Preventing falls and injuries in care homes

Falls in care homes are common with an annual incidence from 600 to 3,600 per 1000 beds [1]. In a recent UK study of 56 homes [2], with mean occupancy of 1,862 residents, there were 2,690 falls in 1 year, with mean falls rates as high as 3 per resident per annum in specialist residential homes for clients with dementia. Some 30% of falls result in documented injury [3] but there is also considerable attendant physical and psychological morbidity, as well as concern, complaint and litigation from clients’ relatives and guilt or worry for staff. The inevitable desire from homes for falls policies and protocols is further fuelled by the recent emphasis on falls prevention from the National Service Framework for Older People [4], good practice guidelines [5], the regulatory framework provided by the Care Standards Act [6] and guidance from the Health and Safety Executive for Care Homes [7] on providing a safe environment both for staff and clients. But evidence-based practice in risk management requires evidence.

In this issue, Dyer et al. [8] describe with great clarity a well-conducted falls intervention trial on 196 clients in 20 residential care homes, with randomisation at the level of the cluster (care home) to receive intervention or control. There was a low rate of consent by care homes to be randomised – suggesting possible inclusion bias (either towards or against care homes with a proactive interest in falls prevention – possibly influencing effect size). The intervention provided was multifactorial, with gait/balance training, medication review, podiatry, optometry, environmental modification, medical risk factor assessment and staff education. Adherence to assessments and intervention was high – including the exercise component. Although the intervention was associated with a 27% reduction in falls rate, this failed to achieve statistical significance following adjustment for cluster correlation and the study was underpowered to detect differences in injury rate. Interestingly, there was a trend towards greater effect size in clients with cognitive impairment. Also, there were clear benefits in good practice resulting from introducing the intervention, e.g. an increase in optometry and podiatry input and in medication review. Whilst this paper has not provided a definitive model for fall prevention in care home settings, it adds to the field and neatly illustrates some of the complexities of such studies.

There are certainly a number of generic risk factors for falls and injuries in all settings [1, 3, 5]. It follows that there are core elements to fall and injury prevention, involving assessment for common reversible risk factors and specific plans to address each one [9]. However, it is likely that a falls risk profile and the emphasis of interventions are specific to populations or settings. For instance, a residential care home for often highly ambulant clients with dementia will need different emphasis than, for instance, a conventional nursing home with low general levels of mobility and high levels of medical co-morbidity.

Secondly, when interventions such as this one are multifactorial, it is hard to determine the degree of attributable benefit from each component, especially when some components (such as staff education) are at the level of the whole care home.

Thirdly, trial design, randomisation and data analysis are problematic. Individual (client) randomisation leads to the possibility of consent bias and therefore low external validity – especially in view of the high prevalence of cognitive impairment in care homes of all types (though there is an established ethical framework for obtaining consent) [10].
Furthermore, ‘contamination’ can be problematic if ‘intervention’ and ‘control’ clients are in the same facility. However, cluster randomisation (at care home level) requires adequate allowance in statistical power for cluster correlation. Few published care home falls studies have adequately addressed this. The recent CONSORT statement [11] on reporting of cluster randomised trials identifies this failing in 75% of published trials in all fields. This issue is well illustrated in the evidence base for the use of hip protectors in long-term care settings [5, 12], where the pooled effect from cluster randomised trials is null, despite some promising data from simple randomised controlled trial (RCT) designs.

Finally, endpoints chosen for analysis have included falls rate, number of falls per resident, number of residents who fall, relative risk of falling, time to first fall, rate of injurious falls – though cost-effectiveness of interventions has rarely been described, nor opportunity costs, nor effects on psychological morbidity or function. If significant reductions in injury rates are to be an endpoint, then statistical power must increase commensurately. We also need to acknowledge that there may be considerable recording bias in care homes when falls do not result in injury, so that measurement of the outcome itself is not robust. Finally, changes in process around effective components of falls prevention may be an outcome irrespective of falls and injuries endpoints, e.g. review and reduction of culprit drugs such as psychotropics [5, 13], changes in environmental safety, attention to footwear, or correction of visual impairment, structured risk assessment after index fall. There needs to be more clarity about which outcomes are most relevant for clients and institutions, and temptation should be resisted to emphasise only those outcomes that enter statistical significance.

Dyer’s paper is the seventh RCT of a multifaceted falls intervention in care homes to be reported in recent years. Rubenstein et al. [14] studied structured medical assessment in a small simple RCT in one US care home, with a range of secondary benefits but insufficient power to detect a difference in falls. Ray et al. [15] randomised 14 US care homes within matched pairs to receive intervention or control status and selected high-risk clients in each group (n=463) to receive usual treatment or intervention based on structured assessment of individual risk and environmental safety, with only a small reduction in the mean proportion of recurrent fallers. However, there was no correction for clustering. McMurdo et al. [16] performed individual randomisation in Scottish care homes (n=133) with the intervention group receiving structured risk factor assessment and a seated balance training programme. There were many secondary process, function and psychosocial benefits but no significant reduction in falls outcomes.

More recently, two much larger studies from Europe have been reported. Jensen et al. [17] described a cluster randomised trial in nine Swedish residential homes (n=439) using staff education, environmental/equipment review, progressive exercise, multidisciplinary post-fall assessment and hip protectors. There was a significant reduction in incidence ratios for falls. Fractures were also significantly reduced, although to what extent this was due to the use of hip protectors is unclear. Falls reduction was less pronounced in the subgroup of individuals with cognitive impairment [18]. Becker et al. [19] reported a cluster randomised trial (n=981) in six German nursing homes, using staff education, progressive balance training, environmental adaptations and hip protectors. There was a strong and significant reduction in falls rate and in the number of clients who fell, though no effect on fractures.

Neither of these more definitive studies entirely addressed the issue of cluster correlation, though it is fair to say that the debate on design and reporting of such trials has moved on since their conception. Whilst reinforcing the message that very large trials are required to demonstrate reductions in injuries, these studies consistently demonstrate that a multifactorial intervention is feasible and can be adhered to within practice in a variety of settings and that structured approaches generate improvements in a range of primary and secondary outcome and process measures – though the effect on falls per se has only been reported in two rather heterogeneous trials. They also demonstrate that even in institutional settings, among often frail cohorts of clients, even with a degree of cognitive impairment, high adherence rates to formal programmes of progressive strength/balance training can be achieved, which in turn has benefits beyond effect on fall rates. Exercise in each of the above cases was a component of a multifaceted intervention. Nonetheless, the recent falls guidelines from the National Institute for Clinical Excellence (NICE) have stated ‘Targeted and untargeted exercise as a single intervention cannot be recommended to reduce falls for older people at risk of falls in extended care settings’.

Disappointingly, another recent cluster RCT of 14 New Zealand care homes by Kerse et al. [20] showed that a programme of systematic individualised fall risk management for all residents using a fall-risk assessment tool, high-risk logo and strategies to address identified risks was associated with an increase in the incident rate of falls in the intervention homes compared to the control homes – though there are methodological concerns about the predictive validity of risk assessment tools and the effect of recording bias in this context [21].

In terms of the evidence base, having mentioned bone protection and the current balance of evidence against routine hip protector usage except perhaps in ‘high-risk clients’ [5], we should finally mention the role of bone strengthening. We know that the prevalences of osteoporosis and vitamin D insufficiency are high in care home settings. The seminal RCT from Chapuy et al. [22] among older female residents of sheltered accommodation and long-term care facilities in France did show striking benefits in fracture reduction from routine supplementation with calcium and vitamin D, with some effects attributable to the early effect of vitamin D on neuromuscular function (therefore falls and physical function) proven in a number of studies [23]. Consistent with these findings is the recent study by Bischoff et al. on 122 women in long-term geriatric care (mean age 85 years), showing that vitamin D and calcium compared to calcium alone for a 12 week treatment period reduced significantly the mean number of falls per person per week by a half, with recurrent fallers benefiting most [24]. This is still an area of some debate as neither NICE falls
guidelines [5] nor the recent draft NICE guidelines on osteoporosis [25] have given definitive guidance on routine supplementation specifically with calcium and vitamin D in care home settings, (rather than vitamin D alone, which is not recommended). There is, however, acknowledgement that ‘Calcium and vitamin D supplements should be advised in women who have low dietary calcium intake or who are at risk of vitamin D deficiency’. A number of ongoing studies may help to resolve this issue.

So where next? In research terms, there is a growing weight of emerging evidence for the effectiveness of multifactorial interventions, though there are still major gaps. Further large studies with adequate correction for clustering and adequate power to detect reductions in injury are required. Moreover, interventions specific to different care home populations need to be evaluated, as do single interventions (e.g. exercise; medication review; staff education; environmental safety; assistive technology). Cost-effectiveness and opportunity cost should be built into outcome evaluation. In the UK, there are two major streams of work in progress. One is the National Osteoporosis Society’s care home falls and fractures study. The multifactorial intervention – including a programme of staff education and falls/fracture risk assessment – has been offered to care homes in localities throughout the UK in a ‘Stepped Wedge’ design so that all care homes will receive intervention or control status within the 2 years of the study. Secondly, the Department of Health Policy research programme has commissioned streams of primary and secondary research on fall prevention in care homes.

In terms of evidence-based recommendations for good practice, there is probably sufficient evidence to advocate programmes of staff education, attention to environmental safety (including one recent trial suggesting that fractures can be prevented by the use of less resistant flooring [26]), medication review and adjustment (especially psychotropics) and assessment for common reversible falls risk factors in all clients – repeated should they fall. More controversially, despite the NICE statements, there is reasonable evidence for benefit of progressive exercise programmes as part of such ‘joined up’ approaches and for supplementation of biochemically deficient clients with high-dose calcium and vitamin D. With regard to hip protectors, the weight of evidence seems to be increasingly against their use. Despite promising early experiences, there is no good evidence from RCTs to support the use of assistive technology approaches such as bed/chair alarms, movement or falls detectors, nor can the routine use of bedrails be recommended on current evidence [27].

**References**


