

Fall and Fracture Prevention in the Elderly

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Prevention of falls in the elderly is a high priority in many countries. Single component and multifaceted interventions have been extensively studied. However, only two interventions have been shown to reduce injuries or fractures. Hip protectors effectively reduce hip fractures. Home-based exercise programs administered by qualified professionals may reduce falls and fall-related injuries. Most interventions are intensive and require substantial resources. Before considering implementation of a fall prevention program, its practicability, acceptance and cost-effectiveness should be explored.

Key words: accidental falls, prevention, hip fractures, hip protector, protective devices.

Introduction

Prevention of falls among elderly persons is a high priority in many countries. Guidelines explicitly recommend special services for fall prevention in high-risk groups, including the elderly presenting after a fall, recurrent fallers and nursing home residents. Multifaceted interventions are recommended for both community-dwelling older persons and residents of long-term care facilities.^{1,2} Implementation of these guidelines will have considerable resource implications.

A major concern is not only the high incidence of falls, but also the high disposition to fall-related injuries resulting in considerable morbidity and functional decline. It has been estimated that 20% of falls require medical attention,^{3,4} and 10% result in a fracture.^{5,6} However, only two of the many prevention strategies available appear to reduce the incidence of fall-related injuries, the main outcome of interest. Hip protectors are of proven benefit to reduce the incidence of hip fractures,⁷⁻⁹ while home-based exercise programs administered by qualified professionals are likely to reduce the number of falls resulting in injury.¹⁰ In this article, we present a brief overview of the effectiveness of non-pharmacological fall and fracture prevention approaches targeted at community-dwelling elderly and residents of long-term care facilities.

Methods

We searched the Cochrane Database of Systematic Reviews and the Cochrane Controlled Trials Register (The Cochrane Library, Issue 1, 2003) for relevant publications dealing with non-pharmacological fall and fracture prevention in the elderly. Further trials were identified by searching PubMed to February 2003. English language restriction was applied.

Effectiveness of Fall and Fracture Prevention Strategies Exercise Interventions

Despite extensive research, there is no evidence that exercise interventions reduce fall-related fractures. Studies using untargeted group exercises in community-dwelling elderly even failed to demonstrate a reduction in falls.¹⁰ Only one study reported a reduction in falls in healthy seniors through a supervised group-based exercise program.¹¹ Although Tai Chi is popular and widely recommended,² only one short-term study has observed a reduction in the occurrence of falls.¹²

The reason for the lack of effectiveness of exercise programs may be that exercise on its own enhances the risk of falls and injuries. Even brisk walking has been found to raise the risk of falls in women with a history of fracture.¹³ In contrast, individually tailored home-based exercise programs administered by

qualified professionals, including progressive muscle strengthening, balance exercises and a walking plan, are likely to reduce the number of fallers by about 20% (pooled relative risk from three trials with 566 participants: 0.80, 95% confidence interval 0.66–0.98). The number of people sustaining a fall-related injury has also been found to decrease (pooled RR 0.67, 95% CI 0.51–0.89).¹⁰

Home Safety Interventions

Home safety interventions include home visits by an experienced therapist to assess environmental hazards and supervise modifications and installation of safety devices. They are usually part of multifaceted programs.¹⁰ Specific examples of environment modification and safety devices include installation of grab rails, removal of obstacles, repair of damaged flooring, adaptation of height of chairs and improvement of poor lighting.¹⁴ There is no clear evidence that these interventions as an isolated approach reduce falls and fractures.^{10,14,15}

Withdrawal of Psychotropic Medication

The association between psychotropic medication use and falls is well recognized (see article, page 45). Medication manipulation has been investigated within complex interventions. However, the role of medication modification in the context of these programs remains unclear.^{10,16}

Multifaceted Screening and Intervention Programs

Multifaceted programs have been studied extensively.¹⁰ They include the assessment of environmental, medical, functional and psychological risk factors, health professional advice, arrangement of referrals and provision of risk-modifying interventions such as exercise. These interventions do not work in persons with cognitive impair-

ment,¹⁷ but may work in nursing homes under the conditions of extensive staff training and external support by professional specialists.¹⁸ However, it remains unknown which components of multifactorial interventions are effective.

If hip protectors are part of the program, the additive effects of other components of fracture prevention might be marginal.¹⁸ There is fair evidence that multifaceted programs reduce falls in the community.¹⁰

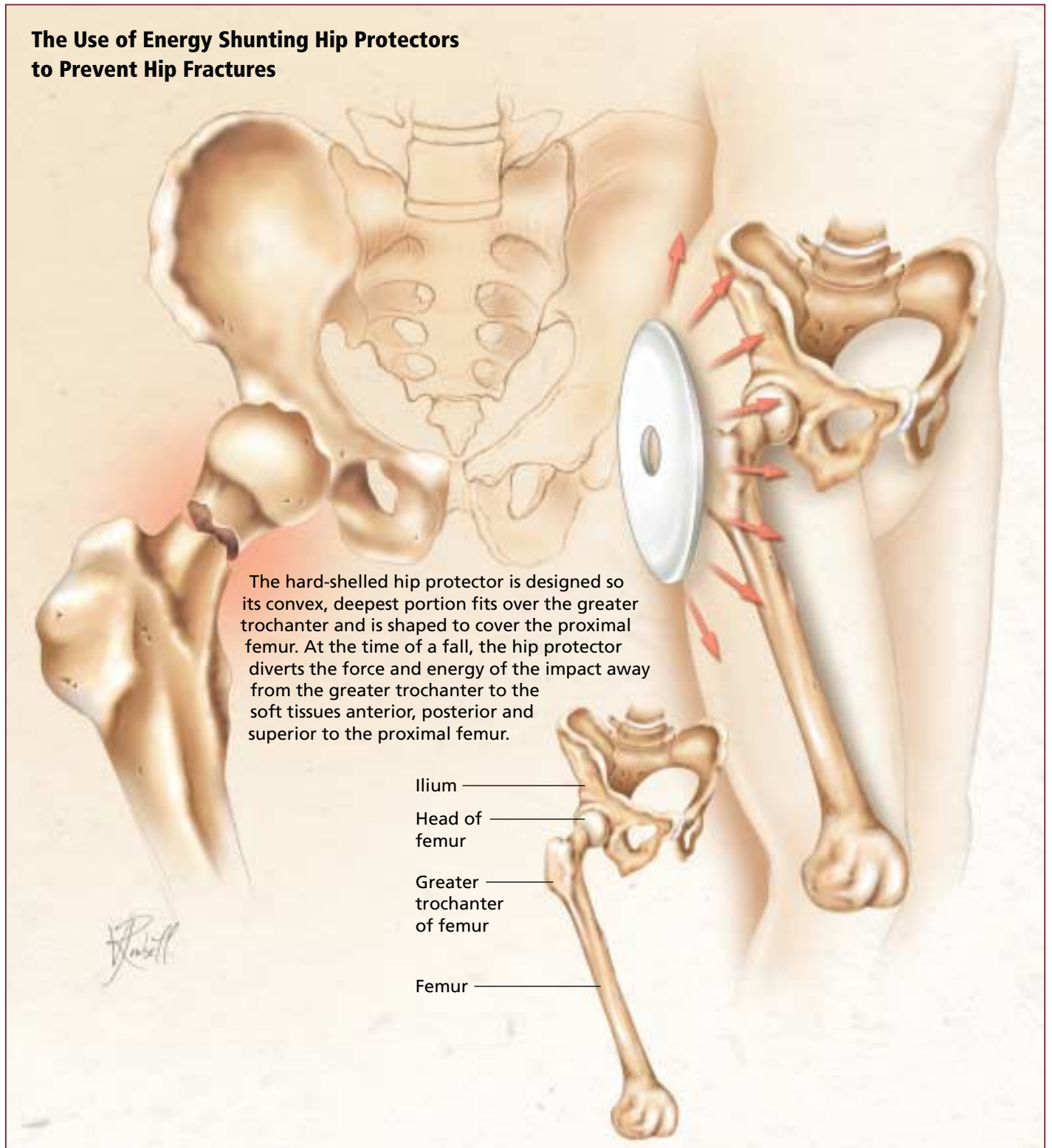
Hip Protectors

Hip protectors are the only non-pharmacological intervention proven to effectively prevent hip fractures. In nursing homes, hip fractures could be reduced by 50% with the use of hip pro-

The Use of Energy Shunting Hip Protectors to Prevent Hip Fractures

The hard-shelled hip protector is designed so its convex, deepest portion fits over the greater trochanter and is shaped to cover the proximal femur. At the time of a fall, the hip protector diverts the force and energy of the impact away from the greater trochanter to the soft tissues anterior, posterior and superior to the proximal femur.

Ilium —
Head of femur —
Greater trochanter of femur —
Femur —



tectors.^{7,8,9} Different protectors have been studied in several randomized trials in various countries.⁷ Energy shunting (hard-shelled) hip protectors are made of durable plastic, designed to divert a direct impact away from the greater trochanter onto the surrounding soft tissue (Figure).^{19,20} Although soft, absorbing hip pads do offer some reduction in the peak forces involved,²¹ energy shunting systems are likely superior in preventing hip fractures. Some pads rely on both principles. Hip fractures are rare if the protector is used.⁷⁻⁹ Despite their effectiveness, however, the acceptance of hip protectors is poor.⁷ Distribution of hip protectors to cognitively impaired persons without systematic involvement of caregivers is of limited benefit and should be discouraged.²² Structured education and involvement of caregivers can substantially improve compliance with hip protectors.^{8,9} Therefore, hip protectors should be implemented only in combination with an education program. For practical purposes, a user will need three to five protectors at the time. Cost-effectiveness analyses of hip protectors are awaited.

Remaining Questions

Several relevant questions about the long-term implementation of fall prevention programs remain. At present there is no evidence indicating the optimal duration and intensity of the available interventions. Although the majority of fall prevention trials did not report an increase of adverse effects, this could be due to under-reporting. For most interventions, the benefit in terms of injury and fracture prevention is unknown. Acceptability and the feasibility of implementing the programs into the general health care system should be explored. Since most of these interventions are very time and resource consuming, cost-effectiveness analyses should also be performed.

Implications for Practice

Health care providers contemplating the implementation of fall prevention

programs should target scarce resources where benefit is proven. Offering hip protectors to all nursing home residents should be considered. Their usefulness is also likely for high-risk community dwellers. Implementation of hip protectors should be combined with structured education of nursing staff or other caregivers and, if possible, of the target person. Professionally prescribed, home-based balance and gait training and muscle strengthening reduce falls and fall-related injuries (see article, page 26). Carefully conducted multifaceted health and environmental programs for community-dwelling elderly are likely to prevent falls. However, the intervention does not work if targeted at cognitively impaired persons. ♦

Gabriele Meyer and Andrea Warnke have received travel grants from Rölke Pharma, the German exclusive distributor company of Safehip® hip protectors. Andrea Warnke was formerly an employee of Rölke Pharma.

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