Product Information

HipSaver®

The Leader in Hip Protection

Endorsed by:

AUSTRALIAN PHYSIOTHERAPY ASSOCIATION

REGISTERED PRODUCT TGA 165374

HipSaver®
The Leader in Hip Protection

Product Range


Nursing Home™


QuickChange™

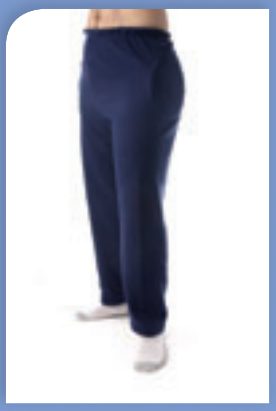

SlimFit™


Open-Bottom™


Tailbone Pad


Shorts


Interim


Track Pants

REGISTERED PRODUCT TGA 165374

All-Soft AirPad™ Technology

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HipSaver® hip protecting AirPads are manufactured by
HipSaver Inc., 7 Hubbard Street, Canton, MA 02021, USA, and are distributed by

HealthSaver Pty Ltd, 14/140 Wecker Road, Mansfield, QLD 4122, Australia.
Phone: 1300 767 888 Fax: 1300 767 999 Email: info@healthsaver.com.au

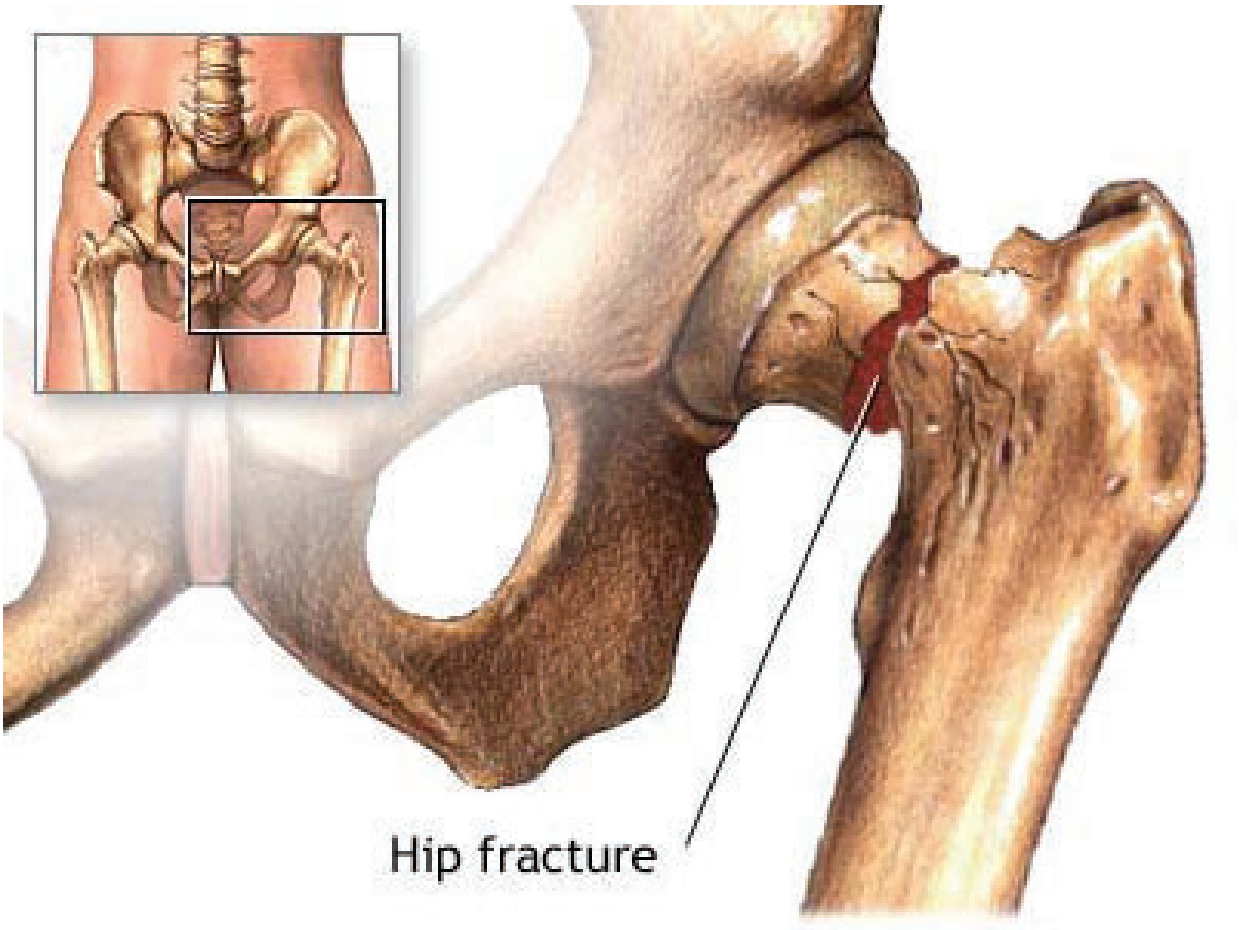
www.healthsaver.com.au

What is a hip fracture?

Hip fractures usually occur in the femoral neck (the part of the femur, or thighbone, which connects to the ball that fits into the hip socket) or the trochanteric area (the area below the neck of the femur).

The trochanteric area is the most vulnerable to fracture. It lies at the very top of the thigh bone in close proximity to the pelvic joint. The trochanter feels like a small bony elevation on the side of the hip. This ball will notably move, when the knee is slightly raised. Most people can locate their trochanter by placing the fingers on the side of the hip whilst standing and slightly raising their knee.

The trochanter should not be confused with the pelvic bone that is located higher and further towards the front of the body and does not move on raising the knee. Hip fractures are usually treated with orthopedic surgery (surgery that corrects problems of muscles, bones, and/or joints). Sometimes damaged parts of bones or joints are replaced with artificial components.



How are hip fractures caused and how are they treated?

Hip fractures are most commonly sustained during a fall. Falls and hip fractures have serious implications on an elderly person's life as the consequences can be very severe. There is a high degree of morbidity and mortality, pain and hardship. The majority of people suffering hip fracture never regain their previous mobility and permanently lose their independence. The costs to the health services and social care systems are extremely high. Preventing hip fractures is, therefore, of the utmost importance.

Hip fractures are a major public health problem. In the U.S., the cost of hip fracture is approximately 7 billion dollars annually, and hip fracture is the second most common cause of admission to nursing homes, accounting for some 60,000 admissions each year. Osteoporosis in the elderly contributes to most of these fractures. Many elderly patients who break a hip face a broad array of problems that transcend the treatment of the injury itself. In many cases, an elderly person's independent existence is impacted by a fall that causes a hip fracture, an event that can forever lessen the patient's level of function. Medical treatment for hip fracture can lead to complications in older people depending on their health status. Rehabilitation from hip surgery often is prolonged and discouraging to aged patients anxious to return to their homes. Confusion and agitation result from depression, a condition often experienced by the elderly when they have been removed from familiar surroundings and brought to the hospital environment. This injury may be complicated by other factors such as the failure to regain the ability to walk, sores resulting from persistent pressure on the skin during confinement to bed, pneumonia, confusion and dementia (decreased intellectual functioning).

Can Hip Fractures be prevented?.....YES!

The chance of sustaining a hip fracture can be greatly reduced by putting some simple procedures in place.

Some Hip Fracture Prevention Strategies include:

- **The prevention and treatment of osteoporosis**
- **Falls prevention strategies and implementation**
- **Protection of the hip with external hip protectors**

HipSaver History

A hip fracture is one of the most catastrophic, life-changing and life-threatening health hazards facing the elderly. That's why, over 14 years ago in the USA, Ed Goodwin, Founder and President of The HipSaver Co. Inc., and inventor of HipSaver, decided to design and engineer a hip protector that was effective, comfortable, affordable and easy to use. At that time, the only hip protection being developed positioned a hard shell over the hip bone. The discomfort of hard shells resulted in low compliance rates and slow adoption of hip protectors in general.

As a consumer product designer, Ed believed that new space-age materials could be used to design an all-soft hip protector that would help to protect against hip fractures. He envisioned truly comfortable protection that would reduce impact – yet be as easy to put on, wear and launder as regular underwear.

That's how HipSaver was born. Now, with more than 14 years of development and refinement, HipSaver can offer you all-soft protection that has been proven superior to hard shell technology in both independent biomechanical testing and clinical studies.

Today, falls prevention and risk management teams, doctors, physiotherapists, nurses, clinical managers and other health care professionals are recommending and using HipSaver hip protectors in not only over 10,000 nursing homes, hospitals and seniors communities, but also in the wider community worldwide.

In Australia we totally agree and concur with Ed Goodwin's advice:

"Please take your selection of hip protection very seriously. Get the facts. Compare products and prices. Read the written tests and studies and be sure that they refer to that specific product and not just hip protectors in general. Ask for references and follow up on them. Do it for your clients, your reputation and your true concern for quality care."

Ian Lancaster

Ian Lancaster
Managing Director
HealthSaver Pty Ltd

HipSaver Benefits & Features

• Premium Protection

Scientifically validated testing by two of the world's leading universities specializing in hip protection has proven that HipSavers' unique AirPad™ technology system provides superior impact absorption capabilities. The superior impact absorption qualities of the HipSaver AirPad™ provides up to 20% more force reduction than hard shell protectors.

• Maximum Comfort

HipSavers' all soft, lightweight, flexible materials provide a most comfortable fit and feel - with no binding edges or seams. Our seniors will wear HipSavers.

• Lightweight for less pressure

At just 80 grams per pad, HipSaver is less than half the weight of other soft pads in Australia.

• 24 Hour Assurance

Because HipSavers are so comfortable to wear, they can be worn all day and night - even while sleeping.

• Convenient and Safe

Only HipSaver garments (including protective pads) can be washed and tumble dried at high institutional laundry temperatures of up to 95°Celsius allowing high level infection control.

• Wide Variety of Choice

With 7 styles, available in 6 sizes, in either male or female, with sewn-in or removable pads, there's a HipSaver to perfectly match the needs of all users.

• Clinically Proven

With 14 years on the global market, HipSaver is widely used in over 10,000 institutions worldwide, with real successes experienced in several countries, including USA, Canada, United Kingdom, Ireland, Czech Republic, Sweden, Israel, Germany, and of course Australia.

Clinical trials prove that HipSaver wearers consistently report high rates of compliance, and when HipSavers are used as a key component in fall safety programs, consistent reduction in fracture rates are obtained.

HipSaver Implementation Procedure

Step 1: Identify candidates to wear HipSaver hip protectors

High risk factors include: Osteoporosis, orthostatic hypotension, impairment of gait or balance, positive fall history, history of fracture, generalised weakness, presence of neuromuscular disease (e.g. Parkinson's, CVA, Dementia), multiple chronic diseases or conditions, medications, dizziness, reduced vision or hearing.

Step 2: Select Style

Determine which HipSaver style is best suited for each resident by referring to the selection guide on the next page. Considerations include toileting ability/degree of continence or incontinence, amount of help needed for dressing, likelihood of backward fall, degree of manual dexterity, etc. Please note: Nursing Home, SlimFit, and QuickChange Styles are available in either 'Male' with a fly front or 'Female' without. Please specify gender when requiring these styles. All other garments are unisex.

Step 3: Select Model

Choose between permanently sewn in protective padding (i.e. High Compliance) or traditional removable/interchangeable protective padding (e.g. Starter Kit). For a full list of available models and kits please refer to the model descriptions on the next page.

Step 4: Measure for size

Measure around the widest part of the wearer's hips over the greater trochanters. Use the measurement chart provided on the next page to determine the correct size.

Step 5: Determine number of units per resident

The recommended minimum is 3 garments per user. Consult with laundry regarding wash cycles. Consider how long it will take for the HipSaver to be returned from the laundry. Bear in mind users should wear HipSavers all day, every day and while sleeping. Falls can occur at any time.

Step 6: Place your order

We have designed a 'Priority Order Form' which contains all of the information you need to place your order in one easy step. This easy to follow one page form displays our current styles, models, measurement chart, and pricing. It is downloadable from our website at www.healthsaver.com.au . Alternatively, email us at info@healthsaver.com.au or call us on 1300 767 888 and we will forward you a copy. After filling in the relevant details, simply fax the completed form to us on 1300 767 999. In the most circumstances your order will be dispatched on the same day.

HipSaver Selection Guide

Wearer's Particulars	Hursing Home Undergarment	SlimFit Undergarment	QuickChange Undergarment	Open-Bottom Undergarment	Interim Overpant	Hip Protecting track Pant	Hip Protecting Shorts
Socially active and is cognitively well		✔				✔	✔
Prefers a discreet garment		✔					
Continent		✔				✔	✔
Wears a small incontinence pad		✔				✔	✔
Wears a full size incontinence pad or brief	✔		✔	✔	✔	✔	✔
Experiences urge incontinence				✔			
Staff changes incontinence product	✔		✔				
Staff changes incontinence product in bed			✔				
Tends to fall forward - Knee padding optional						✔	
Tends to fall backwards - Tailbone padding optional	✔	✔	✔		✔	✔	✔
Wearer specific due to hygene regulations	✔	✔	✔	✔			
Multi-wearer interchangeable after laundering					✔	✔	✔
Immediate protection for new admissions					✔	✔	✔

HipSaver Model Descriptions

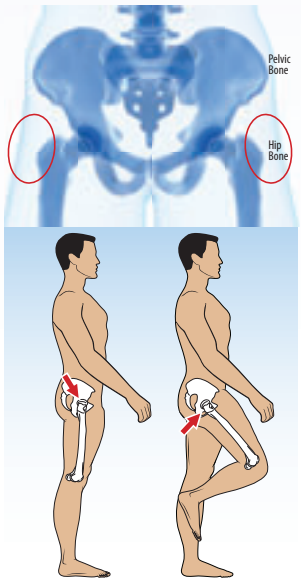
Pant Only	1 pant with open pouches for holding removable interchangeable hip protecting pads. (hip protecting pads not included)
All Soft Hip Protecting Pads	1 set of hip protecting pads with AirPad technology. (i.e. 2 pads)
Starter Kit	3 pants with open pouches and 1 set of removable interchangable hip protecting pads.
Veterans Kit	6 pants with open pouches and 2 sets of removable interchangable hip protecting pads.
High Compliance	1 pant with hip protecting pads permanently sewn in.
High Compliance with Tailbone Protection	pant with hip and tailbone protecting pads permanently sewn in.
Veterans High Compliance Pack	6 pants with hip protecting pads permanently sewn in.

All HipSaver products including soft hip protecting pads are fully machine washable and tumble dryable in both home and institutional laundries up to 95 °C.

HipSaver Measurement Chart

Measuring Instructions	Hip Measurement		Size
Nusring Home, SlimFit, and QuickChange styles are available in 'Male' with a flyfront or 'Female' without. Please specify gender when ordering these styles. All other garments are unisex. When assessing wearer's size, measure all the way around the widest part of the hips, usually over the greater trochanters. Measure over any incontinence product if applicable. Please measure carefully as hygiene regulations prevent us from accepting returned garments once they have been worn. Manufacturing anomalies excepted.	71 to 81 cm	28 to 31 inches	Extra Small
	82 to 92 cm	32 to 35 inches	Small
	93 to 102 cm	36 to 39 inches	Medium
	103 to 114 cm	40 to 44 inches	Large
	115 to 127 cm	45 to 50 inches	Extra Large
	128 to 146 cm	51 to 57 inches	Extra Extra Large

Once you have received your HipSavers



Ensure proper fit and placement of pads

HipSaver hip protecting garments are designed so that the cushioning pads easily cover the hip bones.

Read below for how to determine the location of the hip bones (i.e. greater trochanters).

The hip bone is actually the top of the thigh bone and is shaped similar to a small light bulb. You can feel this bony ball by placing your fingertips on the side of the hip and while raising the knee slightly, noting the movement of the underlying bone.

This is not to be confused with the pelvic bone which is higher, more toward the front and does not move when the knee is raised. Fit should be snug to insure proper pad placement.

Label

Label the HipSavers with the wearer's name.

Educate & encourage compliance

Educate wearers and their family members about the serious consequences of hip fractures, noting that wearing HipSavers may allow less restraint and more freedom to move about. Demonstrate the softness and comfort of HipSavers. Encourage uninterrupted wear, even while sleeping.

Ongoing & follow-up

Add "HipSaver Wearer" to the resident's treatment chart.

Train clinical staff

Keep records of all falls and any injuries.

Support

If you have any queries regarding hip protection please feel free to call **1300 767 888** and speak with one of our knowledgeable qualified staff. Business hours are 9 to 5, Monday to Friday, Aust. EST.Alternatively you may email us with your query at **info@healthsaver.com.au**.

HipSaver Testing, Studies and Clinical Trials

The following pages contain results of independent university testing and several clinical trials and studies carried out on HipSaver hip protectors in various facilities throughout the world.

Summary of Contents

If you have any questions please feel free to call our knowledgeable HealthSaver staff on **1300 767 888** or email us at **info@healthsaver.com.au**.

Interpretation of Biomechanical Testing of HipSaver® Dual-mechanism Shunting/Absorbing AirPad

August 2000

Background: HipSaver pads were tested at the Harvard affiliated laboratory in 1996 and found to offer 10% better impact attenuation than SafeHip® (SafeHip is the product resulting from the initial research efforts as reported in *The Lancet* 1993 341:11-18). Since then HipSaver has researched a variety of materials with various attributes for potential incorporation into the HipSaver product. In August 2000, the selected construction (HSPE4 12.7mm) was sent to the Tampere University of Technology Applied Mechanics Laboratory for impact testing on a mechanical hip system. The research group affiliated with this laboratory is currently most active in the development and biomechanical testing of hip protectors and has several published reports on the subject.

HipSaver Pad Construction: HipSaver encloses a 1/2" (12.7mm) thick damping foam material in a waterproof/air tight pouch. The pads taper down to 1mm at the edge. The pouch is either RF or heat sealed around the perimeter. Pad diameters are 6.5 to 7.5 inches. These pads are sewn into polycotton underwear so as to overlie the trochanters.

Test Results: The test system and protocol are identical to that reported in *Bone* 1999 Aug. 25(2):229-35 (abstract enclosed). The pad being tested is affixed to a surrogate hip bone and then impacted by a swinging pendulum. Load cells capture the amount of force on the system. The test report on HipSaver shows the HipSaver pad (HSPE4 12.7mm) lowered a typical falling force of 7200N to below the fracture threshold of 3100N +/- 1200N. The following table compares the results from the HipSaver test to other pads tested in the *Bone* report (using the identical system and protocol):

Pad Id.	Description	7200N Fall Force Reduced to
KPH2	35mm height, polyethylene shell	760N
SafeHip	25mm height, polypropylene shell	2240N
Saftypants	20mm thick, low density polyethylene (soft)	2270N
HipSaver HSPE4	12.7mm thick, urethane foam in pouch (soft)	1790N

Conclusion: Only KPH2 and HipSaver reduced the applied force clearly below the fracture threshold of 3100N (+/- 1200N). A lower value on this test indicates better protective capacity since the values represent force REDUCTION. The above shows HipSaver to offer 20% more attenuation than Safehip.

The Damping Foam Absorbs the Shock and the Displaced Air Redistributes the Forces in the AirPad:
Although the HipSaver pad has the lowest profile (thinness) and is the softest, it performed remarkably well when compared to the stiffer and thicker pads. This result stems from the fact that the airtight pouch renders an “energy shunting” or diverting effect on the applied force: the initial impact is absorbed by the urethane foam and the displaced air from the foam inflates or distends the surrounding pouch. Hence, much similar to automotive air bag, the force is redistributed over a larger and softer area. This inflation effect can be demonstrated by pushing a HipSaver pad with the heel of the hand and observing the distention of the pouch. The HipSaver pad is thus a dual mechanism “shunting/absorbing” air pad.

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Trochanteric pad tests **HipSaver®**

Two thicknesses of the hip protector type HSPE4 were tested. The thickness of the thinner model was 8.4 mm, the thicker one was 12.7 mm. These pads were enclosed in waterproof nylon and polycotton knit material. These pad tests were performed at the midrange force of 7230N as per the protocol and the testing system described in ***Bone*** 1999 Aug. 25(2):229-35. The above-mentioned force was attenuated by soft tissue to the value of 5600 N, which match the average peak hip impact force measured in the muscle-relaxed state during in vitro falling tests (Robinovitch et al. 1991). Pad named PE30 (thickness 20 mm) was used to simulate the soft tissue and that pad was changed after every impact for a new one. Six impact tests were done for every pad type. Then the force measurements were filtered and evaluations of averaged peak values and standard deviations were calculated to get the maximum compressive impact forces as seen in Table 1. Typical time-dependent test curves of both thicknesses are seen in Figure 2.

Table 1 Averaged trochanteric impact forces and their standard deviations.

Speed	Energy	HSPE4 8.4 mm		HSPE4 12.7 mm	
1.9 m/s	74 Nm	Mean kN	Std kN	Mean kN	Std kN
		2.51	0.071	1.79	0.067

Description of facilities and the calibration

The data acquisition system is based on Microstar Laboratories Data Acquisition Processor DAP 3200A. The DAP 3200A has the DPL operating system.

The acquired data were analyzed by Matlab, which is used to numeric computation and visualization. The Matlab is a trademark of Math Works.

The sampling time was 10 µs. The number of acquired points was 1500 for each test curve. Known pads were used to see the same impact force level as reached in the tests earlier. The test system is seen in Figure 1.

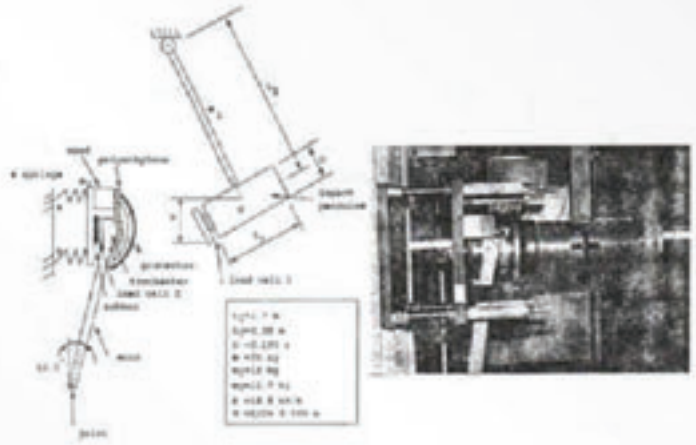

Figure 1 The hip protector testing system.

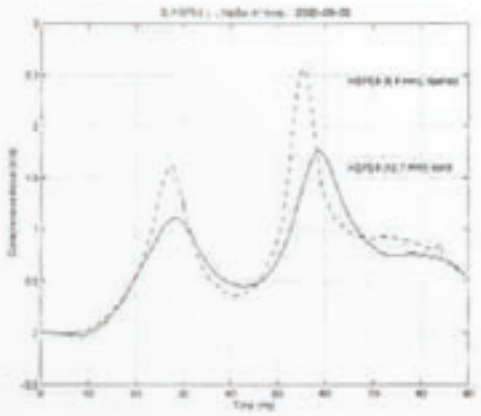

Figure 2 Test curves for the third impact of HSPE4 pf the both thicknesses.

Tampere 2000-09-15

Jarmo Poutala, Laboratory Manager

ORIGINAL STUDIES

Hip Protector Compliance: A 13-Month Study on Factors and Cost in a Long-Term Care Facility

Jeffrey B. Burl, MD, CMD, James Centola, PT, Alice Bonner, APRN-BC, and Colleen Burque, PTA

Objective: To determine if a high compliance rate for wearing external hip protectors could be achieved and sustained in a long-term care population.

Study Design: A 13-month prospective study of daytime use of external hip protectors in an at-risk long-term care population.

Setting: One hundred-bed not-for-profit long-term care facility.

Participants: Thirty-eight ambulatory residents having at least 1 of 4 risk factors (osteoporosis, recent fall, positive fall screen, previous fracture).

Intervention: The rehabilitation department coordinated an implementation program. Members of the rehabilitation team met with eligible participants, primary caregivers, families, and other support staff for educational instruction and a description of the program. The rehabilitation team assumed overall responsibility for measuring and ordering hip protectors and monitoring compliance.

Results: By the end of the third month, hip protector compliance averaged greater than 90% daily wear. The average number of falls per month in the hip protector group was 3.9 versus 1.3 in nonparticipants. Estimated total indirect staff time was 7.75 hours. The total cost of the study (hip protectors and indirect staff time) was $6300.

Conclusions: High hip protector compliance is both feasible and sustainable in an at-risk long-term care population. Achieving high compliance requires an interdisciplinary approach with one department acting as a champion. The cost of protectors could be a barrier to widespread use. Facilities might be unable to cover the cost until the product is paid for by third-party payers. **(J Am Med Dir Assoc 2003; 4: 245–250)**

Keywords: hip protectors; compliance; falls; costs and cost analysis; long-term care facilities

Hip fractures exact a heavy financial and human toll in the United States. More than 250,000 individuals sustain a hip fracture each year. Nearly 20% of those individuals die from complications of the fracture within 1 year, another 25% seek long-term placement, and less than half fully recover.[1–8] Over $5 billion is spent annually in direct and indirect hip fracture costs.[9–11]

Ninety percent of hip fractures occur in individuals over the age of 70.[12,13] Close to 2 million elderly, with a mean age of 84 years, reside in long-term care facilities. An estimated 4 million reside in the community with similar functional and medical impairments. This population of frail, at-risk elders has the highest potential for future hip fractures.[14,15]

Several factors that potentially increase the risk for hip fracture have been identified. They include osteoporosis, low body mass index, and, most importantly, a sideways fall onto the greater trochanter of the proximal femur.[16–20] Multidimensional programs designed to reduce hip fractures have been reported, and most include reducing falls and fall risk factors, increasing bone density and muscle strength, and improving gait and balance.[21] However, some recent meta-analyses have reported limited statistical power to detect the effectiveness of specific strategies or programs to prevent falls and fractures.[22,23]

Use of an external hip protection system that covers the greater trochanter of the proximal femur has been shown to reduce the incidence of hip fractures.[24–30] Yet, low compli-

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ance remains a major obstacle in the effective use of hip protector systems.[24,28,30–32] This 1-year study was undertaken to determine if moderate to high levels of hip protector compliance could be achieved and sustained in a long-term care facility.

METHODS

Subjects

Subjects were residents of The Masonic Home, a not-for-profit, 100-bed long-term care facility in Central Massachusetts. Eligible residents were ambulatory, with or without the use of an assistive device. High-risk residents were identified as having at least one of the following criteria:

1. Diagnosis of osteoporosis (T-score <2.5)
2. History of one or more falls within the past 6 months
3. History of prior fracture
4. Positive falls screen on admission for residents admitted within the previous 3 months

Fifty-six long-term care residents met the criteria for participation in the hip protector compliance study. The enrollment period was continued from September 2001 through the end of December 2001 and ran through September 2002.

Study Design

All eligible participants were invited to attend a 1-hour educational session conducted by the medical director, the director of rehabilitation, and a physical therapist. This session explained the use of hip protectors, the potential risks and benefits, and the objectives of the study. At that time, any interested individuals were invited to participate and consent was obtained. Residents who agreed to participate at the initial meeting were measured for hip protectors (see "Equipment" section). For eligible residents with a diagnosis of dementia or other cognitive impairment, families received a letter explaining the use of the hip protectors, the potential risks and benefits, and the objectives of the study. Families of those residents were given the option of having the resident participate in the study, and consent was obtained from the appropriate family member. The medical director, the director of rehabilitation, and the physical therapist were also available to answer individual questions at any time.

One-hour inservice education sessions by the rehabilitation department were provided to all licensed nursing and Certified Nurse Aide (CNA) staff on the use of hip protectors, their potential benefits, the number of protectors each resident would receive, and how and when they should be worn. Although these sessions were not mandatory, most of the nursing staff did attend. The rehabilitation department met separately with those individuals unable to attend the sessions to explain the study.

Laundry and housekeeping were inserviced separately by the director of rehabilitation on the hip protector product, and the handling and laundering instructions (no bleach). They were informed of the total number of protectors that would be circulating through the department.

Equipment

A local Massachusetts manufacturer of soft hip protectors, the HipSaver™ Company, Inc., was contracted to provide the product. They were selected based on extensive discussions of various models, including results from the PACE Program (Program for All-Inclusive Care of the Elderly) in East Boston, which had successfully used this hip protector model for over 2 years.[33] The Hip Saver Company in Canton, Massachusetts, was also selected because of close proximity to the study site and the ability to provide comprehensive customer service.

The hip protector company provided inservice education to the department of rehabilitation on measuring residents for proper size, ordering, and laundering requirements. They also provided a sizing chart, and all subjects were subsequently measured and fitted by the rehabilitation department for the proper-sized protector (there were 4 possible sizes). A measurement was performed around the widest circumference of the pelvic region.

After discussions with the nursing, rehabilitation, and laundry departments, it was determined that 4 sets of protectors would be dispensed to each resident to ensure that a hip protector would be available when needed. The rehabilitation staff was responsible for ordering the protectors and marking them with the resident's name before distribution. The nursing staff was responsible for distribution and storage on the nursing units. The cost of each hip protector, at the beginning of the study, was $30.

Tracking Compliance

For the purposes of this study, any individual who wore the hip protector at least once and was able to be monitored for a minimum of 9 months was included. It was felt that a longitudinal follow up was essential to determine if consistent wearing of the hip protectors could be maintained over time. Only daytime hip protector use was evaluated (ie, use from the time the resident was dressed in the morning until they were in bed for that night). Nursing staff received the protectors and distributed them to the appropriate residents. Those with activities of daily living deficits were given reminders by the CNAs and staff assistance in donning the protectors when needed.

Percent compliance was measured monthly by dividing the total days hip protectors were worn by the number of days in the month. Nursing tracked daily compliance on a log created and kept in the medication administration record (MAR) on the medication cart. At the time of the medication pass, the CNA reported to the nurse whether the resident had worn the hip protector for that day. The nurse noted this in the study log. Nursing was interviewed monthly by a representative from the rehabilitation department to obtain ongoing compliance data in the study subjects. The rehabilitation department reviewed the monthly tracking record and recorded monthly compliance for each resident. Compliance data was recorded for a total of 13 months.

Table 1. *Demographic Characteristics*

Characteristic	N/%
Average age (y)	89
Mode	93
Percent female	75%
Medicare	86%
Medicaid	92%
1 risk factor	39%
2≥ risk factors	61%

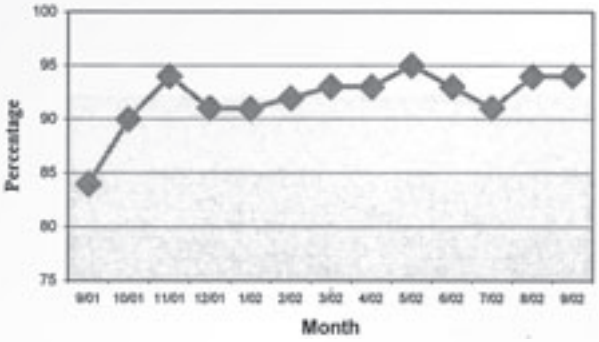

Fig. 1. *Percent hip protector compliance from September 2001 through September 2002.*

RESULTS

Fifty-six long-term care residents met the inclusion criteria for the study. Five residents agreed to participate when initially approached by the medical director, but refused to be measured and were not issued the hip protectors. These residents were not considered to be in the study. Six residents died, and an additional 7 had a significant change in condition to nonambulatory status well before the 9-month minimum could be completed. These 2 subgroups were not included in the data. Thirty-eight residents completed at least 9 months of the 13-month trial, with a mean follow up of 11.9 months. Data was collected on a total of 38 residents.

The average age of study participants was 89.5 years, with a mode of 93 years. Seventy-five percent of the participants were women, and 78% had a primary diagnosis of dementia. Ninety-two percent of participants were on state medical assistance (Medicaid) and 86% had Medicare coverage for part A expenses. More than half of the participants had 2 or more risk factors, and approximately one third had only one risk factor (Table 1). The total number of medications per resident did not change significantly during the study. The total scheduled psychoactive medications averaged one medication per participant (Table 2).

During the 13-month study period, a total of 206 falls occurred in the facility, averaging 15.8 falls per month or approximately 1.5 falls per resident per year. One hundred twenty-six of the falls (61%) involved 34 of the 38 study participants, or one-third of the total 100-bed nursing facility population (average occupancy, 98.9). Mean number of falls per participant was 3.9, compared with 1.3 falls for those not in the study. There were 2 hip fractures in the facility in the year before the start of the study. There were no hip fractures in the facility during the 13-month intervention. There were 5 non-hip fractures during the study, 2 fractures (clavicle, humerus) in 1 individual. Three of the 4 individuals who sustained a non-hip fracture were in the study group. Two subjects sustained fractures during the night (pelvis, rib) when they were not scheduled to wear the hip protectors. The other subject sustained a forearm fracture from a fall. She was wearing hip protectors at the time of the fall. By the third month of the study, average compliance exceeded 90%, and this was sustained for the remainder of the study (Fig. 1).

CNAs were interviewed by the rehabilitation staff in cases of noncompliance and were asked why hip protectors were not being worn. Most often, CNAs reported that the individuals were not wearing the hip protectors because of acute illness (not expected to get out of bed that day) or possibly as a result of laundry issues (occasional difficulty getting protectors back from laundry on Mondays, according to CNAs). Another reason given was that the resident was going out to see a specialist (medical or surgical), where the use of hip protectors was felt to be an added burden during the appointment. By the third month of the study, residents (those not requiring help with activities of daily living) appeared to consider the protectors part of their daily dressing routine and, for the most part, only required minimal cues from CNAs. Two participants wore hip protectors regularly for the first month of the study, but reported that they were not comfortable. Despite size changes, these subjects elected not to continue the hip protectors but were counted in the compliance data.

Staff time spent in the initial phase of the study on educational sessions for the residents and staff was 7.75 hours, for an estimated indirect cost of approximately $500. Total cost for the hip protectors for the 49 participants who agreed to be measured was $5880, for a total direct and indirect cost of $6300 for the study. None of the 6 deaths were related to a fall, and were not related to the use of hip protectors. The average time that hip protectors were worn by the 7 subjects who had a change in condition was 1.8 months (range, 1–4 mo). Average compliance for this group was 55% (range, 35–75%). The average time that hip protectors were worn by the 6 subjects who died was 3 months (range, 0–7 mo). The average compliance was 93% (range, 67–100%).

Table 2. *Prestudy and Poststudy Average Medications*

Average Medications Per Participant Per Day	Start of Study	End of Study	Paired *t*-test	*P* Value
Total medications	7.75	8.06	−.551	.59
Cardiac medications	1.14	1.17	−.177	.86
Total psychoactives	0.94	1.08	−1.54	.13
Antidepressants	0.47	0.53	−.81	.42
Antipsychotics	0.22	0.25	−1.43	.16

DISCUSSION

The incidence of hip fractures is expected to significantly outpace the growth of the senior population in the coming years. Between 1970 and 1997, the Finnish population over age 50 increased by 53%, whereas hip fracture incidence increased by more than 169%.[34] The total number of hip fractures worldwide is predicted to more than quadruple from 1.6 million to more than 6.2 million by 2050 if nothing is done to prevent this potential health crisis.[34]

Although the incidence of falls in long-term care is 1.5 falls per bed per year,[24,35,36] only 1–2% of all falls result in a hip fracture.[37,38] Studies have shown that the major causal factor for hip fracture is an impact to the greater trochanter, in which the impact energy of a fall exceeds the average fracture threshold of the proximal femur.[16–20] In addition, studies have demonstrated that osteoporosis, low body mass index, and height of a fall are independent risk factors for hip fracture.[16–20]

Successfully reducing hip fracture rates requires an interdisciplinary process in which all risk factors are addressed. To date, efforts to reduce falls, improve gait and balance, and increase body mass index have met with only partial success. Treatment of osteoporosis with antiresorptive medications might only increase femoral neck density by 2% per year,[39] which might not be sufficient for fracture reduction in long-term care residents whose average life expectancy is approximately 24 months.[15] One preventive strategy that could potentially reduce the impact energy of a fall to the greater trochanter is the use of external hip protectors, an external padding system that both absorbs and shunts energy away from the proximal femur. Studies have demonstrated the effectiveness of hip protectors, with one estimate that hip fractures could be reduced by 60% in those wearing the device, and up to 80% if all residents wore the protectors.[28]

Two recent studies have questioned the efficacy of hip protectors. In a randomized, controlled trial with 18 months of follow up, Meyer showed a relative reduction in hip fracture of more than 40%, but at borderline significance.[30] vanSchoor randomized a mixed group of community-dwelling elderly and nursing facility residents in a 16-month study.[40] No statistical difference between the control and study groups was realized. However, the authors noted a 23% nonsignificant reduction in hip fractures in individuals who wore the hip pads, as well as a lower fracture rate per fall in the study group.[41]

The definition of compliance is not standardized, making comparisons between studies problematic. Several studies report compliance only at the time of a fall, as opposed to reporting total number of days of fracture protection per patient. Lauritzen et al. base their compliance reporting on fall registers, ie, the number of times the resident was wearing the hip protectors at the time of the fall with a compliance rate of 24%.[24] Two other studies using similar compliance measures had rates of 46%, and 54%, respectively.[25,30] Harada, using a case-controlled observation method, noted a compliance rate for complete and incomplete wear in 88 subjects of 70% and 17%, respectively.[26] vanSchoor, using a self-reporting mechanism, found compliance of 45% at 6 months and 37% at the end of 12 months.[40]

The reasons for low compliance in these studies are not described in detail; however, study design could be one factor. Individuals are often asked to wear hip protectors without the staff having had detailed education regarding their use. Thus, lack of staff understanding and support could have been a factor in some studies. Hip protectors are most likely to be of benefit with maximum daily wear. Based on Parkkari's framework,[41] a structured educational program for both staff and patients was instituted in this study. The intent was to have staff support and encourage the use of the hip protectors. In addition, the concept of daily wear count was used in determining compliance. Each day the CNA provided feedback on hip protector wear, which was documented in the MAR. This was felt to be a more accurate assessment of total hip protector wear and fracture prevention. In our study, residents with a significant change in condition or decline in functional status had lower compliance than the other subjects (55%). One explanation for the low compliance in this group is that when patients become acutely ill, staff determines other care issues to be of higher priority. Also, when patients spend more time in bed, for example when acutely ill, CNAs might elect not to use hip pads. This specific topic might require dedicated inservice education.

Based on the results of this study, it appears that relatively high compliance is feasible and potentially sustainable in a long-term care facility. Compliance after the third month did not drop below 90%. This could have been attributable in large part to the rehabilitation department's role as a champion as well as the formal educational component of the study. There were 2 individuals included in the compliance who could not wear the hip protectors as a result of poor fit. Despite repeated attempts to optimize fit, the individuals complained of discomfort. If we exclude these 2 subjects from the data, average daily compliance exceeded 95%.

Failure to achieve higher compliance in the first 3 months could have been the result, at least in part, of issues with laundering of the protectors. Because of limited laundering on the weekends, especially for the incontinent residents who needed frequent changes, clean hip protectors might not have always been available on Monday mornings. This was resolved by providing those residents with 2 additional sets of protectors. One positive finding was that CNAs who had received the educational session would often call the rehabilitation department to obtain hip protectors before getting residents out of bed, if none were available in the patient's room. The CNAs reported occasionally borrowing unused/unopened hip protectors from other residents in an emergency, rather than getting a resident out of bed without them. For continent residents, 3 sets of hip protectors might be sufficient. However, incontinent residents might need more than 4, depending on the frequency of laundry services. Previous studies have not always reported the number of pads dispensed per resident. In some studies, only 2 or 3 protectors per resident were used. It is possible that the higher compli-

ance rate in this study was, in part, related to the relatively high number of pads dispensed to each resident.

Kannus estimated that 42 individuals would need to be treated for 1 year to prevent one hip fracture.[28] Given the compliance and number of users in the current study, approximately 1–2 hip fractures per year could be prevented. This could represent a potential cost savings to Medicare of approximately $20–40,000 (Fallon Community Health Plan, unpublished data).[11,42]

One major barrier to the use of hip protectors is the cost of the product. Until Medicare and Medicare + Choice programs provide external hip protectors as a covered benefit, either facilities or residents/families will be responsible for purchasing the protectors. Given the current budget crisis in many states, long-term care facilities are likely to face reductions in per diem rates. As of March 1, 2003, Massachusetts has reduced Medicaid payments to nursing facilities by over 2%, with possible further reductions. Facilities are faced with trying to maintain quality of care despite decreased revenue, and might be less likely to offer hip protectors to high-risk residents, unless they perceive some indirect benefits to the facility as well as to the resident. Some of those indirect benefits might include improved facility quality ratings, fewer reports of hip fractures to state authorities, and improved state survey results with regard to fall prevention. As more studies demonstrate the effectiveness of external hip protectors in preventing hip fractures in targeted populations, state or federal regulations might change to require hip protectors for certain high-risk, long-term care residents.

CONCLUSION

High compliance rates for hip protectors in an at-risk, long-term care population are feasible. Success depends in part on whether there is broad-based acceptance by support staff, especially CNAs, who can make the hip protectors an integral part of the daily routine for each resident. The process also requires a champion, a person or team, to assume accountability not only for measuring compliance, but also for attending to small details such as measuring, ordering, marking, and storing the hip protectors. In this study, the department of rehabilitation provided the leadership and accountability to sustain the program. Elder advocates and lobbyists need to inform federal and state governments of the potential benefits of hip protectors. Pending further research, insurers should be encouraged to provide them as a covered benefit to targeted, high-risk patients.

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HIP PADS: EFFECTIVE FRACTURE PREVENTION

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

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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.[1 2 3 4] Loss of independence often follows a fall. Falls are a factor in 40 percent of nursing home admissions.[5] The more frequently falls occur, the greater the likelihood of mortality and morbidity for the older adult.[6] Fall related injuries are the leading cause of death from injury in people over 65.[1 7] Only 50 percent of individuals admitted to hospitals as a result of a fall will be alive in one year.[3 8]

Ten percent of falls in the elderly result in serious injury and 5 percent result in some type of fracture.[4 8] The rate of hip fracture as a result of falls in the elderly has been calculated between 1 percent and 2.9 percent.[2 7 9] 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.[3] Hip fracture is the most common among all injuries leading to hospital admissions in the United States[10] and is a contributing factor in 40 percent of admissions to nursing homes.[3 11] 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.[12]

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.[10] Falls pose a particular problem for public health professionals in the development of both surveillance systems and prevention strategies.[7] 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.[10] Adler-Traines views injuries as predictable events that have remedial behavioral and environmental antecedents.[5] 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 multifactoral. 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[7] 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."[11]

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 that 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.

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PREVENTION OF FALL-INDUCED HIP FRACTURES: USABILITY EVALUATION OF HIP PROTECTORS

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Hip fractures are a common consequence of falls among the older population, with the incidence set to rise as our aging society increases. It has been suggested that the use of hip protectors are instrumental in substantially reducing the occurrence of hip fractures and so reducing the associated risks of disability and death. A serious limitation to their efficacy however, is that of non-use, particularly in the community setting. This paper presents a qualitative interpretation of the usability issues arising from the use of hip protectors and reasons for non-compliance. Two types of hip protectors (soft and hard) were examined to deduce if one was superior to the other on these accounts. The main reasons for non-compliance were: poor comfort; poor self-perceived appearance of the user; and high levels of self perceived safety. The soft hip protectors were found to be superior in terms of usability and compliance, and reported to be significantly more comfortable than the hard hip protectors ($p = 0.009$).

Introduction

It has been well documented over the years that a third of individuals over 65, and nearly half of those over 80, fall each year. Current trends show evidence of an ageing population and an associated rise in the number of falls sustained (Easterbrook, 2001). This is a major health concern, especially when considering fall-induced injuries and deaths. Some of the most devastating of these injuries are hip fractures. Deterioration in quality of life results after a hip fracture; inability to manage activities of daily living independently and the subsequent reliance on others after a hip fracture are likely causes of this decline. Repression in social activities is likely to prevail and thus further reduce quality of life. Hip fractures are thus a severe threat to the health and well being of the older population. A time trade off study dramatically illustrates this point: the study found that 80% of the elderly population would prefer a shorter life span instead of a bad hip fracture and the consequences that it would bring (Salkeld et al., 2000). Additionally, hip fractures cost the UK's National Health Service between £12,000 and £20,000 per incident (Easterbrook, 2001). These personal and economic dimensions are imminent issues to note and give weight to the importance of assessing hip fracture prevention techniques and to providing improvements to their efficacy.

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It has been suggested that the use of hip protectors may be instrumental in substantially reducing the occurrence of fractures and so eliminating the associated risks of disability and death. Hip protectors are garments worn by older people who are at risk of falling and are thus at an increased risk of experiencing a hip fracture. The standard design of hip protectors includes two pads, one sewn into each leg of a pair of briefs. The materials used in the undergarment and hip protector pads differ between makes, and the size and method of protection offered by the pads also vary. Hip protectors have been developed through substantial biomechanical testing and have been found to be technically able to prevent hip fractures (Parkkiari *et al*., 1995) by protecting the bones, notably the greater trochanter and proximal femur, during a fall episode.

However, recent studies have shown contrasting views on hip protector efficacy: the serious limitation to efficacy is user non-compliance. Compliance is critical to the effectiveness of hip protectors. If the hip protectors are not worn at the time of a fall, they cannot prevent a hip fracture. A study by Lauritzen *et al*. (1993) reported that less than ¼ of people issued with hip protectors wore them regularly. Previous studies, which have generally been conducted with institutionalised older people, have helped to identify causal reasons for non-compliance: hip protectors have been reported as being uncomfortable, of a poor fit and too tight (Villar *et al*., 1998; Hubacher *et al*., 2001). This may give explanation for complaints of bowel irritation and swollen legs (Kannus et al., 2000). Another important issue of concern was reported by Hubacher *et al*. (2001) who found that 38.9% of dropouts versus 12.7% of wearers reported that their appearance was unattractive when wearing the hip protectors, which may be another reason for non-compliance. A further factor acknowledged by a number of studies to limit compliance is the case of skin irritation which can occur (Cameron *et al.,* 2001).

This paper presents a qualitative interpretation of the usability issues arising from the use of hip protectors by community dwelling older people and their reasons for non-compliance. Two types of hip protectors were examined to deduce if one was superior to the other on these accounts, and issues for usability and design improvements have been summarised.

Method

Nineteen community-dwelling, fall-susceptible, older people (aged between 65-96 years, mean 80), who had not used hip protectors previously, were recruited from the community setting and involved in a cross over study design to test two types of hip protectors. The Safehip (hard) hip protector is anatomically designed to fit over the greater trochanter and proximal femur. It is made from two hard shell-shaped polypropylene plastic shields that are incorporated into briefs. The shields are fixed into the briefs and positioned so that one covers each hip. The briefs are made from a combination of cotton and Lycra®, and hold the shields in place. The hip protectors work by diverting the impact produced from a lateral fall, away from the hip joint and into surrounding tissues. The Hipsaver (soft) hip protector is an all-soft one piece brief. Sewn into the undergarment are two thin viscoelastic foam pads which are situated over the greater trochanter, one on each hip. The pads are encased in a waterproof and airtight pouch, made from nylon and during a fall the impact on the hip is significantly reduced through both energy attenuation and energy absorbing mechanisms.

A multi-methodological approach was taken and included the use of focus groups (n=2) and interviews (n=19) after a period of wear (at least 7 days per garment type).

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Repeated measures questionnaires centred on usability issues and compliance, and were used to verify and quantify the qualitative data gathering. Additional questionnaires were also used to determine whether wearing hip protectors had an influence on quality of life and fear of falling. The SF36 (Short Form 36) (a questionnaire that has been developed to identify the health status of individuals) and FES (Falls Efficacy Scale) (developed to measure the fear of falling within individuals, Tinetti 1988) were used to determine these respectively.

Discussion of Results

The hip protectors generally seemed to be well accepted, although many participants were concerned about their appearance in the garments and what others thought. This seemed to negatively affected compliance, especially with regard to the hard hip protector. The majority felt that the hard hip protector was more uncomfortable compared to the soft, and this seemed to influence both preference and compliance. This view was similar for comfort at night, with the soft type again being preferred. Toileting was made difficult with the use of the garments and in some instances made participants have to rush to the toilet due to the extra time required to remove additional clothing. Furthermore, many individuals regarded the garment as unnecessary, which also had an adverse affect on compliance. The percentage of participants who reported wearing the soft hip protector for 'most days' or more during the study period was 67% compared to 53% of participants wearing the hard design. The main reasons for non-compliance were: poor comfort and fit; poor self-perceived appearance of the user; and high levels of self perceived safety. The soft hip protectors were found to be superior in terms of usability and compliance, and reported to be significantly more comfortable than the hard hip protectors ($p = 0.009$).

It emerged that many of the participants who found the hip protector to be uncomfortable went on to report that they failed to continue wearing the garment. The responses support the natural conclusion that if the garment is uncomfortable, then the likelihood of it being worn is reduced. Comfort was especially noted to influence compliance at night, as one of the reasons presented for non-use at night included the concern that the garment would be uncomfortable to wear at this time and that it may disturb their sleep.

It is important to recognise that the older population for whom the protective devices are essentially being developed is likely to present with physical difficulties. Those individuals with such attributes have been found to have difficulties in getting the hip protectors on and off (van Schoor et al., 2003), as was an issue reported by some of the participants in this study. It has been noted that this difficulty may increase the risk of falling and thus place the wearer at a greater risk of a hip fracture (Oster & Specht-Leible, 1999). Additionally, this usability issue was also of concern to some individuals in an aesthetic sense as the clothing fitted tightly over the protectors, making them more conspicuous to others. For other users, this issue was not of any concern as they felt that safety takes priority and they were more concerned with protecting their hips during a fall than worrying about their appearance. Fear of falling is often a concern among the older population and this lack of confidence can cause further falls or cause a self-imposed restriction on activities. It was suggested by a number of participants that they felt safer when wearing the hip protectors and a feeling of safety was associated with their wear, influencing compliance positively. However, for some, the use of the protectors made

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them feel more at risk because it raised awareness of their fall risk. It was revealed in the study that individuals who felt more confident in their walking ability were less inclined to comply, the reasons given were that they felt no need to wear the device because they had not had a fall, or hadn't had one for a while, or that through other interventions (such as physiotherapy) they felt as if their mobility was improving and were therefore at less risk of falling (and had less need for protection). As a linear relationship exists between the number of fall risk factors and likelihood of falling, it is not surprising that individuals with a greater risk of falling have a higher compliance rate (Hubacher *et al*., 2001). Additionally, it is important to understand the psychological effects that the use of hip protectors can have on users. For some, the inability to dress or toilet independently with their use, to feel undignified, or to feel at increased risk of falling, may affect individuals' quality of life.

Interestingly, although the protectors resulted in a lot of negative comments from the participants, very few stated that their design could be optimised, although this may have been due to concerns that changes could reduce their efficacy in fracture prevention. From comments made during the study, it appeared that users may benefit from cooler fabric, less bulky (less visible) and softer material in the design of the protectors, and an easier way to don and doss such garments. The design could be changed although it is likely that a number of participants will not be willing to wear them as they feel they are accepting old age:

> *"I just thought - they are the last straw. You think, why should it happen to me… and it has happened to me, and I don't like it, do I, but who am I to be that proud at 85 - I felt very degraded [wearing the hip protectors]. I just can't visualise having to wear those things every day and perhaps at night… I just feel as though that's the end."*

It may be necessary to employ other additional support to increase the acceptance and subsequent compliance of hip protectors. Literature has suggested that a possible intervention to help improve compliance involves educating the nursing staff caring for the patients about the use of hip protectors and the risks associated with hip fractures. Therefore, the type of information that the staff can give to their patients can be more tailored to suit an individual. Meyer et al. (2003) reported successful adherence with this methodology and a 40% reduction in hip fractures being achieved as a result. A study by Parkkari *et al.* (1998) supports this as an effective method of achieving good compliance and reported an adherence rate of 91%, with a one hour introduction lesson on the incidence, causes, consequences and prevention of hip fractures, given to the nursing staff.

Conclusions

The aim of the study was to develop a greater understanding of the usability issues surrounding hip protector use among community dwelling older people, and to identify reasons for non-use. The study aimed to compare two different types of hip protectors, a hard hip protector (Safehip) and soft hip protector (Hipsaver), on issues of usability. The study concluded that the soft hip protector is superior in terms of usability and general compliance.

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It can be suggested that there is a requirement to involve the user in the design process in order to improve acceptance and compliance. It can further be concluded that the nature of the information given to the user on allocation of hip protectors impacts on compliance and needs to be tailored to an individual's perception of their own limitations.

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High Efficacy for Hip Protectors in the Prevention of Hip Fractures Among Elderly People With Dementia

Doron Garfinkel, MD , Zorian Radomislsky, MD, Samira Jamal, RN, Joshua Ben-Israel, MD

published online 01 May 2008.

Objective
To evaluate the efficacy of hip protectors (HP) in preventing hip fractures (HF) in patients with dementia.

Design
A case-control study.

Setting
Four specialized dementia units.

Participants
206 physically independent patients with dementia.

Interventions
Beginning in January 2004, following the recommendation of the Israeli Ministry of Health, we recommended the use of HP (Hip Saver-nursing home type) to each family/guardian of all patients in these departments.

Measurements
The rate of falls and HF per falls in patients with and without HP.

Results
We achieved patient compliance of 70% to 80% for wearing the HP 24 hours a day; 106 patients were permanently wearing HP for a total period of 1905 months. Of those, subgroup B of 63 patients had been monitored prior to January 2004, before HP were introduced. One hundred patients of the same departments have never used HP; together with the months of follow-up before January 2004 in subgroup B, the follow-up period in patients not wearing HP, reached a total of 3136 months. There was no statistical difference between patients with/without HP regarding age, gender, comorbidities, routine laboratory findings, and medications. The rate of falls was not significantly different in patients with and without HP. However, there was a significant difference in the rate of hip fractures (HF): in patients not wearing HP there were 323 falls resulting in 14 HF, and in patients wearing HP, 260 falls but only 2 HF (4.3% versus 0.8%, respectively, *P* = .007, chi-square test, 95% confidence interval 1.3–24.6, NNT = 28).

Conclusions
When appropriately introduced and used, hip protectors have high efficacy in preventing hip fractures in long-term care patients with dementia. The medical, social, and economic beneficial outcomes are substantial.

Hip Protectors reduce fractures in Burnaby Hospital

From Fraser Heath's *InFocus Newsletter* Sept 2007
by Michael Bernard

Fraser Health's expert on falls prevention says a lot of teamwork — and a little padding in the right place – has helped Burnaby Hospital cut in-hospital hip fractures suffered by seniors by a whopping 80% over the last four years.

One in about 1,000 seniors admitted to hospital in Canada each year fractures a hip during their stay, said Fabio Feldman, Fraser Health's Manager of Seniors Falls and Injury Prevention.

Seniors fall for any number of reasons, ranging from being in a new environment or the effect of medications, to poor balance, lack of muscle strength or the medical reason for which they are hospitalized. When the fall leads to a fracture, the effect can be catastrophic. Many lose their mobility and independence, and about one in four will die within a year.

But Feldman made a startling find when he reviewed the incidence of hip fractures reported among seniors at Burnaby Hospital. The number has dropped from 14 in the 2003/04 fiscal year to three in 2006/07.

"Only two preventive strategies could account for this," said Feldman. "almost all of in-hospital hip fractures are due to falls, so one factor is falls prevention, which involves educating staff, conducting safety checks and establishing standardized safety procedures. The other factor is the use of hip protectors."

Dena Gartner, senior physiotherapist and section head for medicine at Burnaby Hospital, said a team approach to falls prevention has been a big factor in reducing falls. "We've had a multi-disciplinary team working on this for years," she said. "Everyone is aware that many seniors are frail and at risk when they enter the hospital."

Feldman is hoping to see the Burnaby experience repeated at other Fraser Health hospitals. Not only can hip protectors save lives, they can also save money. "We know that hospitalization following a hip fracture runs about $18,000 a patient. If you do the math, conservatively speaking, that means that Burnaby staff has saved more than $340,000 by following a falls prevention strategy and ensuring patients wear hip protectors. By comparison, the hospital has spent only $5,000 so far purchasing hip protectors."

For further information, contact Fabio Feldman at 604-519-8534

The hip protectors used at this acute care hospital are the HipSaver brand.

Notes:

Notes:

HipSaver® hip protecting AirPads are manufactured by
HipSaver Inc., 7 Hubbard Street, Canton, MA 02021, USA, and are distributed by

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