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## Tailored group exercise (Falls Management Exercise — FaME) reduces falls in community-dwelling older frequent fallers (an RCT)

SIR—Frequent or recurrent fallers are more likely to have chronic medical conditions and physiological impairments, exhibit functional decline and have poor outcomes, than single fallers [1]. Fractures are also more common in recurrent fallers than single fallers [2]. Modern surgery for hip fracture can no longer improve on its outcomes [3] and therefore, effective prevention of falls [4, 5] is the key to preventing disability and death. There is still no published evidence that a single intervention (tailored group exercise) can prevent falls or injuries in a high risk group of frequent fallers.

This randomised controlled trial (RCT) aimed to investigate the impact of a 36 week individualised and tailored group and home exercise intervention, compared with a control intervention, in reducing falls and injuries in community-dwelling, independent-living, frequent falling women aged 65 years and over. Preliminary results have been published in abstract form [6]. The primary outcome was falls and fall-related injuries. The secondary outcome was the number of frequent fallers who had died, had moved into residential care or were in hospital compared with the group they were in.

## Methods

Women aged 65 years or over, living in their own home without help, and with a history of three or more falls in the

previous year, were eligible for inclusion into the study. Subjects with known medical reasons for their falls were not excluded. All subjects' GPs gave consent for their patients to take part in the exercise programme. Approximately 30% of those eligible and invited to take part enrolled in the trial. The trial received local Ethical Committee approval and all subjects gave written informed consent. For further information on study design, recruitment, exclusion criteria and drop-outs please see Appendix 1 in the supplementary data on the journal website (<http://www.ageing.oxfordjournals.org/>). Data are presented on the 50 exercisers and the 31 controls who completed fall data collection. Baseline assessments (Table 1) were collected for all subjects.

This trial differs from most in that there were prospective falls data collected for at least 36 weeks before the intervention started. Both groups completed daily falls diaries. (For further details of the diary kept please see Appendix 2 in the supplementary data on the journal website (<http://www.ageing.oxfordjournals.org/>). Diaries were returned every 2 weeks by post to the investigator, for a mean of 46.5 (SD 7.3) weeks at baseline, 36 weeks of intervention (set time period) and then a mean of 49.7 (SD 8.9) weeks in the follow-up period.)

The definition of a fall was given as 'an event which causes you to come to rest on the ground or other lower level unintentionally'. The subjects were asked not to record trips or slips ('a potential fall corrected'). Injurious falls were defined as those requiring medical attention and were coded. (For further details on the coding please see Appendix 2 in the supplementary data on the journal website (<http://www.ageing.oxfordjournals.org/>)). The information from the diaries was recorded by an observer blinded to the subject's group who also contacted subjects if diaries had not been returned for two weeks or more.

The controls were given a set of home exercises (consisting of seated warm-up, mobility, flexibility and cool-down exercises) to do twice-weekly for their intervention. This programme was considered unlikely to improve the components of fitness necessary to maintain postural stability.

The exercisers had pre-exercise assessments to assess individually asymmetry and specific problems with balance, strength and flexibility. They attended 36 weeks of Falls Management Exercise (FaME) [7] classes once a week for an hour, taken by qualified exercise-for-the-older-person instructors, with additional FaME programme training (and regular quality assurance). The OTAGO exercises [8] were core to both the home (twice a week for 30 minutes) and group programme but were progressed to more challenging balance exercises during the group sessions. The exercise classes were balance specific, individually-tailored and targeted training for dynamic balance, strength, bone, endurance, flexibility, gait and functional skills, training to improve 'righting' or 'correcting' skills to avoid a fall, backward-chaining and functional floor exercises. A full description of the exercise programming and progression has been published [7]. Hip protectors (SafeHip, Robinson's Healthcare, UK) were supplied for wear during the exercise sessions. Subjects also had a set of home exercises (20–40 minutes duration), aimed at reducing asymmetry [9] in strength of the lower limbs, to

perform twice a week. A copy of these exercises is available from the author.

The main analysis of falls data was performed on an intention to treat basis, on all who completed falls diaries (irrespective of whether they dropped out of the intervention or control group). The numbers of falls in the two groups were compared using negative binomial regression models, adjusting for baseline falls [10]. Time at risk was included in person-weeks, the intervention and follow-up periods for this analysis being combined. The number needed to treat was calculated from the proportion of controls and exercisers who did not fall during follow-up.

## Results

The mean (SD) age of the subjects was 72.8 (5.9) years. The average number of non-returns on the falls diaries was eight (four 'fortnightly' diaries), which corresponded with either holidays or injurious falls. There were no significant differences in the baseline assessments or fall rates between groups (Table 1).

Of those randomised to the exercise group of the trial, only 17% refused with another 10% dropping out of the exercise sessions after initial entry. There were no adverse events during the course of the exercise sessions.

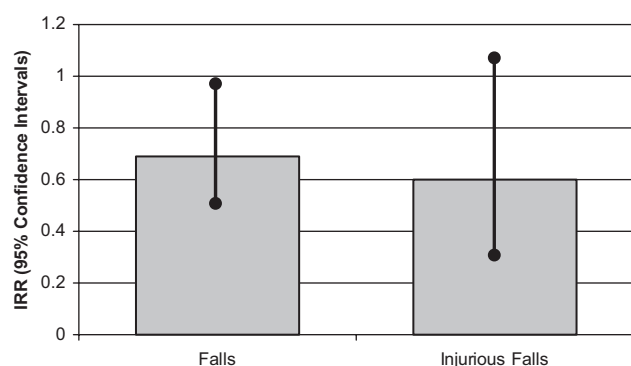
There was a total of 743 falls in both groups over the falls data collection period, with 293 (39.5%) occurring at home, and 20 (2.7%) leading to a fracture (including two hip fractures, one in each group). 37% cited a loss of balance or a change in level to be the cause of the fall, 49% cited a slip or trip. 7% of falls outside the person's home occurred on public transport and 10% on stairs.

There was a 31% reduction in the number of falls during the whole trial period for the exercise group compared with the control group (Figure 1, incidence rate ratio (IRR) from negative binomial regression model 0.69, 95% CI 0.50–0.96,  $P=0.029$ ). However, on further analysis, this reduction was totally due to the 54% reduction in falls in the follow-up period (IRR 0.46, 95% CI 0.34–0.63). When this analysis was repeated with only those who completed the intervention and follow-up periods, the IRR was 0.66 (95% CI 0.49–0.90). Negative binomial regression showed a trend in, but not a significant decrease in, injurious falls over the entire period

**Table 1.** Baseline characteristics of subjects

	Exercisers	Controls
Number of women	50	31
Age (years) <sup>a</sup>	72.7 (5.8)	73.2 (5.4)
Weight (kg) <sup>a</sup>	65.6 (9.9)	67.5 (10.7)
Height (m) <sup>a</sup>	1.57 (0.05)	1.57 (0.05)
Number of medications <sup>b</sup>	4 (0–9)	4 (0–8)
Number using walking aids (canes) (%)	9 (18.0%)	7 (19.4%)
Number able to rise from the floor unaided (%)	18 (36.0%)	13 (41.9%)
Mean fall rate (falls/week) <sup>a</sup>	0.09 (0.06)	0.09 (0.06)

All data as a mean (SD) except b median (range) and % where indicated. There were no significant differences between the groups.



**Figure 1.** Reduction in falls with 36 weeks of FaME group and home exercises. The inclusion of 1 denotes non-significance. Falls,  $P = 0.03$ ; injurious falls,  $P = 0.08$ .

(IRR 0.60, 95% CI 0.33–1.07,  $P = 0.08$ ), due to the small number of injuries.

The number of fallers among exercisers fell progressively from baseline through intervention to follow-up, while the number falling among controls did not. For further details please see Appendix 3 in the supplementary data on the journal website (<http://www.ageing.oxfordjournals.org/>).

At the end of the three year study, five out of the 50 exercisers (10%) had died, moved into residential care or were in hospital compared with 10/31 controls (32%). This difference was significant (Fishers Exact Test,  $P=0.017$ ).

## Conclusions

Frequent fallers have poor outcomes: 27% of people who fell three or more times in a year were admitted to hospital, transferred to nursing homes or died at one year follow-up [11]. The frequently falling women who undertook the 36 week FaME exercise programme fell significantly less compared with the control group, particularly in the follow-up period. By the end of this RCT, those who had taken part in the FaME exercises were less likely to be in hospital, have entered a nursing home or have died, than those who did not. Effective exercise can reduce the risk of a fall, help avoid a 'long lie' and can maintain threshold levels of strength and power necessary to remain independent [7]. Exercise can also help reduce fear, depression and associated avoidance of activities [12].

This trial provides generalisable evidence that individualised, progressive, balance and strength exercise reduces falls amongst community-dwelling frequent fallers. The lead in baseline period of the study has allowed comparison of the fall rates in the two groups before intervention and decreased the likelihood of the reporting rate during the trial being affected by the process of the reporting itself. This has helped ensure that similar results will be obtained outside a formal trial situation. The limitations of the trial can be found in Appendix 4 in the supplementary data on the journal website (<http://www.ageing.oxfordjournals.org/>).

This trial concurs with recent guidelines that effective exercise for falls prevention needs targeted approaches and specifically trained professionals [13]. The Chang Review [5]

showed multifactorial interventions were most effective at reducing falls (RR 0.82, 95% CI 0.72–0.94, number needed to treat 11) but that the pooled effect of exercise only programmes in those at risk of falls was RR 0.86 (CI 0.75–0.99, number needed to treat 16). FaME, directed at frequent fallers, was highly effective (IRR 0.69, number needed to treat 5) and if combined with a multifactorial intervention seems likely to provide the greatest benefit to community-dwelling frequent fallers. Perhaps the largest benefit to the women in the FaME groups was reduction in isolation (increased ability to use public transport) and increased social contact. They founded the 'Fallen Angels' club and still meet regularly.

A health service challenge must be to ensure a continuum of provision to fill the current gap in physical activity provision between the hospital-based rehabilitation setting and the much more active 'senior' exercise community classes. Currently, rehabilitation groups last between 6 and 10 weeks with the person being discharged back into the community only to return at a later date having fallen again. Yet, the majority of published effective exercise programmes have had durations over 36 weeks [4, 5]. A recent British Geriatrics Society Survey on Falls Services provision in the UK was disappointing, only 69% suggesting a formal exercise programme was part of their service and 41% of exercise programmes reported no strength or balance training, the two key components of a successful exercise programme for fallers [14].

This RCT shows that tailored, balance specific group and home exercise can prevent falls in people at high risk. The evidence base is changing faster than guideline developers can assess it, with the risk that any clinical guidelines, such as the NICE guidelines on falls prevention [15] may rapidly become out of date as soon as they are published.

## Key points

- Community-dwelling women aged 65 years or over with a history of frequent falls, undertaking a 36 week individualised balance and strength retraining group and home exercise programme (FaME) were significantly less likely to fall than the women who did not take part in FaME. This was particularly evident in the follow-up period.
- Women with a history of frequent falls generally have poor outcomes. Taking part in the FaME exercise programme lessened the chances of hospitalisation, nursing home admission or death.
- Long-term, regular, tailored, strength and balance exercise should be a referral option for any evidence-based interdisciplinary falls prevention programme and should be led by trained, specialist instructors with regular quality assurance.

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## Conflicts of interest

None.

DAWN SKELTON<sup>1\*</sup>, SUSIE DINAN<sup>2</sup>, MALCOLM CAMPBELL<sup>1</sup>,  
OLGA RUTHERFORD<sup>3</sup>

<sup>1</sup>*School of Nursing, Midwifery & Social Work,  
The University of Manchester, Coupland III, Oxford Road,  
Manchester M13 9PL, UK*

*Tel: 0161 275 5336 Fax: 0161 275 7556  
Email: dawn.skelton@manchester.ac.uk*

<sup>2</sup>*Department of Primary Care and Population Sciences,  
Royal Free and University College London Medical School,  
Upper 3rd Floor, Royal Free Campus, Rowland Hill Street,  
London NW3 2PF, UK*

<sup>3</sup>*Division of Physiology, Shepherd House,  
King's College London, Guy's Campus,  
London Bridge, London SE1 1UL, UK*

*\*To whom correspondence should be addressed*

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## Age-related differences in smoking cessation advice and support given to patients hospitalised with smoking-related illness

SIR—Cigarette smoking is a major public health concern accounting for 17% of all deaths and over 80% of deaths from chronic obstructive pulmonary disease (COPD). Much of the morbidity and mortality from smoking is preventable through effective smoking cessation. The British Thoracic Society Guidelines on smoking cessation highlight the effectiveness of smoking cessation strategies in terms of life-years gained[1, 2], and recommend that opportunistic advice should be given in community and hospital settings, with specialist service support if required. They also highlight the need to document provision of advice in the patients' medical records.

One cessation strategy of recent interest is the 'teachable moment', a short-term opportunity, as brief as 10 minutes, enabling health professional/patient interaction whereby smoking behaviour can be influenced[3]. However, in the acute medical setting, clinical pressures may result in inadequate time for such support to be provided.

Benefits from smoking cessation can be obtained regardless of age (certainly up to 80–85 years, particularly in women) or presence of disease, and mainly comprise morbidity compression including reduction in progression of COPD, reduced cough/sputum, and reduced risk of ischaemic stroke and myocardial infarction within 2–3 years of cessation [4–7].

There is no consistent association between age and stage of readiness to quit smoking although, of those who plan to quit, the elder age group are most likely to succeed over the subsequent three months [8, 9]. Patient insight into association between their illness and smoking behaviour is also an important factor in successful cessation. Although the elderly are more likely to underestimate smoking risks, those older patients who see the connection