Improve Public Policy Response and Medicare Coverage

for Fall Prevention and Intervention

July 2010

BIBLIOGRAPHY

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The following articles were found when searching "falls", "older adults", "fall risk", and "fall prevention" in PubMed, EMBASE, CINAHL, OVID and Cochrane databases.

Alcee, D. (2000). "The experience of a community hospital in quantifying and reducing patient falls." Journal of Nursing Care Quality 14(3): 43-53.

> A retrospective review of patient falls in a 248-bed acute-care community hospital was conducted in order to quantify the number of patient falls and identify what factors resulted in these falls. The author reports these results and describes specific measures that were implemented in an attempt to reduce the number of falls in the organization.

Allen, T. and T. Allen (2004). "Preventing falls in older people: evaluating a peer education approach." British Journal of Community Nursing 9(5): 195-200.

> Initiatives in falls prevention usually rely on the expertise of health professionals and are therefore limited in scope. In order to reach a wider audience, a peer education programme in Bradford gave one-off sessions to groups of older people providing information about falls prevention and demonstrating simple balance and strength building exercises. Although evaluation found the programme to be well received, it also revealed a high rate of undisclosed falls and a reluctance to inform, or seek advice from, health professionals. It was not clear how far this was to do with embarrassment or being seen as not coping, but suggests that a more appropriate role for health professionals may be one that is complementary and supportive within a broad educational and facilitative programme embodying peer education.

Armstrong, M., A. Bates, et al. (2002). "Staying Active -- Staying Safe: development of a physical activity and falls prevention resource for older people who dwell in the community." New South Wales Public Health Bulletin 13(1-2): 13-4.

> Staying Active—Staying Safe is an initiative of the Northern Sydney Health Promotion unit and the Safe Communities project in Ryde. The aim of the initiative is to develop a resource that promotes exercises that can be completed at home by the more frail members of the older population. The resource consists of an audiotape and a booklet, which facilitate exercise at a pace and at a level of simplicity that is appropriate for this age group. This article describes the development and evaluation of the resource, and

considers the ways in which the resource is useful in increasing physical activity, functional mobility, and self-efficacy in completing everyday tasks.

Banez, C., S. Tully, et al. (2008). "Development, implementation, and evaluation of an Interprofessional Falls Prevention Program for older adults." Journal of the American Geriatrics Society 56(8): 1549-55.

This article describes the development and implementation of an Interprofessional Falls Prevention Program (IFPP) designed for community-dwelling seniors. The program was a collaborative pilot research study conducted in a retirement home and an outpatient hospital setting. The pilot was successful and was positioned into a permanent falls prevention program. The IFPP aimed at improving physical function and balance and reducing the fear of falling in seniors with a history of falls. The pilot study included an interprofessional falls assessment followed by a 12-week program of once-weekly group education and exercise sessions, 3- and 6-month follow-up visits, and individual counseling. To measure program effectiveness, the Berg Balance Scale, the Timed Up and Go Test, the Falls Efficacy Scale, and the Morse Fall Risk Scale were used at baseline, upon program completion, and at 3- and 6-month follow-up. Process measures were also collected, including patient satisfaction. Persistent improvements were found in participants' balance, strength, functional mobility, and fear of falling. Patient satisfaction with the program was high. Challenges faced in program implementation are also highlighted.

Barnett, L., E. van Beurden, et al. (2003). "Falls prevention in rural general practice: what stands the test of time and where to from here?" Australian & New Zealand Journal of Public Health 27(5): 481-5.

OBJECTIVE: General practitioner recall of the 1992-96 'Stay on Your Feet' (SOYF) program and its influence on practice were surveyed five years post-intervention to gauge sustainability of the SOYF General Practice (GP) component. METHODS: A survey assessed which SOYF components were still in existence, current practice related to falls prevention, and interest in professional development. All general practitioners (GPs) situated within the boundaries of a rural Area Health Service were mailed a survey in late 2001. RESULTS: Response rate was 66.5% (139/209). Of 117 GPs in practice at the time of SOYF, 80.2% reported having heard of SOYF and 74.4% of those felt it had influenced practice. Half (50.9%) still had a copy of the SOYF GP resource and of those, 58.6% used it at least 'occasionally'. Three-quarters of GPs surveyed (75.2%) checked medications 'most/almost all' of the time with patients over 60 years; 46.7% assessed falls risk factors; 41.3% gave advice; and 22.6% referred to allied health practitioners. GPs indicated a strong interest in falls prevention-related professional development. There was no significant association between use of the SOYF resource package and any of the current falls prevention practices (all chi2 > 0.05). CONCLUSIONS AND IMPLICATIONS: There was high recall of SOYF and a general belief that it influenced practice. There was little indication that use of the resource had any lasting influence on GPs' practices. In future, careful thought needs to go into designing a program that has potential to affect long-term change in GPs' falls prevention practice.

Beer, C. and C. Beer (2006). "Attitudes of GPs to medical management in a falls clinic service." Australian Family Physician 35(12): 1008-10.

BACKGROUND: Intervention programs that target falls risk factors can be effective. Falls clinics that use detailed multidisciplinary assessment are relatively new in Australia and it is not known how they are perceived by general practitioners. METHOD: A survey of referring GPs' attitudes to a falls clinic service and an audit of changes to patients' medical management resulting from falls clinic advice. RESULTS: General practitioners were largely satisfied with the falls clinic service, although they did not often change their patients' medical therapy as a result, or feel that review in the falls clinic had reduced their patients' frequency of falling. DISCUSSION: Further work is needed to confirm that the reductions in falls achieved in clinical trials are also being found in routine clinical practice. Alternative models of falls prevention and falls clinics could be explored, in partnership with primary care providers.

Bell, A. J., J. K. Talbot-Stern, et al. (2000). "Characteristics and outcomes of older patients presenting to the emergency department after a fall: a retrospective analysis." Medical Journal of Australia 173(4): 179-82.

OBJECTIVES: To study older patients presenting to the emergency department after a fall--factors associated with the fall, injuries sustained and outcome. DESIGN: A retrospective analysis using the Emergency Department Information System (EDIS), the Trauma Registry and the patient information database (CCIS), in addition to the patient's emergency and inpatient medical records. SETTING: Emergency department of a major inner city teaching hospital, 1 June-30 November 1997. PATIENTS: All patients over 65 years presenting to the emergency department (ED) after a fall, for whom complete medical records were available. RESULTS: Of 803 patients over 65 years presenting to the ED after a fall, complete records were available for 733 (91.3%) (283 men and 450 women). Extrinsic (accidental) causes were implicated in more than a third of falls (313 patients [42.7%]). A high proportion of the patients were living at home (520; 70.9%) and walking unaided (389; 53.1%). Although absolute numbers of women increased with age, men were as likely as women to present after a fall. Many patients had fallen before--39% of the men (111/283) and 24% of the women (110/450). In 78 patients (10.6%), alcohol misuse may have been a direct cause of the fall. The overall injury rate was 70.5% (517/733 patients), the most common injury being an isolated fracture (269/517 patients; 52.0%). In all, 419 patients (57.2%) were admitted to hospital, 48% (200/419) with a fracture and 52% (219/419) for investigation of the medical cause of the fall. The median length of hospital stay was 6 days (mean, 10.4 days; range, 1-129 days); 35% (146/419) of patients were in hospital for more than 10 days. CONCLUSION: Older patients presenting to the ED after a fall had high injury rates, high admission rates and often prolonged hospitalisation. About a third had fallen before. Patients at risk can be identified in the ED and referred to falls prevention programs.

Bergland, A. and T. B. Wyller (2004). "Risk factors for serious fall related injury in elderly women living at home." Injury Prevention 10(5): 308-13.

OBJECTIVES: To study whether balance, function, and other health status indicators can predict serious fall related injury in elderly women living at home. METHODS: In this prospective study, the authors took a random sample of 307 women aged 75 years and

over (mean 80.8 years, response rate 74.5%), living in the community. Serious fall injuries which occurred over a period of during one year were recorded, together with baseline registrations of health, function, and tests of walking and balance. RESULTS: In all, 155 women (50.5%) fell one or more times. One hundred and fifty six (51%) of the 308 falls resulted in a fall related injury, 74 (24%) in a serious fall related injury, and 40 falls (13%) resulted in fractures. The presence of rheumatic disorders, inability to rise from the floor, arthrosis of the hip, having had more than one fall during the one year follow up period, and an increased tendency to sway in the frontal plane when doing a calculation task were independent and significant predictors for serious fall related injury (fractures included). The independent predictors of fall induced fractures were experiencing more than one fall in the follow up period, cognitive impairment, and receiving care from professional or other. CONCLUSION: The study suggests that rheumatic disorders and the inability to get up from lying on the floor were the strongest independent risk factors for serious fall related injury. Experiencing more than one fall in the follow up period and cognitive impairment are the strongest independent predictors for fall induced fractures. Age was not a significant predictor of serious fall related injury. Assessment of these markers is feasible in a clinical setting and is a useful way of identifying those who are at risk of serious fall related injuries.

Black, A., J. Wood, et al. (2005). "Vision and falls." Clinical & Experimental Optometry 88(4): 212-22.

Falls occur in about one third of older people living independently in the community every year. This can lead to significant physical, psychological and financial costs to the individual and the community. While the risk factors for falls in older people are multifactorial, poor vision is considered to be an important contributing factor. The aim of this review is to evaluate current research linking impaired visual function with falls and to review current intervention strategies for the prevention of falls in older individuals. The evidence from the current literature indicates that impairment of visual functions, such as visual acuity, contrast sensitivity, visual fields and depth perception, is associated with an increased risk of falls. Recent studies have also demonstrated that falls can be reduced following cataract surgery as a visual intervention. Optometrists need to be aware of these associations and through appropriate treatment, referral and/or education, they can play a major role in optimising visual function in older people, as part of a multidisciplinary approach to falls prevention.

Blake, A., K. B. Morgan, M.J., et al. (1988). "Falls by elderly people at home:prevalence and associated factors." Age & Ageing 17: 365-372.

Of 1042 individuals aged 65 years and over who were successfully interviewed in a community survey of health and physical activity, 35% (n=356) reported one or more falls in the preceding year. Although the overall ratio of female fallers to male fallers was 2.7: 1, this ratio approached unity with advancing age. Mobility was significantly impaired in those reporting falls. Asked to provide a reason for their falls, 53% reported tripping, 8% dizziness and 6% reported blackouts. A further 19% were unable to give a reason. There was no association between falls and the use of diuretics, antihypertensives or tranquillizers, but a significant association between falls and the use of hypnotics and antidepressants was found. Discriminate analysis of selected medical and anthropometric

variables indicated that handgrip strength in the dominant hand and reported symptoms of arthritis, giddiness and foot difficulties were most influential in predicting reports of recent falls.

Bleijlevens, M. H., M. R. Hendriks, et al. (2008). "Process factors explaining the ineffectiveness of a multidisciplinary fall prevention programme: a process evaluation." BMC Public Health 8: 332.

BACKGROUND: Falls are a major health threat to older community-living people, and initiatives to prevent falls should be a public health priority. We evaluated a Dutch version of a successful British fall prevention programme. Results of this Dutch study showed no effects on falls or daily functioning. In parallel to the effect evaluation, we carried out a detailed process evaluation to assess the feasibility of our multidisciplinary fall prevention programme. The present study reports on the results of this process evaluation. METHODS: Our fall prevention programme comprised a medical and occupational-therapy assessment, resulting in recommendations and/or referrals to other services if indicated. We used self-administered questionnaires, structured telephone interviews, structured recording forms, structured face-to-face interviews and a plenary group discussion to collect data from participants allocated to the intervention group (n = 166) and from all practitioners who performed the assessments (n = 8). The following outcomes were assessed: the extent to which the multidisciplinary fall prevention programme was performed according to protocol, the nature of the recommendations and referrals provided to the participants, participants' self-reported compliance and participants' and practitioners' opinions about the programme. RESULTS: Both participants and practitioners judged the programme to be feasible. The programme was largely performed according to protocol. The number of referrals and recommendations ensuing from the medical assessment was relatively small. Participants' self-reported compliance as regards contacting their GP to be informed of the recommendations and/or referrals was low to moderate. However, self-reported compliance with such referrals and recommendations was reasonable to good. A large majority of participants reported they had benefited from the programme. CONCLUSION: The results of the present study show that the programme was feasible for both practitioners and participants. Main factors that seem to be responsible for the lack of effectiveness are the relatively low number of referrals and recommendations ensuing from the medical assessments and participants' low compliance as regards contacting their GP about the results of the medical assessment. We do not recommend implementing the programme in its present form in regular care.

Blyth, F. M., R. Cumming, et al. (2007). "Pain and falls in older people." European Journal of Pain: Ejp 11(5): 564-71.

Pain and falling both affect substantial segments of the older population. Despite the presence of several plausible mechanisms for pain to contribute to falling, very few studies have investigated this relationship in older people. If pain is a falls risk factor, this represents a potentially important point of intervention for falls prevention. Falls are a major cause of disability and loss of independent living status in older people. We examined the relationship between pain, pain-related interference with activities and falls

in a cross-sectional analysis of 3509 people aged 49 years or more in two postal code areas in New South Wales, Australia (the Blue Mountains Eye Study). We found that subjects reporting pain with moderate to severe level of pain-related interference with activities were more likely to report any falls or multiple falls in the past 12 months than subjects not reporting pain (adjusted prevalence ratios 1.42, p=0.0001 and 1.62, p=0.0156, respectively). We also found a significant trend in the association indicating an increasing likelihood of self-reported falls associated with increasing level of pain-related interference with activities. The association was stronger for multiple falls than for any falls. Excluding subjects with recent fractures did not alter the findings. Given the high prevalence and public health importance of both conditions, further investigation of this association in prospective studies is recommended.

Boonen, S., E. Dejaeger, et al. (2008). "Osteoporosis and osteoporotic fracture occurrence and prevention in the elderly: a geriatric perspective." Best Practice & Research Clinical Endocrinology & Metabolism 22(5): 765-85.

Age is a major determinant of osteoporosis, but the elderly are rarely assessed and often remain untreated for this condition. Falls, co-morbidities and co-medications compound the risk of fracture in senile osteoporosis. The prevalence of osteoporosis is expected to increase with increasing life expectancy, and the associated fractures - particularly hip fractures - will lead to significant demands on health resources. Treatment of senile osteoporosis can include pharmacological and non-pharmacological intervention. Calcium and vitamin D dietary supplementation is a relatively low-cost way of reducing the risk of fracture. Pharmacological interventions with risedronate, zoledronic acid, or teriparatide have been shown to reduce vertebral fracture risk in osteoporosis patients over the age of 75. Zoledronic acid has been shown to reduce fracture risk in frail patients with recent hip fracture. In the oldest old (patients over 80), strontium ranelate is the first agent with documented anti-fracture efficacy for both non-vertebral and vertebral fracture and documented sustained efficacy over 5 years. Falls prevention is an essential component of any strategy for decreasing fracture risk in old age. Currently, senile osteoporosis is under-diagnosed and under-treated, but age should not be a barrier to intervention.

Boyd, R., J. A. Stevens, et al. (2009). "Falls and fear of falling: burden, beliefs and behaviours." Age & Ageing 38(4): 423-8.

OBJECTIVES: this study estimated the frequency of recent falls and prevalence of fear of falling among adults aged 65 and older. DESIGN: a cross-sectional, list-assisted random digit dialling telephone survey of US adults from 2001 to 2003. SUBJECTS: 1,709 adults aged 65 or older who spoke either English or Spanish. Methods: prevalence estimates were calculated for recent falls, fall injuries, fear of falling and fall prevention beliefs and behaviours. RESULTS: an estimated 3.5 million, or 9.6%, of older adults reported falling at least once in the past 3 months. About 36.2% of all older adults said that they were moderately or very afraid of falling. Few older adults who fell in the past 3 months reported making any changes to prevent future falls. CONCLUSIONS: the high prevalence of falls and fear of falling among US older adults is of concern. Both can result in adverse health outcomes including decreased quality of life, functional limitations, restricted activity and depression. Older adults' fear of falling and their

reluctance to adopt behaviours that could prevent future falls should be considered when designing fall prevention programmes.

Brandis, S. J. and A. T. Tuite (2001). "Falls prevention: partnering occupational therapy and general practitioners." Australian Health Review 24(1): 37-42.

The Falls STOP project was a partnership between general practitioners (GPs) and occupational therapists with the common goal to reduce accidental falls in the elderly. A home visiting service was implemented that included the organisation of home modifications, education on falls prevention strategies and referral to other community services. The pilot demonstrated some valuable benefits to sixty-eight clients referred to the program by twenty GPs. A number of resources were developed such as a falls risk questionnaire completed by patients while waiting to see the doctor, and a falls prevention educational booklet. A significant challenge for future preventative programs is rousing the interest of a larger group of referring doctors, and promoting the benefits of shared care arrangements with occupational therapists that target specific health issues such as falls in the elderly.

Brown, J. S., E. Vittinghoff, et al. (2000). "Urinary incontinence: does it increase risk for falls and fractures? Study of Osteoporotic Fractures Research Group." Journal of the American Geriatrics Society 48(7): 721-5.

OBJECTIVE: To determine if urge urinary incontinence is associated with risk of falls and non-spine fractures in older women. METHODS: Type and frequency of incontinent episodes were assessed by 6,049 community-dwelling women using a self-completed questionnaire. Postcards were subsequently mailed every 4 months to inquire about falls and fractures. Incident fractures were confirmed by radiographic report. Logistic and proportional hazard models were used to assess the independent association of urge urinary incontinence and risk of falling or fracture. RESULTS: The mean age of the women was 78.5 (+/- 4.6) years. During an average follow-up of 3 years, 55% of women reported falling, and 8.5% reported fractures. One-quarter of the women (1,493) reported weekly or more frequent urge incontinence, 19% (1,137) reported weekly or more frequent stress incontinence, and 708 (12%) reported both types of incontinence. In multivariate models, weekly or more frequent urge incontinence was associated independently with risk of falling (odds ratio = 1.26; 95% confidence interval (CI), 1.14-1.40) and with non-spine nontraumatic fracture (relative hazard 1.34; 95% CI, 1.06-1.69; P = .02). Stress incontinence was not associated independently with falls or fracture. CONCLUSIONS: Weekly or more frequent urge incontinence was associated independently with an increased risk of falls and non-spine, nontraumatic fractures in older women. Urinary frequency, nocturia, and rushing to the bathroom to avoid urge incontinent episodes most likely increase the risk of falling, which then results in fractures. Early diagnosis and appropriate treatment of urge incontinence may decrease the risk of fracture.

Burke-Doe, A., A. Hudson, et al. (2008). "Knowledge of osteoporosis risk factors and prevalence of risk factors for osteoporosis, falls, and fracture in functionally independent older adults." Journal of Geriatric Physical Therapy 31(1): 11-7.

PURPOSE: This study had three goals: (1) to assess knowledge of osteoporosis risk factors, (2) to determine the prevalence of risk factors for osteoporosis, falls, and fractures, and (3) to ascertain the relationship between knowledge and prevalence of osteoporosis risk factors in affluent independent community-dwelling aging adults. METHODS: Forty-nine individuals over the age of 50 years completed a series of questionnaires and clinical testing procedures to identify osteoporosis knowledge, fall and fracture risk factors. RESULTS: Positive correlations were found between greater knowledge of osteoporosis risk factors and confidence in performing activities of daily living (r=0.32, p=0.05), better static and dynamic balance (r=0.42, p=0.01) and greater lower extremity strength (r=0.33, p=0.05). Despite these correlations 64% of participants had less than 50% correct responses related to osteoporosis knowledge. The average number of risk factors was 5.5 with many participants having modifiable risk factors including inadequate calcium and vitamin D intake and limitations in agility, balance, strength and flexibility. CONCLUSIONS: Participants with increased knowledge of risk factors presented with increased confidence performing activities of daily living, greater lower extremity strength and lower fall risk. Knowledge of disease processes, risk factors and strategies for prevention and management may improve patient compliance for behavioral changes necessary in successful participatory management.

Cameron, I. D., G. R. Murray, et al. "Interventions for preventing falls in older people in nursing care facilities and hospitals." Cochrane Database of Systematic Reviews(1): CD005465.

BACKGROUND: Falls in nursing care facilities and hospitals are common events that cause considerable morbidity and mortality for older people. OBJECTIVES: To assess the effectiveness of interventions designed to reduce falls by older people in nursing care facilities and hospitals. SEARCH STRATEGY: We searched the Cochrane Bone, Joint and Muscle Trauma Group Specialised Register (January 2009); the Cochrane Central Register of Controlled Trials (The Cochrane Library 2008, Issue 2); MEDLINE, EMBASE, and CINAHL (all to November 2008); trial registers and reference lists of articles. SELECTION CRITERIA: Randomised controlled trials of interventions to reduce falls in older people in nursing care facilities or hospitals. Primary outcomes were rate of falls and risk of falling. DATA COLLECTION AND ANALYSIS: Two review authors independently assessed trial quality and extracted data. Data were pooled where appropriate. MAIN RESULTS: We included 41 trials (25,422 participants).In nursing care facilities, the results from seven trials testing supervised exercise interventions were inconsistent. This was the case too for multifactorial interventions, which overall did not significantly reduce the rate of falls (rate ratio (RaR) 0.82, 95% CI 0.62 to 1.08; 7 trials, 2997 participants) or risk of falling (risk ratio (RR) 0.93, 95% CI 0.86 to 1.01; 8 trials, 3271 participants). A post hoc subgroup analysis, however, indicated that where provided by a multidisciplinary team, multifactorial interventions reduced the rate of falls (RaR 0.60, 95% CI 0.51 to 0.72; 4 trials, 1651 participants) and risk of falling (RR 0.85, 95% CI 0.77 to 0.95; 5 trials, 1925 participants). Vitamin D supplementation reduced the rate of falls (RaR 0.72, 95% CI 0.55 to 0.95; 4 trials, 4512 participants), but not risk of falling (RR 0.98, 95% CI 0.89 to 1.09; 5 trials, 5095 participants).In hospitals, multifactorial interventions reduced the rate of falls (RaR 0.69, 95% CI 0.49 to 0.96; 4 trials, 6478 participants) and risk of falling (RR 0.73, 95% CI 0.56 to 0.96; 3 trials, 4824 participants). Supervised exercise interventions showed a significant reduction in risk of

falling (RR 0.44, 95% CI 0.20 to 0.97; 3 trials, 131 participants). AUTHORS' CONCLUSIONS: There is evidence that multifactorial interventions reduce falls and risk of falling in hospitals and may do so in nursing care facilities. Vitamin D supplementation is effective in reducing the rate of falls in nursing care facilities. Exercise in subacute hospital settings appears effective but its effectiveness in nursing care facilities remains uncertain.

Campbell, A. J., M. C. Robertson, et al. (2007). "Rethinking individual and community fall prevention strategies: a meta-regression comparing single and multifactorial interventions.[see comment]." Age & Ageing 36(6): 656-62.

BACKGROUND: Guidelines recommend that fall prevention programmes for older people include multifactorial interventions. OBJECTIVE: We aimed to determine if randomised controlled trial evidence supports interventions with multiple components over single strategies in community based fall prevention. METHODS: We searched the literature for trials of interventions aimed at preventing falls. We included trials if they met the following criteria: (i) participants were randomly allocated to intervention and control groups, (ii) all participants were aged 65 years or older, (iii) the majority lived independently in the community, (iv) fall events were recorded prospectively using a diary or calendar during the entire trial and monitored at least monthly, (v) follow up was for 12 months or longer, (vi) at least 70% of participants completed the trial, (vii) all falls during the trial for at least 50 participants were included in the analysis, and (viii) a relative rate ratio with 95% CI comparing the number of falls in the intervention and control groups was reported. We calculated a pooled rate ratio separately for trials testing multifactorial and single interventions and compared their overall efficacy using meta-regression. RESULTS: Meta-regression showed that single interventions were as effective in reducing falls as interventions with multiple components (pooled rate ratios 0.77, 95% CI 0.67-0.89 and 0.78, 0.68-0.89 respectively). CONCLUSION: Multifactorial fall prevention interventions are effective for individual patients. However, for community programmes for populations at risk, targeted single interventions are as effective as multifactorial interventions, may be more acceptable and cost effective.

Carson, M. and J. Cook (2000). "A strategic approach to falls prevention." Clinical Performance & Quality Health Care 8(3): 136-41.

As part of the Trust's clinical governance arrangements and to facilitate a systematic approach to clinical governance a risk assessment was conducted. This assessment identified that falls were a significant risk of patients, both during episodes of in-patient care and in their own homes. There is little evidence nationally to guide good practice; therefore a multidisciplinary steering group was set up to develop a comprehensive approach to falls prevention. This resulted in the development of evidence based falls prediction tools, Trust policy and guidelines and extensive staff training programmes. Information leaflets have been provided to patients and additional services such as falls groups have been developed.

Casteel, C., C. Peek-Asa, et al. (2004). "Evaluation of a falls prevention program for independent elderly." American Journal of Health Behavior 28 Suppl 1: S51-60.

OBJECTIVE: To evaluate the effectiveness of an older adult falls-prevention program and describe compliance with the program. METHODS: The No More Falls! program was evaluated by comparing outcomes of program participants and nonparticipants from the same health care system and by comparing outcomes in pre- and postintervention periods. RESULTS: Program participants were 20% less likely to fall than nonparticipants. Falls during the year after program participation decreased 53%, compared with a 21% decline among nonparticipants. Compliance was positively associated with program effectiveness. CONCLUSION: These findings suggest that the No More Falls! program was successful in reducing falls among older adults.

Cesari, M., F. Landi, et al. (2002). "Prevalence and risk factors for falls in an older community-dwelling population." Journals of Gerontology Series A-Biological Sciences & Medical Sciences 57(11): M722-6.

BACKGROUND: Falls are responsible for considerable morbidity, immobility, and mortality among elderly people. The aim of this study was to determine the prevalence of falls and related intrinsic and extrinsic risk factors in a community-dwelling older population. METHODS: An observational study was performed on all patients (N = 5570) admitted from 1997 to 2001 to home care programs in 19 home health agencies that participated in the National Silver Network project in Italy. Patient evaluation was performed through the Minimum Data Set-Home Care (MDS-HC) instrument. RESULTS: A 35.9% falls prevalence was found within 90 days of the patient assessment through the MDS-HC instrument. After adjusting for all potential confounding factors, the logistic regression showed a high increase in risk of falling for those patients who wandered (odds ratio [OR] 2.38; 95% confidence interval [CI] 1.81-3.12) or suffered with gait problems (OR 2.13; 95% CI 1.81-2.51). Patients affected by depression were more likely to fall (OR 1.53; 95% CI 1.36-1.73). Those who lived in an unsafe place with environmental hazards had an increase in the risk of falling (OR 1.51; 95% CI 1.34-1.69). The associations of main risk factors for falls were also evaluated. CONCLUSIONS: Rate of falls among frail elderly people living in the community is very high and frequently correlates with potentially reversible factors. To identify those with higher falling risk, home care staff and general practitioners could use the MDS-HC assessment tool.

Chaabane, F. (2007). "Falls prevention for older people with dementia." Nursing Standard 22(6): 50-5; quiz 56.

This article discusses the issues that can lead to older people with dementia sustaining falls in mental health services. Strategies to reduce the likelihood of such events occurring are discussed.

Chang, J. T., S. C. Morton, et al. (2004). "Interventions for the prevention of falls in older adults: systematic review and meta-analysis of randomised clinical trials." BMJ 328(7441): 680.

OBJECTIVE: To assess the relative effectiveness of interventions to prevent falls in older adults to either a usual care group or control group. DESIGN: Systematic review and meta-analyses. DATA SOURCES: Medline, HealthSTAR, Embase, the Cochrane Library, other health related databases, and the reference lists from review articles and systematic reviews. DATA EXTRACTION: Components of falls intervention:

multifactorial falls risk assessment with management programme, exercise, environmental modifications, or education. RESULTS: 40 trials were identified. A random effects analysis combining trials with risk ratio data showed a reduction in the risk of falling (risk ratio 0.88, 95% confidence interval 0.82 to 0.95), whereas combining trials with incidence rate data showed a reduction in the monthly rate of falling (incidence rate ratio 0.80, 0.72 to 0.88). The effect of individual components was assessed by meta-regression. A multifactorial falls risk assessment and management programme was the most effective component on risk of falling (0.82, 0.72 to 0.94, number needed to treat 11) and monthly fall rate (0.63, 0.49 to 0.83; 11.8 fewer falls in treatment group per 100 patients per month). Exercise interventions also had a beneficial effect on the risk of falling (0.86, 0.75 to 0.99, number needed to treat 16) and monthly fall rate (0.86, 0.73 to 1.01; 2.7). CONCLUSIONS: Interventions to prevent falls in older adults are effective in reducing both the risk of falling and the monthly rate of falling. The most effective intervention was a multifactorial falls risk assessment and management programme. Exercise programmes were also effective in reducing the risk of falling.

Chang, W. R. (2001). "The effect of surface roughness and contaminant on the dynamic friction of porcelain tile." Applied Ergonomics 32(2): 173-84.

Surface roughness affects friction, but it is not clear what surface roughness characteristics are better correlated with friction. The average of the maximum height above the mean line in each cut-off length (Rpm) and the arithmetical average of surface slope (deltaa) had the highest correlation with dynamic friction coefficient in a previous study. The previous study was expanded to two different footwear materials and four different contaminants on a porcelain tile in the current investigation. The results showed that dynamic friction decreased as the interface speed and glycerol content in the contaminant were increased due to the hydrodynamic lubrication effect. Deltaa had the highest correlation with friction for most of the test conditions with neolite. For Four S rubber, friction coefficient appeared to have the highest correlation with the parameters related to the surface void volume at 30% glycerol content, related to the surface slope at 70 and 85% glycerol contents, and related to the peak to valley distance at 99% glycerol content. A good indicator of surface slip resistance probably should consist of the surface parameters representing the surface slope, the surface void volume and the surface peak-to-valley distance with the coefficients determined by the system parameters.

Chiarelli, P. E., L. A. Mackenzie, et al. (2009). "Urinary incontinence is associated with an increase in falls: a systematic review." Australian Journal of Physiotherapy 55(2): 89-95.

QUESTION: Is urinary incontinence associated with falls in community-dwelling older people? DESIGN: A systematic review and meta-analysis of observational studies investigating falls and urinary incontinence. PARTICIPANTS: Community-dwelling older people. OUTCOME MEASURES: Falls rather than fracture or injury, and any type of urinary incontinence. RESULTS: Odds ratios of nine studies were included in the meta-analysis. The odds of falling were 1.45 (95% CI 1.36 to 1.54) in the presence of any type of urinary incontinence. The odds of falling were 1.54 (95% CI 1.41 to 1.69) in the presence of urge incontinence. The odds of falling were 1.11 (95% CI 1.00 to 1.23) in the presence of stress incontinence. The odds of falling were 1.92 (95% CI 1.69 to 2.18) in the presence of mixed incontinence. CONCLUSION: Urge urinary incontinence, but not

stress urinary incontinence, is associated with a modest increase in falls. Falls prevention programs need to include an assessment of incontinence and referral for interventions to ameliorate the symptoms of urge incontinence.

Chu, L. W., C. K. Pei, et al. (1999). "Risk factors for falls in hospitalized older medical patients." Journals of Gerontology Series A-Biological Sciences & Medical Sciences 54(1): M38-43.

BACKGROUND: The incidence of falls among older hospitalized patients is higher than that of community-dwelling older persons. Prevention is important, but factors associated with these falls are less well studied than falls occurring in the community or nursing homes. METHODS: This study was conducted in an acute-care general hospital in Hong Kong. During November 1995 to March 1997, all older inpatients who fell during hospitalization were assessed by a geriatrician, a physiotherapist, and an occupational therapist. A standardized protocol to study the clinical and performance-oriented functional factors was employed. A sex- and age-matched hospital control was recruited for each case. In total, 51 cases and controls (mean ages 77.8 +/- 7.3 years and 77.5 +/- 7.0 years, respectively) were studied. RESULTS: Among the multiple clinical and functional risk factors for falls identified, lower limb weakness (i.e., power less than MRC grade 4 in one or both lower limbs) and poor tandem walk ability emerged as two significant predictive factors for falls in the hospital. The overall classification accuracy of fallers and nonfallers was 79%. The sensitivity was 84% and specificity was 75%. Clinical factors were the underlying causes for the lower limb weakness and poor tandem walk performance. CONCLUSIONS: Among clinical and functional risk factors for falls in the older medical patient, lower limb weakness and poor tandem walk ability were most predictive. Falls prevention programs in hospitals should employ these two tests as screening instruments.

Chua, E., C. McLoughlin, et al. (2000). "Myasthenia gravis and recurrent falls in an elderly patient." Age & Ageing 29(1): 83-4.

PRESENTATION: An elderly man had recurrent hospital admissions with falls. OUTCOME: Acetylcholine receptor antibodies and single-fibre electromyogram were useful in the diagnosis of myasthenia gravis. Treatment prevented further hospital admissions.

Clarke, P., L. K. George, et al. (2005). "The role of the built environment in the disablement process." American Journal of Public Health 95(11): 1933-9.

The Disablement Process model explicates the transition from health conditions to disability and specifically emphasizes the role of intervening factors that speed up or slow down the pathway between pathology and disability. We used hierarchical Poisson regression analyses with data on older adults from central North Carolina to examine the role of the built environment as a modifying factor in the pathway between lower extremity functional limitations and activities of daily living. We found that, despite declining physical function, older adults report greater independence in instrumental activities when they live in environments with more land-use diversity. Independence in self-care activities is modified by housing density, in part through the effect of substandard and inadequate housing.

Clemson, L., R. G. Cumming, et al. (2003). "The development of an assessment to evaluate behavioral factors associated with falling." American Journal of Occupational Therapy 57(4): 380-8.

The purpose of this study was to report the development of the Falls Behavioral (FaB) Scale for Older People, an assessment designed to evaluate behavioral factors that could potentially protect against falling. Instrument development included content analysis, expert review, and factor analysis. Ten behavioral dimensions were identified including Cognitive Adaptations, Protective Mobility, Avoidance, Awareness, Pace, Practical Strategies, Displacing Activities, Being Observant, Changes in Level, and Getting to the Phone. The final 30-item scale had a Content Validity Index of 0.93. Test-retest reliability was ICC = 0.94 ($p < .01$). Construct validity was established by showing that, as expected, scale scores were positively associated with increasing age ($rs = 0.46$, $p < .01$) and negatively associated with greater physical mobility ($rs = -0.68$, $p < .01$). People who had fallen utilized safer behaviors than those who had not reported a fall ($p < .05$) providing a benchmark for using the scale in future studies. The FaB is an easily completed, reliable, and valid tool for determining the presence or absence of protective behaviors. It has potential to assist in goal setting for falls prevention and to evaluate behavioral outcomes of fall prevention programs.

Clemson, L., R. G. Cumming, et al. (2004). "The effectiveness of a community-based program for reducing the incidence of falls in the elderly: a randomized trial." Journal of the American Geriatrics Society 52(9): 1487-94.

OBJECTIVES: To test whether Stepping On, a multifaceted community-based program using a small-group learning environment, is effective in reducing falls in at-risk people living at home. DESIGN: A randomized trial with subjects followed for 14 months. SETTING: The interventions were conducted in community venues, with a follow-up home visit. PARTICIPANTS: Three hundred ten community residents aged 70 and older who had had a fall in the previous 12 months or were concerned about falling. INTERVENTION: The Stepping On program aims to improve fall self-efficacy, encourage behavioral change, and reduce falls. Key aspects of the program are improving lower-limb balance and strength, improving home and community environmental and behavioral safety, encouraging regular visual screening, making adaptations to low vision, and encouraging medication review. Two-hour sessions were conducted weekly for 7 weeks, with a follow-up occupational therapy home visit. MEASUREMENTS: The primary outcome measure was falls, ascertained using a monthly calendar mailed by each participant. RESULTS: The intervention group experienced a 31% reduction in falls (relative risk (RR)=0.69, 95% confidence interval (CI)=0.50-0.96; P=.025). This was a clinically meaningful result demonstrating that the Stepping On program was effective for community-residing elderly people. Secondary analysis of subgroups showed that it was particularly effective for men (n=80; RR=0.32, 95% CI=0.17-0.59). CONCLUSION: The results of this study renew attention to the idea that cognitive-behavioral learning in a small-group environment can reduce falls. Stepping On offers a successful fall-prevention option.

Clemson, L., R. G. Cumming, et al. (1996). "Case-control study of hazards in the home and risk of falls and hip fractures." Age & Ageing 25(2): 97-101.

The importance of environmental hazards in the home as risk factors for falls and fractures is uncertain. A case-control study was conducted, involving people aged 65 years and over referred to an occupational therapy department for home assessment. There were 52 subjects with a recent hip fracture, 43 fallers (subjects with two or more falls in the past year but no hip fracture), and 157 non-fallers (subjects without hip fracture and with fewer than two falls in the past year). Subjects' homes were assessed for environmental hazards by occupational therapists using a structured home assessment form comprising 35 potential hazards. Overall, the homes of fallers were no more hazardous than the homes of non-fallers. However, fallers with cognitive impairment had significantly more hazards in their homes than non-fallers with cognitive impairment. A wide range of environmental hazards was associated with hip fractures. Many of the findings of this study could be due to bias inherent in the case-control design. To overcome the inadequacies of observational studies for the investigation of home hazards and falls, randomized trials are recommended to determine if removing hazards reduces the risk of falls and fractures.

Clemson, L., A. Cusick, et al. (1999). "Managing risk and exerting control: determining follow through with falls prevention." Disability & Rehabilitation 21(12): 531-41.

PURPOSE/METHOD: This study used in-depth interviews to explore the perspectives of nine older women who had not followed through with environmental modification recommendations to reduce their risk of falls in the home. RESULTS: It was found that the core concept of 'exerting control' provided an understanding of their experience following an occupational therapy home visit. Exerting control was a behavioural, cognitive and affective process whereby the women made decisions about whether or not to follow through with environmental modification recommendations based on their knowledge of environmental risks, perceptions of degree of risk, perceived ability to mediate these risks through behaviour and the degree of freedom she had in decision making. Exerting control meant that the women made daily choices about their home environment which increased or decreased the risk of falls with identified home hazards. CONCLUSION: The findings suggest that, for some women, health professionals need to understand and work with the phenomenon of exerting control, in order to work with clients to reduce environmental hazards.

Clemson, L., L. Mackenzie, et al. (2008). "Environmental interventions to prevent falls in community-dwelling older people: a meta-analysis of randomized trials." Journal of Aging & Health 20(8): 954-71.

Objective. This study seeks to determine the efficacy of environmental interventions in reducing falls in community-dwelling older people. Method. A systematic review and meta-analysis of randomized trials was performed. Results. Pooled analysis of six trials (N = 3,298) demonstrated a 21% reduction in falls risk (relative risk [RR] = 0.79; 0.65 to 0.97). Heterogeneity was attributable to the large treatment effect of one trial. Analysis of a subgroup of studies with participants at high risk of falls (four trials, n = 570) demonstrated a clinically significant 39% reduction of falls (RR = 0.61; 0.47 to 0.79), an absolute risk difference of 26% for a number needed to treat four people. Discussion. Home assessment interventions that are comprehensive, are well focused, and incorporate an environmental-fit perspective with adequate follow-up can be successful in reducing

falls with significant effects. The highest effects are associated with interventions that are conducted with high-risk groups.

Close, J. C. and E. Glucksman (2000). "Falls in the elderly: what can be done?" Medical Journal of Australia 173(4): 176-7.

Aim: This article gives information about falls in the elderly. Background: The evaluation of an older patient who has fallen includes a focused history with an emphasis on medications, risk factors and physical examination. The article also discusses the etiology and prevention of falls. Conclusion: Risk factors for falls in the elderly include increasing age, medication use, cognitive impairment and sensory deficits. To reduce the incidence of patient falls, clinicians and researchers have developed a variety of risk assessment tools to aid in the identification of patients at greater risk of falling.

Coleman, A. L., K. Stone, et al. (2004). "Higher risk of multiple falls among elderly women who lose visual acuity." Ophthalmology 111(5): 857-62.

OBJECTIVE: To determine the association between changes in visual acuity (VA) and frequent falls in older women. DESIGN: Prospective cohort study. PARTICIPANTS: Two thousand two elderly community-residing women participating in the Study of Osteoporotic Fractures with measurements of VA at baseline and a follow-up examination 4 to 6 years later (mean of 5.6 years). METHODS: Binocular VA with habitual correction was measured under standard illumination using Bailey-Lovie charts at baseline and fourth examinations. Change in VA was stratified into 5 categories: no change or VA gain, loss of 1 to 5 letters, loss of 6 to 10 letters, loss of 11 to 15 letters, and loss of >15 letters. A separate analysis considered decline in VA as the loss of >or=10 letters (>or=2 lines) on the Bailey-Lovie acuity measure between baseline and follow-up examinations. MAIN OUTCOME MEASURES: Data on falls were obtained from postcards sent every 4 months after the follow-up examination. Frequent falling was defined as >or=2 falls during a 1-year period after the follow-up examination. RESULTS: Compared with women with stable or improved VA, women with declining acuity had significantly greater odds of experiencing frequent falling during the subsequent year. Odds ratios after adjustment for baseline acuity and other confounders were 2.08 (95% confidence interval [CI]: 1.39-3.12) for loss of 1 to 5 letters, 1.85 (95% CI: 1.16-2.95) for loss of 6 to 10 letters, 2.51 (95% CI: 1.39-4.52) for loss of 11 to 15 letters, and 2.08 (95% CI: 1.01-4.30) for loss of >15 letters. In the analysis of visual decline defined as a loss of >or=10 letters, heightened risk of frequent falling was evident in each of 2 subgroups defined by splitting the sample on baseline VA, with borderline significant evidence of a more pronounced effect in those women with baseline VA of 20/40 or worse (P value for interaction, 0.083). CONCLUSIONS: Loss of vision among elderly women increases the risk of frequent falls. Prevention or correction of visual loss may help reduce the number of future falls.

Comans, T., S. Brauer, et al. (2009). "A break-even analysis of a community rehabilitation falls prevention service." Australian & New Zealand Journal of Public Health 33(3): 240-5.

OBJECTIVE: To identify and compare the minimum number of clients that a multidisciplinary falls prevention service delivered through domiciliary or centre-based care needs to treat to allow the service to reach a 'break-even' point. METHOD: A break-

even analysis was undertaken for each of two models of care for a multidisciplinary community rehabilitation falls prevention service. The two models comprised either a centre-based group exercise and education program or a similar program delivered individually in the client's home. The service consisted of a physiotherapist, occupational therapist and therapy assistant. The participants were adults aged over 65 years who had experienced previous falls. Costs were based on the actual cost of running a community rehabilitation team located in Brisbane. Benefits were obtained by estimating the savings gained to society from the number of falls prevented by the program on the basis of the falls reduction rates obtained in similar multidisciplinary programs. RESULTS: It is estimated that a multi-disciplinary community falls prevention team would need to see 57 clients per year to make the service break-even using a centre-based model of care and 78 clients for a domiciliary-based model. CONCLUSIONS AND IMPLICATIONS: The service this study was based on has the capability to see around 300 clients per year in a centre-based service or 200-250 clients per year in a home-based service. Based on the best available estimates of costs of falls, multidisciplinary falls prevention teams in the community targeting people at high risk of falls are worthwhile funding from a societal viewpoint.

Connell, B. R. and S. L. Wolf (1997). "Environmental and behavioral circumstances associated with falls at home among healthy elderly individuals. Atlanta FICSIT Group." Archives of Physical Medicine & Rehabilitation 78(2): 179-86.

OBJECTIVE: To conduct an in-depth examination of the environmental and behavioral circumstances associated with falls and near-falls experienced by elderly individuals and to evaluate the usefulness of reenactment as a method for studying falls. DESIGN: Observational and self-report data of incidents were obtained through a reenactment procedure. Environmental characteristics were documented with physical measurements, visual inspection, and photography. SETTING: Incidents occurred inside participants' homes, and reenactments were conducted at incident sites. PARTICIPANTS: Subjects were 15 community-dwelling, relatively healthy individuals, age 70 to 81 years. MAIN OUTCOME MEASURES: Incidents were analyzed to determine patterns of interaction of individuals' personal characteristics, environmental use behaviors, and environmental characteristics. RESULTS: Seven patterns were identified: collisions in the dark, failing to avoid temporary hazards, preoccupation with temporary conditions, frictional variations between shoes and floor coverings, excessive environmental demands, habitual environmental use, and inappropriate environmental use. CONCLUSIONS: There is a dynamic interaction between environmental conditions and behavior involving use of the environment and its implications for falls in older people. Although some incidents involved familiar environmental and behavioral risk factors, less familiar factors also were critical contributors to the incidents. Successful elimination of these factors is likely to be closely related to an individual's perception that an environmental or environmental use problem is correctable, motivation to undertake changes in the environment, and a desire to integrate changes into daily activities.

Corcoran, M. and L. Gitlin (1992). "Dementia Management: An Occupational Therapy Home-Based Intervention for Caregivers." The American Journal of Occupational Therapy 46(9): 801-808.

Describes an occupational therapy intervention for caregivers of persons with dementia. The intervention was implemented during 5 home visits. Each visit was designed to build caregiving skills through collaboration in identifying problem areas, developing and implementing environmental strategies, and modifying management approaches. A case vignette of a woman with Alzheimer's disease (AD) illustrates the therapeutic process and outcomes. Documentation used to evaluate the therapeutic process is presented

Corman, E. and E. Corman (2009). "Including fall prevention for older adults in your trauma injury prevention program--introducing Farewell to Falls." Journal of Trauma Nursing 16(4): 206-7.

With data showing that more than 50% of visits to our trauma center for older adults 65 years and older are due to falls, injury prevention programs in trauma centers should be paying more attention to the area of fall prevention for older adults. Farewell to Falls, a free, home-based program of Stanford Hospital and Clinic's trauma service, utilizes a multifaceted approach to help reduce falls. In addition to improving the lives of seniors, the program fulfills a community benefit goal and provides strong hospital marketing opportunities. This program is a benefit to hospitals and the older adults they serve.

Costello, E., J. E. Edelstein, et al. (2008). "Update on falls prevention for community-dwelling older adults: review of single and multifactorial intervention programs." Journal of Rehabilitation Research & Development 45(8): 1135-52.

The incidence of falls, fall-related injuries, and fall-associated costs continue to rise along with the increase in the aging population. Community-based fall prevention programs for the elderly are proliferating in an attempt to address this health problem. Prevention programs vary widely in their scope, ranging from single intervention strategies to comprehensive multifactorial approaches. Programs have been offered to targeted groups of elderly individuals at high risk for falls and to nonselect groups of community-dwelling elderly adults. This article presents a review of randomized controlled trials that investigated the effectiveness of fall prevention programs for community-dwelling older adults. Following a comprehensive critical analysis of the literature, we present the following guidelines: (1) multifactorial fall prevention programs appear to be more effective for older individuals with a previous fall history versus a nonselect group; (2) medication and vision assessment with appropriate health practitioner referral should be included in a falls screening examination; (3) exercise alone is effective in reducing falls and should include a comprehensive program combining muscle strengthening, balance, and/or endurance training for a minimum of 12 weeks; and (4) home hazard assessment with modifications may be beneficial in reducing falls, especially in a targeted group of individuals.

Crews, D. E. and D. E. Crews (2005). "Artificial environments and an aging population: designing for age-related functional losses." Journal of Physiological Anthropology & Applied Human Science 24(1): 103-9.

Over the past century there has been a large and continuing increase in the frequency of persons aged over 65 years; particularly those aged over 100 years. During the 21st century the number of persons over 100 years will continue to increase. This will occur at such a rapid rate that the 21st century may one day be called the century of centenarians.

Frailty and disability secondary to senescence, disease, and trauma have accompanied old age (often defined as age 65 and over) as far back as recorded history. However, during the 20th century, age, frailty, disability, and chronic degenerative diseases have been decoupled to some extant in the most long-lived human populations. Until recently, there was little need to design artificial environments for the unique needs of the elderly due to their low representation in most national populations. Today that need is increasing in concert with the number of persons aged 65 and older. The purpose of this review is to suggest areas wherein physiological anthropologists may have an opportunity to contribute to design trends for this rapidly increasing aging population. Major considerations for design of environments for the elderly are based upon altering the environment to accommodate their declining visual, auditory, and kinesthetic senses, thereby enhancing their declining faculties and improving their autonomy, independence, and self perceptions of well-being. To date most design considerations have been directed toward improving environments for those suffering from Alzheimer's disease or residing within assisted living facilities. Many such design improvements also may be effective in improving life satisfaction and functional abilities of the non-institutionalized elderly.

Cumming, R. G. and R. G. Cumming (2002). "Intervention strategies and risk-factor modification for falls prevention. A review of recent intervention studies." Clinics in Geriatric Medicine 18(2): 175-89.

At least 21 randomized trials of falls-prevention interventions have been published in the past 10 years; thus, many falls clearly can be prevented. The most effective interventions are those that target community-dwelling people who are at high risk for falling. There is no doubt that for this group multifactor intervention is effective. Convincing evidence that exercise can prevent falls does exist, but the best type of exercise remains uncertain. Tai Chi, intensive strength and endurance training, and home-based exercises prescribed by a physiotherapist seem promising. Reducing the use of psychotropic medications does prevent falls, but the value of home modifications is still unclear.

Cumming, R. G., M. Thomas, et al. (2001). "Adherence to occupational therapist recommendations for home modifications for falls prevention." American Journal of Occupational Therapy 55(6): 641-8.

OBJECTIVE: This study examined adherence to home modification recommendations made by an occupational therapist and attempted to identify predictors of adherence. METHOD: An experienced occupational therapist visited the homes of 178 people (mean age = 764 years) to evaluate for and recommend appropriate home modifications for falls prevention. One year later, a research assistant visited these persons' homes to assess adherence. RESULTS: At least one home modification was recommended in 150 of the 178 homes visited. The most common recommendations were to remove mats and throw rugs (48%), to change footwear (24%), and to use a nonslip bathmat (21%). In the 121 homes revisited after 12 months, 419 home modifications had been recommended, and 216 (52%) were met with partial or complete adherence. The only significant predictors of adherence were a belief that home modifications can prevent falls and having help at home from relatives. CONCLUSION: A major barrier to adherence to home modification recommendations is that many older people do not believe that home modifications can reduce their risk of falling.

Cumming, R. G., M. Thomas, et al. (1999). "Home visits by an occupational therapist for assessment and modification of environmental hazards: a randomized trial of falls prevention." Journal of the American Geriatrics Society 47(12): 1397-402.

OBJECTIVE: To determine whether occupational therapist home visits targeted at environmental hazards reduce the risk of falls. DESIGN: A randomized controlled trial. SETTING: Private dwellings in the community in Sydney, Australia. PARTICIPANTS: A total of 530 subjects (mean age 77 years), recruited primarily before discharge from selected hospital wards. INTERVENTION: A home visit by an experienced occupational therapist, who assessed the home for environmental hazards and facilitated any necessary home modifications. MEASUREMENTS: The primary study outcome was falls, ascertained over a 12-month follow-up period using a monthly falls calendar. RESULTS: Thirty six percent of subjects in the intervention group had at least one fall during follow-up, compared with 45% of controls (P = .050). The intervention was effective only among subjects (n = 206) who reported having had one or more falls during the year before recruitment into the study; in this group, the relative risk of at least one fall during follow-up was 0.64 (95% confidence interval, 0.50-0.83). Similar results were obtained when falls data were analyzed using survival analysis techniques (proportional and multiplicative hazards models) and fall rates (mean number of falls per person per year). About 50% of the recommended home modifications were in place at a 12-month follow-up visit. CONCLUSIONS: Home visits by occupational therapists can prevent falls among older people who are at increased risk of falling. However, the effect may not be caused by home modifications alone. Home visits by occupational therapists may also lead to changes in behavior that enable older people to live more safely in both the home and the external environment.

Cusimano, M. D., J. Kwok, et al. (2008). "Effectiveness of multifaceted fall-prevention programs for the elderly in residential care." Injury Prevention 14(2): 113-22.

BACKGROUND: Unintentional falls are particularly prevalent among older people and constitute a public health concern. Not much is known about the implications of multifaceted intervention programs implemented in residential care settings. OBJECTIVES: To evaluate the effectiveness of multifaceted intervention programs in reducing the number of falls, fallers, recurrent fallers, and injurious falls among older people living in residential care facilities. SEARCH STRATEGY: Comprehensive searches of Medline, PubMed, and EMBASE up to July 2007, the cited literature lists of each included study, and the internet engines Google Scholar, Yahoo, and Dogpile were performed to identify eligible studies. SELECTION CRITERIA: Eligible studies for this review were those that had randomized, controlled trials with adequate follow-up study components in their design. Studies that included elderly people in residential care who participated in multifaceted falls-prevention programs were included. DATA COLLECTION AND ANALYSIS: Two authors independently extracted the necessary data. Studies were assessed for quality by the criteria of Downs and Black. The results of the included studies have been reviewed narratively. MAIN RESULTS: From 21 articles potentially relevant to the topic, five studies met the inclusion criteria and all were reasonably well conducted. Three reported significant reductions in the number of recurrent fallers, two reported significant reductions in the number of falls, and one

reported significant reductions in the number of fallers. One other reported a reduction in the number of injurious falls in those who received the multifaceted prevention program compared with the control group. However, the analyses of this specific study were not based on intent-to-treat, so the effect of intervention on the number of injurious falls remains inconclusive. No study reported on adverse events, costs, or sustainability of the interventions. CONCLUSIONS: Multifaceted programs that encompass a wide range of intervention strategies have shown some evidence of efficacy. However, more well-designed research is required that assesses effects on injurious falls, quality of life, cost-effectiveness, and sustainability.

Cutchin, M. P. (2003). "The process of mediated aging-in-place: a theoretically and empirically based model." Social Science & Medicine 57: 1077-1090.

Aging-in-place is a complex geographical process mediated by institutions and other social forces. Two relatively under-studied services based on an aging-in-place strategy are adult day centers (ADCs) and assisted living residences (ALRs). This paper begins by re-casting aging-in-place as a process of place integration, based on a combination of geographical theory and John Dewey's philosophy of experience. Using empirical evidence from qualitative fieldwork and analysis of that evidence, the paper then introduces a theoretical model of the place integration process for older adults using ADCs and ALRs. The analysis describes how the domains of home and community are central to the originating problematic situation of these persons. It suggests that ‘socio-geographical differentiation of older adults’ situations’ is involved in these domain problems and describes how the process works to influence the core processes of place integration generated by the ADC or ALR setting. The analysis then explains three core processes of the model: ‘re-shaping the experiential context through space and place’, ‘creating meaning through place-centered activity’, and ‘contesting space and place’. The model also includes two final component processes. One is the distillate of the core processes, termed ‘approximating home and community’. The other is ‘instability as ongoing challenge’ to place integration. A brief conclusion discusses theoretical and policy implications drawn from the study.

Dacenko-Grawe, L., K. Holm, et al. "Evidence-based practice: a falls prevention program that continues to work." MEDSURG Nursing 17(4): 223-7.

The successful implementation of an evidence-based falls prevention protocol in an acute care facility is described. The number of falls per 1000 patient days decreased by 50% without rebound over a 5-year period.

Day, L., B. Fildes, et al. (2002). "Randomised factorial trial of falls prevention among older people living in their own homes." BMJ 325(7356): 128.

OBJECTIVE: To test the effectiveness of, and explore interactions between, three interventions to prevent falls among older people. DESIGN: A randomised controlled trial with a full factorial design. SETTING: Urban community in Melbourne, Australia. PARTICIPANTS: 1090 aged 70 years and over and living at home. Most were Australian born and rated their health as good to excellent; just over half lived alone. INTERVENTIONS: Three interventions (group based exercise, home hazard management, and vision improvement) delivered to eight groups defined by the presence or absence of each intervention. MAIN OUTCOME MEASURE: Time to first fall ascertained by an 18 month falls calendar and analysed with survival analysis techniques.

Changes to targeted risk factors were assessed by using measures of quadriceps strength, balance, vision, and number of hazards in the home. RESULTS: The rate ratio for exercise was 0.82 (95% confidence interval 0.70 to 0.97, P=0.02), and a significant effect (P<0.05) was observed for the combinations of interventions that involved exercise. Balance measures improved significantly among the exercise group. Neither home hazard management nor treatment of poor vision showed a significant effect. The strongest effect was observed for all three interventions combined (rate ratio 0.67 (0.51 to 0.88, P=0.004)), producing an estimated 14.0% reduction in the annual fall rate. The number of people needed to be treated to prevent one fall a year ranged from 32 for home hazard management to 7 for all three interventions combined. CONCLUSIONS: Group based exercise was the most potent single intervention tested, and the reduction in falls among this group seems to have been associated with improved balance. Falls were further reduced by the addition of home hazard management or reduced vision management, or both of these. Cost effectiveness is yet to be examined. These findings are most applicable to Australian born adults aged 70-84 years living at home who rate their health as good.

DeJong, G. (1979). "Independent Living: From Social Movement to Analytic Paradigm." Arch Phys Med Rehabil 60: 435-446.

Independent Living (IL) is more than a social movement; it is also an analytic paradigm that is re shaping the thinking of rehabilitation professionals and researchers alike. The IL paradigm is contrasted with the rehabilitation paradigm that has dominated disability policy, practice, and research. This article analyzes how the shift from the rehabilitation to the IL paradigm is likely to affect the future of disability research. To gain an appreciation for the IL paradigm, the article first evaluates independent living as a social movement in terms of the movement's constituency, origins, and its relationship to other social movements.

Di Monaco, M., F. Vallero, et al. (2008). "A single home visit by an occupational therapist reduces the risk of falling after hip fracture in elderly women: a quasi-randomized controlled trial." Journal of Rehabilitation Medicine 40(6): 446-50.

OBJECTIVE: To assess the effectiveness of a single home visit by an occupational therapist in the reduction of fall risk after hip fracture in elderly women. DESIGN: Quasi-randomized controlled trial. PARTICIPANTS: Ninety-five women aged 60 years or older, living in the community, who sustained a fall-related hip fracture. METHODS: The women were allocated alternately to intervention or control groups. All the women underwent a multidisciplinary programme targeted at fall prevention during in-patient rehabilitation. Additionally, the intervention group received a home visit by an occupational therapist a median of 20 days after discharge. Falls were recorded at a 6-month follow-up. RESULTS: Thirteen of the 50 women in the control group sustained 20 falls during 9231 days, whereas 6 of the 45 women in the intervention group sustained 9 falls during 8970 days. After adjustment for observation periods, Barthel Index scores, and body height, a significantly lower proportion of fallers was found in the intervention group: the odds ratio was 0.275 (95% confidence interval 0.081-0.937, p=0.039). CONCLUSION: A single home visit by an occupational therapist after discharge from a

rehabilitation hospital significantly reduced the risk of falling in a sample of elderly women following hip fracture.

Donaldson, M. G., K. M. Khan, et al. (2005). "Emergency department fall-related presentations do not trigger fall risk assessment: a gap in care of high-risk outpatient fallers." Archives of Gerontology & Geriatrics 41(3): 311-7.

We wanted to determine whether women aged 70 years and older, who presented to the emergency department (ED) with a fall and injury, received guideline care within 18 months of presentation. Women aged 70 years and older who presented to the ED with a fall were recorded prospectively from August 1, 2001 to May 1, 2002 (n=226). Structured telephone interviews were performed 18 months after the ED fall to obtain details of patient management (n=63). The most frequently reported referral was to the family physician (32%) and to physiotherapy (24%). We concluded that most older women who presented to the ED with a fall did not appear to be receiving current guideline care. We propose that future research use a prospective study design to assess whether or not guideline care is being delivered by a variety of health care providers after the patients leave the ED.

Donaldson, M. G., B. Sobolev, et al. (2009). "Analysis of recurrent events: a systematic review of randomised controlled trials of interventions to prevent falls." Age & Ageing 38(2): 151-5.

RATIONALE: there are several well-developed statistical methods for analysing recurrent events. Although there are guidelines for reporting the design and methodology of randomised controlled trials (RCTs), analysis guidelines do not exist to guide the analysis for RCTs with recurrent events. Application of statistical methods that do not account for recurrent events may provide erroneous results when used to test the efficacy of an intervention. It is unknown what proportion of RCTs of falls prevention studies have utilised statistical methods that incorporate recurrent events. METHODS: we conducted a systematic review of RCTs of interventions to prevent falls in community-dwelling older persons. We searched Medline from 1994 to November 2006. We determined the proportion of studies that reported using three statistical methods appropriate for the analysis of recurrent events (negative binomial regression, Andersen-Gill extension of the Cox model and the WLW marginal model). RESULTS: fewer than one-third of 83 papers that reported falls as an outcome utilised any appropriate statistical method (negative binomial regression, Andersen-Gill extension of the Cox model and Cox marginal model) to analyse recurrent events and fewer than 15% utilised graphical methods to represent falls data. CONCLUSION: RCTs that have a recurrent event end-point should include an analysis appropriate for recurrent event data such as negative binomial regression, Andersen-Gill extension of the Cox model and/or the WLW marginal model. We recommend that researchers and clinicians seek consultation with a statistician with expertise in recurrent event methodology.

Elley, C. R., M. C. Robertson, et al. (2008). "Effectiveness of a falls-and-fracture nurse coordinator to reduce falls: a randomized, controlled trial of at-risk older adults.[see comment]." Journal of the American Geriatrics Society 56(8): 1383-9.

OBJECTIVES: To assess the effectiveness of a community-based falls-and-fracture nurse coordinator and multifactorial intervention in reducing falls in older people. DESIGN:

Randomized, controlled trial. SETTING: Screening for previous falls in family practice followed by community-based intervention. PARTICIPANTS: Three hundred twelve community-living people aged 75 and older who had fallen in the previous year. INTERVENTION: Home-based nurse assessment of falls-and-fracture risk factors and home hazards, referral to appropriate community interventions, and strength and balance exercise program. Control group received usual care and social visits. MEASUREMENTS: Primary outcome was rate of falls over 12 months. Secondary outcomes were muscle strength and balance, falls efficacy, activities of daily living, self-reported physical activity level, and quality of life (Medical Outcomes Study 36-item Short Form Questionnaire). RESULTS: Of the 3,434 older adults screened for falls, 312 (9%) from 19 family practices were enrolled and randomized. The average age was 81+/-5, and 69% (215/312) were women. The incidence rate ratio for falls for the intervention group compared with the control group was 0.96 (95% confidence interval=0.70-1.34). There were no significant differences in secondary outcomes between the two groups. CONCLUSION: This nurse-led intervention was not effective in reducing falls in older people who had fallen previously. Implementation and adherence to the fall-prevention measures was dependent on referral to other health professionals working in their usual clinical practice. This may have limited the effectiveness of the interventions.

Enevold, G. and N. F. Courts (2000). "Fall prevention program for community-dwelling older adults and their caregivers." Home Healthcare Nurse Manager 4(4): 22-8.

Falls are the leading cause of injury and death among community-dwelling older adults. Many of these falls are a result of environmental and internal risk factors. The authors developed a fall prevention program consisting of a self-administered checklist and an audio-visual presentation on ways to reduce or prevent falls for community-dwelling older adults and their caregivers.

Englander, F., T. J. Hodson, et al. (1996). "Economic dimensions of slip and fall injuries." Journal of Forensic Sciences 41(5): 733-46.

This paper provides an update of annual economic costs imposed by fall injuries. Such costs include medical, rehabilitation, hospital costs, and the costs of morbidity and mortality. These costs are projected to the year 2020, based on changing demographic trends. The market for slip and fall injury prevention is analyzed for the elderly and for those in the workplace-two high risk groups. Questions as to whether this market operates in a socially desirable manner, or whether government intervention is justified on efficiency grounds, are considered. Essential aspects of cost-benefit analysis are reviewed in the context of a prospective evaluation of interventions to prevent slip and fall injuries. THe cost-benefit analysis framework is applied to part of the FICSIT experiment (a major intervention to reduce falls among the elderly) and to recent revisions in Occupational Safety and Health Administration regulations directed at reducing workplace falls.

Fange, A., S. Iwarsson, et al. (2003). "Accessibility and usability in housing: construct validity and implications for research and practice." Disability & Rehabilitation 25(23): 1316-25.

PURPOSE: The aim of this study was to validate the conceptual definitions of accessibility and usability, and to explore differences between objective accessibility

assessments and subjective ratings of usability in different client groups. METHOD: The Housing Enabler and the Usability in My Home instruments were used for 131 persons above 18 years of age, living in ordinary housing and receiving a housing adaptation grant. Covariation between accessibility in four different housing sections and three different usability aspects were explored, for the total sample and for six sub-samples reflecting person-environment-activity transactions or demographic factors. RESULTS: Significant correlations were found in the total sample, among clients aged 75-84, women, clients living alone, as well as among clients with high dependence in personal and instrumental ADL and in outdoor activities. Subjective usability evaluations of activity aspects and physical environmental aspects were correlated to accessibility indoors and outdoors, while personal and social aspects of usability were correlated to outdoor accessibility. CONCLUSIONS: Accessibility and usability are concluded to be different but related concepts. The results indicate that e.g. age, civil status and ADL dependence affect how clients assess aspects of their housing situation. For efficient planning and evaluation of housing adaptations, assessment of housing accessibility, usability, and dependence in ADL is recommended.

Fange, A., S. Iwarsson, et al. (2005). "Changes in ADL dependence and aspects of usability following housing adaptation--a longitudinal perspective." American Journal of Occupational Therapy 59(3): 296-304.

OBJECTIVE: To investigate longitudinal changes in activities of daily living (ADL) dependence and aspects of usability in housing among clients receiving housing adaptation grants in Sweden. METHODS: The ADL Staircase and the Usability in My Home instruments were used to collect data on three occasions: at baseline 1 month before housing adaptation, at follow-ups 2 to 3 months after housing adaptation completion, and after another 6 to 7 months. In all, 131 clients, living in ordinary housing 24 to 93 years of age were consecutively enrolled. RESULTS: Overall ADL dependence did not change significantly whereas dependence in "Bathing" decreased over time. "Activity aspects" and "Personal and social aspects" of usability improved at different phases in the process. CONCLUSION: This study delivers new insights about the complexity of longitudinal person-environment-activity transactions, specifically targeting activity and usability. The results are useful for developing efficient strategies for evaluating housing adaptations within occupational therapy practice and research.

Feder, G., C. Cryer, et al. (2000). "Guidelines for the prevention of falls in people over 65. The Guidelines' Development Group." BMJ 321(7267): 1007-11.

Older people frequently fall. This is a serious public health problem, with a substantial impact on health and healthcare costs.[1] These guidelines translate trial evidence about prevention of falls into recommendations that can be implemented in different settings, with the aim of reducing the rate of falls and injurious falls in people over 65.

Felson DT, Anderson JJ, Hannan MT, Milton RC, Wilson PW, Kiel DP. (1989) Impaired vision and hip fracture. The Framingham Study. J Am Geriatr Soc. 37(6):495-500.

Falls affect a large proportion of the elderly and can result in a variety of injuries, including hip fractures. Several studies have suggested that visual impairment contributes to falls, but studies have not used standardized definitions of visual impairment and have

not examined injurious falls or fractures. We looked at the risk of hip fracture associated with visual impairment in those members of the Framingham Study Cohort who took part in the Framingham Eye Study in 1973-75. Of 2,633 subjects followed for 10 years after the eye exam, 110 sustained hip fractures. The fracture rates in those with moderately impaired (20/30 to 20/80) vision (8.5%) and poor (20/100 or worse) vision (11.3%) were higher than in those with good (20/25 or better) vision (3.0%). After adjustment for age, sex, weight, alcohol consumption, and (in women) estrogen use, the relative risk of fracture in those with moderate impairment was 1.54 (95% CI = 0.95-2.49), while for those with poor vision, the relative risk was 2.17 (95% CI = 1.24-3.80). Of note, those with moderately impaired vision in one eye and good vision in the other had a higher risk of fracture (relative risk = 1.94) than those with a similar degree of binocular impairment (relative risk = 1.11). Poor vision in one or both eyes was linked to an elevated fracture risk. This suggests that good stereoscopic vision may be necessary to prevent falls. The risk of fracture with poor and moderately impaired vision combined was increased in women (relative risk = 1.96, 95% CI = 1.23-3.11) but not in men (relative risk = 0.79, 95% CI = 0.23-2.72).

Ferreri, S., M. T. Roth, et al. (2008). "Methodology of an ongoing, randomized controlled trial to prevent falls through enhanced pharmaceutical care." American Journal of Geriatric Pharmacotherapy 6(2): 61-81.

BACKGROUND: Falls are the leading cause of both fatal and nonfatal injuries among adults aged > or =65 years in the United States. Past research suggests that individuals taking multiple medications are at increased risk of falls. Central nervous system-active drugs in particular have been associated with increased risk. OBJECTIVE: The goal of this research was to describe the design of a study evaluating the effectiveness of a community pharmacy-based falls prevention program. Also presented are the algorithms used to identify high-risk patients based on their prescription profile records and to deliver the experimental intervention. METHODS: The study is a randomized controlled trial. The target population was community-dwelling older adults (aged > or =65 years) at high risk for future falls because: (1) they had experienced > or =1 fall within the 12-month period preceding study enrollment; (2) they were currently using > or =4 chronic prescription medications; and (3) they were taking > or =1 of the high-risk medications targeted by the intervention. Participants were recruited using pharmacy prescription profile records. Individuals in the intervention group received a face-to-face medication consultation provided by a community pharmacy resident. Identification of drug therapy problems and therapeutic recommendations was guided by a series of algorithms developed for this study. All participants were followed up for 24 months. The primary study end points were: (1) time to first fall; and (2) proportion of participants who experienced > or =1 fall during the first year of follow-up. RESULTS: Participant enrollment began in September 2005 and was completed in August 2007. A total of 186 individuals were enrolled in the study (mean [SD] age, 74.8 [6.9] years; 132 women, 54 men), and 67 have completed the first year of follow-up. CONCLUSIONS: The study is using a rigorous randomized controlled research design, which will enhance the internal validity of its findings. Results of the study, which will be reported after the completion of follow-up data collection activities, will enable us to assess the effects of the

intervention on both medication use and the incidence of falls. If the intervention is found to be effective, it will provide a resource for community pharmacists working with older adults at high risk of medication-related falls.

Filiatrault, J., L. Gauvin, et al. (2008). "Impact of a multifaceted community-based falls prevention program on balance-related psychologic factors." Archives of Physical Medicine & Rehabilitation 89(10): 1948-57.

OBJECTIVE: To assess the impact of a multifaceted falls prevention program including exercise and educational components on perceived balance and balance confidence among community-dwelling seniors. DESIGN: Quasi-experimental design. SETTING: Community-based organizations. PARTICIPANTS: Two hundred community-dwelling adults aged 60 years and over recruited by community-based organizations. INTERVENTION: A 12-week multifaceted falls prevention program including 3 components (a 1-hour group exercise class held twice a week, a 30-minute home exercise module to be performed at least once a week, a 30-minute educational class held once a week). MAIN OUTCOME MEASURES: Perceived balance and balance confidence. RESULTS: Multivariate analysis showed that the program was successful in increasing perceived balance in experimental participants. However, balance confidence was not improved by program participation. CONCLUSIONS: A multifaceted community-based falls prevention program that was successful in improving balance performance among community-dwelling seniors also had a positive impact on perceived balance. However, the program did not improve participants' balance confidence. These results suggest that balance confidence has determinants other than balance and that new components and/or modifications of existing components of the program are required to achieve maximal benefits for seniors in terms of physical and psychologic outcomes.

Filiatrault, J., M. Parisien, et al. (2007). "Implementing a community-based falls-prevention program: from drawing board to reality." Canadian Journal on Aging 26(3): 213-25.

Several studies have demonstrated the efficacy of falls-prevention programs designed for community-dwelling seniors using randomized designs. However, little is known about the feasibility of implementing these programs under natural conditions and about the success of these programs when delivered under such conditions. The objectives of this paper are to (a) describe a multifactorial falls-prevention program (called Stand Up!) designed for independent community-dwelling seniors and (b) present the results of an analysis of the practicability of implementing this program in community-based settings. The program was implemented in the context of an effectiveness study in 10 community-based organizations in the Montreal metropolitan area. Data pertaining to the reach and delivery of the program as well as participation level show that a falls-prevention program addressing multiple risk factors can be successfully implemented in community-based settings.

Finch, C. F., L. Day, et al. (2009). "Determining policy-relevant formats for the presentation of falls research evidence." Health Policy 93(2-3): 207-13.

OBJECTIVES: Population modelling holds considerable promise for identifying the most efficient and cost-effective falls prevention measures, but the outcomes need to be in a readily useable form. This paper describes an iterative, collaborative process undertaken

by researchers and falls prevention policy officers to develop such a format for falls prevention intervention evidence. METHODS: The researchers developed a draft template that underwent several iterations and improvements, through three collaborative consultations with policy officers. RESULTS: Although the researchers initially identified many key information needs, active engagement with policy officers ensured that policy requirements were met and that the value of the reporting formats for policy decision-making was maximised. Importantly, they highlighted the need to articulate underlying modelling assumptions clearly. The resulting formats, with complete data, were given to policy officers to inform their local jurisdictional policy decisions. CONCLUSIONS: There is strong benefit in researchers and policy officers collaborating to develop optimal formats for presenting scientific evidence to inform policy decisions. Such a process can reduce concerns of researchers that evidence is not incorporated into policy decisions. They also meet policy officers' needs for evidence to be provided in a way that can directly inform their decision-making processes.

Fletcher, P. C., K. Berg, et al. (2009). "Risk factors for falling among community-based seniors." Journal of patient safety 5(2): 61-6.

BACKGROUND: Falling constitutes a significant risk to the health and well-being of seniors. Although a number of risk factors have been established within the literature for falling, limited work has differentiated risk factors for 1-time versus recurrent or multiple fallers. METHODS: The purpose of this research was to examine 2 relationships: (1) the risk factors for nonfallers versus fallers (1+ falls); and (2) the risk factors for nonfallers/1-time fallers versus multiple fallers (2+ falls). All participants (n = 453) were subjects within 5 different fall intervention programs funded through the Falls Prevention Initiative sponsored by Health Canada and Veterans Affairs Canada. In total, 5 project sites funded in Ontario conducted independent fall intervention programs. At the onset of their programs and at the completion of their programs, each project site assessed all of their subjects or a predetermined number of seniors (if the subject pool was extensive) using 2 instruments, namely the interRAI Community Health Assessment and the Berg Balance Scale, so that comparisons could be made between sites. RESULTS: Of the 453 individuals, 67% of the sample was classified as nonfallers, with 33% classified as experiencing 1 or more falls. Risk factors significant within the model examining nonfallers versus 1+ fallers included increased medication use and a previous history of falling. For the second analyses, examining 0 falls/1 fall versus recurrent fallers, the following factors were associated with increased risk: medication use, previous history of falling, and compromised activities of daily living (ADL). Fourteen percent of the sample experienced 2+ falls. CONCLUSIONS: It is important to distinguish fallers based on fall status because recurrent or multiple fallers are more likely to benefit from fall prevention efforts. Using a standardized and comprehensive tool such as the interRAI-CHA would assist researchers in making comparisons between different research groups.

Forrester, D. A., J. McCabe-Bender, et al. (1999). "Fall risk assessment of hospitalized adults and follow-up study." Journal for Nurses in Staff Development - JNSD 15(6): 251-8; discussion 258-9.

One-hundred seventy-seven randomly selected hospitalized adult patients were assessed for their risk of falls by 24 registered nurses (RNs). Twelve specific indices of fall risk

assessment were studied. Patients' scores on three separate fall risk-assessment scales also were calculated. Only one of the fall risk-assessment scale scores was significantly associated with documented implementation of the hospital fall prevention protocol. A follow-up study of most of these patients' medical records by seven RNs resulted in seven patients being found to have had at least one documented inpatient fall. These findings demonstrate the importance of: (1) further identifying and defining indices of fall risk assessment, (2) investing staff energy and resources in a comprehensive program of education and fall prevention, and (3) identifying intervention strategies that can be documented to prevent inpatient falls.

Frey, C. (2000). "Foot health and shoewear for women." Clinical Orthopaedics & Related Research(372): 32-44.

Females are different from males in structure and biomechanics. The foot in the female tends to have a narrower heel in relationship to the forefoot and overall is narrower than a man's foot relative to length. Females tend to pronate their feet more and have smaller Achilles tendons than males, both factors having implications for shoe fit. Although shoes have been worn for thousands of years for the main purpose of protecting feet from the environment, recent studies have implicated shoes as the principal cause of forefoot disorders seen in females. Several authors have reported the harmful effects of shoewear and the greatest factor is a shoe that is improperly fit. With respect to foot disorders in the female, the current study will explore anatomy, biomechanics, common forefoot disorders, and shoewear through the ages, athletic shoewear, and a toe strengthening program.

Frick, K. D., J. Y. Kung, et al. "Evaluating the cost-effectiveness of fall prevention programs that reduce fall-related hip fractures in older adults." Journal of the American Geriatrics Society 58(1): 136-41.

OBJECTIVES: To model the incremental cost-utility of seven interventions reported as effective for preventing falls in older adults. DESIGN: Mathematical epidemiological model populated by data based on direct clinical experience and a critical review of the literature. SETTING: Model represents population level interventions. PARTICIPANTS: No human subjects were involved in the study. MEASUREMENS: The last Cochrane database review and meta-analyses of randomized controlled trials categorized effective fall-prevention interventions into seven groups: medical management (withdrawal) of psychotropics, group tai chi, vitamin D supplementation, muscle and balance exercises, home modifications, multifactorial individualized programs for all elderly people, and multifactorial individualized treatments for high-risk frail elderly people. Fall-related hip fracture incidence was obtained from the literature. Salary figures for health professionals were based on Bureau of Labor Statistics data. Using an integrated healthcare system perspective, healthcare costs were estimated based on practice and studies on falls in older adults. Base case incremental cost utility ratios were calculated, and probabilistic sensitivity analyses were conducted. RESULTS: Medical management of psychotropics and group tai chi were the least-costly, most-effective options, but they were also the least studied. Excluding these interventions, the least-expensive, most-effective options are vitamin D supplementation and home modifications. Vitamin D supplementation costs less than home modifications, but home modifications cost only $14,794/quality-

adjusted life year (QALY) gained more than vitamin D. In probabilistic sensitivity analyses excluding management of psychotropics and tai chi, home modification is most likely to have the highest economic benefit when QALYs are valued at $50,000 or $100,000. CONCLUSION: Of single interventions studied, management of psychotropics and tai chi reduces costs the most. Of more-studied interventions, home modifications provide the best value. These results must be interpreted in the context of the multifactorial nature of falls.

Fried, T. R., C. van Doorn, et al. (2000). "Older person's preferences for home vs hospital care in the treatment of acute illness." Archives of Internal Medicine 160(10): 1501-6.
BACKGROUND: Although the home is expanding as a potential site for acute illness treatment, little is known about patients' preferences for home vs the hospital. OBJECTIVE: To determine older persons' preferences for home or hospital as a treatment site for acute illness and factors associated with preference. METHODS: Two hundred forty-six community-dwelling persons aged 65 years or older hospitalized with congestive heart failure, chronic obstructive pulmonary disease, or pneumonia were identified in 2 urban teaching hospitals and received telephone interviews 2 months after hospitalization. They were asked their preference for home or hospital treatment, given the availability of equivalent therapies and outcomes at the 2 sites and a nursing visit and several hours of home health aide assistance daily in the home. They were also asked about changes in preference with changes in the description of the outcome or the availability of services. RESULTS: If home and hospital offered equivalent outcomes, 46% of the sample preferred treatment at home. Preferences were heavily dependent on the outcome of the illness, physician opinion about the best site of care, and the provision of house calls. Higher education, white race, living with a spouse, being deeply religious, and having 2 or more dependencies in activities of daily living were associated with a preference for home treatment. CONCLUSIONS: Under conditions of equivalent outcome, preferences for treatment site are almost equally divided between home and hospital. Explicit elucidation of preferences is necessary if patients' preferences are to play a meaningful role in decision making about site of care.

Ganz, D. A., Y. Bao, et al. (2007). "Will my patient fall?" JAMA 297(1): 77-86.
CONTEXT: Effective multifactorial interventions reduce the frequent falling rate of older patients by 30% to 40%. However, clinical consensus suggests reserving these interventions for high-risk patients. Limiting fall prevention programs to high-risk patients implies that clinicians must recognize features that predict future falls. OBJECTIVE: To identify the prognostic value of risk factors for future falls among older patients. DATA SOURCES AND STUDY SELECTION: Search of MEDLINE (1966-September 2004), CINAHL (1982-September 2004), and authors' own files to identify prospective cohort studies of risk factors for falls that performed a multivariate analysis of such factors. DATA EXTRACTION: Two reviewers independently determined inclusion of articles and assessed study quality. Disagreements were resolved by consensus. Included studies were those identifying the prognostic value of risk factors for future falls among community-dwelling persons 65 years and older. Clinically identifiable risk factors were identified across 6 domains: orthostatic hypotension, visual impairment, impairment of gait or balance, medication use, limitations in basic or

instrumental activities of daily living, and cognitive impairment. DATA SYNTHESIS: Eighteen studies met inclusion criteria and provided a multivariate analysis including at least 1 of the risk factor domains. The estimated pretest probability of falling at least once in any given year for individuals 65 years and older was 27% (95% confidence interval, 19%-36%). Patients who have fallen in the past year are more likely to fall again [likelihood ratio range, 2.3-2.8]. The most consistent predictors of future falls are clinically detected abnormalities of gait or balance (likelihood ratio range, 1.7-2.4). Visual impairment, medication variables, decreased activities of daily living, and impaired cognition did not consistently predict falls across studies. Orthostatic hypotension did not predict falls after controlling for other factors. CONCLUSIONS: Screening for risk of falling during the clinical examination begins with determining if the patient has fallen in the past year. For patients who have not previously fallen, screening consists of an assessment of gait and balance. Patients who have fallen or who have a gait or balance problem are at higher risk of future falls.

Gardner, M. M., M. C. Robertson, et al. (2000). "Exercise in preventing falls and fall related injuries in older people: a review of randomised controlled trials." British Journal of Sports Medicine 34(1): 7-17.

OBJECTIVE: To assess the effectiveness of exercise programmes in preventing falls (and/or lowering the risk of falls and fall related injuries) in older people. DESIGN: A review of controlled clinical trials designed with the aim of lowering the risk of falling and/or fall injuries through an exercise only intervention or an intervention that included an exercise component. MAIN OUTCOME MEASURES: Falls, fall related injuries, time between falls, costs, cost effectiveness. SUBJECTS: A total of 4933 men and women aged 60 years and older. RESULTS: Eleven trials meeting the criteria for inclusion were reviewed. Eight of these trials had separate exercise interventions, and three used interventions with an exercise programme component. Five trials showed a significant reduction in the rate of falls or the risk of falling in the intervention group. CONCLUSIONS: Exercise is effective in lowering falls risk in selected groups and should form part of falls prevention programmes. Lowering fall related injuries will reduce health care costs but there is little available information on the costs associated with programme replication or the cost effectiveness of exercise programmes aimed at preventing falls in older people.

Gill, T. M., J. T. Robison, et al. (1999). "Mismatches between the home environment and physical capabilities among community-living older persons." Journal of the American Geriatrics Society 47(1): 88-92.

OBJECTIVE: To determine whether environmental hazards related to transfers, balance, and gait are any less prevalent in the homes of older persons with specific deficits in physical capabilities than they are in the homes of older persons without the same deficits. DESIGN: Cross-sectional study of a population-based cohort. SETTING: The general community in New Haven, Connecticut. PARTICIPANTS: A total of 1088 persons, aged 72 years and older, who had an environmental assessment of their homes. MEASUREMENTS: Each participant underwent a physical performance assessment and comprehensive interview to document the presence of underlying deficits in physical

capabilities. Items from the environmental assessment that were potentially hazardous for participants with specific deficits in transfers, balance, or gait were identified. RESULTS: With the exception of no grab bars in the tub/shower, environmental hazards were as prevalent in the homes of participants with specific deficits in physical capabilities as they were in the homes of participants without the same deficits, and, in many cases, they were actually more prevalent. Among participants with and without observed difficulty standing from a chair, for example, the prevalence of a low lying chair was 24% versus 14% (chi2 = 13.4; P < .001), respectively. Among participants with and without an observed deficit in turning, the prevalence of an obstructed pathway was 47% versus 37% (chi2 = 8.7; P = .003), respectively; and the prevalence of loose throw rugs was 72% in both groups. CONCLUSIONS: If the epidemiologic link between environmental hazards and adverse functional outcomes can be strengthened, then interventions designed to enhance the everyday function of frail, older persons should focus on the environment as well as the individual.

Gill, T. M., C. S. Williams, et al. (1999). "A population-based study of environmental hazards in the homes of older persons." American Journal of Public Health 89(4): 553-6.

OBJECTIVES: This study sought to estimate the population-based prevalence of environmental hazards in the homes of older persons and to determine whether the prevalence of these hazards differs by housing type or by level of disability in terms of activities of daily living (ADLs). METHODS: An environmental assessment was completed in the homes of 1000 persons 72 years and older. Weighted prevalence rates were calculated for each of the potential hazards and subsequently compared among subgroups of participants characterized by housing type and level of ADL disability. RESULTS: Overall, the prevalence of most environmental hazards was high. Two or more hazards were found in 59% of bathrooms and in 23% to 42% of the other rooms. Nearly all homes had at least 2 potential hazards. Although age-restricted housing was less hazardous than community housing, older persons who were disabled were no less likely to be exposed to environmental hazards than older persons who were nondisabled. CONCLUSIONS: Environmental hazards are common in the homes of community-living older persons.

Gill, T. M., C. S. Williams, et al. (2000). "Environmental hazards and the risk of nonsyncopal falls in the homes of community-living older persons." Medical Care 38(12): 1174-83.

BACKGROUND: Identifying and eliminating environmental hazards in the home has high face validity but little empirical support for fall prevention. OBJECTIVE: The objective of this study was to determine whether environmental hazards increase the risk of nonsyncopal falls in the homes of community-living older persons. RESEARCH DESIGN: This was a prospective cohort study. PARTICIPANTS: The study included 1,088 men and women from a probability sample of 1,103 persons > or =72 years of age. MEASURES: A room-by-room assessment for 13 potential trip or slip hazards was completed at baseline and 1 year later by a trained research nurse using a standard instrument. Falls were ascertained monthly for 3 years using a fall calendar and follow-up phone calls. RESULTS: The numbers of participants with a nonsyncopal fall (by room) were as follows: 88 (kitchen), 144 (living room), 41 (hallway), 136 (bedroom), and 59 (bathroom). The risk of a nonsyncopal fall was significantly elevated for only 1 of the 13

trip or slip hazards. For exposure to > or =1 hazards per room, the relative risks adjusted for age, gender, and housing type were 0.91 (95% CI, 0.58-1.43) for the kitchen, 1.30 (95% CI, 0.92-1.83) for the living room, 1.73 (95% CI, 0.93-3.22) for the hallway, 1.29 (95% CI, 0.90-1.84) for the bedroom, and 0.57 (95% CI, 0.32-1.00) for the bathroom. No consistent association was found between the 13 trip or slip hazards and nonsyncopal falls, even after participants were categorized by impairments in vision, balance/gait, and cognition. CONCLUSIONS: Our findings do not support an association between environmental hazards and nonsyncopal falls.

Gillespie, L. D., W. J. Gillespie, et al. (2000). "Interventions for preventing falls in the elderly." Cochrane Database of Systematic Reviews(2): CD000340.

BACKGROUND: Fractures in the elderly often result from a simple fall. OBJECTIVES: To assess the effects of programmes designed to reduce the incidence of falls in community dwelling, institutionalised, or hospitalised elderly people. SEARCH STRATEGY: We searched MEDLINE, EMBASE, CINAHL, PsycLIT, Social Science Citation Index, Dissertation Abstracts, Index to UK Theses, the Cochrane Register of Controlled Trials, and bibliographies of identified studies. We contacted known workers in the field. Trials were also obtained from the Cochrane Musculoskeletal Injuries Group trials register. Date of the most recent search: May 1997. SELECTION CRITERIA: Randomised trials of interventions designed to minimise the effect of, or prevent exposure to, any putative risk factor for falling in elderly individuals living in the community, in institutional care, or in hospital. The main outcomes of interest were number of fallers or falls, or the number sustaining a fall resulting in injury. Trials that focused on intermediate outcomes such as improved balance or did not report fall outcomes, were excluded. DATA COLLECTION AND ANALYSIS: Two reviewers selected trials for inclusion. For each included trial, quality assessment and data extraction was carried out independently by two reviewers. Results of trials of similar design were pooled. MAIN RESULTS: Eighteen trials and one pre-planned meta-analysis were included. The analysis of four trials which studied the effect of exercise alone did not establish protection against falling (Peto odds ratio 1.05; 95% confidence interval 0.74 to 1.48). Based on one trial, there was no evidence to support exercise in conjunction with health education classes (Peto odds ratio 1.72; 95% confidence interval 0.78 to 3.75), or of health education classes alone (Peto odds ratio 1.25; 95% confidence interval 0.51 to 3.03) for the prevention of falls. However, significant protection against falling was apparent from interventions which targeted multiple, identified, risk factors in individual patients (Peto odds ratio 0.77; 95% confidence interval 0. 64 to 0.91), and from interventions which focused on behavioural interventions targeting environmental hazards plus other risk factors (Peto odds ratio 0.81; 95% confidence interval 0.71 to 0.93). REVIEWER'S CONCLUSIONS: Health care purchasers and providers contemplating fall prevention programmes should consider health screening of at risk elderly people, followed by interventions which are targeted at both intrinsic and environmental risk factors of individual patients. There is inadequate evidence for the effectiveness of single interventions such as exercise alone or health education classes for the prevention of falls.

Gillespie, L. D., W. J. Gillespie, et al. (2001). "Interventions for preventing falls in elderly people." Cochrane Database of Systematic Reviews(3): CD000340.

BACKGROUND: Approximately 30 per cent of people over 65 years of age and living in the community fall each year; the number is higher in institutions. Although less than one fall in 10 results in a fracture, a fifth of fall incidents require medical attention. OBJECTIVES: To assess the effects of interventions designed to reduce the incidence of falls in elderly people (living in the community, or in institutional or hospital care). SEARCH STRATEGY: We searched the Cochrane Musculoskeletal Group specialised register (January 2001), Cochrane Controlled Trials Register (The Cochrane Library, Issue 1, 2001), MEDLINE (1966 to February 2001), EMBASE (1988 to 2001 Week 14), CINAHL (1982 to March 2001), The National Research Register, Issue 1, 2001, Current Controlled Trials (www.controlled-trials.com accessed 25 May 2001), and reference lists of articles. We also contacted researchers in the field. SELECTION CRITERIA: Randomised trials of interventions designed to minimise the effect of, or exposure to, risk factors for falling in elderly people. Main outcomes of interest were the number of fallers, or falls. Trials reporting only intermediate outcomes were excluded. DATA COLLECTION AND ANALYSIS: Two reviewers independently assessed trial quality and extracted data. Data were pooled using the fixed effect model where appropriate. MAIN RESULTS: Interventions likely to be beneficial: ~bullet~A programme of muscle strengthening and balance retraining, individually prescribed at home by a trained health professional (3 trials, 566 participants, pooled relative risk (RR) 0.80, 95% confidence interval (95%CI) 0.66 to 0.98). ~bullet~A 15 week Tai Chi group exercise intervention (1 trial, 200 participants, risk ratio 0.51, 95%CI 0.36 to 0.73). ~bullet~Home hazard assessment and modification that is professionally prescribed for older people with a history of falling (1 trial, 530 participants, RR 0.64, 95% CI 0.49 to 0.84). A reduction in falls was seen both inside and outside the home. ~bullet~Withdrawal of psychotropic medication (1 trial, 93 participants, relative hazard 0.34, 95%CI 0.16 to 0.74). ~bullet~Multidisciplinary, multifactorial, health/environmental risk factor screening/intervention programmes, both for unselected community dwelling older people (data pooled from 3 trials, 1973 participants, pooled RR 0.73, 95%CI 0.63 to 0.86), and for older people with a history of falling, or selected because of known risk factors (data pooled from 2 trials, 713 participants, pooled RR 0.79, 95%CI 0.67 to 0.94). Interventions of unknown effectiveness: ~bullet~Group-delivered exercise interventions (9 trials, 2177 participants). ~bullet~Nutritional supplementation (1 trial, 50 participants). ~bullet~Vitamin D supplementation, with or without calcium (3 trials, 679 participants). ~bullet~Home hazard modification in association with advice on optimising medication (1 trial, 658 participants), or in association with an education package on exercise and reducing fall risk (1 trial, 3182 participants). ~bullet~Pharmacological therapy (raubasine-dihydroergocristine, 1 trial, 95 participants). ~bullet~Fall prevention programmes in institutional settings. ~bullet~Interventions using a cognitive/behavioural approach alone (2 trials, 145 participants). ~bullet~Home hazard modification for older people without a history of falling (1 trial, 530 participants). ~bullet~ Hormone replacement therapy (1 trial, 116 participants). Interventions unlikely to be beneficial: ~bullet~Brisk walking in women with an upper limb fracture in the previous two years (1 trial, 165 participants). REVIEWER'S CONCLUSIONS: Interventions to prevent falls that are likely to be effective are now available; less is known about their effectiveness in

preventing fall-related injuries. Costs per fall prevented have been established for four of the interventions and careful economic modelling in the context of the local healthcare system is important. Some potential interventions are of unknown effectiveness and further research is indicated.

Gillespie, L. D., W. J. Gillespie, et al. (2003). "Interventions for preventing falls in elderly people." Cochrane Database of Systematic Reviews(4): CD000340.

BACKGROUND: Approximately 30 per cent of people over 65 years of age and living in the community fall each year; the number is higher in institutions. Although less than one fall in 10 results in a fracture, a fifth of fall incidents require medical attention. OBJECTIVES: To assess the effects of interventions designed to reduce the incidence of falls in elderly people (living in the community, or in institutional or hospital care). SEARCH STRATEGY: We searched the Cochrane Musculoskeletal Group specialised register (January 2003), Cochrane Central Register of Controlled Trials (The Cochrane Library, Issue 1, 2003), MEDLINE (1966 to February 2003), EMBASE (1988 to 2003 Week 19), CINAHL (1982 to April 2003), The National Research Register, Issue 2, 2003, Current Controlled Trials (www.controlled-trials.com accessed 11 July 2003) and reference lists of articles. No language restrictions were applied. Further trials were identified by contact with researchers in the field. SELECTION CRITERIA: Randomised trials of interventions designed to minimise the effect of, or exposure to, risk factors for falling in elderly people. Main outcomes of interest were the number of fallers, or falls. Trials reporting only intermediate outcomes were excluded. DATA COLLECTION AND ANALYSIS: Two reviewers independently assessed trial quality and extracted data. Data were pooled using the fixed effect model where appropriate. MAIN RESULTS: Sixty two trials involving 21,668 people were included. Interventions likely to be beneficial: Multidisciplinary, multifactorial, health/environmental risk factor screening/intervention programmes in the community both for an unselected population of older people (4 trials, 1651 participants, pooled RR 0.73, 95%CI 0.63 to 0.85), and for older people with a history of falling or selected because of known risk factors (5 trials, 1176 participants, pooled RR 0.86, 95%CI 0.76 to 0.98), and in residential care facilities (1 trial, 439 participants, cluster-adjusted incidence rate ratio 0.60, 95%CI 0.50 to 0.73) A programme of muscle strengthening and balance retraining, individually prescribed at home by a trained health professional (3 trials, 566 participants, pooled relative risk (RR) 0.80, 95% confidence interval (95%CI) 0.66 to 0.98) Home hazard assessment and modification that is professionally prescribed for older people with a history of falling (3 trials, 374 participants, RR 0.66, 95% CI 0.54 to 0.81) Withdrawal of psychotropic medication (1 trial, 93 participants, relative hazard 0.34, 95%CI 0.16 to 0.74) Cardiac pacing for fallers with cardioinhibitory carotid sinus hypersensitivity (1 trial, 175 participants, WMD -5.20, 95%CI -9.40 to -1.00) A 15 week Tai Chi group exercise intervention (1 trial, 200 participants, risk ratio 0.51, 95%CI 0.36 to 0.73). Interventions of unknown effectiveness: Group-delivered exercise interventions (9 trials, 1387 participants) Individual lower limb strength training (1 trial, 222 participants) Nutritional supplementation (1 trial, 46 participants) Vitamin D supplementation, with or without calcium (3 trials, 461 participants) Home hazard modification in association with advice on optimising medication (1 trial, 658 participants), or in association with an education package on exercise and reducing fall risk (1 trial, 3182 participants) Pharmacological

therapy (raubasine-dihydroergocristine, 1 trial, 95 participants) Interventions using a cognitive/behavioural approach alone (2 trials, 145 participants) Home hazard modification for older people without a history of falling (1 trial, 530 participants) Hormone replacement therapy (1 trial, 116 participants) Correction of visual deficiency (1 trial, 276 participants). Interventions unlikely to be beneficial: Brisk walking in women with an upper limb fracture in the previous two years (1 trial, 165 participants). REVIEWER'S CONCLUSIONS: Interventions to prevent falls that are likely to be effective are now available; less is known about their effectiveness in preventing fall-related injuries. Costs per fall prevented ha

Gillespie, L. D., M. C. Robertson, et al. (2009). "Interventions for preventing falls in older people living in the community." Cochrane Database of Systematic Reviews(2): CD007146.

BACKGROUND: Approximately 30% of people over 65 years of age living in the community fall each year. OBJECTIVES: To assess the effects of interventions to reduce the incidence of falls in older people living in the community. SEARCH STRATEGY: We searched the Cochrane Bone, Joint and Muscle Trauma Group Specialised Register, CENTRAL (The Cochrane Library 2008, Issue 2), MEDLINE, EMBASE, CINAHL, and Current Controlled Trials (all to May 2008). SELECTION CRITERIA: Randomised trials of interventions to reduce falls in community-dwelling older people. Primary outcomes were rate of falls and risk of falling. DATA COLLECTION AND ANALYSIS: Two review authors independently assessed trial quality and extracted data. Data were pooled where appropriate. MAIN RESULTS: We included 111 trials (55,303 participants).Multiple-component group exercise reduced rate of falls and risk of falling (rate ratio (RaR) 0.78, 95%CI 0.71 to 0.86; risk ratio (RR) 0.83, 95%CI 0.72 to 0.97), as did Tai Chi (RaR 0.63, 95%CI 0.52 to 0.78; RR 0.65, 95%CI 0.51 to 0.82), and individually prescribed multiple-component home-based exercise (RaR 0.66, 95%CI 0.53 to 0.82; RR 0.77, 95%CI 0.61 to 0.97).Assessment and multifactorial intervention reduced rate of falls (RaR 0.75, 95%CI 0.65 to 0.86), but not risk of falling.Overall, vitamin D did not reduce falls (RaR 0.95, 95%CI 0.80 to 1.14; RR 0.96, 95%CI 0.92 to 1.01), but may do so in people with lower vitamin D levels. Overall, home safety interventions did not reduce falls (RaR 0.90, 95%CI 0.79 to 1.03); RR 0.89, 95%CI 0.80 to 1.00), but were effective in people with severe visual impairment, and in others at higher risk of falling. An anti-slip shoe device reduced rate of falls in icy conditions (RaR 0.42, 95%CI 0.22 to 0.78).Gradual withdrawal of psychotropic medication reduced rate of falls (RaR 0.34, 95%CI 0.16 to 0.73), but not risk of falling. A prescribing modification programme for primary care physicians significantly reduced risk of falling (RR 0.61, 95%CI 0.41 to 0.91).Pacemakers reduced rate of falls in people with carotid sinus hypersensitivity (RaR 0.42, 95%CI 0.23 to 0.75). First eye cataract surgery reduced rate of falls (RaR 0.66, 95%CI 0.45 to 0.95).There is some evidence that falls prevention strategies can be cost saving. AUTHORS' CONCLUSIONS: Exercise interventions reduce risk and rate of falls. Research is needed to confirm the contexts in which multifactorial assessment and intervention, home safety interventions, vitamin D supplementation, and other interventions are effective.

Gitlin, L. N., W. W. Hauck, et al. (2009). "Long-term effect on mortality of a home intervention that reduces functional difficulties in older adults: results from a randomized trial." Journal of the American Geriatrics Society 57(3): 476-81.

OBJECTIVES: To evaluate the long-term mortality effect of a home-based intervention previously shown to reduce functional difficulties and whether survivorship benefits differ according to initial mortality risk level. DESIGN: Two-group randomized trial with survivorship followed up to 4 years from study entry. SETTING: Homes of urban community-living elderly people. PARTICIPANTS: Three hundred nineteen adults aged 70 and older with difficulties performing daily activities. INTERVENTION: Occupational and physical therapy sessions to instruct participants in compensatory strategies, home modifications, home safety, fall recovery techniques, and balance and muscle strength exercises. MEASUREMENTS: Survival time was number of days between baseline interview and date of death, as determined using data from the National Death Index or December 31, 2005. Participants were stratified according to baseline mortality risk (low, moderate, high) using a prognostic indicator. RESULTS: At 2 years, intervention participants (n=160) had a 5.6% mortality rate (n=9 deaths) and controls (n=159) a 13.2% rate (n=21 deaths; P=.02). Mortality rates remained lower for intervention participants up to 3.5 years from study entry. At 2 years, intervention participants with moderate mortality risk had a 16.7% mortality rate (n=16 deaths/96), compared with 28.2% for equivalent control group participants (n=24 deaths/85; P=.02). By 3 years, mortality rates were not statistically significantly different between the experimental and control groups. CONCLUSIONS: The intervention extended survivorship up to 3.5 years and maintained statistically significant differences for 2 years. Subjects at moderate mortality risk derived the most intervention benefit. Findings suggest that the intervention could be a low-cost clinical tool to delay functional decline and mortality.

Gitlin, L. N., W. W. Hauck, et al. (2006). "Effect of an in-home occupational and physical therapy intervention on reducing mortality in functionally vulnerable older people: preliminary findings." Journal of the American Geriatrics Society 54(6): 950-5.

OBJECTIVES: To evaluate the effect of a multicomponent intervention on mortality and the role of control-oriented strategy use as the change mechanism. DESIGN: Two-group randomized design with survivorship followed for 14 months. Participants were randomized to intervention or a no-treatment control group. SETTING: Urban, community-living older people. PARTICIPANTS: Three hundred nineteen people aged 70 and older with functional difficulties. INTERVENTION: Occupational therapy and physical therapy sessions involving home modifications, problem solving, and training in energy conservation, safe performance, balance, muscle strength, and fall recovery techniques. MEASUREMENTS: Survival time was number of days between baseline interview and date of death or final interview if date unknown. Control-oriented strategy use was measured using eight items. RESULTS: Intervention participants exhibited a 1% rate of mortality, compared with a 10% rate for no-treatment control participants (P=.003, 95% confidence interval=2.4-15.04%). At baseline, those who subsequently died had more days hospitalized and lower control-oriented strategy use 6 months before study enrollment than survivors. No intervention participants with previous days hospitalized (n=31) died, whereas 21% of control group counterparts did (n=35; P=.001). Although

intervention participants with low and high baseline control strategy use had lower mortality risk than control participants, mortality risk was lower for intervention participants with low strategy use at baseline (P=.007). CONCLUSION: An occupational and physical therapy intervention to ameliorate functional difficulties may reduce mortality risk in community-dwelling older people overall and benefit those most compromised. Instruction in control-oriented strategies may account for the intervention's protective effects on survivorship.

Gitlin, L. N., W. Mann, et al. (2001). "Factors associated with home environmental problems among community-living older people." Disability & Rehabilitation 23(17): 777-87.

PURPOSE: This paper describes the types of difficulties older people have with their home environments and the factors associated with having such difficulties. METHOD: Data were used from 296 study participants of the University at Buffalo's Consumer Assessments Study that examines the home modification needs and environmental difficulties of older people. A combination of socio-demographic variables, health and functional status indicators and measures of psychosocial well-being were used to predict environmental problems. RESULTS: An average of 13 problems with the environment that posed as a barrier to safe and independent performance was observed in homes. It was found that most difficulties occurred in bathrooms, kitchens, bedrooms and access to entryways and rooms. Hierarchical multiple regression analysis showed that having home environmental problems was most strongly associated with younger age, being female, being of minority status, having pain, and greater physical disability. CONCLUSION: The findings show that a combination of conditions that include demographic and functional conditions place older people at risk for problems with the home environment that impede performance of daily living activities.

Gitlin, L. N., L. Winter, et al. (2006). "A randomized trial of a multicomponent home intervention to reduce functional difficulties in older adults." Journal of the American Geriatrics Society 54(5): 809-16.

OBJECTIVES: To test the efficacy of a multicomponent intervention to reduce functional difficulties, fear of falling, and home hazards and enhance self-efficacy and adaptive coping in older adults with chronic conditions. DESIGN: A prospective, two-group, randomized trial. Participants were randomized to a treatment group or no-treatment group. SETTING: Urban community-living older people. PARTICIPANTS: Three hundred nineteen community-living adults aged 70 and older who reported difficulty with one or more activities of daily living. INTERVENTION: Occupational and physical therapy sessions involving home modifications and training in their use; instruction in strategies of problem-solving, energy conservation, safe performance, and fall recovery techniques; and balance and muscle strength training. MEASUREMENTS: Outcome measures included self-rated functional difficulties with ambulation, instrumental activities of daily living, activities of daily living, fear of falling, confidence performing daily tasks, and use of adaptive strategies. Observations of home hazards were also conducted. RESULTS: At 6 months, intervention participants had less difficulty than controls with instrumental activities of daily living (P=.04, 95% confidence interval (CI)=-0.28-0.00) and activities of daily living (P=.03, 95% CI=-0.24 to -0.01), with largest reductions in bathing (P=.02, 95% CI=-0.52 to -0.06) and toileting

(P=.049, 95% CI=-0.35-0.00). They also had greater self-efficacy (P=.03, 95% CI=0.02-0.27), less fear of falling (P=.001, 95% CI=0.26-0.96), fewer home hazards (P=.05, 95% CI=-3.06-0.00), and greater use of adaptive strategies (P=.009, 95% CI=0.03-0.22). Benefits were sustained at 12 months for most outcomes. CONCLUSION: A multicomponent intervention targeting modifiable environmental and behavioral factors results in life quality improvements in community-dwelling older people who had functional difficulties, with most benefits retained over a year.

Gitlin, L. N., L. Winter, et al. (2008). "Variation in response to a home intervention to support daily function by age, race, sex, and education." Journals of Gerontology Series A-Biological Sciences & Medical Sciences 63(7): 745-50.

BACKGROUND: Functional difficulty is associated with increased frailty and poor life quality, with the oldest old, women, African Americans, and less educated persons at greatest risk of disablement. This study examines whether these at-risk groups benefit differentially from an in-home intervention previously found to effectively reduce functional difficulties. METHODS: Three hundred nineteen community-living, functionally vulnerable adults 70 years old or older were randomized to usual care or an intervention involving occupational and physical therapy home instruction in problem solving, device use, energy conservation, safety, fall recovery, balance, and muscle strengthening. Outcome measures at 6 and 12 months included difficulty level in ambulation, instrumental (IADLs) and activities of daily living (ADLs), self-efficacy, and fear of falling. RESULTS: At 6 months, for ADLs, individuals > or =80 years (p =.022), women (p =.036), and less educated persons (p =.028) improved compared to their control group counterparts. For mobility, women (p =.048) and the oldest participants (p =.001) improved relative to their counterparts. For self-efficacy, women (p =.036) benefited more than men. For fear of falling, less educated persons improved more than their counterparts (p =.001). A similar pattern was found at 12 months. For IADLs, whites improved more than non-whites at 12 months. CONCLUSIONS: Treatment benefits varied by specific participant characteristics, with individuals at greatest disability risk being most responsive to the intervention. Both white and minority participants benefited similarly except in IADL functioning. Future research should control for participant characteristics, identify underlying mechanisms for variation in treatment effects, and tailor treatment to patient characteristics and desired outcomes.

Gleason, C. E., R. E. Gangnon, et al. (2009). "Increased risk for falling associated with subtle cognitive impairment: secondary analysis of a randomized clinical trial." Dementia & Geriatric Cognitive Disorders 27(6): 557-63.

BACKGROUND/AIMS: Having dementia increases patients' risk for accidental falls. However, it is unknown if having mild cognitive deficits also elevates a person's risk for falls. This study sought to clarify the relationship between subtle cognitive impairment, measured with a widely-used, clinic-based assessment, the Mini Mental State Exam (MMSE), and risk for falls. METHODS: In a secondary analysis of the Kenosha County Falls Prevention Study, a randomized controlled trial targeting older adults at risk for falls, we examined the association between baseline MMSE and prospective rate of falls over 12 months in 172 subjects randomized to control group. RESULTS: Using univariate analysis, the rate of falls increased with each unit decrease in MMSE score

down to at least 22 (rate ratio 1.25, 95% confidence interval (CI) 1.09-1.45, p = 0.0026). Using stepwise multivariate regression, controlling for ability to perform activities of daily living, use of assistive device, current exercise, and arthritis, the association between MMSE score and falls rate persisted (rate ratio 1.20, 95% CI 1.03-1.40, p = 0.021). CONCLUSION: Minimal decrements on the MMSE were associated with elevations in rate of falls, suggesting that subtle cognitive deficits reflected in MMSE scores above a cut-off consistent with a diagnosis of dementia, can influence risk for falls.

Gray, S. L., M. H. Jenkins, et al. (2000). "Psychotropic medication use in older patients referred for evaluation of falls risk." Annals of Pharmacotherapy 34(2): 265-6.

Approximately 30% of community-dwelling elderly experience a fall each year. Despite the numerous studies suggesting a moderate increase in falls with psychotropic drug use,1 - 3 little is known about the prevalence of use of these agents in patients at known risk for falls (e.g., patients referred to a clinic for evaluation for falls). Since medication use may be a modifiable risk factor, we hypothesized that use of these agents would be minimal in patients referred to a specialty clinic for falls or gait disturbance. Our objectives were to describe the extent of psychotropic medication use (benzodiazepines, tricyclic antidepressants [TCAs], antipsychotics) in patients referred to a specialty clinic for falls, and to describe the success in reducing use of these agents

Haines, T. P., K. D. Hill, et al. (2007). "Additional exercise for older subacute hospital inpatients to prevent falls: benefits and barriers to implementation and evaluation." Clinical Rehabilitation 21(8): 742-53.

OBJECTIVE: To evaluate the clinical effectiveness and implementation of a falls prevention exercise programme for preventing falls in the subacute hospital setting. DESIGN: Randomized controlled trial, subgroup analysis. PARTICIPANTS: Patients of a metropolitan subacute/aged rehabilitation hospital who were recommended for a falls prevention exercise programme when enrolled in a larger randomized controlled trial of a falls prevention programme. METHODS: Participants in both the control and intervention groups who were recommended for the exercise programme intervention were followed for the duration of their hospital stay to determine if falls occurred. Participants had their balance, strength and mobility assessed upon referral for the exercise programme and then again prior to discharge. Participation rates in the exercise programme were also recorded. RESULTS: Intervention group participants in this subgroup analysis had a significantly lower incidence of falls than their control group counterparts (control: 16.0 falls/1000 participant-days, intervention: 8.2 falls/1000 participant-days, log-rank test: P = 0.007). However few differences in secondary balance, strength and mobility outcomes were evident. CONCLUSION: This exercise programme provided in addition to usual care may assist in the prevention of falls in the subacute hospital setting.

Hairon, N. and N. Hairon (2007). "Using a range of interventions to prevent falls in hospital." Nursing Times 103(9): 23-4.

The National Patient Safety Agency (NPSA) has published a report this week on falls in hospital, which suggests that a range of interventions, when used together, could result in

an 18% reduction in the number of falls. This article outlines the incidence and cost of falls in hospital and how nurses can help with falls prevention.

Hakim, R. M., A. Roginski, et al. (2007). "Comparison of fall risk education methods for primary prevention with community-dwelling older adults in a senior center setting." Journal of Geriatric Physical Therapy 30(2): 60-8.

PURPOSE: The purpose of this study was to determine which of 2 primary prevention education programs was more effective in increasing knowledge and prompting behavior change to reduce fall risks among community-dwelling older adults who attended Senior Centers. METHODS: A convenience sample (N=69) was recruited at 4 local senior centers to compare 2 fall risk education methods. Subjects were divided randomly by location into a class and pamphlet (CP) group (n = 35) that received a one-hour class plus written information and a pamphlet only (PO) group (n = 34) that received only written information. Pretesting for level of knowledge was conducted at baseline and at 2 weeks following the intervention and data were also collected on risk factor reduction behaviors. RESULTS: There was no significant difference (p=0.34) between groups for knowledge posttests. The CP group reported 121 changes to reduce fall risk while the PO group reported 120 changes. Subjects who had been injured by past falls (n=22) were significantly (p=0.04) more likely to report changes than those who had not fallen or were not injured by a fall. CONCLUSION: Both methods prompted fall risk reduction behaviors. This study provides an example of community-based, primary prevention programs designed to reduce fall risk factors among older adults.

Harmer, P. A., F. Li, et al. (2008). "Tai Chi and falls prevention in older people." Medicine & Sport Science 52: 124-34.

BACKGROUND: Considerable research evidence has been accumulated since 1990 that practicing Tai Chi can ameliorate multiple characteristics in older adults that place them at increased risk of falling, including poor balance, loss of strength, limited flexibility, and fear of falling. However, relatively few studies have directly examined the influence of Tai Chi practice on falls in this population. RESULTS: Nine randomized controlled trials utilizing Tai Chi (n = 6), or Tai Chi-inspired exercise (n = 3), were published between 1996 and July, 2007. The studies varied considerably on study settings, participant characteristics, sample size, type of Tai Chi intervention, length of intervention and quality of the study design. Of the six studies that used Tai Chi forms, three showed significant improvement in fall-related outcomes. One study using Tai Chi-inspired exercise also had a significant fall-related outcome. CONCLUSION: Despite the evidence demonstrating the beneficial influence of Tai Chi practice on known risk factors for falling in older adults, evidence indicating an actual impact on falls-related outcomes is equivocal. More large-scale, longitudinal studies with consistent intervention parameters and clinically meaningful outcome variables are needed to a clarify the role of Tai Chi in effective falls prevention programs. The recent development of a standardized, research-to-practice Tai Chi falls prevention program may be an important step in this process.

Hauer, K., S. E. Lamb, et al. (2006). "Systematic review of definitions and methods of measuring falls in randomised controlled fall prevention trials." Age & Ageing 35(1): 5-10.

OBJECTIVE: to review systematically the range of case definitions and methods used to measure falls in randomised controlled trials. DESIGN/METHODS: a Cochrane review of fall prevention interventions was used to identify fall definitions in published trials. Secondary searches of various databases were used to identify additional methodological or theoretical papers. Two independent reviewers undertook data extraction, with adjudication by a third reviewer in cases of disagreement. SETTINGS: community-dwelling and institutionalised older persons. RESULTS: 90 publications met the predefined inclusion criteria. Of these, 44 provided no definition of the term fall. In the remainder, there were substantial variations in the definition and methods of measuring falls. Reporting periods ranged from 1 week to 4 years with only 41% using prospective data collection methods. CONCLUSION: the standard of reporting falls in published trials is poor and significantly impedes comparison between studies. The review has been used to inform an international consensus exercise to make recommendations for a core set of outcome measures for fall prevention trials.

Hauer, K., B. Rost, et al. (2001). "Exercise training for rehabilitation and secondary prevention of falls in geriatric patients with a history of injurious falls." Journal of the American Geriatrics Society 49(1): 10-20.

OBJECTIVE: To determine the safety and efficacy of an exercise protocol designed to improve strength, mobility, and balance and to reduce subsequent falls in geriatric patients with a history of injurious falls. DESIGN: A randomized controlled 3-month intervention trial, with an additional 3-month follow-up. SETTING: Out-patient geriatric rehabilitation unit. PARTICIPANTS: Fifty-seven female geriatric patients (mean age 82 +/- 4.8 years; range 75-90) admitted to acute care or inpatient rehabilitation with a history of recurrent or injurious falls including patients with acute fall-related fracture. INTERVENTION: Ambulatory training of strength, functional performance, and balance 3 times per week for 3 months. Patients of the control group attended a placebo group 3 times a week for 3 months. Both groups received an identical physiotherapeutic treatment 2 times a week, in which strengthening and balance training were excluded. MEASUREMENTS: Strength, functional ability, motor function, psychological parameters, and fall rates were assessed by standardized protocols at the beginning (T1) and the end (T2) of intervention. Patients were followed up for 3 months after the intervention (T3). RESULTS: No training-related medical problems occurred in the study group. Forty-five patients (79%) completed all assessments after the intervention and follow-up period. Adherence was excellent in both groups (intervention 85.4 +/- 27.8% vs control 84.2 +/- 29.3%). The patients in the intervention group increased strength, functional motor performance, and balance significantly. Fall-related behavioral and emotional restrictions were reduced significantly. Improvements persisted during the 3-month follow-up with only moderate losses. For patients of the control group, no change in strength, functional performance, or emotional status could be documented during intervention and follow-up. Fall incidence was reduced nonsignificantly by 25% in the intervention group compared with the control group (RR:0.753 CI:0.455-1.245). CONCLUSIONS: Progressive resistance training and progressive functional training are safe and effective methods of increasing strength and functional performance and reducing fall-related behavioral and emotional restrictions during ambulant rehabilitation in frail, high-risk geriatric patients with a history of injurious falls.

Healey, F., D. Oliver, et al. (2008). "The effect of bedrails on falls and injury: a systematic review of clinical studies." Age & Ageing 37(4): 368-78.

BACKGROUND: around one-fourth of all falls in healthcare settings are falls from bed. The role of bedrails in falls prevention is controversial, with a prevailing orthodoxy that bedrails are harmful and ineffective. OBJECTIVE: to summarise and critically evaluate evidence on the effect of bedrails on falls and injury DESIGN: systematic literature review using the principles of QuoRoM guidance. Setting and SUBJECTS: adult healthcare settings Review METHODS: using the keyword, bedrail, and synonyms, databases were searched from 1980 to June 2007 for direct injury from bedrails or where falls, injury from falls, or any other effects were related to bedrail use. RESULTS: 472 papers were located; 24 met the criteria. Three bedrail reduction studies identified significant increases in falls or multiple falls, and one found that despite a significant decrease in falls in the discontinue-bedrails group, this group remained significantly more likely to fall than the continue-bedrails group; one case-control study found patients who had their bedrails raised significantly less likely to fall; one retrospective survey identified a significantly lower rate of injury and head injury in falls with bedrails up. Twelve papers described direct injury from bedrails. DISCUSSION: it is difficult to perform conventional clinical trials of an intervention already embedded in practice, and all included studies had methodological limitations. However, this review concludes that serious direct injury from bedrails is usually related to use of outmoded designs and incorrect assembly rather than being inherent, and bedrails do not appear to increase the risk of falls or injury from falls.

Hektoen, L. F., E. Aas, et al. (2009). "Cost-effectiveness in fall prevention for older women." Scandinavian Journal of Public Health 37(6): 584-9.

AIMS: The aim of this study was to estimate the cost-effectiveness of implementing an exercise-based fall prevention programme for home-dwelling women in the > or = 80-year age group in Norway. METHODS: The impact of the home-based individual exercise programme on the number of falls is based on a New Zealand study. On the basis of the cost estimates and the estimated reduction in the number of falls obtained with the chosen programme, we calculated the incremental costs and the incremental effect of the exercise programme as compared with no prevention. The calculation of the average healthcare cost of falling was based on assumptions regarding the distribution of fall injuries reported in the literature, four constructed representative case histories, assumptions regarding healthcare provision associated with the treatment of the specified cases, and estimated unit costs from Norwegian cost data. We calculated the average healthcare costs per fall for the first year. RESULTS: We found that the reduction in healthcare costs per individual for treating fall-related injuries was 1.85 times higher than the cost of implementing a fall prevention programme. CONCLUSIONS: The reduction in healthcare costs more than offset the cost of the prevention programme for women aged > or = 80 years living at home, which indicates that health authorities should increase their focus on prevention. The main intention of this article is to stipulate costs connected to falls among the elderly in a transparent way and visualize the whole cost picture. Cost-effectiveness analysis is a health policy tool that makes politicians and other makers of health policy conscious of this complexity.

Hendrie, D., S. E. Hall, et al. (2004). "Health system costs of falls of older adults in Western Australia." Australian Health Review 28(3): 363-73.

The aim of this study was to determine the health system costs associated with falls in older adults who had attended an emergency department (ED) in Western Australia. The data relating to the ED presentations and hospital admissions were obtained from population-based hospital administrative records for 2001-2002. The type of other health services (eg, outpatient, medical, community, ancillary and residential care), the quantity, and their cost were estimated from the literature. In adults aged 65 years and above, there were 18 706 ED presentations and 6222 hospital admissions for fall-related injuries. The estimated cost of falls to the health system was $86.4 million, with more than half of this attributable to hospital inpatient treatment. Assuming the current rate of falls remains constant for each age group and gender, the projected health system costs of falls in older adults will increase to $181 million in 2021 (expressed in 2001-02 Australian dollars). The economic burden to the health services imposed by falls in older adults is substantial, and a long-term strategic approach to falls prevention needs to be adopted. Policy in this area should be targeted at both reducing the current rate of falls through preventing injury in people from high-risk groups and reducing the future rate of falls through reducing population risk.

Hennessy, C. H., D. M. Buchner, et al. (2001). "The public health perspective in health promotion and disability prevention for older adults: the role of the Centers for Disease Control and Prevention." Journal of Rural Health 17(4): 364-9.

As the United States federal public health agency, the role of the Centers for Disease Control and Prevention (CDC) in health promotion and disability prevention with older adults encompasses research, surveillance and program activities in aging. This article characterizes the objectives and context of prevention in later life and summarizes CDCs functions, collaborative partnerships with public health agencies and other organizations, and range of activities in older adult health. As a major focus of these efforts, chronic disease risk reduction is examined through CDC's efforts in the area of physical activity; a longitudinal investigation of osteoarthritis in an older biracial rural population; and chronic illness self-management programs as a prototype for secondary prevention. Other CDC activities highlighted include addressing the burden of vaccine-preventable diseases through CDC-funded programs to improve immunization coverage in older adults, and falls prevention interventions and resources. Future directions in aging at CDC are also outlined.

Hill, A. M., K. Hill, et al. (2009). "Evaluation of the effect of patient education on rates of falls in older hospital patients: description of a randomised controlled trial." BMC Geriatrics 9: 14.

BACKGROUND: Accidental falls by older patients in hospital are one of the most commonly reported adverse events. Falls after discharge are also common. These falls have enormous physical, psychological and social consequences for older patients, including serious physical injury and reduced quality of life, and are also a source of substantial cost to health systems worldwide. There have been a limited number of randomised controlled trials, mainly using multifactorial interventions, aiming to prevent older people falling whilst inpatients. Trials to date have produced conflicting results and

recent meta-analyses highlight that there is still insufficient evidence to clearly identify which interventions may reduce the rate of falls, and falls related injuries, in this population. METHODS AND DESIGN: A prospective randomised controlled trial (n = 1206) is being conducted at two hospitals in Australia. Patients are eligible to be included in the trial if they are over 60 years of age and they, or their family or guardian, give written consent. Participants are randomised into three groups. The control group continues to receive usual care. Both intervention groups receive a specifically designed patient education intervention on minimising falls in addition to usual care. The education is delivered by Digital Video Disc (DVD) and written workbook and aims to promote falls prevention activities by participants. One of the intervention groups also receives follow up education training visits by a health professional. Blinded assessors conduct baseline and discharge assessments and follow up participants for 6 months after discharge. The primary outcome measure is falls by participants in hospital. Secondary outcome measures include falls at home after discharge, knowledge of falls prevention strategies and motivation to engage in falls prevention activities after discharge. All analyses will be based on intention to treat principle. DISCUSSION: This trial will examine the effect of a single intervention (specifically designed patient education) on rates of falls in older patients in hospital and after discharge. The results will provide robust recommendations for clinicians and researchers about the role of patient education in this population. The study has the potential to identify a new intervention that may reduce rates of falls in older hospital patients and could be readily duplicated and applied in a wide range of clinical settings.

Hill, K. and K. Hill (2009). "Don't lose sight of the importance of the individual in effective falls prevention interventions." BMC Geriatrics 9: 13.

Falls remain a major public health problem, despite strong growth in the research evidence of effective single and multifactorial interventions, particularly in the community setting. A number of aspects of falls prevention require individual tailoring, despite limitations being reported regarding some of these, including questions being raised regarding the role of falls risk screening and falls risk assessment. Being able to personalise an individual's specific risk and risk factors, increase their understanding of what interventions are likely to be effective, and exploring options of choice and preference, can all impact upon whether or not an individual undertakes and sustains participation in one or more recommendations, which will ultimately influence outcomes. On all of these fronts, the individual patient receiving appropriate and targeted interventions that are meaningful, feasible and that they are motivated to implement, remains central to effective translation of falls prevention research evidence into practice.

Hill, K., N. Kerse, et al. (2002). "Falls: a comparison of trends in community, hospital and mortality data in older Australians." Aging-Clinical & Experimental Research 14(1): 18-27.

BACKGROUND AND AIMS: Falls are major contributors to disability, morbidity and death for older people. Frequently, falls-related data for each of these areas is viewed in isolation. The aim of this study was to establish trends in incidence of falls-related events including: community reporting of falls and falls-related injuries, hospitalizations as a result of accidental falls, and mortality related to accidental falls for older people in two states of Australia (Victoria and South Australia). METHODS: We analysed data sets for

falls hospitalizations and mortality rates for the period 1988 to 1997, and from two longitudinal population-based proportional samples during the same time period. RESULTS: Age-standardised falls mortality rates have steadily declined in Victoria, and remained unchanged between 1988 and 1997 in South Australia. In both states, age-standardised falls hospitalization rates have increased significantly (in Victoria, RR=1.32, 95% CI: 1.30-1.34; and South Australia, RR=1.05, 95% CI: 1.03-1.06). In both states, there was a clear age-related effect, with those in the 85-year and older age group having a falls-related mortality rate approximately 40 times that of those aged 65-69 years, and a hospitalization rate 9 times that of those in the 65-69 age group. The community studies indicated that falls rates remain high among older Australians, and that injurious falls occurred in 10% in the first wave of data collection in each of these studies. CONCLUSIONS: The results highlight that various indicators related to falls trends taken in isolation may yield differing conclusions. For a true reflection of the effectiveness of falls prevention programs, falls-related mortality, hospitalization and community data need to be integrated. Increased focus on falls prevention activity in Australia during the 1990's has not reduced the magnitude of this major public health problem.

Holmes, P. and P. Holmes "Supporting older people: Promoting falls prevention." British Journal of Community Nursing 11(6): 247-8.

In this article, brought to you in association with Help the Aged, Pamela Holmes reviews the development of falls prevention programmes in the UK, and reinforces their importance to older people.

Hoppes, S., L. A. Davis, et al. (2003). "Environmental Effects on the Assessment of People With Dementia: A Pilot Study " American Journal of Occupational Therapy 57(4): 396-402.

The purpose of this piolet study was to use a standardized assessment of independent living skills to explore the effects of environment on functional performance of individuals with dementia. Twelve participants (6 males, 6 females), diagnosed with dementia, were given the Structured Assessment of Independent Living Skills (SAILS), a standardized assessment of functional motor, cognitive, instrumental, and social performance. Participants were assessed in their homes, in an adults day-services facility they regularly attended, and in an occupational therapy clinic. The results of this study shows participants' motor performance was significantly better at home than in an unfamiliar environment. Effects of environment on motor performance, and absence of effectson cognitive, instrumental, and social performances, can be explained through ecological theory. This suggests that the ability to adapt movement to an unfamiliar environment may decline with the onset ad progression of dementia.

Horne, M., S. Speed, et al. (2009). "What do community-dwelling Caucasian and South Asian 60-70 year olds think about exercise for fall prevention?" Age & Ageing 38(1): 68-73.

BACKGROUND: strategies to prevent falls often recommend regular exercise. However, 40% of over 50s in the UK report less physical activity than is recommended. Even higher rates of sedentary behaviour have been reported among South Asian older adults. OBJECTIVE: to identify salient beliefs that influence uptake and adherence to exercise for fall prevention among community-dwelling Caucasian and South Asian 60-70 year

olds in the UK. METHODS: we undertook an ethnographic study using participant observation, 15 focus groups (n = 87; mean age = 65.7 years) and 40 individual semi-structured interviews (mean age = 64.8 years). Data analysis used framework analysis. RESULTS: young older adults do not acknowledge their fall risk and are generally not motivated to exercise to prevent falls. Those who had fallen are more likely to acknowledge risk of future falls. Whilst many of the beliefs about falls and exercise expressed were very similar between Caucasians and South Asians, there was a tendency for South Asians to express fatalistic beliefs more often. Conclusion: fall prevention should not be the focus of strategies to increase uptake and adherence to exercise. The wider benefits of exercise, leading to an active healthy lifestyle should be encouraged.

Hrafft, C. and C. Hrafft (2009). "Does your fall prevention program drive clinical decision making?" Caring 28(3): 40-3.

There is a significant amount of information available that outlines the negative impacts of falls in the aging population on both the individual's quality of life and the economics of health care delivery throughout the continuum.

Hussain, A., M. R. Qadiri, et al. (1999). "An unusual cause of falls in an elderly patient." International Journal of Clinical Practice 53(5): 399-400.

Falls are common in the elderly, often causing considerable morbidity and mortality. Prevention is therefore important and is based on determining the cause. A case of an elderly patient who had multiple falls during the day due to recurrent daytime sleep episodes, an entity we believe has not previously been reported is presented in this article.

Ivers, R. Q., R. G. Cumming, et al. (1998). "Visual impairment and falls in older adults: the Blue Mountains Eye Study." Journal of the American Geriatrics Society 46(1): 58-64.

OBJECTIVES: To examine the association between visual impairment and falls in older people. DESIGN: Cross-sectional survey of eye disease with retrospective collection of falls data. SETTING: Two postcode areas in the Blue Mountains west of Sydney, Australia. PARTICIPANTS: All people 49 years of age and older were invited to participate, 3654 (82.4%) of 4433 eligible residents took part, and 3299 answered questions about falls. MEASUREMENTS: Subjects had a detailed eye examination and answered questions about health and vision status, use of medication, and number of falls in the previous 12 months. RESULTS: Tests of visual function that had a statistically significant association with two or more falls after adjustment for confounders were visual acuity (prevalence ratio (PR) 1.9 for visual acuity worse than 20/30), contrast sensitivity (PR 1.2 for a 1-unit decrease at 6 cycles per degree), and suprathreshold visual field screening (PR 1.5 for 5 or more points missing). However, only visual acuity and contrast sensitivity were significantly associated with two or more falls per 1 standard deviation decrease. The presence of posterior subcapsular cataract (PR 2.1) and use of nonmiotic glaucoma medication (PR 2.0) had a statistically significant association with two or more falls; presence of age-related macular degeneration, diabetic retinopathy, and cortical or nuclear cataract did not. CONCLUSION: Visual impairment is strongly associated with two or more falls in older adults. In addition to poor visual acuity, visual factors such as reduced visual field, impaired contrast sensitivity, and the presence of cataract may explain this association.

Ivers, R. Q., R. Norton, et al. (2000). "Visual impairment and risk of hip fracture." American Journal of Epidemiology 152(7): 633-9.

As part of a case-control study, the Auckland Hip Fracture Study (1991-1994), the authors examined associations between impaired vision and risk of hip fracture. Subjects (911 cases and 910 controls aged 60 years or older) completed a questionnaire and had vision measurements taken, including measurements of visual acuity and stereopsis (depth perception). Binocular visual acuity worse than 20/60 was statistically significantly associated with increased risk of hip fracture after adjustment for age, sex, proxy response, hours of activity per week, and height (odds ratio (OR) = 1.5; 95% confidence interval (CI): 1.1, 2.0), as was having poor vision (less than 20/100) in both eyes (OR = 2.4; 95% CI: 1.0, 6.1). Having no depth perception was associated with increased risk (OR = 6.0 95% CI: 3.2, 11.1), as were categories of decreasing stereopsis (trend p = 0.0001), self-reported poor vision (OR = 1.4; 95% CI: 1.0, 1.9), not wearing glasses at the time of the fall (OR = 1.2; 95% CI: 1.0, 1.6), and increasing time since the last eye examination (trend p = 0.03). The population attributable risk of hip fracture due to poor visual acuity or stereopsis was 40%. Visual factors are important fall-related factors which influence risk of hip fracture. Risk of hip fracture may be decreased by correcting refractive error, improving stereopsis, and administering regular eye examinations.

Iwarsson, S. and A. Stahl (2003). "Accessibility, usability and universal design--positioning and definition of concepts describing person-environment relationships." Disability & Rehabilitation 25(2): 57-66.

PURPOSE: The aim of this paper is to position, define and discuss three concepts crucial for research and practice concerning person-environment relationships, viz. accessibility, usability and universal design. METHODS: Literature review, synthesized with the authors' research and practice experiences. RESULTS: The authors suggest an instrumental, three-step definition to accessibility, highlighting that accessibility comprises a personal as well as a environmental component, and that accessibility must be analysed by an integration of both. Suggesting the introduction of an activity component, accessibility should partly be replaced by the more complex term usability. Universal design is highlighted as a more process-oriented but less stigmatizing concept. CONCLUSION: This paper contributes to the positioning and definition of concepts describing person-environment relationships. The definitions suggested challenge current terminology, but can support in developing more efficient research and practice strategies. In order to develop theory for application to societal planning issues, the definition of concepts is a necessary step.

Johansson, K., M. Lilja, et al. (2007). "Performance of activities of daily living in a sample of applicants for home modification services." Scandinavian Journal of Occupational Therapy 14(1): 44-53.

Home modification services are provided to support persons with functional limitations to live independently at home. It is not well known what causes individuals to apply for home modifications, or in what kind of life situation this need appears. The aim of this study was to examine the relationship between performance of activities of daily living,

housing and living situation, and the home modification applied for in a sample of home modification applicants. Further, the aim was to examine differences in performance of activities of daily living between subgroups with different social support. A total of 102 participants were included in the study. Data on performance of activities of daily living was collected through interviews in the participants' homes, using structured instruments. The participants reported high levels of independence in activities of daily living, and were using assistive devices to a large extent. However, the applicants clearly experienced difficulties in performing activities related to the applied home modification. The study indicates that the main reason for applying for Home Modification Grants was perceived difficulties in performance of activities of daily living. This stresses the importance of including other aspects besides independence when trying to understand persons' activity performance and planning for occupational therapy interventions.

Johnson, C. S. and C. S. Johnson (2003). "The association between nutritional risk and falls among frail elderly." Journal of Nutrition, Health & Aging 7(4): 247-50.

PURPOSE: To examine the association between nutritional risk and falls among frail older adults. METHODS: This study involved 98 frail older adults with a mean age of 82 years. Measures included background questionnaire, falls profile, a nutritional risk assessment checklist, physical parameters such as balance, lower extremity strength, and functional mobility and endurance, and psychological variables. RESULTS: Approximately 31% of participants had suffered falls. Fallers and non-fallers were similar in age, prevalence of self-reported health problems and medications use. However, fallers had a higher level of nutritional risk and poorer physical and psychological well-being compared to non-fallers. Regression analysis showed that the level of nutritional risk is a significant determinant of falls along with leg strength and balance. CONCLUSION: Although the level of nutritional risk is associated with falls, further research is necessary to establish the causal link and to explore the effectiveness of nutritional intervention as a falls prevention strategy.

Jorstad, E. C., K. Hauer, et al. (2005). "Measuring the psychological outcomes of falling: a systematic review.[see comment]." Journal of the American Geriatrics Society 53(3): 501-10.

The objectives were to identify fall-related psychological outcome measures and to undertake a systematic quality assessment of their key measurement properties. A Cochrane review of fall-prevention interventions in older adults was used to identify fall-related psychological measurements. PubMed, CINAHL, and PsycINFO were systematically searched to identify instruments not used in trials and papers reporting the methodological quality of relevant measures. Reference lists of articles were searched for additional literature, and researchers were contacted. Two reviewers undertook quality extraction relating to content, population, reliability, validity, responsiveness, practicality, and feasibility. Twenty-five relevant papers were identified. Twenty-three measures met the inclusion criteria: six single-item questions, Falls Efficacy Scale (FES), revised FES, modified FES, FES-UK, Activities-specific Balance and Confidence Scale (ABC), ABC-UK, Confidence in maintaining Balance Scale, Mobility Efficacy Scale, adapted FES, amended FES, Survey of Activities and Fear of Falling in the Elderly (SAFFE), University of Illinois at Chicago Fear of Falling Measure, Concern about Falling Scale, Falls Handicap Inventory, modified SAFFE, Consequences of Falling Scale, and Concern

about the Consequences of Falling Scale. There is limited evidence about the measurement properties of single-item measures. Several multiitem measures obtained acceptable reliability and validity, but there is less evidence regarding responsiveness, practicality, and feasibility. Researchers should select measures based on the constructs they intend to study. Further research is needed to establish and compare the instruments' measurement properties.

Klein, B., Klein, R., Lee, K., & Cruickshanks, K.(1998) Performance-based and self-assessed measures of visual function as related to history of falls, hip fractures, and measured gait time. The Beaver Dam Eye Study. Ophthalmology.105(1):160-4.

OBJECTIVE: The purpose of the study is to report relationships between visual function parameters and falls, hip fractures, and gait time in adults. DESIGN: Population-based study. PARTICIPANTS: The 3722 persons who participated in the 5-year follow-up of the Beaver Dam Eye Study cohort. MAIN OUTCOME MEASURES: The visual functions measured at the examination were best-corrected visual acuity, current binocular acuity, near acuity, contrast sensitivity, and visual threshold to light. Information on falls and hip fractures was obtained by structured interview. Gait time was measured by standardized protocol. RESULTS: History of falls and hip fractures increased with age, as did time to walk a measured course. Falls were more commonly reported for all persons who had poorer visual function, although not all relationships were significant in persons less than 60 years of age. In persons 60 years of age and older, hip fractures after the age of 40 were significantly related to all measures of visual function. Time to walk a measured course was significantly related to all measures of visual function. CONCLUSIONS: These data indicate a consistent relationship between falls, fractures, gait time, and visual functions. Longitudinal data are necessary to accurately determine temporal relationships and to determine the likelihood of a causal association. In the interim, these data suggest that improving visual function may have benefits such as decreased traumatic events and improved mobility.

Krueger, P. D., K. Brazil, et al. (2001). "Risk factors for falls and injuries in a long-term care facility in Ontario." Canadian Journal of Public Health Revue Canadienne de Sante Publique 92(2): 117-20.

OBJECTIVE: To identify risk factors for falls and injuries among seniors living in a long-term care facility. METHOD: Case-control study of 335 residents living at St. Joseph's Villa, Dundas, Ontario. Cases were defined as residents who fell between July 1, 1996 and June 30, 1997; controls were those who did not fall. To identify risk factors for injury, cases were defined as those with completed incident injury forms and controls as those without. RESULTS: The most important risk factors for falls included: having fallen in the past three months; residing in a secured unit; living in the facility for two or more years; having the potential to cause injury to others; and having an illness, disease or behaviour that may cause a fall. The most important risk factor for injury among those who fell was altered mental state. CONCLUSION: The risk factors identified may be helpful to those planning falls prevention initiatives within long-term care settings.

Laforest, S., A. Pelletier, et al. (2009). "Impact of a community-based falls prevention program on maintenance of physical activity among older adults." Journal of Aging & Health 21(3): 480-500.

OBJECTIVE: This study examines the 9-month impact of a 12-week falls prevention program (called Stand Up!) which included balance exercises and educational components on maintenance of physical activity among community-dwelling seniors. METHOD: Data were collected among 98 experimental and 102 control participants at baseline, immediately after the program and 9 months later. Involvement in physical activity was measured with three indicators. Program effects were examined using linear and logistic regression procedures. RESULTS: Both groups showed similar increases in weekly frequency of exercise at the 9-month posttest. However, the program's participants showed higher increases in their variety of exercises at the 9-month posttest (especially among those with greater baseline scores). Among seniors reporting lower levels of energy expenditure at baseline, the program's participants showed significantly greater increases in energy expenditure than control participants. DISCUSSION: These preliminary findings suggest that programs such as Stand Up! have the potential to stimulate continued involvement in physical activity.

Lansley, P., C. McCreadie, et al. (2004). "Can adapting the homes of older people and providing assistive technology pay its way?" Age & Ageing 33(6): 571-6.

BACKGROUND: Adaptations and assistive technology (AT) have an important role in enabling older people to remain in their own homes. OBJECTIVE: To measure the feasibility and cost of adaptations and AT, and the scope for these to substitute and supplement formal care. DESIGN: Detailed design studies to benchmark the adaptability of 82 properties against the needs of seven notional users. SETTING: Social rented housing sector. MAIN OUTCOME MEASURES: Measures of the adaptability of properties, costs of care, adaptations and AT, and relationships between these costs. RESULTS: The adaptability of properties varies according to many design factors and the needs of occupiers. The most adaptable properties were ground floor flats and bungalows; the least were houses, maisonettes and flats in converted houses. Purpose-built sheltered properties were generally more adaptable than corresponding mainstream properties but the opposite was the case for bungalows. Adaptations and AT can substitute for and supplement formal care, and in most cases the initial investment in adaptations and AT is recouped through subsequently lower care costs within the average life expectancy of a user. CONCLUSION: Appropriately selected adaptations and AT can make a significant contribution to the provision of living environments which facilitate independence. They can both substitute for traditional formal care services and supplement these services in a cost-effective way.

Lee, J. S., T. Kwok, et al. (2006). "Medical illnesses are more important than medications as risk factors of falls in older community dwellers? A cross-sectional study." Age & Ageing 35(3): 246-51.

BACKGROUND: Previous studies have confirmed the contribution of various medications towards falls in the older population. Recently questions were raised as to whether the chronic illnesses or drug use was more important. OBJECTIVE: We attempt to test the hypothesis that underlying medical illnesses are the cause of falls rather than medications. DESIGN: Cross-sectional. SETTING: Urban community in Hong Kong. SUBJECTS: 4,000 Ambulatory community-dwelling men and women aged 65 years or over. METHODS: Demographic data, fall history in the previous 12 months, medical

diagnoses, current medications and self-rated health were recorded. Body measurements and neuromuscular function tests were performed. Medical diagnoses and their corresponding medications were tested simultaneously in a multivariate model. RESULTS: 789 (19.7%) Subjects reported at least one fall and 235 (5.9%) experienced two or more falls. After adjustment for age and sex, medications associated with any falls were aspirin, diabetic drugs, nitrates, NSAIDs, and paracetamol, and those associated with recurrent falls were calcium channel blockers, diabetic drugs, nitrates, NSAIDs, aspirin and statins. Only anti-diabetics and nitrate showed moderate and borderline significance in multivariate analyses for recurrent and any falls respectively (OR 2.9, P = 0.01; OR 1.5, P = 0.027). Other medications failed to show significant relationship with falls, while eye diseases, heart diseases and musculoskeletal pain showed variable associations. CONCLUSION: The apparent association between many medications and falls was mediated through the underlying medical diagnoses and neuromuscular impairment. Anti-diabetics agents were associated with falls.

Lee, V., B. Ross, et al. (2001). "Functional assessment of older adults in an emergency department." Canadian Journal of Occupational Therapy - Revue Canadienne d Ergotherapie 68(2): 121-9.

The fast paced nature of emergency medicine often precludes assessment of patient functioning which may have significant consequences for geriatric patients including falls, functional decline and/or hospital re-admission. A rehabilitation consultation service to a hospital emergency department was implemented based on recommendations in the literature that functional assessments and a multidisciplinary approach be used with older adults. A systematic method of targeting and assessing elderly at-risk patients included a safety checklist and a comprehensive functional assessment tool. An observational study of 80 patients receiving functional assessments from rehabilitation professionals is described. Patients with high levels of disability or who lived alone prior to the emergency visit were more likely to be admitted to hospital. This study supports using multidisciplinary efforts and comprehensive functional assessments in emergency departments to guide decision-making about discharge outcome and planning for the health care needs of elderly patients.

Li, F., P. Harmer, et al. (2008). "Translation of an effective tai chi intervention into a community-based falls-prevention program." American Journal of Public Health 98(7): 1195-8.

Tai chi--moving for better balance, a falls-prevention program developed from a randomized controlled trial for community-based use, was evaluated with the re-aim framework in 6 community centers. The program had a 100% adoption rate and 87% reach into the target older adult population. All centers implemented the intervention with good fidelity, and participants showed significant improvements in health-related outcome measures. This evidence-based tai chi program is practical to disseminate and can be effectively implemented and maintained in community settings.

Li, F., P. Harmer, et al. (2008). "Tai Chi: moving for better balance -- development of a community-based falls prevention program." Journal of Physical Activity & Health 5(3): 445-55.

BACKGROUND: This study was designed to develop an evidence- and community based falls prevention program -- Tai Chi: Moving for Better Balance. METHODS: A

mixed qualitative and quantitative approach was used to develop a package of materials for program implementation and evaluation. The developmental work was conducted in 2 communities in the Pacific Northwest. Participants included a panel of experts, senior service program managers or activity coordinators, and older adults. Outcome measures involved program feasibility and satisfaction. RESULTS: Through an iterative process, a program package was developed. The package contained an implementation plan and class training materials (ie, instructor's manual, videotape, and user's guidebook). Pilot testing of program materials showed that the content was appropriate for the targeted users (community-living older adults) and providers (local senior service organizations). A feasibility survey indicated interest and support from users and providers for program implementation. A 2-week pilot evaluation showed that the program implementation was feasible and evidenced good class attendance, high participant satisfaction, and interest in continuing Tai Chi. CONCLUSIONS: The package of materials developed in this study provides a solid foundation for larger scale implementation and evaluation of the program in community settings.

Lichtenberg, P. A., S. E. MacNeill, et al. (2000). "Environmental Press and Adaptation to Disability in Hospitalized Live-Alone Older Adults." Gerontologist 40(5): 549-556.

Purpose: This study examined the ability of personal competency variables at the time of hospital discharge to predict primary instrumental activities of daily living (IADLs) and secondary outcomes (living arrangements) in a sample of 194 urban, live-alone, older adults who had a new onset disability. Design and Methods: Consecutively admitted medical rehabilitation patients, 72% women and 85% African American, participated in the study. Using path analysis, three of the four competency variables collected at the time of hospitalization (cognition, medical burden, activities of daily living) predicted IADLs at 3 and 6 months after hospitaliza-tion (e.g., cooking, telephone use, money management). IADLs, in turn, predicted living arrangements at 3 and at 6 months after hospitalization. Results: The findings provided strong support for the importance of assessing a broad range of competency variables when investigating adaptation to disability. Implications: The increased understanding of ad-aptation in live-alone older adults with a new-onset disability is particularly timely given the increase in live-alone older adults and the dire consequences associated with change in living arrangement (i.e., mortality and morbidity) in this group.

Liu-Ambrose, T., L. A. Katarynych, et al. (2009). "Dual-task gait performance among community-dwelling senior women: the role of balance confidence and executive functions." Journals of Gerontology Series A-Biological Sciences & Medical Sciences 64(9): 975-82.

BACKGROUND: Exploring factors that contribute to dual-task gait performance among seniors is of particular interest in falls prevention because dual-task-related gait changes are associated with increased falls risk. It is unclear currently which specific executive processes are most relevant to dual-task gait performance and whether "balance confidence" is independently associated with dual-task gait performance. METHODS: A cross-sectional analysis of 140 senior women aged 65-75 years old. Balance confidence was assessed by the Activities-Specific Balance Confidence scale. Three key executive processes were assessed by standard neuropsychological tests: (i) set shifting, (ii) working memory, and (iii) response inhibition. Dual-task gait performance was assessed

by the simple and complex versions of the walking while talking (WWT) test. Two linear regression models were constructed to determine the independent association of executive functions and balance confidence with: (i) simple WWT completion time and (ii) complex WWT completion time. RESULTS: Balance confidence was independently associated with both simple and complex WWT completion times after accounting for age, time to walk 40 ft without talking, and global cognition. Set shifting was independently associated with complex WWT completion time; no executive processes were independently associated with simple WWT completion time. CONCLUSIONS: This study highlights that balance confidence is independently associated with dual-task gait performance. Furthermore, executive functions do not play a significant role in dual-task gait performance when the concurrent cognitive load is low. Clinicians may need to consider balance confidence and executive functions in the assessment and rehabilitation of dual-task gait performance among community-dwelling seniors.

Liu-Ambrose, T., M. Y. Pang, et al. (2007). "Executive function is independently associated with performances of balance and mobility in community-dwelling older adults after mild stroke: implications for falls prevention." Cerebrovascular Diseases 23(2-3): 203-10.

BACKGROUND: Stroke survivors have a high incidence of falls. Impaired executive-controlled processes are frequent in stroke survivors and are associated with falls in this population. Better understanding of the independent association between executive-controlled processes and physiological fall risk (i.e. performances of balance and mobility) could enhance future interventions that aim to prevent falls and to promote an independent lifestyle among stroke survivors. METHODS: Cross-sectional analysis of 63 adults who suffered a mild stroke >1 year prior to the study, aged > or =50 years. RESULTS: Cognitive flexibility was independently associated with performances of balance and mobility in community-dwelling older adults after mild stroke, after accounting for age, quadriceps strength of the paretic side and current physical activity level. CONCLUSIONS: Clinicians may need to consider cognitive function when assessing and treating impaired balance and mobility in community-dwelling older adults after mild stroke.

Lord, S. R. and J. Dayhew (2001). "Visual risk factors for falls in older people." Journal of the American Geriatrics Society 49(5): 508-15.

OBJECTIVES: To determine the tests most predictive of falls in community-dwelling older people from a range of visual screening tests (high and low contrast visual acuity, edge contrast sensitivity, depth perception, and visual field size). To determine whether one or more of these visual measures, in association with measures of sensation, strength, reaction time, and balance, can accurately predict falls in this group. DESIGN: Prospective cohort study of 12 months duration. SETTING: Falls and Balance Laboratory, Prince of Wales Medical Research Institute. PARTICIPANTS: 156 community-dwelling men and women age 63 to 90 (mean age 76.5, standard deviation = 5.1). MEASUREMENTS: Screening tests of vision, sensation, strength, reaction time and balance, falls. RESULTS: Of the 148 subjects available at follow-up, 64 (43.2%) reported falling, with 32 (21.7%) reporting multiple falls. Multiple fallers had decreased vision, as indicated by all visual tests, with impaired depth perception, contrast sensitivity, and low-contrast visual acuity being the strongest risk factors. Subjects with good vision in both

eyes had the lowest rate of falls, whereas those with good vision in one eye and only moderate or poor vision in the other eye had elevated falling rates-equivalent to those with moderate or poor vision in both eyes. Discriminant analysis revealed that impaired depth perception, slow reaction time, and increased body sway on a compliant surface were significantly and independently associated with falls. These variables correctly classified 76% of the cases, with similar sensitivity and specificity. CONCLUSION: The study findings indicate that impaired vision is an important and independent risk factor for falls. Adequate depth perception and distant-edge-contrast sensitivity, in particular, appear to be important for maintaining balance and detecting and avoiding hazards in the environment.

Lord, S. R., J. Dayhew, et al. (2002). "Multifocal glasses impair edge-contrast sensitivity and depth perception and increase the risk of falls in older people." Journal of the American Geriatrics Society 50(11): 1760-6.

OBJECTIVES: To determine the extent to which multifocal glasses impair contrast sensitivity and depth perception at critical distances required for detecting hazards in the environment and whether multifocal glasses use increases the risk of falls in older people. DESIGN: One-year prospective cohort study. SETTING*:* Falls Laboratory, Prince of Wales Medical Research Institute. PARTICIPANTS*:* One hundred fifty-six community-dwelling people aged 63–90. MEASUREMENTS*:* Contrast sensitivity, depth perception, accidental falls. RESULTS*:* Eighty-seven subjects (55.8%) were regular wearers of multifocal (bifocal, trifocal, or progressive lens) glasses. These subjects performed significantly worse in the distant depth perception and distant edge-contrast sensitivity tests in conditions that forced them to view test stimuli through the lower segments of their glasses. Multifocal glasses wearers were more than twice as likely to fall in the follow-up period than non-multifocal glasses wearers (odds ratio (OR) = 2.29, 95% confidence interval (CI) = 1.06–4.92), when adjusting for age, poor vision, reduced lower limb sensation and strength, slow reaction time, and increased postural sway. Multifocal glasses wearers were also more likely to fall because of a trip (OR = 2.79, 95% CI = 1.08–7.22), when outside their homes (OR = 2.55, 95% CI = 1.14–5.70), and when walking up or down stairs ($P < .01$). The population attributable risks of regular multifocal glasses use were 35.2% for any falls, 40.9% for falls due to a trip, and 40.9% for falls outside the home. CONCLUSIONS*:* The study findings indicate that multifocal glasses impair depth perception and edge-contrast sensitivity at critical distances for detecting obstacles in the environment. Older people may benefit from wearing non-multifocal glasses when negotiating stairs and in unfamiliar settings outside the home.

Lord, S. R., H. B. Menz, et al. (2006). "Home environment risk factors for falls in older people and the efficacy of home modifications." Age & Ageing 35 Suppl 2: ii55-ii59.

Most homes contain potential hazards, and many older people attribute their falls to trips or slips inside the home or immediate home surroundings. However, the existence of home hazards alone is insufficient to cause falls, and the interaction between an older person's physical abilities and their exposure to environmental stressors appears to be more important. Taking risks or impulsivity may further elevate falls risk. Some studies have found that environmental hazards contribute to falls to a greater extent in older vigorous people than in older frail people. This appears to be due to increased exposure to

falls hazards with an increase in the proportion of such falls occurring outside the home. There may also be a non-linear pattern between mobility and falls associated with hazards. Household environmental hazards may pose the greatest risk for older people with fair balance, whereas those with poor balance are less exposed to hazards and those with good mobility are more able to withstand them. Reducing hazards in the home appears not to be an effective falls-prevention strategy in the general older population and those at low risk of falls. Home hazard reduction is effective if targeted at older people with a history of falls and mobility limitations. The effectiveness may depend on the provision of concomitant training for improving transfer abilities and other strategies for effecting behaviour change.

Lord, S. R., M. W. Rogers, et al. (1999). "Lateral stability, sensorimotor function and falls in older people." Journal of the American Geriatrics Society 47(9): 1077-81.

AIMS: To design simple tests of lateral stability for assessing balance in older people and to determine whether poor performances in these tests are associated with impaired vision, lower limb sensation, quadriceps strength, simple reaction time, and falling in this group. DESIGN: A cross-sectional and retrospective study. SETTING: Falls and Balance Laboratory, Prince of Wales Medical Research Institute. PARTICIPANTS: One hundred fifty-six community-dwelling men and women aged 63-90 years (mean age 76.5, SD = 5.1). OUTCOME MEASURES: The maximal lateral sway in a near-tandem stability test with eyes open and closed and the necessity of taking a protective step in the near-tandem stability test with eyes closed. RESULTS: All 156 subjects could complete the near-tandem stability test with eyes open, but only 99 subjects (63.5%) could undertake the test with eyes closed without taking a protective step. Subjects with a history of falls had increased lateral sway both with eyes open and eyes closed as well as poorer visual acuity, proprioception, and quadriceps strength. Fallers were also significantly more likely to take a protective step when undertaking the near-tandem stability test with eyes closed. Multiple regression analysis revealed that impaired lower limb proprioception, quadriceps strength, and reaction time were the best predictors of increased maximal sway in the near-tandem stability test with eyes open. Reduced proprioception and quadriceps strength, in addition to age, were also found to be the best determinants of the necessity of taking a protective step in the near-tandem stability test with eyes closed. CONCLUSIONS: The study findings identify simple new tests that are associated with falling in older people and elucidate the relative importance of specific physiological systems in the maintenance of lateral stability.

Lord, S. R. and D. L. Sturnieks (2005). "The physiology of falling: assessment and prevention strategies for older people." Journal of Science & Medicine in Sport 8(1): 35-42.

Balance calls upon contributions from vision, peripheral sensation, vestibular sense, muscle strength, neuromuscular control and reaction time. With increased age, there is a progressive loss of functioning of these systems and an increased likelihood of falls. Falls can mark the beginning of a decline in function and independence and are the leading cause of injury-related hospitalisation in older people. By using simple tests of vision, leg sensation, muscle strength, reaction time and standing balance, it is possible to identify accurately older people at risk of falls and assess intervention outcomes. This approach overcomes the limitations associated with traditional methods of assessing falls risk via

medical diagnoses, including varied severity between individuals. Using a physiological approach provides information at the impairment and functional capacity levels to assist in understanding falls and developing and evaluating optimal falls prevention strategies for older people.

Lord, S. R., A. Tiedemann, et al. (2005). "The effect of an individualized fall prevention program on fall risk and falls in older people: a randomized, controlled trial." Journal of the American Geriatrics Society 53(8): 1296-304.

OBJECTIVES: To determine whether an individualized falls prevention program comprising exercise, visual, and counseling interventions can reduce physiological falls risk and falls in older people. DESIGN: Randomized, controlled trial of 12 months' duration. SETTING: Falls Clinic, Royal North Shore Hospital, Sydney, Australia. PARTICIPANTS: Six hundred twenty people aged 75 and older recruited from a health insurance company membership database. Interventions: Participants in the extensive intervention group (EIG) received individualized interventions comprising exercise and strategies for maximizing vision and sensation; the minimal intervention group (MIG) received brief advice; and the control group (CG) received no intervention. MEASUREMENTS: Accidental falls, vision, postural sway, coordinated stability, reaction time, lower limb muscle strength, sit-to-stand performance, and physiological profile assessment (PPA) falls risk scores. RESULTS: At the 6-month follow-up, PPA falls risk scores were significantly lower in the EIG than in the CG. EIG subjects assigned to the extensive exercise intervention group showed significant improvements in tests of knee flexion strength and sit-to-stand times but no improvements in balance. EIG subjects assigned to the extensive visual intervention group showed significant improvements in tests of visual acuity and contrast sensitivity. The rate of falls and injurious falls within the trial period were similar in the three groups. CONCLUSION: The individualized intervention program reduced some falls risk factors but did not prevent falls. The lack of an effect on falls may reflect insufficient targeting of the intervention to an at-risk group.

Low, S., L. W. Ang, et al. (2009). "A systematic review of the effectiveness of Tai Chi on fall reduction among the elderly." Archives of Gerontology & Geriatrics 48(3): 325-31.

Falls among the elderly is a major public health concern. There has been recent extensive research on the effects of Tai Chi in fall prevention among the elderly. As such, we undertook a systematic review to look for evidence on the effect of this intervention. There were seven randomized controlled trials, which met our objective and inclusion criteria. Our review has shown that Tai Chi has the potential to reduce falls or risk of falls among the elderly, provided that they are relatively young and non-frail. Further review is needed to look into the non-English studies, which assess the effectiveness of Tai Chi on fall reduction.

Luukinen, H., K. K., et al. (1995). "Predictors for recurrent falls among the home dwelling elderly." Scandinavian Journal of PRimary Health Care 13: 294-299.

Objective - Scant attention has been paid to the risk factors for recurrent falls among the home-dwelling elderly, although there are remarkable age and sex differences according to whether or not the falls recur. in this report we describe and analyze the risk factors for

recurrent falls by selected clinical variables and the history of falling during the previous year. Design - A community-based prospective study covering two years. Setting - All home-dwelling persons (N=1016) aged 70 years or older living in five municipalities in northern Finland. Outcome measures - the risk factors of recurrent falling by selected clinical variables using cross-tabulations and multivariate analyses. Results - Previous falls, peripheral neuropathy, use of psychotropic medication and slow walking speed were independent risk factors for recurrent falling. the risk of recurrent falling increased with an increasing number of previous falls. Conclusions - Early preventive measures should be taken among the elderly persons who are prone to falling. in order to reduce the risk of recurrent falls among the elderly, the attending physician should take a critical view of the use of psychotropic medications, and attempts should be made to treat conditions underlying peripheral neuropathies and abnormal gait.

Lysack, C. L., S. Neufeld, et al. (2003). "Occupational therapist home evaluations: inequalities, but doing the best we can?" American Journal of Occupational Therapy 57(4): 369-79.

OBJECTIVE: The purpose of this study was (a) to describe the occupational therapy recommendations provided to patients discharged to inner city homes, and (b) to examine the relationship between patient health insurance and the number and type of occupational therapist recommendations for equipment and home modifications. METHOD: An archival review was conducted of all referrals to the home evaluation program (n = 755) at a large urban rehabilitation hospital between January 1, 1994, and December 31, 1998. Additional patient demographic data and Functional Independence Measure (FIM) data were obtained in electronic form from the hospital information database. RESULTS: Analysis of results showed that while the pattern of equipment and modification recommendations varied little, publicly insured patients received fewer home modification recommendations compared to privately insured patients ($t = 3.7$; $p < .0005$), and were discharged from rehabilitation with significantly lower functional independence (MANOVA $F = 3.9$; $p = .05$). CONCLUSION: Results alert occupational therapists to the relationship between health insurance and treatment recommendations and point to patient advocacy and health policy as potential pathways to desired a achieve social change.

MacCulloch, P. A., T. Gardner, et al. (2007). "Comprehensive fall prevention programs across settings: a review of the literature." Geriatric Nursing 28(5): 306-11.

The prevention and management of falls across health care and community settings continues to be one of the greatest challenges in geriatric nursing. This article reviews the literature on fall prevention and management and provides information on national programs and resources, as well as public policy related to falls in the elderly.

Mackenzie, L. and L. Mackenzie (2009). "Perceptions of health professionals about effective practice in falls prevention." Disability & Rehabilitation 31(24): 2005-12.

PURPOSE: Falls prevention is a practice context with a rapidly expanding evidence-base. However, little is known about the implementation of this evidence into practice by health professionals. This study aimed to explore how falls prevention evidence is applied in practice internationally by health professionals working in the homes of older people, and to identify the perceived barriers and effective strategies in implementing

falls prevention programs. METHOD: A qualitative study design using a grounded theory approach was selected. Data were collected via focus groups or individual, semi-structured interviews with 50 health professionals from Australia, the UK and Canada. All participants visited older people in their homes as part of their usual practice. Data analysis used the constant comparative method. RESULTS: Three themes emerged from the data: (i) client experiences of falls prevention, (ii) professional skills and clinical reasoning in falls prevention and (iii) service issues in falls prevention. CONCLUSIONS: The complexity of delivering an evidence-based, multi-disciplinary falls prevention intervention that is acceptable to clients was described by participants. Challenges were identified in applying the evidence according to the resources and experience of health professionals in the systems within which they work.

Manning, D. P. and C. Jones (2001). "The effect of roughness, floor polish, water, oil and ice on underfoot friction: current safety footwear solings are less slip resistant than microcellular polyurethane." Applied Ergonomics 32(2): 185-96.

Research over a period of about 18 years has shown that a microcellular polyurethane known as AP66033 is the most slip-resistant safety footwear soling material on oily and wet surfaces. In recent years it has been replaced in commercially available footwear by a dual density polyurethane (DDP) which has a dense outer layer and a soft microcellular backing. This research programme has compared the slip resistance of AP66033 with DDP and some rubber solings. In addition, data were obtained on the effects of soling and floor roughness, and floor polish on slip resistance. Some data were also obtained for walking on ice. The coefficient of friction (CoF) of the solings was measured on 19 water wet surfaces in three conditions: (I) when the solings were new, (II) following abrasion to create maximum roughness and (III) after polishing. The CoF was measured on four oily surfaces after each of 11 abrasion or polishing treatments. The profound effects of the roughening of all soles and of floor roughness on the CoF were demonstrated for both wet and oily surfaces. The superior slip resistance of AP66033 was confirmed for oily and wet conditions; however, some rubbers not suitable for safety footwear achieved higher CoF values on wet floors. All of the floor polishes reduced the CoF of all floors when contaminated with water. The mean CoF of DDP solings was lower than the mean for AP66033 on wet and oily surfaces. No safety footwear soling provided adequate grip on dry ice and the CoF was reduced by water on the ice. A rubber used for rock climbing footwear was one of the most slip-resistant solings on wet surfaces in the laboratory but recorded the lowest CoF on ice. It is concluded that the incidence of occupational injuries caused by slipping could be reduced by the following: (A) returning to safety footwear soled with the microcellular polyurethane AP66033; (B) abrading all new and smooth footwear solings with a belt sanding machine coated with P100 grit; (C) avoiding the use of floor polish; (D) informing the general public about the poor slip resistance of ordinary footwear on ice and the lowering of slip resistance in cold weather.

Mathieson, K. M., J. J. Kronenfeld, et al. (2002). "Maintaining functional independence in elderly adults: the roles of health status and financial resources in predicting home modifications and use of mobility equipment." Gerontologist 42(1): 24-31.

PURPOSE: We investigated whether health status (i.e., need characteristics) and financial resources (i.e., enabling characteristics) were important predictors of two types

of functional adaptations among elderly adults: home modifications such as putting nonslip tape on rugs or installing more telephones and use of equipment for mobility or activities of daily living (ADLs) such as canes or walkers. DESIGN AND METHODS: Participants were identified from the National Survey of Self-Care and Aging (n = 3,485), a nationally representative sample of noninstitutionalized U.S. adults aged 65 and older. Need and enabling characteristics were used to predict home modifications and equipment use in multinomial logistic analysis, controlling for predisposing characteristics. RESULTS: Although several health-status (need) variables had significant, direct effects on functional adaptations, the effects of ADL limitations were diminished at higher levels of impairment. Among the financial (enabling) variables, subjective income measures and supplemental insurance had significant, direct effects on functional adaptations. IMPLICATIONS: Promotion of functional adaptations among elderly people may benefit from both a proactive approach that targets elders with few limitations and a consideration of financial factors in addition to health status.

Menz, H. B., K. D. Hill, et al. (2007). "Podiatric involvement in multidisciplinary falls-prevention clinics in Australia." Journal of the American Podiatric Medical Association 97(5): 377-84.

BACKGROUND: Falls in older people are a major public health problem, and there is increasing evidence that foot problems and inappropriate footwear increase the risk of falls. Several multidisciplinary prevention clinics have been established to address the problem of falls; however, the role of podiatry in these clinics has not been clearly defined. The aims of this study were to determine the level of podiatric involvement in multidisciplinary falls clinics in Australia and to describe the assessments undertaken and interventions provided by podiatrists in these settings. METHODS: A database of falls clinics was developed through consultation with departments of health in each state and territory. Clinic managers were contacted and surveyed as to whether the clinic incorporated podiatry services. If so, the podiatrists were contacted and asked to complete a brief questionnaire regarding their level of involvement and the assessment procedures and interventions offered. RESULTS: Of the 36 clinics contacted, 25 completed the survey. Only four of these clinics reported direct podiatric involvement. Despite the limited involvement of podiatry in these clinics, all of the clinic managers stated that they considered podiatry to have an important role to play in falls prevention. Podiatry service provision in falls clinics varied considerably in relation to eligibility criteria, assessments undertaken, and interventions provided. CONCLUSIONS: Despite the recognition that foot problems and inappropriate footwear are risk factors for falls, podiatry currently has a relatively minor and poorly defined role in multidisciplinary falls-prevention clinics in Australia.

Menz, H. B. and S. R. Lord (1999). "Foot problems, functional impairment, and falls in older people." Journal of the American Podiatric Medical Association 89(9): 458-67.

Falls in older people are common and may lead to considerable disability. Although a number of risk factors for falling have been identified, the role of foot problems has received relatively little attention in the literature. This article reviews the literature pertaining to the prevalence of foot problems in older people and discusses the relationship of foot problems to functional impairment and falls. In addition, a number of

theoretical considerations regarding specific foot conditions and postural instability are outlined.

Menz, H. B., S. T. Lord, et al. (2001). "Slip resistance of casual footwear: implications for falls in older adults." Gerontology 47(3): 145-9.

BACKGROUND: A large proportion of falls in older people are caused by slipping. Previous occupational safety research suggests that inadequate footwear may contribute to slipping accidents; however, no studies have assessed the slip resistance of casual footwear. OBJECTIVE: To evaluate the slip resistance of different types of casual footwear over a range of common household surfaces. METHODS: The slip resistance of men's Oxford shoes and women's fashion shoes with different heel configurations was determined by measuring the dynamic coefficient of friction (DCoF) at heel contact (in both dry and wet conditions) on a bathroom tile, concrete, vinyl flooring and a terra cotta tile using a specially-designed piezoelectric force plate apparatus. RESULTS: Analysis of variance revealed significant shoe, surface, and shoe-surface interaction effects. Men's Oxford shoes exhibited higher average DCoF values than the women's fashion shoes, however, none of the shoes could be considered safe on wet surfaces. Application of a textured sole material did not improve slip resistance of any of the shoes on wet surfaces. CONCLUSION: Heel geometry influences the slip resistance of casual footwear on common household surfaces. The suboptimal performance of all of the test shoes on wet surfaces suggests that a safety standard for casual footwear is required to assist in the development of safe footwear for older people.

Menz, H. B., M. E. Morris, et al. (2006). "Foot and ankle risk factors for falls in older people: a prospective study." Journals of Gerontology Series A-Biological Sciences & Medical Sciences 61(8): 866-70.

BACKGROUND: Foot problems are common in older people and are associated with impaired balance and functional ability. Few prospective studies, however, have been undertaken to determine whether foot problems are a risk factor for falls. METHODS: One hundred seventy-six people (56 men and 120 women, mean age 80.1, standard deviation 6.4 years) residing in a retirement village underwent tests of foot and ankle characteristics (including foot posture, range of motion, strength, and deformity) and physiological falls risk factors (including vision, sensation, strength, reaction time, and balance) and were followed for 12 months to determine the incidence of falls. RESULTS: Seventy-one participants (41%) reported falling during the follow-up period. Compared to those who did not fall, fallers exhibited decreased ankle flexibility, more severe hallux valgus deformity, decreased plantar tactile sensitivity, and decreased toe plantarflexor strength; they were also more likely to have disabling foot pain. Discriminant function analysis revealed that decreased toe plantarflexor strength and disabling foot pain were significantly and independently associated with falls after accounting for physiological falls risk factors and age. CONCLUSIONS: Foot and ankle problems increase the risk of falls in older people. Interventions to address these factors may hold some promise as a falls prevention strategy.

Meyer, G., S. Kopke, et al. (2009). "Comparison of a fall risk assessment tool with nurses' judgement alone: a cluster-randomised controlled trial." Age & Ageing 38(4): 417-23.

BACKGROUND: the impact of fall risk assessment tools on clinical endpoints is unknown. OBJECTIVE: we compared a standardised fall risk assessment tool alongside nurses' clinical judgement with nurses' judgement alone. DESIGN: a 12-month cluster-randomised controlled trial. SETTING: nursing homes in Hamburg (29 per study group). SUBJECTS: 1,125 residents (n = 574 intervention group, IG; n = 551 control group, CG). INTERVENTIONS: all homes received structured information on fall prevention before randomisation. The IG monthly administered the Downton Index, and the CG did not use a tool. Measurements were number of participants with at least one fall, falls, fall-related injuries and medical attention, fall preventive measures, physical restraints. RESULTS: the mean follow-up was 10.8 +/- 2.9 months in both groups: 105 (IG) and 114 (CG) residents died or moved away. There was no difference between the groups concerning the number of residents with at least one fall (IG: 52%, CG: 53%, mean difference -0.7, 95% confidence interval -10.3 to 8.9, P = 0.88) and the number of falls (n = 1,016 and n = 1,014). All other outcomes were also comparable between the IG and CG. CONCLUSIONS: application of a fall risk assessment tool in nursing homes does not result in the better clinical outcome than reliance on nurses' clinical judgement alone.

Milisen, K., A. Geeraerts, et al. (2009). "Use of a fall prevention practice guideline for community-dwelling older persons at risk for falling: a feasibility study." Gerontology 55(2): 169-78.

BACKGROUND: Falls among older persons occur frequently and are a common cause of physical and psychological morbidity and healthcare utilization. The problem can be attributed to a complex interaction between health-related, behavioral and environmental factors. To ensure a uniform and evidence-based approach, a practice guideline was developed for fall prevention in community-dwelling older persons at risk for falls. OBJECTIVE: To test the feasibility of integrating a fall prevention practice guideline into the daily practice of 4 primary healthcare disciplines, i.e. general practitioners, nurses, occupational therapists and physiotherapists. METHODS: This was a descriptive study which was carried out by 10 local health networks located throughout Flanders. The subjects involved in the study were 99 primary care workers and 1,142 community-dwelling older patients (65 years or older) who could rise from a chair and transfer independently. For 6 months, primary care workers implemented our fall prevention guideline, which consisted of 3 parts (case finding, multifactorial in-depth assessment and interventions). After the 6-month trial phase, participating primary care workers were asked to complete a semistructured questionnaire to evaluate the feasibility of using the guideline in daily practice. RESULTS: The average time spent on carrying out the guideline was 32.0+/-14.0 min. Healthcare workers from all 4 disciplines considered case finding to be their responsibility. The picture was different for the evaluation of risk factors and interventions. Although 87.5% considered fall prevention to be an important issue, healthcare workers from different disciplines failed to agree about how to integrate the prevention guideline into daily practice. Perceived barriers to implementing the guideline were lack of time (57.3%), poor motivation of the target population (53.3%) and insufficient cooperation between healthcare workers (37.3%). CONCLUSION: A guideline can be used to initiate the integration of prevention strategies into daily practice. Case finding is feasible for all disciplines. Multifactorial assessment and

interventions require specific task allocation, multidisciplinary cooperation and clear communication.

Mitchell, E., H. Lawes, et al. (2008). "Falls education for practitioners: auditing a three-tier learning approach." Nursing Older People 20(1): 27-30.

In line with 2004 NICE guidelines, practitioners in West Dorset, England, are developing and maintaining their basic professional competence in falls' assessment and prevention. Local 'falls champions' have been appointed to assist in the education of all staff who work in older people's services in order to raise awareness and promote best practice. A three-tier style of education has been developed to allow staff to learn skills of assessment and intervention in relation to falls prevention. Evaluation over a two-year period clearly demonstrates how primary care trust staff are beginning to meet the requirements of the NICE recommendation on 'education and information-giving', while choosing their own style of learning.

Mitty, E., S. Flores, et al. (2007). "Fall prevention in assisted living: assessment and strategies." Geriatric Nursing 28(6): 349-57.

Residents in assisted living residences have similar risk factors for falls as do community-residing older adults and, as such, can benefit from the research findings on falls prevention conducted with that population. Some risk factors can be managed, such as, medication side effects, and muscle weakness; others such as degenerative neurological changes, cannot. Knowing a resident's falls history and conducting a full risk assessment, in combination with appropriate interventions, can reduce the probability of a future fall. Exercise appears to be the most effective factor in reducing the risk of falls and injuries from falls. The fear of falling, whether or not associated with a previous fall, is more common among older women and can seriously restrict their quality of life. This article describes evidence-based falls risk assessment instruments and interventions to reduce falls risk. T'ai chi, for example, can reduce falls risk by improving balance. The article describes a standard fall prevention program for older adults that can be part of a resident's care or service plan, criteria for an occurrence report, quality improvement monitoring, and a formula to calculate the residence's monthly falls rate.

Moore, M., B. Williams, et al. "Translating a multifactorial fall prevention intervention into practice: a controlled evaluation of a fall prevention clinic." Journal of the American Geriatrics Society 58(2): 357-63.

Although multifactorial fall prevention interventions have been shown to reduce falls and injurious falls, their translation into clinical settings has been limited. This article describes a hospital-based fall prevention clinic established to increase availability of preventive care for falls. Outcomes for 43 adults aged 65 and older seen during the clinic's first 6 months of operation were compared with outcomes for 86 age-, sex-, and race-matched controls; all persons included in analyses received primary care at the hospital's geriatrics clinic. Nonsignificant differences in falls, injurious falls, and fall-related healthcare use according to study group in multivariate adjusted models were observed, probably because of the small, fixed sample size. The percentage experiencing any injurious falls during the follow-up period was comparable for fall clinic visitors and controls (14% vs 13%), despite a dramatic difference at baseline (42% of clinic visitors

vs 15% of controls). Fall-related healthcare use was higher for clinic visitors during the baseline period (21%, vs 12% for controls) and decreased slightly (to 19%) during follow-up; differences in fall-related healthcare use according to study group from baseline to follow-up were nonsignificant. These findings, although preliminary because of the small sample size and the baseline difference between the groups in fall rates, suggest that being seen in a fall prevention clinic may reduce injurious falls. Additional studies will be necessary to conclusively determine the effects of multifactorial fall risk assessment and management delivered by midlevel providers working in real-world clinical practice settings on key outcomes, including injurious falls, downstream fall-related healthcare use, and costs.

Moreland, J., J. Richardson, et al. (2003). "Evidence-based guidelines for the secondary prevention of falls in older adults." Gerontology 49(2): 93-116.

BACKGROUND: Falls are a significant problem for older adults. Individuals who have sustained a fall come to the attention of health care providers and are at risk of further falls. To promote the highest quality of care and reduce variation in care, a practice guideline is needed. Summarization of evidence regarding falls may be useful to researchers in this field. OBJECTIVES: To provide evidence-based guidelines of assessment and treatment to prevent falls in older adults and to provide researchers with tables of risk factor studies and randomized controlled trials of falls prevention. METHODS: A template for the development of practice guidelines from the Agency for Health Care Policy and Research was used. Evidence for risk factors was accepted from prospective studies with more than 80% follow-up. Potentially modifiable risk factors were selected and a schema for evaluating the importance of each risk factor was used. Evidence for interventions was examined from randomized controlled trials and strength of the evidence was graded. Recommendations for aspects of care where judgment was required were made by panel consensus. RESULTS: Information was drawn from 46 risk factor studies and 37 randomized controlled trials to develop a practice guideline consisting of assessment items and recommended interventions for community-dwelling and institution-dwelling older adults separately. For clinicians, a check list is provided. Summary tables of the results of studies are given to substantiate the recommendations. CONCLUSIONS: For community-dwelling older adults, there is strong evidence for multi-factorial specific risk assessment and targeted treatment. Balance exercises are recommended for all individuals who have had a fall and there is evidence for a program of home physiotherapy for women over 80 years of age regardless of risk factor status. For institutional settings, the establishment of a falls program for safety checks, ongoing staff education and monitoring is substantiated by research. Residents who have fallen need to be assessed for specific risk factors and clinical indicators to determine relevant management options.

Moss, P. (1997). "Negotiating spaces in home environments: older women living with arthritis." Social Science & Medicine 45(1): 23-33.

Within medical geography there has been a surge of interest in applying critical concepts in social theory to empirical settings, including those for persons with disabilities. The ways through which persons with disabilities negotiate space vary widely according to material and social experiences of being disabled. For older women, chronic illness as a

type of disability shapes the way in which they approach their daily lives with respect to both the physical and social aspects of their home environments. In the first half of the paper, conceptually, I take a relational view of space and argue that household, as a narrow reading of domestic space, needs to be replaced by home environment which incorporates more fully age- and ablement-sensitive readings of the spaces constitutive of domestic space. This lays the basis for a contextualized socio-spatial understanding of the ways older women with chronic illness negotiate the spaces in home environments because it accounts for the disadvantaged positionings of access to power and resources as well as the uneven distributions of income based on gender, age, and (dis)ability. It also takes into account the material and social aspects of being disabled. In the second half of the paper, I present case studies of three older women diagnosed with rheumatoid arthritis to illustrate these arguments.

Murphy, T. H., P. Labonte, et al. (2008). "Falls prevention for elders in acute care: an evidence-based nursing practice initiative." Critical Care Nursing Quarterly 31(1): 33-9.

The purpose of this article is to describe and measure the impact of a multifaceted program developed to reduce the falls rate on an acute medical unit at an academic tertiary care center. According to national benchmarks, this unit was one of the hospital's top 3 units for numbers of falls for several years. That distinction drove the hospital and unit leadership and a staff-led unit practice council to develop an evidence-based intervention plan. Interventions included a campaign to raise geriatric awareness, creation of "falls tool boxes," education of staff and family, and implementation of a structured hourly patient rounds schedule. The success of these interventions is discussed, including the effect on the falls rate benchmark. The discussion addresses implications and outcomes associated with the empowerment of nursing staff to respond to benchmarking measures, implement evidence-based practices, and use the same benchmarking procedure to measure outcomes.

Newman, S. and S. Newman (2003). "The living conditions of elderly Americans." Gerontologist 43(1): 99-109.

PURPOSE: This article profiles the housing settings of frail elderly individuals, whether their homes are facilitating or impeding their ability to live in the community, and the change in disability and housing status before and after passage of the 1990 Americans with Disabilities Act. DESIGN AND METHODS: The analysis relies primarily on statistical analysis of the 1995 national American Housing Survey (AHS), with supplementary analysis of the 1978 AHS. RESULTS: In 1995, roughly 14% of elderly individuals had a "housing-related disability," 49% had at least one dwelling modification, and 23% had an unmet need for modifications. Because half those with dwelling modification also reported unmet need, the match between disabling condition and modification, not the presence of modifications, is key. Multivariate results indicate that although unmet need is greater among the poor, lack of modifications is not. Prevalence of modifications nearly doubled between 1978 and 1995. Overall unmet need declined, but some needs were less likely to be met in 1995 than 1978. IMPLICATIONS: The analysis highlights the importance of information about housing for understanding the care and service needs of elderly individuals and provides a compelling argument for a minimum dataset on their housing and neighborhood environments.

Nikolaus, T. and M. Bach (2003). "Preventing falls in community-dwelling frail older people using a home intervention team (HIT): results from the randomized Falls-HIT trial." Journal of the American Geriatrics Society 51(3): 300-5.

OBJECTIVES: To evaluate the effect of an intervention by a multidisciplinary team to reduce falls in older people's homes. DESIGN: Randomized, controlled trial with follow-up of subjects for 1 year. SETTING: University-affiliated geriatric hospital and older patients' homes. PARTICIPANTS: Three hundred sixty subjects (mean age +/- standard deviation = 81.5 +/- 6.4) admitted from home to a geriatric hospital and showing functional decline, especially in mobility. INTERVENTION: The participants were randomly assigned to receive a comprehensive geriatric assessment followed by a diagnostic home visit and home intervention or a comprehensive geriatric assessment with recommendations and usual care at home. The home intervention included a diagnostic home visit, assessing the home for environmental hazards, advice about possible changes, offer of facilities for any necessary home modifications, and training in the use of technical and mobility aids. An additional home visit was made after 3 months to reinforce the recommendations. After 12 months of follow-up, a home visit was made to all study participants. MEASUREMENTS: Number of falls, type of recommended home modifications, and compliance with recommendations. RESULTS: After 1 year, there were 163 falls in the intervention group and 204 falls in the control group. The intervention group had 31% fewer falls than the control group (incidence rate ratio (IRR) = 0.69, 95% confidence interval (CI) = 0.51-0.97). The intervention was most effective in a subgroup of participants who reported having had two or more falls during the year before recruitment into the study. In this subgroup, the proportion of frequent fallers and the rate of falls was significantly reduced for the intervention group compared with the control group (21 vs 36 subjects with recurrent falls, P =.009; IRR = 0.63, 95% CI = 0.43-0.94). The compliance rate varied with the type of change recommended from 83% to 33% after 12 months of follow-up. CONCLUSION: Home intervention based on home visits to assess the home for environmental hazards, providing information about possible changes, facilitating any necessary modifications, and training in the use of technical and mobility aids was effective in a selected group of frail older subjects with a history of recurrent falling.

Nyman, S. R., L. Yardley, et al. (2009). "Usability and acceptability of a website that provides tailored advice on falls prevention activities for older people." Health Informatics Journal 15(1): 27-39.

This article presents the usability and acceptability of a website that provides older people with tailored advice to help motivate them to undertake physical activities that prevent falls. Views on the website from interviews with 16 older people and 26 sheltered housing wardens were analysed thematically. The website was well received with only one usability difficulty with the action plan calendar. The older people selected balance training activities out of interest or enjoyment, and appeared to carefully add them into their current routine. The wardens were motivated to promote the website to their residents, particularly those who owned a computer, had balance problems, or were physically active. However, the participants noted that currently a minority of older

people use the Internet. Also, some older people underestimated how much activity was enough to improve balance, and others perceived themselves as too old for the activities.

O'Connell, B. and H. Myers (2001). "A failed fall prevention study in an acute care setting: lessons from the swamp." International Journal of Nursing Practice 7(2): 126-30.

Designing and implementing fall intervention studies in acute care settings presents researchers with a number of challenges. To date, there are no fall prevention interventions that have unequivocal empirical support in these settings. Based on the best available evidence a multistrategy fall prevention program was implemented using a pretest-post-test design over a 12-month period. The results indicated no reduction in the fall rate. Contrary to the expected result, the fall rate increased post the implementation of the multistrategy fall prevention program. To assist other researchers understand the contextual and methodological barriers to conducting fall prevention research in acute care settings, this paper discusses the difficulties experienced in this study.

O'Loughlin, J. L., Y. Robitaille, et al. (1993). "Incidence of risk factors for falls and injurious falls among community-dwelling elderly." American Journal of Epidemiology 137: 342-354.

To determine the frequency of and risk factors of falls and injurious falls in the non-institutionalized elderly, the authors conducted a follow-up study of 409 community-dwelling persons aged 65 years or more in west-central Montreal, Quebec, Canada, from May 1987 to October 1988. Following an initial at-home interview, each subject was telephoned every 4 weeks for 48 weeks for collection of data on falls experienced since the last contact. Each of the 12 follow-up interviews was completed by at least 90% of the subjects eligible for interview. Data were also collected in the follow-up interviews on time-varying exposures. Twenty-nine percent of the subjects fell during follow-up; 17.6% fell once, and 11.5% fell two or more times. The incidence rate for falls was 41.4 falls per 1,000 person-months. The majority of falls resulted in no injury or in minor injury only. Potential risk factors investigated included socio-demographic variables, physical activity, alcohol consumption, acute and chronic health problems, dizziness, mobility, and medications. Multivariate analyses showed that the following factors were statistically significantly associated with an increased rate of falls: dizziness (incidence rate ratio (IRR) = 2.0), frequent physical activity (IRR = 2.0), having days on which activities were limited because of a health problem (IRR = 1.8), having trouble walking 400 m (IRR = 1.6), and having trouble bending down (IRR = 1.4). Factors which were protective included diversity of physical activities (IRR = 0.6), daily alcohol consumption (IRR = 0.5), having days spent in bed because of a health problem (IRR = 0.5), and taking heart medication (IRR = 0.6). Risk factors for injurious falls were similar.

O'Mahony, D. and C. Foote (1998). "Prospective evaluation of unexplained syncope, dizziness, and falls among community-dwelling elderly adults." Journals of Gerontology Series A-Biological Sciences & Medical Sciences 53(6): M435-40.

BACKGROUND: Unexplained syncope, dizziness, and falls may present a difficult diagnostic challenge to primary care and emergency room physicians. The aim of this study was to evaluate a diagnostic algorithm in the assessment of a cohort of community-dwelling elderly people with symptoms of unexplained syncope, falls, or dizziness. METHODS: Fifty-four consecutive elderly patients (mean age + SD = 76.4 + 8.0 years,

range 61-91) were assessed over a 12-month period. Presenting symptoms were syncope in 33 patients (61.1%), unexplained falls without loss of consciousness in 10 patients (18.5%), and dizziness without loss of consciousness in 11 (20.4%), and true vertigo in 2 patients (3.7%). Patients were assessed systematically using the algorithm, followed up until a diagnosis was made, and appropriate preventive therapy or advice given. RESULTS: Diagnoses were obtained in 41 patients (75.9%). Of the 33 patients with syncope, the cause was identified in 23 (69.7%) as follows: vasovagal in 12, arrhythmia in 5, hypotensive drugs in 3, orthostatic hypotension in 2, and major anxiety with hyperventilation in 1. The cause of syncope remained uncertain in 10 patients. Among the 10 patients with nonsyncopal falls, the cause was identified in 9 as follows: drop attacks with associated knee osteoarthritis or quadriceps muscle weakness in 3, orthostatic hypotension in 2, and single cases of cerebellar ataxia, Parkinson's disease, otologic vertigo, and vertebrobasilar insufficiency. Of 11 patients with dizziness, 4 had vasovagal syncope, 2 had orthostatic hypotension, 2 had otologic vertigo, one had carotid sinus syndrome, and the cause remained obscure in 2. Nineteen of the 41 patients (46.3%) had at least one other abnormality that was possibly contributory to their symptoms. Five of the 13 patients without a clearcut diagnosis had abnormalities of possible significance, including first-degree heart block with fascicular block in 2 patients and individual patients with severe hypertension, aortic valve disease, and vasodepressor carotid sinus hypersensitivity. CONCLUSION: A targeted, problem-oriented algorithm indicates the diagnosis in three quarters of elderly patients with unexplained syncope, falls, and dizziness.

Oliver, D., F. Daly, et al. (2004). "Risk factors and risk assessment tools for falls in hospital in-patients: a systematic review." Age & Ageing 33(2): 122-30.

OBJECTIVE: To identify all published papers on risk factors and risk assessment tools for falls in hospital inpatients. To identify clinical risk assessment tools or individual clinical risk factors predictive of falls, with the ultimate aim of informing the design of effective fall prevention strategies. DESIGN: Systematic literature review (Cochrane methodology). Independent assessment of quality against agreed criteria. Calculation of odds ratios and 95% confidence intervals for risk factors and of sensitivity, specificity, negative and positive predictive value for risk assessment tools (with odds ratios and confidence intervals), where published data sufficient. RESULTS: 28 papers on risk factors were identified, with 15 excluded from further analysis. Despite the identification of 47 papers purporting to describe falls risk assessment tools, only six papers were identified where risk assessment tools had been subjected to prospective validation, and only two where validation had been performed in two or more patient cohorts. CONCLUSIONS: A small number of significant falls risk factors emerged consistently, despite the heterogeneity of settings namely gait instability, agitated confusion, urinary incontinence/frequency, falls history and prescription of 'culprit' drugs (especially sedative/hypnotics). Simple risk assessment tools constructed of similar variables have been shown to predict falls with sensitivity and specificity in excess of 70%, although validation in a variety of settings and in routine clinical use is lacking. Effective falls interventions in this population may require the use of better-validated risk assessment tools, or alternatively, attention to common reversible falls risk factors in all patients.

Pardessus, V., F. Puisieux, et al. (2002). "Benefits of home visits for falls and autonomy in the elderly: a randomized trial study." American Journal of Physical Medicine & Rehabilitation 81(4): 247-52.

OBJECTIVE: To investigate whether home visits by a occupational therapist reduces the risk of falling and improves the autonomy of older patients hospitalized for falling. DESIGN: In this randomized, controlled trial set in a geriatric hospital, 60 patients (mean age, 83.5 yr) who were hospitalized for falling were recruited from the acute medicine department. A home visit from an occupational therapist and an ergotherapist assessed patients' homes for environmental hazards and recommended modifications. The outcomes measured were falls, autonomy, hospitalization for falling, institutionalization, and death. RESULTS: During the follow-up period, the rate of falls, hospitalization for falls, institutionalization, and death were not significantly different between the two groups. Both groups had a loss of dependence at 12 mo. This loss of dependence was significant in the control group but not in the intervention group. CONCLUSIONS: Home visits from occupational therapists during hospitalization of older patients at risk for falling can help to preserve the patient's autonomy.

Peel, N., M. Steinberg, et al. (2000). "Home safety assessment in the prevention of falls among older people." Australian & New Zealand Journal of Public Health 24(5): 536-9.

OBJECTIVE: Home safety assessment was examined as part of a randomised trial of falls prevention interventions among older community dwellers. METHOD: Falls prevention strategies, including education and awareness-raising, exercise, home modifications and medical assessment, were trialed with 252 members of the National Seniors Association. Falls outcomes were monitored using a daily calendar diary during intervention and follow-up periods. RESULTS: The home assessment group was significantly more likely to modify their home environment than the controls ($p < 0.0001$). Participants, regardless of group allocation, reported a significant reduction in concern about falling ($p < 0.0001$). During the intervention, the home assessment group had lower incidence rates for falls and injuries than the control group, although differences were not significant. The lowered rates were sustained post-intervention. CONCLUSIONS: While the effect on falls incidence of a home safety intervention on its own could not be demonstrated, other benefits, including improved confidence attributable to awareness of such falls prevention measures, were recorded. IMPLICATIONS: The null effects of home modifications on falls prevention in this study may indicate that the program is more appropriate for the frail aged.

Peel, N. M., H. P. Bartlett, et al. (2007). "Healthy aging as an intervention to minimize injury from falls among older people." Annals of the New York Academy of Sciences 1114: 162-9.

With global trends toward population aging, many countries are adopting healthy aging policies to minimize disability and increase quality in the extended years of life. Falls in older people are a major contributor to functional decline generally associated with aging. Based on a study quantifying the relationship between healthy aging factors and risk of fall-related hip fracture in community-dwelling older people, this paper discusses evidence for the promotion of healthy aging as a population-based intervention for prevention of injuries from falls. To examine the protective effect of healthy aging on the risk of fall-related hip fractures, a case-control study was conducted with 387

participants. Persons aged 65 and over hospitalized with a fall-related hip fracture were matched with community-based controls recruited via electoral roll sampling. A questionnaire designed to assess lifestyle risk factors, identified as determinants of healthy aging, was administered during face-to-face interviews. After adjustment for health status and demographic factors, a number of lifestyle factors were seen to have a significant independent protective effect on the risk of hip fracture. These included never smoking, moderate alcohol consumption, being active, maintaining normal weight, and being proactive in preventive health care. Psychosocial factors included having supportive environments and personal resources to cope with stress. This study identified a range of modifiable lifestyle factors associated with fall-related hip fracture, suggesting that the "healthy aging" paradigm offers a comprehensive approach to falls injury prevention, and thus supports the adoption of healthy aging policies to extend years of quality life among older persons.

Peel, N. M., J. Warburton, et al. (2009). "Using senior volunteers as peer educators: What is the evidence of effectiveness in falls prevention?" Australasian Journal on Ageing 28(1): 7-11.

Peer education models are well established as a means of delivering health and social welfare information. Common themes identified in regard to peer education are that information sharing and transfer take place; attempts are made to influence knowledge, attitudes or behaviour; that it occurs between people who share similar characteristics or experiences; and that it relies on influential members of a social group or category. Although it is most often associated with younger age-groups, there is growing evidence of involvement of older people as peer educators. As part of community-based fall prevention interventions, there is considerable scope for contribution by peer mentors. This paper explores the theoretical basis for using senior volunteers as peer educators, discusses advantages and disadvantages of this model of service delivery for health promotion of older people and, specifically, reviews the evidence for effectiveness in relation to fall prevention.

Petersson, I., M. Lilja, et al. (2008). "Impact of home modification services on ability in everyday life for people ageing with disabilities." Journal of Rehabilitation Medicine 40(4): 253-60.

OBJECTIVE: To examine the impact of home modifications on self-rated ability in everyday life from various aspects for people ageing with disabilities. METHODS: The study sample was recruited from an agency providing home modification services in Sweden and comprised 73 subjects whose referrals had been approved and who were scheduled to receive home modifications (intervention group) and 41 subjects waiting for their applications to be assessed for approval (comparison group). The subjects rated their ability in everyday life using the Client-Clinician Assessment Protocol Part I on 2 occasions: at baseline and follow-up. The Client-Clinician Assessment Protocol Part I provides data on the clients' self-rated independence, difficulty and safety in everyday life. The data were first subjected to Rasch analysis in order to convert the raw scores into interval measures. Further analyses to investigate changes in self-rated ability were conducted with parametric statistics. RESULTS: Subjects who had received home modifications reported a statistically significant improvement in their self-rated ability in everyday life compared with those in the comparison group. Subjects who had received

home modifications reported less difficulty and increased safety, especially in tasks related to self-care in the bathroom and transfers, such as getting in and out of the home. CONCLUSION: Home modifications have a positive impact on self-rated ability in everyday life, especially on decreasing the level of difficulty and increasing safety.

Petridou, E. T., E. G. Manti, et al. (2009). "What works better for community-dwelling older people at risk to fall?: a meta-analysis of multifactorial versus physical exercise-alone interventions." Journal of Aging & Health 21(5): 713-29.

OBJECTIVE: To compare and quantify the effectiveness of multifactorial versus exercise-alone interventions in reducing recurrent falls among community-dwelling older people. METHOD: A meta-analysis of recently published studies on fall prevention interventions was conducted. Measure of the overall effectiveness was the combined risk ratio for recurrent falls, whereas heterogeneity was explored via metaregression analyses. RESULTS: Ten of the 52 identified studies met the preset criteria and were included in the analysis. The exercise-alone interventions were about 5 times more effective compared to multifactorial ones. Short-term interventions, smaller samples, and younger age related to better outcomes. DISCUSSION: From cost-efficiency and public health perspectives, exercise-alone interventions can be considered valuable, as they are more likely to be implemented in countries with less resources. Further qualitative research is needed, however, to explore determinants of willingness to participate and comply with interventions aiming to prevent recurrent falls among older people.

Piirtola, M., P. Era, et al. (2006). "Force platform measurements as predictors of falls among older people - a review." Gerontology 52(1): 1-16.

BACKGROUND: Poor postural balance is one of the major risk factors for falling. A great number of reports have analyzed the risk factors and predictors of falls but the results have for the most part been unclear and partly contradictory. Objective data on these matters are thus urgently needed. The force platform technique has widely been used as a tool to assess balance. However, the ability of force platform measures to predict falls remains unknown. OBJECTIVE: The purpose of this systematic review was to extract and critically review the findings of prospective studies where force platform measurements have been used as predictors of falls among elderly populations. METHODS: The study was done as a systematic literature review. PubMed, the Cochrane Central Register of Controlled Trials, and CINAHL databases from 1950 to April 2005 were used. The review includes prospective follow-up studies using the force platform as a tool to measure postural balance. Results: Nine original prospective studies were included in the final analyses. In five studies fall-related outcomes were associated with some force platform measures and in the remaining four studies associations were not found. For the various parameters derived on the basis of the force platform data, the mean speed of the mediolateral (ML) movement of the center of pressure (COP) during normal standing with the eyes open and closed, the mean amplitude of the ML movement of the COP with the eyes open and closed, and the root-mean-square value of the ML displacement of COP were the indicators that showed significant associations with future falls. Measures related to dynamic posturography (moving platforms) were not predictive of falls. CONCLUSION: Despite a wide search only a few prospective follow-up studies using the force platform technique to measure postural balance and a reliable registration

of subsequent falls were found. The results suggest that certain aspects of force platform data may have predictive value for subsequent falls, especially various indicators of the lateral control of posture. However, the small number of studies available makes it difficult to draw definitive conclusions.

Radhamanohar, M. and M. Radhamanohar (2004). "Falls and their prevention in old age." Hospital Medicine (London) 65(12): 730-4.

Falls in old age present a threat to the everyday activities of elderly people and pose a challenge to health-care professionals. Why are falls common in elderly people and how can we address this major problem?

Rauch, K., J. Balascio, et al. (2009). "Excellence in action: developing and implementing a fall prevention program." Journal for Healthcare Quality 31(1): 36-42.

The University Medical Center at Princeton has been a leading teaching hospital for more than 30 years. Established in 1919, University Medical Center at Princeton is committed to redefining care by continually enhancing the quality of the care provided and improving the health of the communities served. University Medical Center at Princeton, in collaboration with the Hill-Rom Clinical Excellence Team, designed, implemented, and monitored a new fall prevention program.

Rejeski, W. J., E. H. Ip, et al. (2008). "Measuring disability in older adults: the International Classification System of Functioning, Disability and Health (ICF) framework." Geriatrics & gerontology international 8(1): 48-54.

BACKGROUND: Despite the importance of disability to geriatric medicine, no large scale study has validated the activity and participation domains of the International Classification System of Functioning, Disability, and Health (ICF) in older adults. The current project was designed to conduct such as analysis, and then to examine the psychometric properties of a measure that is based on this conceptual structure. METHODS: This was an archival analysis of older adults (n = 1388) who had participated in studies within our Claude D Pepper Older Americans Independence Center. Assessments included demographics and chronic disease status, a 23-item Pepper Assessment Tool for Disability (PAT-D) and 6-min walk performance. RESULTS: Analysis of the PAT-D produced a three-factor structure that was consistent across several datasets: activities of daily living disability, mobility disability and instrumental activities of daily living disability. The first two factors are activities in the ICF framework, whereas the final factor falls into the participation domain. All factors had acceptable internal consistency reliability (>0.70) and test-retest (>0.70) reliability coefficients. Fast walkers self-reported better function on the PAT-D scales than slow walkers: effect sizes ranged from moderate to large (0.41-0.95); individuals with cardiovascular disease had poorer scores on all scales than those free of cardiovascular disease. In an 18-month randomized clinical trial, individuals who received a lifestyle intervention for weight loss had greater improvements in their mobility disability scores than those in a control condition. CONCLUSION: The ICF is a useful model for conceptualizing disability in aging research, and the PAT-D has acceptable psychometric properties as a measure for use in clinical research.

Rhoads, J., A. Clayman, et al. (2007). "The relationship of urinary tract infections and falls in a nursing home." Director 15(1): 22-6.

The purpose of this study was to determine if there was a relationship between urinary tract infections and falls in a nursing home population. The incidence of falls in nursing homes is prevalent with the current data suggesting that each nursing home resident falls 1.6 times per year. The consequences of a fall can be devastating to the quality of life of the nursing home resident. Therefore, this study was designed to identify falls as the symptom of a urinary tract infection and to provide treatment. Over 75 patients in a 138 bed community nursing home were followed for 6 months. Data suggests that majority of those residents who had a history of a fall also had a UTI In addition; the study data shows that severely demented patients who fall have a higher probability of having a urinary tract infection.

Richard, L., L. Gauvin, et al. (2008). "Integrating the ecological approach in health promotion for older adults: a survey of programs aimed at elder abuse prevention, falls prevention, and appropriate medication use." International Journal of Public Health 53(1): 46-56.

This study assesses the extent of integration of the ecological approach in disease prevention and health promotion (DPHP) programs for older adults in a sample of organisations offering such programming in Quebec, Canada. Following from our previous work, the study used a model identifying intervention settings, targets, and strategies as independent dimensions of ecological programming. As a first step, public health units, local community health centres and seniors' day centres were surveyed to identify DPHP programs for older adults. In a second phase, detailed data were obtained about programs in the theme areas of elder abuse prevention, falls prevention, and appropriate medication use. Overall, 132 programs were investigated including 17 public health unit programs, 72 local community health centre programs, and 43 day centre programs. All data were obtained through telephone interviews. The DPHP programs for these organisations tended to be situated in organisational (especially health organisation) and community settings, with individual clients and organisations as main intervention targets. Assessment of the level of integration of the ecological approach showed it to be relatively low, especially in the local community health centres and seniors' day centres.

Robertson, M. C., A. J. Campbell, et al. (2002). "Preventing injuries in older people by preventing falls: a meta-analysis of individual-level data." Journal of the American Geriatrics Society 50(5): 905-11.

OBJECTIVES: Our falls prevention research group has conducted four controlled trials of a home exercise program to prevent falls in older people. The objectives of this meta-analysis of these trials were to estimate the overall effect of the exercise program on the numbers of falls and fall-related injuries and to identify subgroups that would benefit most from the program. DESIGN: We pooled individual-level data from the four trials to investigate the effect of the program in those aged 80 and older, in those with a previous fall, and in men and women. SETTING: Nine cities and towns in New Zealand. PARTICIPANTS: One thousand sixteen community dwelling women and men aged 65 to 97. INTERVENTION: A program of muscle strengthening and balance retraining exercises designed specifically to prevent falls and individually prescribed and delivered at home by trained health professionals. MEASUREMENTS: Main outcomes were

number of falls and number of injuries resulting from falls during the trials. RESULTS: The overall effect of the program was to reduce the number of falls and the number of fall-related injuries by 35% (incidence rate ratio (IRR) = 0.65, 95% confidence interval (CI) = 0.57-0.75; and, respectively IRR = 0.65, 95% CI = 0.53-0.81.) In injury prevention, participants aged 80 and older benefited significantly more from the program than those aged 65 to 79. The program was equally effective in reducing fall rates in those with and without a previous fall, but participants reporting a fall in the previous year had a higher fall rate (IRR = 2.34, 95% CI = 1.64-3.34). The program was equally effective in men and women. CONCLUSION: This exercise program was most effective in reducing fall-related injuries in those aged 80 and older and resulted in a higher absolute reduction in injurious falls when offered to those with a history of a previous fall.

Robertson, M. C., A. J. Campbell, et al. (2005). "Statistical analysis of efficacy in falls prevention trials." Journals of Gerontology Series A-Biological Sciences & Medical Sciences 60(4): 530-4.

BACKGROUND: Many different and sometimes inappropriate statistical techniques have been used to analyze the results of randomized controlled trials of falls prevention programs for elderly people. This makes comparison of the efficacy of particular interventions difficult. METHODS: We used raw data from two randomized controlled trials of a home exercise program to compare the number of falls in the exercise and control groups during the trials. We developed two different survival analysis models (Andersen-Gill and marginal Cox regression) and a negative binomial regression model for each trial. These techniques a) allow for the fact that falls are frequent, recurrent events with a non-normal distribution; b) adjust for the follow-up time of individual participants; and c) allow the addition of covariates. RESULTS: In one trial, the three different statistical techniques gave surprisingly similar results for the efficacy of the intervention but, in a second trial, underlying assumptions were violated for the two Cox regression models. Negative binomial regression models were easier to use. CONCLUSION: We recommend negative binomial regression models for evaluating the efficacy of falls prevention programs.

Robertson, M. C., N. Devlin, et al. (2001). "Effectiveness and economic evaluation of a nurse delivered home exercise programme to prevent falls. 1: Randomised controlled trial." BMJ 322(7288): 697-701.

OBJECTIVES: To assess the effectiveness of a trained district nurse individually prescribing a home based exercise programme to reduce falls and injuries in elderly people and to estimate the cost effectiveness of the programme. DESIGN: Randomised controlled trial with one year's follow up. SETTING: Community health service at a New Zealand hospital. PARTICIPANTS: 240 women and men aged 75 years and older. INTERVENTION: 121 participants received the exercise programme (exercise group) and 119 received usual care (control group); 90% (211 of 233) completed the trial. MAIN OUTCOME MEASURES: Number of falls, number of injuries resulting from falls, costs of implementing the programme, and hospital costs as a result of falls. RESULTS: Falls were reduced by 46% (incidence rate ratio 0.54, 95% confidence interval 0.32 to 0.90). Five hospital admissions were due to injuries caused by falls in the control group and

none in the exercise group. The programme cost $NZ1803 (523 pound sterling) (at 1998 prices) per fall prevented for delivering the programme and $NZ155 per fall prevented when hospital costs averted were considered. CONCLUSION: A home exercise programme, previously shown to be successful when delivered by a physiotherapist, was also effective in reducing falls when delivered by a trained nurse from within a home health service. Serious injuries and hospital admissions due to falls were also reduced. The programme was cost effective in participants aged 80 years and older compared with younger participants.

Robertson, M. C., M. M. Gardner, et al. (2001). "Effectiveness and economic evaluation of a nurse delivered home exercise programme to prevent falls. 2: Controlled trial in multiple centres." BMJ 322(7288): 701-4.

OBJECTIVES: To assess the effectiveness of trained nurses based in general practices individually prescribing a home exercise programme to reduce falls and injuries in elderly people and to estimate the cost effectiveness of the programme. DESIGN: Controlled trial with one year's follow up. SETTING: 32 general practices in seven southern New Zealand centres. PARTICIPANTS: 450 women and men aged 80 years and older. Intervention: 330 participants received the exercise programme (exercise centres) and 120 received usual care (control centres); 87% (371 of 426) completed the trial. MAIN OUTCOME MEASURES: Number of falls, number of injuries resulting from falls, costs of implementing the programme, and hospital costs as a result of falls. RESULTS: Falls were reduced by 30% in the exercise centres (incidence rate ratio 0.70, 95% confidence interval 0.59 to 0.84). The programme was equally effective in men and women. The programme cost $NZ418 (121 pound sterling) (at 1998 prices) per person to deliver for one year or $NZ1519 (441 pound sterling) per fall prevented. Fewer participants had falls resulting in injuries, but there was no difference in the number who had serious injuries and no difference in hospital costs resulting from falls in exercise centres compared with control centres. CONCLUSIONS: An individually tailored exercise programme, delivered by trained nurses from within general practices, was effective in reducing falls in three different centres. This strategy should be combined with other successful interventions to form part of home programmes to prevent falls in elderly people.

Roe, B., F. Howell, et al. (2008). "Older people's experience of falls: understanding, interpretation and autonomy." Journal of Advanced Nursing 63(6): 586-96.

AIM: This paper is a report of a study to explore the experiences of older people who suffered a recent fall and identify possible factors that could contribute to service development. BACKGROUND: Falls in older people are prevalent and are associated with morbidity, hospitalization and mortality, personal costs to individuals and financial costs to health services. METHOD: A convenience sample of 27 older people (mean age 84 years; range 65-98) participated in semi-structured taped interviews. Follow-up interviews during 2003-2004 were undertaken to detect changes over time. Data were collected about experience of the fall, use of services, health and well-being, activities of daily living, informal care, support networks and prevention. Thematic content analysis was undertaken. FINDINGS: Twenty-seven initial interviews and 18 follow-up interviews were conducted. The majority of people fell indoors (n = 23) and were alone

(n = 15). The majority of falls were repeat falls (n = 22) and five were a first-ever fall. People who reflected on their fall and sought to understand why and how it occurred developed strategies to prevent future falls, face their fear, maintain control and choice and continue with activities of daily living. Those who did not reflect on their fall and did not know why it occurred restricted their activities and environments and remained in fear of falling. CONCLUSION: Assisting people to reflect on their falls and to understand why they happened could help with preventing future falls, allay fear, boost confidence and aid rehabilitation relating to their activities of daily living.

Roe, B., F. Howell, et al. (2009). "Older people and falls: health status, quality of life, lifestyle, care networks, prevention and views on service use following a recent fall." Journal of Clinical Nursing 18(16): 2261-72.

AIM AND OBJECTIVE: This study has investigated older people's experiences of a recent fall, its impact on their health, lifestyle, quality of life, care networks, prevention and their views on service use. BACKGROUND: Falls are common in older people and prevalence increases with age. Falls prevention is a major policy and service initiative. DESIGN: An exploratory, qualitative design involving two time points. METHOD: A convenience sample of 27 older people from two primary care trusts who had a recent fall. Taped semi structured qualitative interviews were conducted and repeated at follow up to detect change over time and repeat falls. Data were collected on their experience of falls, health, activities of living, lifestyle, quality of life, use of services, prevention of falls, informal care and social networks. Content analysis of transcribed interviews identified key themes. RESULTS: The majority of people fell indoors (n = 23), were repeat fallers (n = 22) with more than half alone when they fell (n = 15). For five people it was their first ever fall. Participants in primary care trust 1 had a higher mean age than those in primary care trust 2 and had more injurious falls (n = 12, mean age 87 years vs. n = 15, mean age 81 years). The majority of non-injurious falls went unreported to formal services. Falls can result in a decline in health status, ability to undertake activities of living, lifestyle and quality of life. CONCLUSIONS: Local informal care and support networks are as important as formal care for older people at risk of falls or who have fallen. Access to falls prevention programmes and services is limited for people living in more rural communities. RELEVANCE TO PRACTICE: Falls prevention initiatives and services should work with local communities, agencies and informal carers to ensure equitable access and provision of information, resources and care to meet the needs of older people at risk or who have fallen.

Rose, D. J., G. E. Alkema, et al. (2007). "Building an infrastructure to prevent falls in older Californians: the Fall Prevention Center of Excellence." Annals of the New York Academy of Sciences 1114: 170-9.

The Fall Prevention Center of Excellence (Center), a consortium of federal, state, and private organizations, was established in 2005 to guide the implementation of a statewide initiative to prevent falls among older Californians. The process began with the convening of a representative group of recognized leaders in California's health and human services in 2003. This group engaged in a 2-day strategic planning process that culminated in the development of the California Blueprint for Fall Prevention. The overarching goal of the Blueprint is to build a statewide infrastructure for fall prevention

services and programs that will serve as a model for the rest of the country. The specific goals of the Center are to establish fall prevention as a key public health priority in California; create, test, and evaluate effective and sustainable fall prevention programs; and build a comprehensive and sustainable fall prevention system in California. To accomplish these goals, the Center is currently engaged in developing and disseminating fall prevention tools and informational resources directed at the needs of both consumer and professional audiences; linking organizations involved in fall prevention while increasing awareness of fall prevention as an important public health issue; and helping communities build their capacity to effectively address falls in older adults through the delivery of integrated fall prevention services and "best practice" programs.

Roudsari, B. S., B. E. Ebel, et al. (2005). "The acute medical care costs of fall-related injuries among the U.S. older adults." Injury 36(11): 1316-22.

OBJECTIVES: Falls in the older adults are a major public health concern. The growing population of adults 65 years or older, advances in medical care and changes in the costs of care motivated our study of the acute health care costs of fall-related injuries among the older adults in the United States of America. DESIGN AND SETTINGS: The Market Scan Medicare Supplemental database 1998 was used to estimate reimbursed costs for hospital, emergency department (ED), and outpatient clinic treatments for unintentional falls among older adults. RESULTS: A fall on the same level due to slipping, tripping, or stumbling was the most common mechanism of injury (28%). Mean hospitalisation cost was 17,483 US dollars(S.D.: 22,426 US dollars) in 2004 US dollars. Femur fracture was the most expensive type of injury (18,638 US dollars, S.D.: 19,990 US dollars). The mean reimbursement cost of an ED visit was 236 US dollars and 412 US dollars for an outpatient clinic visit. CONCLUSION: The magnitude of the economic and social costs of falls in older adults underscores the need for active research in the field of falls prevention.

Roux, C., S. Langdon, et al. (1999). "The transfer and persistence of automotive carpet fibres on shoe soles." Science & Justice 39(4): 239-51.

The transfer and persistence of automotive carpet fibres to shoe soles was investigated. It was found that fibres were transferred with the normal activity of a car passenger. Carpet type and shoe sole parameters were significant determinants in the number of fibres that transferred. The average number of fibres was between about one and 33 per sole. Fibres that had been transferred after normal activity only persisted for a few minutes after walking. A survey of the shoe soles of people about to leave their car showed that fibres were usually present. The majority of shoe soles surveyed had less than five fibres with the greatest number of fibres found being 14. The likelihood of finding a large number of fibres on such soles is rare. Fibre composition of automotive carpets showed a high degree of variation. Grey was seen to be a common colour irrespective of the colour of the vehicle body.

Ruchinskas, R. and R. Ruchinskas (2003). "Clinical prediction of falls in the elderly." American Journal of Physical Medicine & Rehabilitation 82(4): 273-8.

OBJECTIVE: To assess the ability of physical and occupational therapists engaged in rehabilitation of the elderly to predict posttreatment falls. DESIGN: Prospective cohort

study of 15 mo in duration at an urban academic medical center rehabilitation unit. A total of 165 consecutively admitted geriatric individuals were rated for fall risk by 14 physical and seven occupational therapists. Measurements included the Mini-Mental State Examination, Geriatric Depression Scale, FIM, and therapists' ratings of fall likelihood. RESULTS: Both disciplines evidenced an ability to predict who would fall in the 3 mo after discharge. Clinical judgment regarding fall risk, however, added little value over two major predictors of future falls, fall history and the presence of a neurologic condition. CONCLUSION: Trying to predict an infrequent future event such as falls is inherently difficult. Education regarding known fall-risk factors and inclusion of standardized measurements of physical status are recommended to potentially improve rates of detection, along with adoption of a realistic attitude regarding our abilities to forecast infrequent events.

Salkeld, G., R. G. Cumming, et al. (2000). "The cost effectiveness of a home hazard reduction program to reduce falls among older persons." Australian & New Zealand Journal of Public Health 24(3): 265-71.

BACKGROUND: The effectiveness of individual components (other than exercise) of multifactorial intervention packages aimed to reduce the incidence of falls in older people is uncertain. There have been no randomised trials of home modifications alone for the prevention of falls. OBJECTIVES: To estimate the cost-effectiveness of just one component of a multifactorial approach to falls prevention, that is, a home hazard reduction program. The study estimates the size and direction of change in resource use within and between the hospital, home and community sectors. METHODS: A randomised trial was conducted to evaluate the effectiveness of home modifications for prevention of falls among older people. An occupational therapist (O/T) with experience in aged care assessed homes for environmental hazards and supervised the necessary home modifications. SUBJECTS: The subjects in this study were people aged 65 years and older and most were recruited during a hospital stay. The cost-effectiveness analysis was based on a randomised trial with a total of 530 subjects. RESULTS: The incremental cost per fall prevented was $4,986. A sensitivity analysis was conducted by removing 12 outlier subjects (6 control and 6 intervention). The incremental cost per fall prevented was $1,921 for all subjects and was cost saving for subjects who had fallen in the 12 months prior to randomisation. CONCLUSIONS & IMPLICATIONS: A single factor home hazard reduction program is more likely to be most cost-effective amongst older people who have a history of falls.

Salminen, M., T. Vahlberg, et al. (2009). "The long-term effect of a multifactorial fall prevention programme on the incidence of falls requiring medical treatment." Public Health 123(12): 809-13.

OBJECTIVES: To evaluate the long-term effects of a multifactorial fall prevention programme on the incidence of falls requiring medical treatment. STUDY DESIGN: A randomized controlled trial. METHODS: Five hundred and ninety-one community-dwelling elderly people (> or = 65 years) living in the town of Pori, Finland with at least one fall during the previous 12 months were randomized into an intervention group (n=293) and a control group (n=298). Subjects in the intervention group participated in a multifactorial 12-month fall prevention programme. This study evaluated the incidence of

falls requiring medical treatment during the 3-year follow-up period. RESULTS: The intervention did not significantly reduce the incidence of falls requiring medical treatment during the 3-year follow-up period [incidence rate ratio (IRR) for the intervention group compared with the control group 0.87, 95% confidence interval (CI) 0.63-1.21]. The number of falls requiring medical treatment was lower in the intervention group (n=32) compared with the control group (n=50) (IRR 0.65, 95%CI 0.40-1.07) during the second year of follow-up, but this was not found during the first year (48 and 48 falls, respectively; IRR 1.04, 95%CI 0.64-1.69) or the third year (44 and 48 falls, respectively; IRR 0.94, 95%CI 0.58-1.53) of follow-up. CONCLUSIONS: The multifactorial fall prevention programme did not decrease the incidence of falls requiring medical treatment of fall-prone elderly people during the 3-year follow-up period. However, some positive effect was found during the second year of follow-up (immediately after the 12-month intervention).

Salminen, M., T. Vahlberg, et al. (2009). "Effects of risk-based multifactorial fall prevention on postural balance in the community-dwelling aged: a randomized controlled trial." Archives of Gerontology & Geriatrics 48(1): 22-7.

The purpose of the study was to assess the effects of 12-month risk-based multifactorial fall prevention program on postural control of the aged. Five hundred and ninety-one (97%) eligible subjects were randomized into an intervention group (IG) (n=293) and a control group (CG) (n=298). The effects of the program were measured on standing, dynamic, and functional balance. In standing balance, the velocity moment of semi-tandem standing decreased in IG (median change -0.54 mm(2)/s) but increased in CG (+3.84 mm(2)/s) among all women (p=0.011) and among the women aged 65-74 years (-1.65 mm(2)/s and +2.80 mm(2)/s, correspondingly) (p=0.008). In a dynamic test, performance distance tended to decrease in IG (-26.54 mm) and increase in CG (+34.10mm) among all women (p=0.060). The women aged 75 years or over, showed marginally significant differences between the groups as regards changes in performance time (-2.66 s and -0.90 s) (p=0.068) and distance (-92.32 mm and +76.46 mm) (p=0.062) of the dynamic balance test in favor of IG. Men showed no significant differences in the changes between the groups in any balance measures.

Salminen, M. J., T. J. Vahlberg, et al. (2009). "Effect of a risk-based multifactorial fall prevention program on the incidence of falls." Journal of the American Geriatrics Society 57(4): 612-9.

OBJECTIVES: To evaluate the effects of a multifactorial fall prevention program on falls and to identify the subgroups that benefit the most. DESIGN: Randomized controlled trial. SETTING: Community-dwelling subjects who had fallen at least once during the previous 12 months. PARTICIPANTS: Five hundred ninety-one subjects randomized into intervention (IG) (n=293) and control (CG) (n=298) groups. INTERVENTION: A multifactorial 12-month fall prevention program. MEASUREMENTS: Incidence of falls. RESULTS: The intervention did not reduce the incidence of falls overall (incidence rate ratio (IRR) for IG vs CG=0.92, 95% confidence interval (CI)=0.72-1.19). In subgroup analyses, significant interactions between subgroups and groups (IG and CG) were found for depressive symptoms (P=.006), number of falls during the previous 12 months (P=.003), and self-perceived risk of falling (P=.045). The incidence of falls decreased in

subjects with a higher number of depressive symptoms (IRR=0.50, 95% CI=0.28-0.88), whereas it increased in those with a lower number of depressive symptoms (IRR=1.20, 95% CI=0.92-1.57). The incidence of falls decreased also in those with at least three previous falls (IRR=0.59, 95% CI=0.38-0.91) compared to those with one or two previous falls (IRR=1.28, 95% CI=0.95-1.72). The intervention was also more effective in subjects with high self-perceived risk of falling (IRR=0.77, 95% CI=0.55-1.06) than in those with low self-perceived risk (IRR=1.28, 95% CI=0.88-1.86). CONCLUSION: The program was not effective in reducing falls in the total sample of community-dwelling subjects with a history of falling, but the incidence of falls decreased in participants with a higher number of depressive symptoms and in those with at least three falls.

Sattin, R. W., J. G. Rodriguez, et al. (1998). "Home environmental hazards and the risk of fall injury events among community-dwelling older persons. Study to Assess Falls Among the Elderly (SAFE) Group." Journal of the American Geriatrics Society 46(6): 669-76.

OBJECTIVE: To determine if home environmental hazards increase the risk of fall injury events among community-dwelling older persons. DESIGN: Population-based case-control study. SETTING: South Miami Beach, Florida. PARTICIPANTS: 270 persons aged 65 years and older who sought treatment at six area hospitals for injuries resulting from falls within the dwelling unit and 691 controls, frequency matched for sex and age, selected randomly from Health Care Financing Administration (Medicare) files. MAIN INDEPENDENT VARIABLES: The home environment of each person, assessed directly by interviewers using a standardized instrument. RESULTS: Environmental hazards were present in nearly all dwelling units. After adjusting for important confounding factors, most of these hazards were not associated with an increased risk of fall injury events among most older persons. Increasing numbers of tripping hazards, or total hazards in the dwelling unit, did not increase the risk of fall injury events, nor was there an increasing trend in risk. CONCLUSIONS: Current fall-prevention strategies of finding and changing all environmental hazards in all community-dwelling older persons' homes may have less potential effect than previously thought. The usefulness of grab bars, however, appears to warrant further evaluation.

Schwendimann, R., H. Buhler, et al. (2006). "Falls and consequent injuries in hospitalized patients: effects of an interdisciplinary falls prevention program." BMC Health Services Research 6: 69.

BACKGROUND: Patient falls in hospitals are common and may lead to negative outcomes such as injuries, prolonged hospitalization and legal liability. Consequently, various hospital falls prevention programs have been implemented in the last decades. However, most of the programs had no sustained effects on falls reduction over extended periods of time. METHODS: This study used a serial survey design to examine in-patient fall rates and consequent injuries before and after the implementation of an interdisciplinary falls prevention program (IFP) in a 300-bed urban public hospital. The population under study included adult patients, hospitalized in the departments of internal medicine, geriatrics, and surgery. Administrative patient data and fall incident report data from 1999 to 2003 were examined and summarized using frequencies, proportions, means and standard deviations and were analyzed accordingly. RESULTS: A total of 34,972 hospitalized patients (mean age: 67.3, SD +/- 19.3 years; female 53.6%, mean

length of stay: 11.9 +/- 13.2 days, mean nursing care time per day: 3.5 +/- 1.4 hours) were observed during the study period. Overall, a total of 3,842 falls affected 2,512 (7.2%) of the hospitalized patients. From these falls, 2,552 (66.4%) were without injuries, while 1,142 (29.7%) falls resulted in minor injuries, and 148 (3.9%) falls resulted in major injuries. The overall fall rate in the hospitals' patient population was 8.9 falls per 1,000 patient days. The fall rates fluctuated slightly from 9.1 falls in 1999 to 8.6 falls in 2003. After the implementation of the IFP, in 2001 a slight decrease to 7.8 falls per 1,000 patient days was observed (p = 0.086). The annual proportion of minor and major injuries did not decrease after the implementation of the IFP. From 1999 to 2003, patient characteristics changed in terms of slight increases (female gender, age, consumed nursing care time) or decreases (length of hospital stay), as well as the prevalence of fall risk factors increased up to 46.8% in those patients who fell. CONCLUSION: Following the implementation of an interdisciplinary falls prevention program, neither the frequencies of falls nor consequent injuries decreased substantially. Future studies need to incorporate strategies to maximize and evaluate ongoing adherence to interventions in hospital falls prevention programs.

Scott, V. J., K. Votova, et al. (2006). "Falls prevention training for community health workers: strategies and actions for independent living (SAIL)." Journal of Gerontological Nursing 32(10): 48-56.

This article describes a quasi-experimental study on falls prevention for clients of home support services in British Columbia, Canada. The study tested a nurse-designed multifactorial intervention, delivered by community health workers. The intervention consisted of 1 day of falls surveillance and prevention training for 51 community health workers, followed by 6 months of evidence-based interventions with their clients (n = 70) using a pretested Checklist and Action Plan. Study findings showed a 43% reduction (chi2 = 8.742, p < .01) in falls and a 44% reduction (chi2 = 5.739, p < .05) for fallers (those who fell once or more) from the 6-month preintervention period to postintervention. The proportion of falls resulting in any injury did not decrease; however, fractures were reduced from seven in the 6-month preintervention period to one following the intervention. The results indicate this intervention is an effective and inexpensive falls prevention strategy for frail recipients of home support services.

Seemongal-Dass, R. R., T. E. James, et al. (2001). "Guidelines for prevention of falls in people aged over 65. Guidelines should state that assessment of vision is important." BMJ 322(7285): 554.

The methods used to gather information did not seem to include any references to the patients' visual function. There have been several reports linking poor visual function with an increased risk of falls or fractures related to falls. A recent study by Ivers et al shows that decreased visual function is a risk factor for hip fractures. It would seem logical that people who do not see well are more likely to fall than those who do see well. It is unfortunate, then, that the guidelines given do not contain any references to improving visual function. Poor vision is quite common in elderly people. The causes are varied and include problems related to spectacles (not wearing them, incorrect prescription, scratched lenses, inability to afford them, inappropriate lenses), cataracts, glaucoma, age related macular degeneration, diabetic retinopathy, and other vascular

abnormalities. We believe that regular visual assessments should be included in the guidelines aimed at the prevention of falls. An ophthalmologist should assess patients with potentially treatable eye disease. Perhaps we should more often consider the risk of falling when we assess our patients with cataracts and other eye disease. Certainly, patients with poor vision from untreatable causes should be provided with low vision aids as appropriate. These patients may also be the ones most likely to benefit from other interventions.

Sherrington, C., J. C. Whitney, et al. (2008). "Effective exercise for the prevention of falls: a systematic review and meta-analysis." Journal of the American Geriatrics Society 56(12): 2234-43.

OBJECTIVES: To determine the effects of exercise on falls prevention in older people and establish whether particular trial characteristics or components of exercise programs are associated with larger reductions in falls. DESIGN: Systematic review with meta-analysis. Randomized controlled trials that compared fall rates in older people who undertook exercise programs with fall rates in those who did not exercise were included. SETTING: Older people. PARTICIPANTS: General community and residential care. MEASUREMENTS: Fall rates. RESULTS: The pooled estimate of the effect of exercise was that it reduced the rate of falling by 17% (44 trials with 9,603 participants, rate ratio (RR)=0.83, 95% confidence interval (CI)=0.75-0.91, P<.001, I(2)=62%). The greatest relative effects of exercise on fall rates (RR=0.58, 95% CI=0.48-0.69, 68% of between-study variability explained) were seen in programs that included a combination of a higher total dose of exercise (>50 hours over the trial period) and challenging balance exercises (exercises conducted while standing in which people aimed to stand with their feet closer together or on one leg, minimize use of their hands to assist, and practice controlled movements of the center of mass) and did not include a walking program. CONCLUSION: Exercise can prevent falls in older people. Greater relative effects are seen in programs that include exercises that challenge balance, use a higher dose of exercise, and do not include a walking program. Service providers can use these findings to design and implement exercise programs for falls prevention.

Shumway-Cook, A., I. F. Silver, et al. (2007). "Effectiveness of a community-based multifactorial intervention on falls and fall risk factors in community-living older adults: a randomized, controlled trial." Journals of Gerontology Series A-Biological Sciences & Medical Sciences 62(12): 1420-7.

OBJECTIVE: The purpose of this study was to evaluate the effectiveness of a 12-month community-based intervention on falls and risk factors (balance, lower extremity strength, and mobility) in community-living older adults. METHODS: Four hundred fifty-three sedentary adults (65 years old or older) were randomized to either a multifaceted intervention (3 times a week group exercise, 6 hours of fall prevention education, comprehensive falls risk assessment results sent to primary health care provider) or control group (written materials on falls prevention). Primary outcome was fall incidence rates calculated from self-reported falls reported monthly for 12 months. Secondary outcomes were tests of leg strength, balance, and mobility prior to and following the 12-month intervention. RESULTS: Twelve-month follow-up was completed on 95% of participants. Intent-to-treat analysis found that the incidence rate of

falls was 25% lower among those in the intervention group compared with control group (1.33 vs 1.77 falls/person-year, rate ratio 0.75, 95% confidence interval [CI], 0.52-1.09). This difference was not statistically significant. The risk ratio for any fall was 0.96 (95% CI, 0.82-1.13). Small but significant improvements were found on the Berg Balance Test (adjusted mean difference +1.5 points, 95% CI, 0.8-2.3), the Chair Stand Test (adjusted mean difference +1.2, 95% 0.6-1.9), and the Timed Up and Go Test (adjusted mean difference -0.7, 95% CI, -1.2 to -0.2). CONCLUSIONS: A community-based multifaceted intervention was effective in improving balance, mobility, and leg strength, all known fall risk factors. Although the incidence of falls was lower, the confidence interval included the possibility of no intervention effect on falls.

Skelton, D. A., C. J. Todd, et al. (2007). "Prevention of Falls Network Europe: a thematic network aimed at introducing good practice in effective falls prevention across Europe. Four years on." Journal of Musculoskeletal Neuronal Interactions 7(3): 273-8.

ProFaNE, Prevention of Falls Network Europe, is a four-year thematic network co-ordinated by the University of Manchester, UK, with 25 partners across Europe and funded by the European Community Framework 5. There are also Network Associates from a number of EU and non-EU countries who give their advice and experience at steering meetings, seminars and conferences. There are four main themes (taxonomy and co-ordination of trials; clinical assessment and management of falls; assessment of balance function; psychological aspects of falling). The work of ProFaNE is practical, in terms of developing the evidence base for implementation of effective interventions, standardising the health processes for people with a history of falls and encouraging best practice across Europe. Over the four years of the Network many key publications by the members have been regularly cited, the web membership has increased to over 2,000 members from 30 countries, there is an active discussion board and there are nearly 1,000 resources available to download. The success of the networking and relationship building in these four years has meant that many countries have adopted new national strategies to prevent falls and injuries.

Sleet, D. A., D. B. Moffett, et al. (2008). "CDC's research portfolio in older adult fall prevention: a review of progress, 1985-2005, and future research directions." Journal of Safety Research 39(3): 259-67.

PROBLEM: Falls are a leading cause of mortality and morbidity among adults age 65 and older. Population models predict steep increases in the 65 and older population bands in the next 10-15 years and in turn, public health is bracing for increased fall rates and the strain they place on health care systems and society. To assess progress in fall prevention, the Centers for Disease Control and Prevention conducted a research portfolio review to examine the quality, relevance, outcomes and successes of the CDC fall prevention program and its impact on public health. METHODS: A peer review panel was charged with reviewing 20 years of funded research and conducting a SWOT (strengths, weaknesses, opportunities, and threats) analysis for extramural and intramural research activities. Information was collected from grantees (via a survey instrument), staff were interviewed, and progress reports and products were reviewed and analyzed. RESULTS: CDC has invested over $24,900,000 in fall-related research and programs over 20 years. The portfolio has had positive impacts on research, policies and programs, increasing the

public health injury prevention workforce, and delivering effective fall prevention programs. DISCUSSION: Public health agencies, practitioners, and policy makers recognize that while there are some evidence-based older adult fall prevention interventions available, many remain unused or are infeasible to implement. Specific recommendations across the public health model, include: additional research in gathering robust epidemiologic data on trends and patterns of fall-related injuries at all levels; researching risk factors by setting or sub-population; developing and testing innovative interventions; and engaging in translation and dissemination research on best practices to increase uptake and adoption of fall prevention strategies. CDC has responded to a number of suggestions from the portfolio review including: funding translation research of a proven Tai Chi fall intervention; beginning to address gaps in gender, ethnic, and racial differences in falls; and collaborating with partner organizations who share in CDC's mission to improve public health by preventing falls and reducing fall-related injuries. IMPACT ON INDUSTRY: Industry has an opportunity to develop more accessible and usable devices to reduce injury from falls (for example, hip protectors and force reducing flooring). By implementing effective, evidence-based interventions to prevent falls and reduce injuries from falls, significant decreases in health care costs can be expected.

Smith, J., G. Lewin, et al. (2008). "Home care clients' participation in fall prevention activities." Australasian Journal on Ageing 27(1): 38-42.

OBJECTIVE: To determine whether home care clients have accessed or been influenced by fall prevention programs. METHODS: Mail survey of 4743 home care clients from several home care agencies. RESULTS: Among the clients, 47.2% completed the survey and 46% had fallen within the last year. Faller and non-fallers differed in attitude to falls and fall risk factors. Only 15% of fallers and 7% of non-fallers had taken part in a fall prevention program and only 8% knew how to access information about such activities. CONCLUSIONS: Fall prevention strategies should be targeted at the home care population. Such programs should take into consideration the specific needs of this group.

Smith, R. D. and D. Widiatmoko (1998). "The cost-effectiveness of home assessment and modification to reduce falls in the elderly." Australian & New Zealand Journal of Public Health 22(4): 436-40.

Injury sustained through falling is a significant risk for the elderly and a significant burden on the health service. Although many risk factors have been detected and interventions proposed, there remains limited evidence concerning the cost-effectiveness of fall prevention. This study addressed the cost-effectiveness of a home assessment and modification program hypothesised to reduce risk of falling for the independent elderly. Due to a lack of direct clinical trial evidence concerning such an intervention, a decision analytic model was developed to simulate the potential costs and outcomes of the intervention. The model was developed using available published literature concerning injury in the elderly, focusing on Australian data where possible. Cost-effectiveness was estimated as the cost per fall prevented and cost per injury prevented. Over a one-year period, the incremental cost of introducing the intervention was $172 per person, resulting in an incremental cost per fall prevented of $1,721 and cost per injury prevented

of $17,208. Over a 10-year period, the intervention resulted in a cost saving of $92 per person (i.e. dominance, with cost savings in addition to reduced falls and injuries). This analysis indicates that there is potential for considerable benefit to be gained from this intervention, in terms of less morbidity, fewer hospitalisations and, possibly, improved quality of life. However, these results are based on a model constructed from various data sources and assumptions so, although results are indicative, further research is required to provide firm data before definitive policy conclusions and recommendations may be made.

Song, L., N. Chila, et al. (2007). "Risk analysis of falls in an assisted living community." Quality Management in Health Care 16(4): 336-41.

PURPOSE: A tutorial in the utilization of probabilistic risk analysis to analyze the causes of falls in the ambulatory population of an assisted living community. METHODS: Review of 9 documented incidents of resident falls and interviews with staff regarding the probability of fall causes. A literature review was also conducted. RESULTS: Age-related physiological changes in conjunction with medical/diseases demonstrate a higher risk of falls than age-related physiological changes alone. CONCLUSIONS: The utilization of the fall risk model can aid in identifying the risk factors and the probability of the causes associated with documented falls to identify residents with the propensity to have a fall-related injury given a small set of data. Additional research will enhance the findings of additional fall-related causes.

Spink, M. J., H. B. Menz, et al. (2008). "Efficacy of a multifaceted podiatry intervention to improve balance and prevent falls in older people: study protocol for a randomised trial." BMC Geriatrics 8: 30.

BACKGROUND: Falls in older people are a major public health problem, with at least one in three people aged over 65 years falling each year. There is increasing evidence that foot problems and inappropriate footwear increase the risk of falls, however no studies have been undertaken to determine whether modifying these risk factors decreases the risk of falling. This article describes the design of a randomised trial to evaluate the efficacy of a multifaceted podiatry intervention to reduce foot pain, improve balance, and reduce falls in older people. METHODS: Three hundred community-dwelling men and women aged 65 years and over with current foot pain and an increased risk of falling will be randomly allocated to a control or intervention group. The "usual cae" control group will receive routine podiatry (i.e. nail care and callus debridement). The intervention group will receive usual care plus a multifaceted podiatry intervention consisting of: (i) prefabricated insoles customised to accommodate plantar lesions; (ii) footwear advice and assistance with the purchase of new footwear if current footwear is inappropriate; (iii) a home-based exercise program to strengthen foot and ankle muscles; and (iv) a falls prevention education booklet. Primary outcome measures will be the number of fallers, number of multiple fallers and the falls rate recorded by a falls diary over a 12 month period. Secondary outcome measures assessed six months after baseline will include the Medical Outcomes Study Short Form 12 (SF-12), the Manchester Foot Pain and Disability Index, the Falls Efficacy Scale International, and a series of balance and functional tests. Data will be analysed using the intention to treat principle. DISCUSSION: This study is the first randomised trial to evaluate the efficacy of podiatry

in improving balance and preventing falls. The trial has been pragmatically designed to ensure that the findings can be generalised to clinical practice. If found to be effective, the multifaceted podiatry intervention will be a unique addition to common falls prevention strategies already in use.

Stackpool, G., c. Make a Move' project, et al. (2006). "'Make a move' falls prevention project: an area health service collaboration." Health Promotion Journal of Australia 17(1): 12-20.

ISSUE ADDRESSED: Since a lack of physical activity is a risk factor for falling, effective interventions to increase participation rates among older people need to be found. This project assessed the viability of a metropolitan Area Health Service collaboration to increase physical activity rates among older people. METHODS: A collaboration involving six Area Health Services in the Sydney metropolitan area, central coast of New South Wales (NSW), and NSW Department of Health was established. Interventions included a communication strategy to raise awareness of the benefits of physical activity for preventing falls and enhancement of local physical activity programs for older people. A repeated measures cross-sectional design was used to assess increases in physical activity programs and older people's participation, and data of fall-related hospital admissions were examined. Annual activity logs were completed to track local project activities. Semi-structured interviews with key stakeholders and workshops were used to review the collaborative management model. RESULTS: Response to the communication strategy and gains in physical activity programs for older people varied among Area Health Services. Overall, approximately 2,929 people called the campaign inquiry hotlines in response to the media campaign, Area Health Service-supported exercise programs for older people increased by 19%, participation rates increased by 16%, and fall-related hospital admissions were observed to plateau. The collaborative management model used was somewhat effective, but had difficulties for the issue being addressed. CONCLUSION: 'Make a Move' added value to local physical activity programs for older people and increased the number of older people participating in Area Health Service-supported exercise programs. Collaborative projects are worthwhile if they address the right issue, involve the right partners and have sound management processes.

Stapleton, C., P. Hough, et al. (2009). "Four-item fall risk screening tool for subacute and residential aged care: The first step in fall prevention." Australasian Journal on Ageing 28(3): 139-43.

AIM: To report the reliability, accuracy and compliance of a brief fall risk screening tool in subacute and residential aged care. METHOD: A 9-item tool, developed by expert and literature review, was administered to 291 persons admitted to subacute and residential aged care at Peninsula Health (PH) Victoria, Australia. Items were analysed for their ability to predict falls and the four strongest incorporated into a screening tool. Reliability was assessed on six nurses. RESULTS: Most predictive items were recent falls (0.82), psychological status (0.55), medications (0.46) and cognition (0.41) chi(2) (4, n= 291) = 89.89, P < 0.0001. The final 4-item tool (PH-FRAT) provides 80% accuracy (sensitivity(ER) 70.2%, specificity(ER) 68.8%) and high reliability (ICC = 0.79). The PH-FRAT is now used in 50 local subacute and residential facilities. CONCLUSION:

The 4-item PH-FRAT is a popular, moderately predictive, reliable and brief method of screening fall risk in subacute and residential aged care.

Steinberg, M., C. Cartwright, et al. (2000). "A sustainable programme to prevent falls and near falls in community dwelling older people: results of a randomised trial." Journal of Epidemiology & Community Health 54(3): 227-32.

STUDY OBJECTIVE: In the causative mechanism of falls among older community dwellers, slips and trips have been found to be significant precursors. The purpose of the two year trial was to assess the effectiveness of multi-component interventions targeting major risk factors for falls in reducing the incidence of slips, trips and falls among the well, older community. DESIGN: Four groups with approximately equal numbers of participants were randomly allocated to interventions. The prevention strategies included education and awareness raising of falls risk factors, exercise sessions to improve strength and balance, home safety advice to modify environmental hazards, and medical assessment to optimise health. The interventions combined the strategies in an add on approach. The first intervention group receiving the information session only was regarded as the control. The outcome of interest was the occurrence of a slip, trip or fall, monitored prospectively using a daily calendar diary. PARTICIPANTS AND SETTING: Two hundred and fifty two members of the National Seniors Association in the Brisbane district agreed to participate. National Seniors clubs provide a forum for active, community dwelling Australians aged 50 and over to participate in policy, personal development and recreation. MAIN RESULTS: Using Cox's proportional hazards regression model, adjusted hazard ratios comparing intervention groups with the control ranged from 0.35 (95% CI 0.17, 0.73) to 0.48 (0.25, 0.91) for slips; 0.29 (0.16, 0.51) to 0.45 (0.27, 0.74) for trips; and 0.60 (0.36, 1.01) to 0.82 (0.51, 1.31) for falls. While calendar monitoring recorded outcome, it was also assessed as a prevention strategy by comparing the intervention groups with a hypothetical nonintervened group. At one year after intervention, reductions in the probability of slips, trips and falls (61 (95% CI 54, 66)%; 56 (49, 63)%; 29 (22, 36)% respectively) were demonstrated. CONCLUSIONS: This study makes an important contribution to the priority community health issue of falls prevention by showing that effective, sustainable, low cost programmes can be introduced through community-based organisations to reduce the incidence of slips, trips and falls in well older people.

Stetler, C. B., B. Corrigan, et al. (1999). "Integration of evidence into practice and the change process: fall prevention program as a model." Outcomes Management for Nursing Practice 3(3): 102-11.

A Fall Prevention Program was initiated at an acute care academic medical center grounded on a dynamic evidence-based framework. Multiple sources of evidence were collected and integrated to engage clinical managers and staff in an evolving process designed to both reduce falls and enhance evidence-based thinking. Clinical practice now is based more frequently on evidence rather than ritual, unsystematic clinical experiences, or tradition. This article provides details on this replicable method of enhancing professional practice.

Stevens, J., P. S. Corso, et al. (2006). "The costs of fatal and non-fatal falls among older adults." Injury Prevention 12(5): 290-295.

Objective: To estimate the incidence and direct medical costs for fatal and non-fatal fall injuries among US adults aged ≥65 years in 2000, for three treatment settings stratified by age, sex, body region, and type of injury. Methods: Incidence data came from the 2000 National Vital Statistics System, 2001 National Electronic Injury Surveillance System-All Injury Program, 2000 Health Care Utilization Program National Inpatient Sample, and 1999 Medical Expenditure Panel Survey. Costs for fatal falls came from *Incidence and economic burden of injuries in the United States*; costs for non-fatal falls were based on claims from the 1998 and 1999 Medicare fee-for-service 5% Standard Analytical Files. A case crossover approach was used to compare the monthly costs before and after the fall. Results: In 2000, there were almost 10 300 fatal and 2.6 million medically treated non-fatal fall related injuries. Direct medical costs totaled $0.2 billion dollars for fatal and $19 billion dollars for non-fatal injuries. Of the non-fatal injury costs, 63% ($12 billion) were for hospitalizations, 21% ($4 billion) were for emergency department visits, and 16% ($3 billion) were for treatment in outpatient settings. Medical expenditures for women, who comprised 58% of the older adult population, were 2–3 times higher than for men for all medical treatment settings. Fractures accounted for just 35% of non-fatal injuries but 61% of costs. Conclusions: Fall related injuries among older adults, especially among older women, are associated with substantial economic costs. Implementing effective intervention strategies could appreciably decrease the incidence and healthcare costs of these injuries.

Stevens, M., C. D. Holman, et al. (2001). "Preventing falls in older people: impact of an intervention to reduce environmental hazards in the home." Journal of the American Geriatrics Society 49(11): 1442-7.

OBJECTIVES: To evaluate the impact of an intervention to reduce fall hazards in the homes of older people. DESIGN: The intervention was administered to the 570 subjects in the experimental arm of a randomized controlled trial, with follow-up of subjects for 1 year. SETTING: Community-based seniors living in Perth, Australia. PARTICIPANTS: People age 70 and older. INTERVENTION: Registered nurses delivered the intervention. It consisted of a home hazard assessment, an educational strategy on general fall hazard reduction and ways to reduce identified home hazards, and the free installation of safety devices: grab rails, nonslip stripping on steps, and double-sided tape for floor rugs and mats. All intervention subjects received the home hazard assessment, and 96% received the educational strategy. Grab rails were installed in 77% of homes, rugs were stabilized in 8%, and nonslip step stripping was installed in 36%. MEASUREMENTS: Hazard prevalence was assessed at baseline in all homes and 11 months later in a random sample of 51 homes. Action taken in response to the intervention was assessed by a self-completed postal questionnaire completed 11 months after the intervention. RESULTS: All homes had at least one fall hazard. The most prevalent were floor rugs and mats (mean of 14 per home), stepovers (Stepovers are structural changes to the height of the floor that were designed to be stepped over rather than stepped upon, for example, the lip of a shower or a bath side.) (mean of seven per home), steps (mean of four per home), and trailing cords (mean of two per home). The intervention was associated with a small but significant reduction in four of the five most prevalent hazards. The mean number of

unsafe rugs and mats was reduced by 1.57 per house (95% confidence interval (CI) = 0.91-2.24); the mean number of unsafe steps was reduced by 0.61 per house (95% CI = 0.28-0.94); the mean number of rooms with trailing cords was reduced by 0.43 per house (95% CI = 0.10-0.76); and the mean number of unsafe chairs was reduced by 0.10 per house (95% CI = 0.02-0.18). Safety devices were installed in 81.9% of homes. Advice on modifying specific hazards identified on the home hazard assessment resulted in over 50% of subjects removing hazards of floor rugs and mats, trailing cords, and obstacles. The general education message prompted less activity to reduce these hazards than did the advice on identified hazards. CONCLUSIONS: Fall hazards are ubiquitous in the homes of older people. The intervention resulted in a small reduction in the mean number of hazards per house, with many study subjects taking action but removing only a few hazards. The impact of the intervention in achieving self-reported action to reduce hazards was high.

Stevens, M., C. D. Holman, et al. (2001). "Preventing falls in older people: outcome evaluation of a randomized controlled trial." Journal of the American Geriatrics Society 49(11): 1448-55.

OBJECTIVES: To evaluate the outcome of an intervention to reduce hazards in the home on the rate of falls in seniors. DESIGN: Randomized controlled trial, with follow-up of subjects for 1 year. SETTING: Community-based study in Perth, Western Australia. PARTICIPANTS: People age 70 and older. INTERVENTION: One thousand eight hundred seventy-nine subjects were recruited and randomly allocated by household to the intervention and control groups in the ratio 1:2. Because of early withdrawals, 1,737 subjects commenced the study. All members of both groups received a single home visit from a research nurse. Intervention subjects (n = 570) were offered a home hazard assessment, information on hazard reduction, and the installation of safety devices, whereas control subjects (n = 1,167) received no safety devices or information on home hazard reduction. MEASUREMENTS: Both groups recorded falls on a daily calendar. Reported falls were confirmed by a semistructured telephone interview and were assigned to one of three overlapping categories: all falls, falls inside the home, and falls involving environmental hazards in the home. Analysis was by multivariate modelling of rate ratios and odds ratios for falls, corrected for household clustering, using Poisson regression and logistic regression with robust variance estimation. RESULTS: Overall, 86% of study subjects completed the 1 year of follow-up. The intervention was not associated with any significant reduction in falls or fall-related injuries. There was no significant reduction in the intervention group in the incidence rate of falls involving environmental hazards inside the home (adjusted rate ratio, 1.11; 95% CI = 0.82-1.50), or the proportion of the intervention group who fell because of hazards inside the home (adjusted odds ratio, 0.97; 95% CI = 0.74-1.28). No reduction was seen in the rate of all falls (adjusted rate ratio, 1.02; 95% CI = 0.83-1.27) or the rate of falls inside the home (adjusted rate ratio, 1.17; 95% CI = 0.85-1.60). There was no significant reduction in the rate of injurious falls in intervention subjects (adjusted rate ratio, 0.92; 95% CI = 0.73-1.14). CONCLUSIONS: The intervention failed to achieve a reduction in the occurrence of falls. This was most likely because the intervention strategies had a limited effect on the number of hazards in the homes of intervention subjects. The study provides evidence that a one-time intervention program of education, hazard assessment, and home

modification to reduce fall hazards in the homes of healthy older people is not an effective strategy for the prevention of falls in seniors.

Sturnieks, D. L., A. Tiedemann, et al. (2004). "Physiological risk factors for falls in older people with lower limb arthritis." Journal of Rheumatology 31(11): 2272-9.

OBJECTIVE: To investigate physiological risk factors for falls in people with self-reported lower limb arthritis. METHODS: Six hundred eighty-four community-dwelling men and women aged 75-98 years (mean 80.0, SD 4.4), categorized with and without lower limb arthritis, underwent quantitative tests of strength, peripheral sensation, vision, reaction time, balance, and pain. A 12-month history of falls was also obtained. RESULTS: Subjects with self-reported lower extremity arthritis performed significantly worse in tests of knee and ankle muscular strength, lower limb proprioception, postural sway, and leaning balance than subjects without lower extremity arthritis, while being comparable in vision, tactile sensitivity, and reaction time. This pattern of specific impairments was also evident when group results for the arthritis subjects were compared with community normative values and presented as a physiological profile. The arthritis group suffered significantly more falls [relative risk (RR) 1.22, 95% CI 1.03-1.46] and injurious falls (RR 1.27, 95% CI 1.01-1.60) in the previous 12 months than the nonarthritis group. Within the arthritis group, reduced knee extension strength and increased sway were identified as significant predictors of falls. CONCLUSION: Older people with lower limb arthritis are at increased risk of falling due to deficits in neuromuscular systems. A physiological falls-risk profile based on mean test scores for the arthritis group highlights deficits in muscular strength, knee proprioception, and standing balance, indicating the need for targeted falls prevention interventions for this population.

Sze, P. C., W. H. Cheung, et al. (2008). "The efficacy of a multidisciplinary falls prevention clinic with an extended step-down community program." Archives of Physical Medicine & Rehabilitation 89(7): 1329-34.

OBJECTIVE: To investigate the efficacy of a falls prevention clinic and a community step-down program in reducing the number of falls among community-dwelling elderly at high risk of fall. DESIGN: Prospective cohort. SETTING: Community. PARTICIPANTS: Community-dwelling elderly (N=200) were screened for risk of fall; 60 were identified as being at high risk and were referred to the intervention program. INTERVENTION: Twelve sessions of a once-a-week falls prevention clinic, including fall evaluation, balance training, home hazard management program, and medical referrals, were provided in the first 3 months. The community step-down program, including falls prevention education, a weekly exercise class, and 2 home visitations, was provided in the following 9 months. MAIN OUTCOME MEASURES: Fall rate, injurious fall, and its associated medical consultation were recorded during the intervention period and the year before intervention. Balance tests included the Berg Balance Scale (BBS), Sensory Organization Test, and limits of stability test; fear of falling, as evaluated using the Activities-specific Balance Confidence (ABC) scale, was measured at baseline and after the training in the falls prevention clinic. RESULTS: Significant reductions in fall rate (74%), injurious falls (43%), and fall-associated medical consultation (47%) were noted. Significant improvement in balance scores (BBS, P<.001; endpoint excursion in

limits of stability test, P=.004) and fear of falling (ABC scale, P=.001) was shown. CONCLUSIONS: The programs in the falls prevention clinic were effective in reducing the number of falls and injurious falls. The community step-down programs were crucial in maintaining the intervention effects of the falls prevention clinic.

Tiessen, B., C. Deter, et al. "Continuing the journey to a culture of patient safety: from falls prevention to falls management." Healthcare Quarterly 13(1): 79-83.

This article documents the change management process undertaken in a small community hospital on one stage of the journey toward a patient safety culture. On this part of the journey, the patient care model founded on a philosophy of falls prevention was transformed to one based on a model of falls management. The change process culminated in a more elder-friendly environment complemented by a respect for patients' choices, even when those choices include personal risk. Our cultural transformation resulted in a patient safety culture characterized by (1) a restraints-free physical environment and (2) a rate of patient falls accompanied by serious harm that is lower than the industry average. The first step on our journey to a culture of patient safety was completed over a three-year period.

Tinetti, M. E., D. I. Baker, et al. (2008). "Effect of dissemination of evidence in reducing injuries from falls.[see comment]." New England Journal of Medicine 359(3): 252-61.

BACKGROUND: Falling is a common and morbid condition among elderly persons. Effective strategies to prevent falls have been identified but are underutilized. METHODS: Using a nonrandomized design, we compared rates of injuries from falls in a region of Connecticut where clinicians had been exposed to interventions to change clinical practice (intervention region) and in a region where clinicians had not been exposed to such interventions (usual-care region). The interventions encouraged primary care clinicians and staff members involved in home care, outpatient rehabilitation, and senior centers to adopt effective risk assessments and strategies for the prevention of falls (e.g., medication reduction and balance and gait training). The outcomes were rates of serious fall-related injuries (hip and other fractures, head injuries, and joint dislocations) and fall-related use of medical services per 1000 person-years among persons who were 70 years of age or older. The interventions occurred from 2001 to 2004, and the evaluations took place from 2004 to 2006. RESULTS: Before the interventions, the adjusted rates of serious fall-related injuries (per 1000 person-years) were 31.2 in the usual-care region and 31.9 in the intervention region. During the evaluation period, the adjusted rates were 31.4 and 28.6, respectively (adjusted rate ratio, 0.91; 95% Bayesian credibility interval, 0.88 to 0.94). Between the preintervention period and the evaluation period, the rate of fall-related use of medical services increased from 68.1 to 83.3 per 1000 person-years in the usual-care region and from 70.7 to 74.2 in the intervention region (adjusted rate ratio, 0.89; 95% credibility interval, 0.86 to 0.92). The percentages of clinicians who received intervention visits ranged from 62% (131 of 212 primary care offices) to 100% (26 of 26 home care agencies). CONCLUSIONS: Dissemination of evidence about fall prevention, coupled with interventions to change clinical practice, may reduce fall-related injuries in elderly persons.

Tinetti, M. E., M. Speechley, et al. (1988). "Risk factors for falls among elderly persons living in the community." New England Journal of Medicine 319(26): 1701-1707.

In a 1-yr prospective investigation of 336 community residents aged 75 yrs and older, 108 Ss fell at least once; 24% of those had serious injuries. About a quarter of the Ss restricted their activities because of fear of falling. Cognitive impairment and sedative use were associated with high risk of falling

Tinetti, M. E. and M. E. Tinetti (2003). "Clinical practice. Preventing falls in elderly persons." New England Journal of Medicine 348(1): 42-9.

This *Journal* feature begins with a case vignette highlighting a common clinical problem. Evidence supporting various strategies is then presented, followed by a review of formal guidelines, when they exist. The article ends with the author's clinical recommendations.

Tzeng, H. M., C. Y. Yin, et al. (2009). "Perspectives of recently discharged patients on hospital fall-prevention programs." Journal of Nursing Care Quality 24(1): 42-9.

The aim of this exploratory study was to understand the opinions and observations of recently discharged senior patients concerning the fall-prevention education received during their most recent hospitalization. The focus was on the extrinsic risk factors for falls. This project was conducted in a Michigan home care agency. Participants had to be Medicare home care patients, discharged from the affiliated hospital within 30 days, 65 years or older, and alert. Practical implications that might lead to fewer falls in the future as the goal of this research are discussed.

Unsworth, J. and J. Unsworth (2003). "Falls in older people: the role of assessment in prevention and care." British Journal of Community Nursing 8(6): 256-62.

Falls among older people constitute a serious public health problem, which has a substantial impact on both the person and on healthcare services. Falls assessment can be divided into a number of types. Community nurses are well placed to use falls risk checklists to identify older people who may be at risk of falling and then offer these individuals a more in-depth assessment. In addition, community nurses have a role to play in assessing older people who have recently fallen to prevent future falls and potential injury. Falls prevention programmes centre on the identification of risk factors and the planning and delivery of interventions designed to eliminate or ameliorate these risks. A falls assessment should include a review of intrinsic factors such as mobility, lower extremity functioning, vision, medications, footwear and past medical history. It is also important to consider extrinsic factors such as tripping, slipping and other environmental hazards.

Vaapio, S. S., M. J. Salminen, et al. (2009). "Quality of life as an outcome of fall prevention interventions among the aged: a systematic review." European Journal of Public Health 19(1): 7-15.

BACKGROUND: Measuring quality of life (QOL) is an important part in assessing the effects of treatments and health services on patients' well-being. This kind of an assessment should be included when assessing the effects of preventive programmes. The aim was to explore whether QOL has been used as an outcome measure in fall prevention trials and to provide a systematic review of randomized controlled trials (RCTs) that

involve fall prevention interventions with an assessment of the effects on QOL among the aged. No previous systematic review about this topic among the aged was found. METHODS: A search covering various medical databases was conducted to identify RCTs about the effects of fall prevention programmes on QOL. The 12 included studies were classified according to an appraisal of the population, the method of randomization, the intervention and control programmes, the QOL measures and the results. Methodological quality was assessed in relation to blinding at outcome assessment, length of follow-up and using intention to treat analysis. RESULTS: Six studies out of 12 showed a positive effect on some dimensions of QOL (physical function, social function, vitality, mental health, environmental domain). The methods of interventions showing a positive effect varied. CONCLUSION: Only a few fall prevention studies reported a positive effect on QOL. Studies with larger sample sizes, longer follow-ups and multiple outcome measures are needed. QOL should be taken into account as an secondary outcome measure.

van der Velde, N., B. H. Stricker, et al. (2007). "Risk of falls after withdrawal of fall-risk-increasing drugs: a prospective cohort study." British Journal of Clinical Pharmacology 63(2): 232-7.

AIMS: Falling in older persons is a frequent and serious clinical problem. Several drugs have been associated with increased fall risk. The objective of this study was to identify differences in the incidence of falls after withdrawal (discontinuation or dose reduction) of fall-risk-increasing drugs as a single intervention in older fallers. METHODS: In a prospective cohort study of geriatric outpatients, we included 139 patients presenting with one or more falls during the previous year. Fall-risk-increasing drugs were withdrawn, if possible. The incidence of falls was assessed within 2 months of follow-up after a set 1 month period of drug withdrawal. Multivariate adjustment for potential confounders was performed with a Cox proportional hazards model. RESULTS: In 67 patients, we were able to discontinue a fall-risk-increasing drug, and in eight patients to reduce its dose. The total number of fall incidents during follow-up was significantly lower in these 75 patients, than in those who continued treatment (mean number of falls: 0.3 vs. 3.6; P value 0.025). The hazard ratio of a fall during follow-up was 0.48 (95% confidence interval (CI) 0.23, 0.99) for overall drug withdrawal, 0.35 (95% CI 0.15, 0.82) for cardiovascular drug withdrawal and 0.56 (95% CI 0.23, 1.38) for psychotropic drug withdrawal, after adjustment for age, gender, use of fall-risk-increasing drugs, baseline falls frequency, comorbidity, Mini-Mental State Examination score, and reason for referral. CONCLUSIONS: Withdrawal of fall-risk-increasing drugs appears to be effective as a single intervention for falls prevention in a geriatric outpatient setting. The effect was greatest for withdrawal of cardiovascular drugs.

van Haastregt, J. C., E. van Rossum, et al. (2000). "Preventing falls and mobility problems in community-dwelling elders: the process of creating a new intervention." Geriatric Nursing 21(6): 309-14.

Mobility impairments and the consequences of falls can have a considerable impact on community-dwelling elders' autonomy and quality of life. This article describes the development and implementation of a falls and mobility intervention that features preventive home visits by public health nurses; the study accompanying the intervention

also is presented. This article offers practical guidelines to health professionals who are considering, developing, implementing, and testing new interventions aimed at the prevention of falls and mobility problems in this population.

Vassallo, M., R. Vignaraja, et al. (2004). "Predictors for falls among hospital inpatients with impaired mobility." Journal of the Royal Society of Medicine 97(6): 266-9.

Gait and balance disturbances have been shown to predispose to falls in hospital. We aimed to investigate the patient characteristics associated with an unsafe gait and to determine what features predispose to falling in this group of hospital inpatients. In a prospective open observational study we studied 825 patients admitted for rehabilitation following acute medical illness or a surgical procedure. The patient's gait was assessed with the 'get up and go' test and classified into one of four categories-normal; abnormal but safe with or without mobility aids; unsafe; or unable. 72.6% of patients were assessed as having an unsafe gait. The factors independently associated with an unsafe gait were confusion, abnormal lower limbs, hearing defects and the use of tranquillizers. Patients with an unsafe gait who fell were more likely than the non-fallers within the group to have had falls in the past (85.3% versus 73.8%) and to be confused (66.2% versus 34.1%). Patients with both these characteristics had a 37.5% chance of falling compared with 15.4% in patients with one and 11.2% in patients with none of these characteristics. The presence of confusion and a history of falls identifies those patients who are at greatest risk of falls. Such patients might be the focus of special efforts at falls prevention.

Vellas, B. J., S. J. Wayne, et al. (1998). "A two-year longitudinal study of falls in 482 community-dwelling elderly adults." Journals of Gerontology Series A-Biological Sciences & Medical Sciences 53(4): M264-74.

BACKGROUND: Falls are a common occurrence in elderly persons, including relatively healthy, community-dwelling men and women. A significant percentage of falls result in soft-tissue injuries. Although some risk factors for falls have been identified, more research is needed on risk factors for injurious falls. In addition, there is little information from prospective studies on the long-term consequences of falls other than injury. METHODS: Risk factors and consequences of falls were analyzed in a 24-month prospective study of 482 elderly (mean age 74 +/- 6.7 years) men and women living independently.in the community. Falls and injurious falls were ascertained by telephone and by a bimonthly postcard follow-up. Predictor variables were obtained from a baseline assessment and follow-up questionnaire. Outcomes were defined as rates of falls and injurious falls, circumstances surrounding the fall, and the long-term correlates of falls. RESULTS: Sixty-one percent of the participants (53.7% of men and 65.7% of women) reported one or more falls during the 2-year follow-up. The crude rates of injurious falls were 11.17 per 1000 person-months in women and 7.23 per 1000 person-months in men. Age, history of fracture, low physical health, and low or high mobility level were risk factors for injurious falls in both sexes. The inability to balance unsupported on one leg was associated with injurious falls in women (rate ratio [RR] = 3.0; 95% confidence interval 1.9-4.7). Self-reported cognitive, physical health, and mobility impairments were greater in female fallers compared to the nonfallers. CONCLUSIONS: Falls and injurious

falls without fracture are frequent events for healthy elderly people and may be associated with morbid changes in cognitive status, physical health, and mobility.

Vernon, S., F. Ross, et al. (2008). "Participation in community exercise classes: barriers to access." British Journal of Community Nursing 13(2): 89-92.

Falls prevention is an important part of national health policy and while there are many causes of falls, there is increasing evidence that advocates the use of targeted balance and stability exercise training to address the risk factor of postural instability. The introduction of these exercise programmes in primary care raise questions about the most effective implementation methods that are accessible and acceptable to older people and support maximum adherence. An understanding of factors that support adherence of older people to exercise programmes is of value to community nurses to enable them to deliver health promotion advice appropriately. The purpose of this paper is to discuss the findings from interviews with older people to explore their experiences in relation to access and acceptability of local community based postural stability exercise classes.

Vind, A. B., H. E. Andersen, et al. (2009). "Baseline and follow-up characteristics of participants and nonparticipants in a randomized clinical trial of multifactorial fall prevention in Denmark." Journal of the American Geriatrics Society 57(10): 1844-9.

OBJECTIVES: To address the external validity of a trial of multifactorial fall prevention through an analysis of differences between participants and nonparticipants regarding socioeconomic and morbidity variables. DESIGN: Analysis of nonresponse in a randomized clinical trial. SETTING: Geriatric outpatient department. PARTICIPANTS: One thousand one hundred five community-dwelling adults aged 65 and older who had sustained at least one injurious fall. MEASUREMENTS: Marital status, housing tenure, income, comorbidity, hospitalization, fractures, and drug use before invitation to participate in the trial. Fractures, hospitalization and death were measured for 6 months of follow-up. RESULTS: Four hundred forty-seven responding nonparticipants and 266 nonresponding nonparticipants were compared with 392 participants in the trial. Lower income (odds ratio (OR)=2.38, 95% confidence interval (CI)=1.28-4.28) and more days of hospitalization during the previous 5 years (OR=1.96, 95% CI=1.15-3.33) predicted responding nonparticipation; independent predictors of being a nonresponding nonparticipant were unmarried status (OR=2.0, 95% CI=1.36-2.94), lower income (OR=4.74, 95% CI=2.30-9.78), more days of hospitalization (OR=3.49, 95% CI=1.99-6.11), and prior fractures (OR=1.56, 95% CI=1.02-2.38). Nonresponding nonparticipants were significantly more likely to die (OR=12.99, 95% CI=1.6-105.6) or be hospitalized (OR=2.66, 95% CI=1.7-4.1) than participants during 6 months of follow-up. CONCLUSION: Nonresponding nonparticipants of a trial of multifactorial fall prevention differed significantly from participants in terms of socioeconomic and morbidity variables and were more likely to be hospitalized or die during 6 months of follow-up. Because of the differences between the two populations, it is questionable whether results from this randomized trial can be generalized to people potentially eligible for participation.

Wahl, H. W., A. Fange, et al. (2009). "The home environment and disability-related outcomes in aging individuals: what is the empirical evidence?" Gerontologist 49(3): 355-67.

PURPOSE: Building on the disablement process model and the concept of person-environment fit (p-e fit), this review article examines 2 critical questions concerning the role of home environments: (a) What is the recent evidence supporting a relationship between home environments and disability-related outcomes? and (b) What is the recent evidence regarding the effects of home modifications on disability-related outcomes? DESIGN AND METHODS: Using computerized and manual search, we identified relevant peer-reviewed original publications and review articles published between January 1, 1997, and August 31, 2006. For Research Question 1, 25 original investigations and for Research Question 2, 29 original investigations and 10 review articles were identified. RESULTS: For Research Question 1, evidence for a relationship between home environments and disability-related outcomes for older adults exists but is limited by cross-sectional designs and poor research quality. For Research Question 2, evidence based on randomized controlled trials shows that improving home environments enhances functional ability outcomes but not so much falls-related outcomes. Some evidence also exists that studies using a p-e fit perspective result in more supportive findings than studies that do not use this framework. IMPLICATIONS: Considerable evidence exists that supports the role of home environments in the disablement process, but there are also inconsistencies in findings across studies. Future research should optimize psychometric properties of home environment assessment tools and explore the role of both objective characteristics and perceived attributions of home environments to understand person-environment dynamics and their impact on disability-related outcomes in old age.

Weatherall, M. (2004). "Prevention of falls and fall-related fractures in community-dwelling older adults: a meta-analysis of estimates of effectiveness based on recent guidelines." Internal Medicine Journal 34(3): 102-8.

BACKGROUND: Two recent falls prevention guidelines have been published but did not include quantitative estimates of effectiveness based on the published reports that were reviewed to support their recommendations. AIM: To produce quantitative estimates of effectiveness of falls prevention programs from the randomised controlled trials cited in the guidelines together with an updated search of the available published reports to August 2002. METHODS: A meta-analysis of randomised controlled trials cited in falls guidelines and studies identified by an updated search of the available published reports was carried out. Randomised controlled trials were identified from the falls guidelines and a search, which met the following criteria: trials in community-dwelling older people; 1-year follow up; and outcome measures reported as the number of subjects with at least one fall or the number of subjects with a fracture. RESULTS: The guidelines identified four studies of 'exercise as a sole intervention', which when combined with one further study identified in a search of the published reports, gave a fixed effects odds ratio (OR) favouring this strategy of 0.81 (95% confidence interval (CI) 0.58-1.14); the number of patients needed to be treated to prevent one person having a fall was 19.5. The guidelines identified seven studies of a 'multiple intervention' strategy that gave a random effects OR favouring this strategy of 0.64 (95% CI 0.47-0.88). Four further studies were identified by the search of the published reports. The updated OR favouring this intervention strategy was 0.65 (95% CI 0.52-0.81); the number of patients needed to be treated to prevent one person having a fall was 9.8. Only two studies had data for fracture

and a fixed effects OR favouring falls interventions for fracture prevention was 0.50 (95% CI 0.18-1.40); the number of patients needed to be treated to prevent one person having a fracture was 45.5. CONCLUSION: Semiquantitative statements of evidence can both understate and overstate the effectiveness of falls prevention strategies. There is moderate evidence of efficacy for falls prevention particularly for multiple intervention strategies.

Weerdesteyn, V., H. Rijken, et al. (2006). "A five-week exercise program can reduce falls and improve obstacle avoidance in the elderly." Gerontology 52(3): 131-41.

BACKGROUND: Falls in the elderly are a major health problem. Although exercise programs have been shown to reduce the risk of falls, the optimal exercise components, as well as the working mechanisms that underlie the effectiveness of these programs, have not yet been established. OBJECTIVE: To test whether the Nijmegen Falls Prevention Program was effective in reducing falls and improving standing balance, balance confidence, and obstacle avoidance performance in community-dwelling elderly people. METHODS: A total of 113 elderly with a history of falls participated in this study (exercise group, n = 79; control group, n = 28; dropouts before randomization, n = 6). Exercise sessions were held twice weekly for 5 weeks. Pre- and post-intervention fall monitoring and quantitative motor control assessments were performed. The outcome measures were the number of falls, standing balance and obstacle avoidance performance, and balance confidence scores. RESULTS: The number of falls in the exercise group decreased by 46% (incidence rate ratio (IRR) 0.54, 95% confidence interval (CI) 0.36-0.79) compared to the number of falls during the baseline period and by 46% (IRR 0.54, 95% CI 0.34-0.86) compared to the control group. Obstacle avoidance success rates improved significantly more in the exercise group (on average 12%) compared to the control group (on average 6%). Quiet stance and weight-shifting measures did not show significant effects of exercise. The exercise group also had a 6% increase of balance confidence scores. CONCLUSION: The Nijmegen Falls Prevention Program was effective in reducing the incidence of falls in otherwise healthy elderly. There was no evidence of improved control of posture as a mechanism underlying this result. In contrast, an obstacle avoidance task indicated that subjects improved their performance. Laboratory obstacle avoidance tests may therefore be better instruments to evaluate future fall prevention studies than posturographic balance assessments.

Weigand, J. V. and L. W. Gerson (2001). "Preventive care in the emergency department: should emergency departments institute a falls prevention program for elder patients? A systematic review." Academic Emergency Medicine 8(8): 823-6.

OBJECTIVE: To perform a systematic review of the emergency medicine literature to assess the appropriateness of an intervention to identify, counsel, and refer emergency department (ED) patients >64 years old who are at high risk for falls. METHODS: The systematic review was facilitated through the use of a structured template, a companion explanatory piece, and a grading and methodological scoring system based on published criteria for critical appraisal. A reference librarian did two PubMed searches using the following: ED visits, patients >64 years old, falls, high risk, and effectiveness of intervention. Emergency Medical Abstracts, Science Citation Index, and the Cochrane Collaboration database were searched. Two team members reviewed the abstracts and

selected pertinent articles. References were screened for additional pertinent articles. RESULTS: Twenty-six articles were reviewed. None were ED-based primary or secondary falls prevention in older patients. One randomized controlled trial of an intervention to decrease subsequent falls in elder community-dwelling patients who presented with a fall showed a structured interdisciplinary approach significantly reducing the number of falls. Two ED-based studies showed it was possible to identify ED patients at risk for falls. CONCLUSIONS: Based on one randomized controlled trial demonstrating a significant reduction in the risk of further falls, the burden of suffering caused by falls, and other studies demonstrating the value of interventions to reduce the risk of falling, the authors recommend that EDs conduct research to evaluate the effectiveness of clinical interventions to identify, counsel, and refer ED patients >64 years old who are at high risk for an unintentional fall.

Westlake, K. P., E. G. Culham, et al. (2007). "Sensory-specific balance training in older adults: effect on proprioceptive reintegration and cognitive demands." Physical Therapy 87(10): 1274-83.

BACKGROUND AND PURPOSE: Age-related changes in the ability to adjust to alterations in sensory information contribute to impaired postural stability. The purpose of this randomized controlled trial was to investigate the effect of sensory-specific balance training on proprioceptive reintegration. SUBJECTS: The subjects of this study were 36 older participants who were healthy. METHODS: Participants were randomly assigned to a balance exercise group (n=17) or a falls prevention education group (n=19). The primary outcome measure was the center-of-pressure (COP) velocity change score. This score represented the difference between COP velocity over 45 seconds of quiet standing and each of six 5-second intervals following proprioceptive perturbation through vibration with or without a secondary cognitive task. Clinical outcome measures included the Fullerton Advanced Balance (FAB) Scale and the Activities-specific Balance Confidence (ABC) Scale. Assessments were conducted at baseline, postintervention, and at an 8-week follow-up. RESULTS: Following the exercise intervention, there was less destabilization within the first 5 seconds following vibration with or without a secondary task than there was at baseline or in the falls prevention education group. These training effects were not maintained at the 8-week follow-up. Postintervention improvements also were seen on the FAB Scale and were maintained at follow-up. No changes in ABC Scale scores were identified in the balance exercise group, but ABC Scale scores indicated reduced balance confidence in the falls prevention education group postintervention. DISCUSSION AND CONCLUSION: The results of this study support short-term enhanced postural responses to proprioceptive reintegration following a sensory-specific balance exercise program.

Westlake, K. P., Y. Wu, et al. (2007). "Sensory-specific balance training in older adults: effect on position, movement, and velocity sense at the ankle." Physical Therapy 87(5): 560-8.

BACKGROUND AND PURPOSE: Age-related changes in proprioception contribute to impairments in postural control and increased fall risk in older adults. The purpose of this randomized controlled trial was to examine the effects of balance exercises on proprioception. SUBJECTS: The participants were 36 older people and 24 younger people who were healthy. METHODS: Older participants were randomly assigned to a

balance exercise group (n=17) or a falls prevention education group (n=19). Baseline, postintervention, and 8-week follow-up measurements of 3 proprioceptive measures (threshold to perception of passive movement, passive joint position sense, and velocity discrimination) were obtained at the ankle. For comparative purposes, younger participants underwent a one-time assessment of the 3 proprioceptive measures. RESULTS: Postintervention improvements in velocity discrimination were found in the balance exercise group when compared with values at baseline and in the falls prevention education group. Age-related differences found at baseline were reduced in the balance exercise group after intervention. Improvements were not maintained at the 8-week follow-up. Threshold to perception of passive movement and passive joint position sense did not change as a function of the exercise intervention. DISCUSSION AND CONCLUSION: The results suggest that short-term improvements in velocity sense, but not movement and position sense, may be achieved following a balance exercise intervention.

Whitehead, C. H., R. Wundke, et al. (2006). "Attitudes to falls and injury prevention: what are the barriers to implementing falls prevention strategies?" Clinical Rehabilitation 20(6): 536-42.

OBJECTIVES: To ascertain the reasons for not taking up a fall or injury prevention strategy among older people who have sustained a fall and attended an emergency department. SUBJECTS: As part of another trial, we identified 60 people who attended the emergency department of a public hospital with a fall. MAIN MEASURES: Participants were interviewed to ascertain the reasons for not taking up a falls prevention strategy, their falls-related health state, and the likelihood of them undertaking a falls and injury prevention strategy. RESULTS: A total of 31 (52%) of the participants had considered falls prevention after their fall. There were high levels of reluctance to undertake a strategy with 43 (72%) reluctant to take exercise classes, 10 (59%) reluctant to cease psychotropic medications, 26 (43%) reluctant to have a home safety assessment and 17 (28%) reluctant to take osteoporotic medication. When asked specifically about taking up a strategy to prevent a worsening health state, 19 (63%) of participants would take up exercise, 17 (57%) a home safety assessment, 4 of the 17 (59%) already taking implicated medications would stop and 56 (93%) would begin osteoporotic medication. These decisions did not alter when the goal for treatment was to improve a much worse health state. In participants with a lower starting health state, home safety assessments were viewed more favourably. CONCLUSIONS: There were significant obstacles to the implementation of most falls prevention guidelines examined. Treatment for osteoporosis was more acceptable to participants than exercise classes, cessation of psychotropic medication, and having a home safety assessment. Osteoporosis treatment, which had the least resistance, also had the least impact on the participants' lifestyle.

Whiteneck, G., M. P. Dijkers, et al. (2009). "Difficult to measure constructs: conceptual and methodological issues concerning participation and environmental factors." Archives of Physical Medicine & Rehabilitation 90(11 Suppl): S22-35.

For rehabilitation and disability research, participation and environment are 2 crucial constructs that have been placed center stage by the International Classification of Functioning, Disability and Health (ICF). However, neither construct is adequately conceptualized by the ICF, and both are difficult to measure. This article addresses

conceptual and methodologic issues related to these ICF constructs, and recommends an improved distinction between activities and participation, as well as elaboration of environment. A division of the combined ICF categories for activity and participation into 2 separate taxonomies is proposed to guide future research. The issue of measuring participation from objective and subjective perspectives is examined, and maintaining these distinct conceptual domains in the measurement of participation is recommended. The methodological issues contributing to the difficulty of measuring participation are discussed, including potential dimensionality, alternative metrics, and the appropriateness of various measurement models. For environment, the need for theory to focus research on those aspects of the environment that interact with individuals' impairments and functional limitations in affecting activities and participation is discussed, along with potential measurement models for those aspects. The limitations resulting from reliance on research participants as reporters on their own environment are set forth. Addressing these conceptual and methodological issues is required before the measurement of participation and environmental factors can advance and these important constructs can be used more effectively in rehabilitation and disability observational research and trials.

Wolf, S. L., L. Riolo, et al. (2000). "Urge incontinence and the risk of falling in older women." Journal of the American Geriatrics Society 48(7): 847-8.

Wong, A. M., C. Lan, et al. (2008). "Tai Chi and balance control." Medicine & Sport Science 52: 115-23.

Balance function begins to decline from middle age on, and poor balance function increases the risk of fall and injury. Suitable exercise training may improve balance function and prevent accidental falls. The coordination of visual, proprioceptive, vestibular and musculoskeletal system is important to maintain balance. Balance function can be evaluated by functional balance testing and sensory organization testing. Tai Chi Chuan (TC) is a popular conditioning exercise in the Chinese community, and recent studies substantiate that TC is effective in balance function enhancement and falls prevention. In studies utilizing functional balance testing, TC may increase the duration of one-leg standing and the distance of functional reach. In studies utilizing sensory organization testing, TC improves static and dynamic balance, especially in more challenging sensory perturbed condition. Therefore, TC may be prescribed as an alternative exercise program for elderly subjects or balance-impaired patients. Participants can choose to perform a complete set of TC or selected movements according to their needs. In conclusion, TC may improve balance function and is appropriate for implementation in the community.

Woodland, J. E., S. J. Hobson, et al. (2003). "An occupational therapy perspective on falls prevention among community-dwelling older adults." Canadian Journal of Occupational Therapy - Revue Canadienne d Ergotherapie 70(3): 174-82.

BACKGROUND: Prevention of falls among community-dwelling older adults is an important area of research because of the serious consequences that can result from falls for this population. The risk factors associated with falls tend to be categorized into two groups: intrinsic, or personal factors, such as fear of falling, age, gender, and extrinsic, or environmental factors, such as lighting or slippery surfaces. METHOD: The current falls

prevention literature was reviewed using an occupational therapy perspective. RESULT: It revealed that there are only a few brief examples of the relationship between occupation and falls in the literature. The profession of occupational therapy appears to be underrepresented in the current falls prevention literature. The review highlights the important contributions that occupational therapists could make to this functional problem. PRACTICE AND RESEARCH IMPLICATIONS: For occupational therapy, important areas for consideration when attempting to prevent falls among older adults living in the community include using a client-centred approach, compliance, and follow up on recommendations. There is a need for more occupational therapy research specifically on occupation and falls, that explores their relationship and influence upon one another.

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Yardley, L., N. Beyer, et al. (2007). "Recommendations for promoting the engagement of older people in activities to prevent falls." Quality & Safety in Health Care 16(3): 230-4.

OBJECTIVE: To develop recommendations for promoting uptake of and adherence to falls-prevention interventions among older people. DESIGN: The recommendations were initially developed from literature review, clinical experience of the core group members, and substantial qualitative and quantitative studies of older people's views. They were refined through a consultation process with members of the falls-prevention community, drawing on Delphi survey and nominal group techniques. Transparency was enhanced by recording and reporting aspects of the iterative consultation process such as the degree of consensus and critical comments on drafts of the recommendations. SETTING: The recommendations were developed and refined at three meetings of the core group, and through internet-based consultation and two meetings involving members of the wider falls-prevention community. PARTICIPANTS: The authors developed the recommendations incorporating the feedback from the researchers and practitioners

responding to a broad-based internet consultation and consulted in the meetings. RESULTS: A high degree of consensus was achieved. Recommendations addressed the need for public education, ensuring that interventions were compatible with a positive identity, tailoring interventions to the specific situation and values of the individual, and using validated methods to maintain longer-term adherence. CONCLUSION: These recommendations represent a consensus based on current knowledge and evidence, but the evidence base from which these recommendations were developed was limited, and not always specific to prevention of falls. To increase the effectiveness of falls-prevention interventions, further research is needed to identify the features of falls-prevention programmes that will encourage older people's engagement in them.

Yardley, L., M. Donovan-Hall, et al. (2006). "Older people's views of advice about falls prevention: a qualitative study." Health Education Research 21(4): 508-17.

The aim of this study was to gain an understanding of older people's perceptions of falls prevention advice, and how best to design communications that will encourage older people to take action to prevent falls. Focus groups and interviews were carried out with 66 people aged 61-94 years recruited from a variety of settings, using falls prevention messages to stimulate discussion. Thematic analysis revealed that participants interpreted 'falls prevention' principally as meaning hazard reduction, use of aids and restriction of activity. Only one participant was aware that falls risk could be reduced by carrying out exercises to improve strength and balance. Falls prevention advice was typically regarded as useful in principle but not personally relevant or appropriate. Advice about falling was often depicted as common sense, only necessary for older or more disabled individuals, and potentially patronizing and distressing. Our findings suggest that older people do not reject falls prevention advice because of ignorance of their risk of falling, but because they see it as a potential threat to their identity and autonomy. Messages that focus on the positive benefits of improving balance may be more acceptable and effective than advice on falls prevention.

Yardley, L., M. Donovan-Hall, et al. (2007). "Attitudes and beliefs that predict older people's intention to undertake strength and balance training." Journals of Gerontology Series B-Psychological Sciences & Social Sciences 62(2): P119-25.

Many older people refuse to participate in programs of strength and balance training (SBT), limiting their effectiveness for falls prevention. To persuade older people to take up SBT, we need to know whether their intention to undertake SBT is motivated by the perceived threat of falling or the perceived suitability and benefits of SBT. A survey of 558 people aged 60 to 95 years assessed intention to undertake SBT, as well as measures of threat appraisal (concern about falling, perceived risk, and consequences of falling) and coping appraisal (perceived benefits and appropriateness for them of undertaking SBT). Intention to undertake SBT was much more closely related to all elements of coping appraisal than to threat appraisal. The elements of coping appraisal included the belief that it has multiple benefits and is associated with a positive social identity, and the feeling that family, friends, and doctors would approve of taking part.

Yardley, L., S. Kirby, et al. (2008). "How likely are older people to take up different falls prevention activities?" Preventive Medicine 47(5): 554-8.

OBJECTIVE: To determine the extent to which older people are willing to engage in different falls prevention activities, and how this may vary in different sectors of the older population. METHODS: A survey sent to patients aged over 54 in ten general practices in the Southampton, Bristol and Manchester areas of the UK in 2006 yielded 5,440 respondents. The survey assessed willingness to attend classes of strength and balance training (SBT), carry out SBT at home, or accept support to reduce home hazards. Participants were asked their gender, age, education, home tenure, ethnic group, and how often they had fallen during the past year. RESULTS: Over 60% of the sample would consider doing SBT at home and 36.4% said they would definitely do SBT at home. Only 22.6% would definitely attend group sessions and 41.1% would definitely not attend. Older age, recent falls and lower socioeconomic status were associated with a greater willingness to carry out SBT at home (but not in classes) and accept help with home hazards. CONCLUSIONS: Health promotion programmes should give prominence to home-based performance of SBT as a method of encouraging the entire older population to engage in falls prevention, including those most in need.

Yardley, L., S. R. Nyman, et al. (2007). "Internet provision of tailored advice on falls prevention activities for older people: a randomized controlled evaluation." Health Promotion International 22(2): 122-8.

Falls are very common in older persons and can result in substantial disability and distress. By undertaking strength and balance training (SBT) exercises, older people can reduce their risk of falling. The Internet offers a potentially cost-effective means of disseminating information about SBT to older people and their carers. A particular advantage of using the Internet for this purpose is that the advice given can be 'tailored' to the needs of the individual. This study used a randomized controlled design to evaluate an interactive web-based program that tailored advice about undertaking SBT activities. The participants were 280 people with an age range of 65-97 years recruited by advertising the website by email and the Internet. Those randomized to the tailored advice were presented with advice tailored to their personal self-rated balance capabilities, health problems and activity preferences. Those in the control group were presented with all the advice from which the tailored advice was selected. After reading the advice, those in the tailored advice group ($n = 144$) had more positive attitudes ($p < 0.01$) than those in the control group ($n = 136$), reporting greater perceived relevance of the SBT activities, greater confidence in the ability to carry them out, and hence stronger intentions to undertake the activities. This study provides an initial indication that an interactive website might offer a cost-effective way to provide personalized advice to some older people. Further research is required to determine whether website-based advice on falls prevention changes behavior as well as intentions and whether the advice needs to be supplemented by other forms of support.

Zijlstra, A., T. Ufkes, et al. (2008). "Do dual tasks have an added value over single tasks for balance assessment in fall prevention programs? A mini-review." Gerontology 54(1): 40-9.

BACKGROUND: The Prevention of Falls Network Europe (ProFaNE) aims to bring together European researchers and clinicians to focus on the development of effective falls prevention programs for older people. One of the objectives is to identify suitable balance assessment tools. Assessment procedures that combine a balance task with a

cognitive task may be relevant since part of all falls occurs during dual-task performance of walking or other balance activities. OBJECTIVE: To evaluate whether dual-task balance assessments are more sensitive than single balance tasks in predicting falls and detecting changes in balance performance after fall interventions. METHODS: A systematic literature search was performed in the databases PubMed, EMBASE, CINAHL, AMED, PsycINFO and Cochrane. Articles were selected according to the following inclusion criteria: (1) population: older adults (mean age > or =65 years), (2) assessment tool: dual task combining gait or other balance task with a cognitive task, (3) design: prospective or retrospective data collection of falls, or intervention study. Analysis of papers focused on measures of predictive ability or sensitivity-to-change for both tasks during dual-task performance as well as for the single balance and cognitive task. RESULTS: Out of 114 dual-task studies in older people, 19 articles matched the inclusion criteria. Fourteen studies had sample sizes of 60 subjects or less; the studied populations, task combinations as well as other methodological aspects varied. None of the articles reported the same statistical measures for both tasks during dual-task performance as well as single balance and cognitive task. In two studies with prospective data collection of falls, higher odds ratios were found for the dual compared to the single balance task. CONCLUSIONS: Upon the available literature, conclusions for an added value of dual balance tasks for fall prediction or assessing fall intervention effects cannot be made due to incomplete comparisons of single and dual balance tasks. Nevertheless, two studies do provide an indication that dual balance tasks may have added value for fall prediction.