone density, nutrition or endocrine factors, which may cause potential differences between the groups likelihood for fracture and this is an area for further study.

## Conclusion

Much research has been done on the costs and consequences of hip fractures and the causes of falls. Fall prevention programs are a necessity for any geriatric program. Despite all fall prevention efforts, some elders continue to fall. Compensatory strategies aimed at reducing the risk of injury from falls is the logical course of action. HipSavers are an effective means of reducing the risk of hip fracture from falls in this population. Despite their effectiveness, HipSavers are not for everyone. Some clients dislike their bulky appearance and choose not to wear them. Some clients, especially those who struggle with ADL's, find that the additional padding makes dressing and toileting more difficult and time consuming. Adaptive clothing might remedy that situation. Patient and/or caregiver acceptance and support is a critical factor since consistent compliance is needed to maximize effectiveness.

---

<sup>1</sup> Cook, A.S., Baldwin, M., Yak, N., Pollissar, L., & Gruber, W. (1997). Predicting the probability for falls in community dwelling older adults. *Physical Therapy*, 77(8), 812-819.

<sup>2</sup> Knox, R. (1998, Jan. 19). Falls don't have to happen. *Boston Globe*.

<sup>3</sup> MacRae, P.G., Lacourse, M., & Moldavon, J. (1992). Physical performance measures that predict faller status in community dwelling older adults. *Journal of Orthopedic and Sports Physical Therapy*, 16(3), 123-128.

<sup>4</sup> Koch, M., Schalk, M.G., Baker, D., Palumbo, S., & Tinetti, M. (1994). An impairment and disability assessment and treatment protocol for community living elderly persons. *Physical Therapy*, 74(4), 286-298.

<sup>5</sup> Adler-Trainee, M. (1995, Sept. 8). Falls in the senior population. *Occupational Therapy Forum*, pp. 8-11.

<sup>6</sup> Van Swearingen, J.M., Paschal, K.A., Bonino, P., & Yang. (1996). The modified gait abnormality rating scale for recognizing the risk of recurrent falls in community dwelling older adults. *Physical Therapy*, 76(9), 994-1001.

<sup>7</sup> Sattin, R.W. (1992). Falls among older persons: A public health perspective. *Annual Review of Public Health*, 13, 489-508.

<sup>8</sup> Baker, S.P., Ginsburg, M.J., & Giuhua, L. (1992). *The injury fact book*. New York: Oxford University Press.

<sup>9</sup> Hoard, S. (1997, June). New technology can reduce falls. *Briefings on Assisted Living*, p.4.

<sup>10</sup> Holliday, P.J., Cott, C.A., & Torresin, W.D. (1992). Preventing accidental falls by the elderly. In J. Rothman and R. Levine (Eds.). *Prevention practice: Strategies for physical therapy and occupational therapy* (pp. 234-257). Philadelphia: W.B. Saunders.

<sup>11</sup> Tinetti, M.G., Speechley, M., Ginter, S.F. (1988). Risk factors for falls among elderly persons living in the community. *New England Journal of Medicine*, 319, 1701-1707.

<sup>12</sup> Tideiksaar, R. (1998). *Falls in older persons*. Baltimore: Health Professions Press.

## Additional Resource

Adams, R.C. (June 12, 1995). Multiple risk factor intervention successful. *ADVANCE for Occupational Therapy*, pp. 14-15.

Wolter, L.L. (1996). A clinical synthesis of falls intervention trials. *Topics in Geriatric Rehabilitation*, 11(3), 9-19.

*George Gross, Tsan-Hui Chen and Carolyn Flaherty are part of the Elder Service Plan Administrative Staff at East Boston Neighborhood Health Center, East Boston, MA.*

*This study was not solicited by the manufacturer. The article was produced here with the cooperation of the manufacturer.*