

Interdisciplinary practice in the prevention of falls—a review of working models of care

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Introduction

Falls in older people are often referred to as one of the ‘geriatric giants’ generating diagnostic and rehabilitative dilemmas in everyday clinical practice. The importance of a fall lies in its effect on an older person’s health, function, and independence. A fall may be the first indication of undetected illness and repeated falls often herald a decline in functional ability.

One third of people aged 65+ fall each year, rising to 50% of women aged 85 years and over [1]. Falls are mentioned as a contributing factor in 40% of admissions to nursing homes where the incidence of falls is reported at 1.5 falls/bed/year [2].

Approximately 2.2% of injurious falls are fatal and almost 50% of men and women who die, do so as a result of a hip fracture. In a UK study it was found that 15% of patients presenting with a fractured neck of femur die in hospital and 33% are dead within 1 year [3]. Of those who survive a hip fracture, approximately 2/3 will return to their own home, 2/3 will have impaired mobility and up to 50% will have continued postoperative pain [4].

Fear of falling is a commonly identified although poorly defined phenomena among older persons. For those who do not sustain any major physical injury as a result of a fall, the psychological trauma or fear of falling itself may lead to self imposed reduction in physical activity beyond that due directly to physical disability.

Risk factors associated with falls

Identification of risk factors serves as a useful tool in the selection of high-risk populations and provides a framework on which to structure an intervention program. The populations studied have varied enormously with respect to age, place of residence, method of identification and length of follow up, and as such care should be taken when extrapolating risk factors

from one setting to another. Table 1 highlights risk factors, identified in at least two papers in the literature, which have been shown to increase risk of fall and/or recurrent falls and/or serious injury as a result of a fall. The diversity of risk factors identified reaffirms the multifactorial nature of falls and supports the need for an interdisciplinary approach to prevention and management.

Preventative strategies

With an ageing population the problems associated with falls will become ever more evident unless there is a co-ordinated and effective approach to prevention.

For any strategy to be effective and of direct relevance in the clinical setting, it should be shown to:

- (i) be acceptable and applicable to the relevant population (*applicability*),
- (ii) alter outcome in terms of falls and fall-related injury (*efficacy*),
- (iii) be cost effective (*cost-effectiveness*) and
- (iv) be readily applicable to every day practice (*practicability*).

Given that most falls result from a dynamic interaction between intrinsic and extrinsic factors, a multidisciplinary approach incorporating medical, functional and environmental assessment is likely to be most rewarding. At present it is unclear as to who is most likely to benefit from intervention or indeed which intervention strategy is most beneficial and cost effective. Patient acceptability and compliance as well as cultural differences are important issues which are often overlooked when extrapolating findings from one country and culture to another. Most interventions are costly and therefore it is important to determine the effective intensity and duration of an intervention program as well the most appropriate means of delivery.

Table 1. Risk factors consistently shown to be associated with falls, recurrent falls and injurious falls

Risk factor	Falls	Recurrent falls	Injurious falls	
General	Age	Y	Y	
	Female gender	Y	Y	
	Previous falls	Y	Y	
	Living alone	Y	Y	
Physiological/functional	Impaired muscle strength	Y	Y	
	Impaired balance/gait	Y	Y	
	Impaired mobility	Y	Y	
	Sensory abnormality	Y	Y	
	Impaired vision	Y	Y	
	Impaired ADL's	Y	Y	
	No. of diagnoses	Y	Y	
Medical risk factors	Postural hypotension	Y		
	Cardiac failure	Y	Y	
	Cognitive impairment	Y	Y	
	Stroke	Y	Y	
	Depression	Y	Y	
	Incontinence	Y		
	Arthritis	Y	Y	
	Medication	Number of drugs	Y	
		Any psychotropic medication	Y	Y
		Sedative/hypnotics	Y	Y
Antidepressants		Y	Y	
Digoxin		Y		
Vasodilators		Y		
Analgesics		Y	Y	
Diuretics		Y		

Table 2 highlights the major randomized controlled trials which have had an impact on falls in older people.

Intervention strategies incorporating a medical component

The most striking feature of this group is the relative paucity of studies that have incorporated a medical or health component in the intervention.

Tinetti’s seminal paper published in 1994 focused on people living at home with documented risk factors for falls [5]. The intervention program was aimed at modifying and reducing specific risk factors in order to prevent falls. Modifications included review of medications, balance and gait training and improvement in functional skills. At one-year follow up there were statistically fewer falls and a significant reduction in the number of risk factors present at reassessment in the intervention group. The study impacted favourably on level of function, with statistically significant differences in measures of balance, transfer skills and gait impairment and trends in favour of a reduction in number of hospitalizations and bed days occupied. This was the first well designed and executed randomized controlled trial to show the benefit of interdisciplinary assessment in the prevention of falls in the older person.

The Prevention of Falls in the Elderly Trial (PROFET) has shown the benefits of assessing older people presenting to the Accident and Emergency

Department with a fall [6]. A structured medical and OT assessment with referral to existing services produced a significant and sustained reduction in number of falls and recurrent falls whilst also preserving level of function. There was an observed 50% reduction in the number of fractures during the one-year follow up period. Like Tinetti’s paper, there were observed trends in reduction of hospital admissions and bed days occupied.

Campbell and colleagues looked at the benefits of a psychotropic withdrawal program and a home based exercise program in community dwelling individuals aged 65 and over on psychotropic medications [7]. The 44-week follow up period saw fewer falls in the psychotropic medication withdrawal group. However, within one month of completion of the study, 47% of those who had been withdrawn from their psychotropic medication had restarted, highlighting the need to provide continuing support for these individuals. Whilst not the first study to highlight the increased risk of falls associated with the use of psychotropic medication, it is the first to objectively demonstrate the potential benefits of withdrawal.

Studies focusing on exercise and balance

There have been many studies looking at the effect of exercise on gait, balance and strength. However few have been designed with falls as a primary endpoint.

Table 2. Summary of key RCT's in the prevention of falls in older people

Study	Setting	Interventions	Outcome	Author
RCT Multifactorial risk factor abatement strategy Age: 70+ N=301	C	I: Nurse assessed participants for risk factors and targeted interventions accordingly. Therapist gave home exercise routines C: Friendly visits	1 year follow up. Fewer falls in intervention group: 35% vs 47% (P=0.04). Also significant reduction in risk factors at reassessment e.g. medications, balance impairment, gait impairment and toilet transfer skills	Tinetti <i>et al.</i> , 1994 [5]
FICSIT Meta analysis 7 Separate RCT's all with exercise element	2 NH 5 C	10-36 weeks of exercise—different programs in each centre	2-4 year follow up. Subjects assigned to an exercise intervention were less likely to fall No exercise component was significant for injurious falls	Province <i>et al.</i> , 1995 [9]
RCT to evaluate the effect of Tai Chi compared to conventional balance training Age: 70+ N=200	C	1: Tai Chi 2: Conventional balance training 3: Education	4 month follow up Significant reduction (45%) in multiple falls in Tai Chi group. Also fear of falling reduced when compared to education group	Wolf <i>et al.</i> , 1996 [8]
RCT of effect of individually tailored home exercise program. Women aged 80+ N=233	C	I: Individually tailored program of strength and balance training in the home. 4 one hour sessions with physiotherapist in the first two months of the study C: Social visits	1 year follow up. Significantly fewer falls in the intervention group (152 vs 88) Intervention group had significantly reduced relative hazard for falls and fall with injury and also had improved balance scores	Campbell <i>et al.</i> , 1997 [10]
RCT; OT home assessment targeted on environmental modifications in older people discharged from hospital Age: 65+ N=530	C	I: Home visit by OT with advice and help with modifications C: Usual care	1 year follow up period Reduction in number of falls in intervention group as compared to control (P=0.05) Intervention only effective in those with history of falls	Cumming <i>et al.</i> , 1999 [13]
RCT Interdisciplinary assessment of older people presenting to A&E with a fall Age: 65+ N=397	C	I: Comprehensive medical assessment in Day Hospital with onward referral where need identified. Single OT home visit C: Usual Care	1 year follow up period Statistically significant reduction in falls, number of people falling, recurrent fallers Barthel scores significantly better in intervention group 50% reduction in number of fractures (8 vs 16) P=NS	Close <i>et al.</i> , 1999 [6]

<p>RCT; 2 * 2 Factorial Design to assess effectiveness of psychotropic medication and home-based exercise programme Age: 65 + on psychotropics N=93</p>	<p>C</p>	<p>I1: Gradual withdrawal of psychotropic medication I2: Home based exercise program</p>	<p>44 week follow up Fewer falls in medication withdrawal group (0.34; 95% CI 0.16–0.74) No significant reduction in falls in the exercise group</p>	<p>Campbell <i>et al.</i>, 1999 [7]</p>
<p>RCT; District nurse delivered individually tailored home exercise programme Age 75 + N=240</p>	<p>C</p>	<p>I: District nurse delivered individually tailored exercise programme C: Usual care</p>	<p>1 year follow up Fewer falls in the intervention group (0.54; 95% CI 0.32–0.9)</p>	<p>Robertson <i>et al.</i>, 2001 [12]</p>

§Settings: C = Community; NH = Nursing Home; RH = Residential Home; H = Hospital.

The largest study looking at the effect of exercise in the older population is the ‘Frailty and Injuries: Co-operative studies of intervention techniques’—FICSIT. This multicentre study, involving seven sites across the USA, was designed so each site tested a different exercise intervention strategy in selected target groups of older adults both in the community and institutions. Tinetti’s multifactorial intervention programme [5] was one of the seven sites as was Wolf *et al.*’s Tai Chi study which showed that balance training using this martial art undertaken in a group setting reduces the risk of recurrent falls [8].

A common database across all sites allowed for ‘meaningful’ comparisons of intervention potency. Meta-analysis of the data from the seven sites showed that subjects assigned to an exercise intervention were less likely to fall in the follow up period and the incidence of falls was lower in subjects whose intervention included exercise to improve balance [9].

A well designed randomized controlled trial on the benefits of exercise with a positive outcome was reported by Campbell and colleagues in 1997 [10]. They selected a relatively high risk population; women aged 80 and over who undertook individually tailored home exercise programs. Each participant in the intervention group had 4×1 hour exercise sessions in the home during the first two months of the study. At the end of the initial one year follow up period there was a significant reduction in the number of falls and fall related injury. A further publication showed that the benefits observed were sustained at two years of follow up [11]. More recently, Campbell and colleagues have shown that it is possible for physiotherapists to train district nurses to effectively deliver exercise programmes in such a manner as to lead to a reduction in number of falls [12].

Studies incorporating a home/environmental assessment

A recently published study on the benefits of home assessment is that by Cumming and colleagues in 1999 who looked at 530 people aged 65 and over identified in the hospital setting and subsequently discharged home [13]. The intervention consisted of an OT home assessment and help with modifications. Individuals were not eligible if an OT home assessment was already being considered as part of the discharge planning process. There was a significant reduction in the number of falls in the one year follow up period and sub group analyses showed that those who benefited most were those with a history of falls. Interestingly the observed reduction was for both indoor and outdoor falls raising questions as to the mechanism of observed effect.

Conclusion

The prevention of falls in older people is a problem being addressed by many professionals in health and allied services. Whilst the evidence base is expanding, care must be taken when interpreting studies and extrapolating data into different settings.

Multidisciplinary assessment and intervention has the strongest evidence base with data supporting this approach both in primary and secondary prevention. More studies are starting to emerge supporting exercise in defined groups of individuals although further information is required with respect to the appropriate type of exercise, the method of delivery and the effective duration of input. Assessment of the home environment and function within the home appears to be beneficial in selected high risk individuals.

Despite the increasing number of studies published in the literature, there are still several areas requiring further research and evaluation. Population based screening has yet to be addressed and there are no well validated and published screening tools for use in the primary care setting. More evidence is needed as to the role of intervention to prevent falls in the institutional care setting. Preventive strategies for those with dementia are currently being evaluated. The problem of falls occurring in the hospital setting has yet to be adequately addressed and whilst tools exist to identify those most at risk of falling in hospital, there is as yet no evidence that intervention alters risk.

No randomized controlled trial on falls prevention has shown a significant reduction in fracture risk and the prevention and treatment of osteoporosis in older people needs to be considered in parallel with assessment of risk factors for falls. Hip protectors also deserve further evaluation.

When considering prevention of falls in older people, any service development must be supported by ongoing audit and evaluation. Interdisciplinary working is almost certainly the way forward and collaboration between academics and those responsible for delivering a service is vital to further strengthen and expand the existing evidence base. Only through effective liaison with services within and outside the hospital setting can one effectively alter outcome for older people presenting with falls. The increasing provision of Falls Clinics fulfilling the effective intervention criteria, provide the ideal opportunity to bring together existing but frequently fragmented services to enhance the care of older people.

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