Posthospital Falls Prevention Intervention: A Mixed-Methods Study

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Objective: Posthospital discharge shows increased risk for falls in older people. This pilot study was created to determine feasibility and acceptability of a community-delivered posthospital multifactorial program. **Method**: This mixed-method study used randomized controlled design (quantitative component) and interviews (qualitative component). People aged ≥65 years, hospitalized for a fall, underwent assessment for quality of life and falls-related outcomes, followed by interviews, randomization into intervention (exercise, medication review, and education) or control group, and follow-up at 6 months. **Results**: Thirteen people commenced, with 10 people assessed at 6 months. Participants were complex with high degrees of frailty, multimorbidity, polypharmacy, and falls risk. Interview data related to intervention, impacts on quality of life, and fall-related outcomes. **Conclusion**: Preliminary findings suggest suitability of a multifactorial program for older people posthospital discharge following a fall. A social component would be a useful addition to falls prevention strategies, utilizing existing community nursing organizations.

Keywords: education, exercise, medication, older

Falls are a serious problem in the community, with one-third of people over 65 years of age falling each year (Lord, Ward, Williams, & Anstey, 1993). In Australia, falls are the leading cause of hospitalizations due to injury, accounting for 70% of admissions for people aged over 65 years and 87% in people aged over 85 years (Australian Institute of Health and Welfare, 2013). Falls also contribute to over 30% of injury-related deaths (Australian Institute of Health and Welfare, 2014).

Discharge from the hospital is a time of increased risk of falls, with up to 40% of older people falling within 6 months of discharge and 50% of these falls resulting in injury (Hill et al., 2011). Over half of older people presenting to an emergency department for a fall will fall again within 6 months, with 49% resulting in hospitalization (Close et al., 1999). Functional capacity and physical health are impacted by these falls and hospitalizations (Ehlenbach, Larson, Curtis, & Hough, 2015; Mudge, O'Rourke, & Denaro, 2010). Psychosocial impacts may include loss of confidence, fear of falling, anxiety, and decreased quality of life (Haines et al., 2009; Vaapio, Salminen, Ojanlatva, & Kivelä, 2008), potentially resulting in social isolation, increased frailty, and activity avoidance (Parry et al., 2016). In addition, the economic impact of falls on the health system is high, with costs predicted to rise to approximately $1.4 billion by 2051 (Moller, 2003).

Strong evidence exists for the effectiveness of community-based falls prevention programs, particularly multifactorial programs (Gillespie et al., 2012). Home-based exercise programs, including strength and balance components (e.g., The Otago Exercise Programme) have also been shown to reduce both the risk and rate of falls (Gillespie et al., 2012; Sherrington, Tiedemann, Fairhall, Close, & Lord, 2011). The Australian best practice guidelines recommend medication review and modification of medication regime as part of multifactorial approaches to falls prevention, particularly related to withdrawal of falls risk-inducing drugs (FRIDs; Australian Commission on Safety and Quality in Healthcare, 2009) that may impair balance and coordination and/or promote sedation (Milos et al., 2014). Education is a further important component of multifactorial programs addressing low levels of falls and falls prevention knowledge among older adults and a possible belief that they are not at risk of falls (Haines, Day, Hill, Clemson, & Finch, 2014).

Targeting adults for falls prevention posthospitalization is an important public health challenge, as limited evidence exists for interventions specifically for older people. Despite a plethora of falls prevention studies over two decades, less than 10 studies have evaluated community-based interventions for groups of people at high risk of falls. Most of these studies have focused on single intensive occupational therapy or medical assessments with onward referrals (Close et al., 1999; de Vries et al., 2010; Hendriks et al., 2008; Lightbody, Watkins, Leathley, Sharma, & Lye, 2002; Pardessus et al., 2002; Russell et al., 2010; Shaw et al., 2003; Whitehead, Wundke, Crotty, & Finucane, 2003), with only one showing a significant effect on secondary falls (Close et al., 1999). Functional and psychological impacts of falling, such as fear of falling, quality of life, frailty, and FRID use, have only been measured sporadically. None of the above-mentioned studies included a qualitative component, which is important in understanding the *how* and *why* (Strauss & Corbin, 2008) behind the possible effectiveness of falls prevention programs.

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There is a clear evidence gap for effective falls prevention interventions for older people returning to the community after being hospitalized for a fall. This mixed-methods pilot study aimed to identify the feasibility and acceptability of a posthospital falls prevention program, incorporating exercise, medication review, and education.

Method

Design

A mixed-methods sequential explanatory design was chosen, with qualitative data used to assess and explain the trends, and reasons behind the trends, of the quantitative data (Creswell & Plano Clark, 2011). This pilot study used a parallel pragmatic randomized controlled trial design for the quantitative component and face-to-face interviews for the qualitative component.

The study was conducted within a large nonprofit community home nursing organization in Melbourne, Australia. Ethical approval was obtained from the Institutional Human Research Ethics Committee (HREC No. 150008).

Participants

Potential participants were people aged over 65 years being discharged home after hospitalization for a fall, identified through the community home nursing organization's liaison personnel based within five metropolitan hospitals. Liaison personnel routinely assist with organizing appropriate community healthcare services on discharge from the hospital. Eligible participants were approached by the liaison personnel and provided with verbal explanation of the study and an expression of interest flyer. Liaison personnel gained the person's permission to be contacted by the research team after discharge from the hospital. A phone call was made by one of the study team (second author) to interested participants within 1–2 weeks of discharge to provide further explanation of the study and book an initial appointment. Participant information and consent forms were sent prior to the appointment, with written and verbal consent gained at first visit.

Inclusion criteria for the study were as follows:

a. new or existing clients of the community home nursing organization;

b. recently discharged from an acute or subacute hospital within metropolitan Melbourne after being admitted for a fall;

c. aged 65 years and over; and

d. deemed medically fit to participate by the individual's general practitioner.

Exclusion criteria included: weight-bearing restrictions on discharge, medically unstable, terminal stage of an illness, or if a participant was referred by the hospital to a specific falls prevention service at the point of discharge.

Baseline Data Collection

Baseline data collection was conducted in the person's home at a mutually convenient time.

Demographic Data Collection

Demographic details collected included: age, sex, education level, ethnicity, health conditions, health service usage, and length of hospitalization.

Quantitative outcome measures.

a. *Health-related quality of life (primary outcome measure)* was assessed using the assessment of quality of life-8 dimensions (AQoL-8D) (Richardson, Khan, Chen, Iezzi, & Maxwell, 2012). The AQoL-8D measures quality of life in the following dimensions: independent living, senses, pain, mental health, happiness, self-worth, coping, and relationships. High quality of life is defined as ≥0.84 indicating higher than the age-related norm, with low defined as <0.84 indicating lower than the age-related norm;

b. *Falls risk* was assessed using the Falls Risk for Older Person—Community (Russell, Hill, Blackberry, Day, & Dharmage, 2008). Grading of falls risk was low falls risk (0–15), mild to moderate falls risk (16–24), and high falls risk (>24), with a maximum possible score of 63. Retrospective falls history was also assessed using this tool;

c. *Fear of falling* was assessed using the Falls Efficacy Scale—International (Yardley et al., 2005). The Falls Efficacy Scale—International identifies ongoing concerns about falling which ultimately limit the performance of activities of daily living. Total scores range from 16 to 64, with higher scores indicating increased fear of falling;

d. *Frailty* was assessed using the Fried Frailty Criteria (Fried et al., 2001). Five criteria were used to define frailty: weight loss, exhaustion, physical activity, walk time, and grip strength. If ≥3 criteria were positive, the older person was deemed frail. For 1–2 positive criteria, the older adult is considered prefrail and considered not frail if no criteria are positive;

e. *Physical function* was assessed using the Katz Index of Independence in Activities of Daily Living Scale [28] for level of independence and functional status in five daily activities—bathing, dressing, toileting, continence, and feeding. A score of 6 indicates full function, 4 indicates moderate impairment, and 2 or less indicates severe functional impairment; and

f. Number of falls risk inducing drugs (FRID) was assessed via medication lists gained through Falls Risk for Older Person—Community. Falls risk-inducing drugs were identified using Sweden's National Board of Health and Welfare FRID list (Milos et al., 2014).

Qualitative component. Semistructured interviews were conducted using the following questions, audio-taped and professionally transcribed:

a. Can you tell me a little bit about the fall that you had? Do you know why the fall happened?

b. As a result of the fall, has your confidence in getting about changed at all? What about your independence in getting about?

c. As a result of the fall, have you changed anything that you do, either around the house or in getting out and about like you usually do?

d. When you were in the hospital for the fall, did anyone speak to you about falls or falls prevention? Did anyone give you any written information about falls or falls prevention?

e. When you were being discharged from the hospital, did anyone give you information about where you could go to reduce your risk of falls? Were any referrals made for you?

Group Allocation

Randomization occurred using a block-generated random number schedule. To ensure concealed randomization to groups, the

randomization schedule was generated in advance by a member of the study team (D. Goeman) who was not involved in participant recruitment, interviews, or assessments. Group allocation occurred postbaseline assessment. Baseline and follow-up assessments were conducted by a team member (C. Meyer) blinded to group allocation. All participants continued to receive usual care from a variety of community and healthcare services.

All participants received monthly phone calls to ascertain details of any recent falls. A fall was defined as "an event which results in a person coming to rest inadvertently on the ground or floor or other lower level" (Lamb, Jorstad-Stein, Hauer, & Becker, 2005).

Intervention Arm

Further assessment to inform the intervention was undertaken at the first intervention visit, including:

a. Five-Time Sit-to-Stand test

A functional measure of lower-limb strength, with the person standing up and sitting down as quickly as possible (47-cm chair height) five times (Lord, Murray, Chapman, Munro, & Tiedemann, 2002)

b. Four-Test Balance Scale

A set of four timed static balance tasks of increasing difficulty—feet together, semitandem and tandem stand, and one-leg stand (Rossiter-Fornoff, Wolf, Wolfson, Buchner, & FICSIT Group, 1995)

c. Timed Up and Go

A quick and reliable test of functional mobility, whereby a person is timed to rise from a chair, walk 3 m, turn, walk back to the chair, and sit down (Podsiadlo & Richardson, 1991)

The 6-month intervention program included (a) a home-based exercise program; (b) medication review; and (c) falls prevention education, plus usual care.

Exercise program. The home-based exercise program was delivered by an exercise physiologist based upon the Otago Exercise Programme (graduated lower-limb strengthening and balance exercises, individually prescribed and modified according to pre-existing frailty). In accordance with the Otago Exercise Programme protocol, the exercise physiologist visited at 1, 2, 4, and 8 weeks for exercise progression, providing diagrams of exercise for reference and instruction on exercise safety. Participants were asked to undertake a 20- to 30-min exercise program three to five times per week for the duration of the intervention (6 months). A log book/calendar was used to record exercise activity and additional comments about the effects of exercise (e.g., exercise difficulty, muscle soreness, barriers to exercise). Motivation was also enhanced by regular phone calls (used to collect falls data), plus encouragement from the participant's primary nurse who regularly visited for other matters.

Medication review. A medication review specifically looking at FRID use was conducted by a pharmacist with Home Medicines Review accreditation. The review and pharmacist-led education about FRID medication took place in each participant's home after the first baseline visit. A report was written by the pharmacist for the participant's general practitioner, with a follow-up phone call to discuss recommendations with the general practitioner.

Education. The exercise physiologist delivered falls prevention education at each home visit and during monthly phone calls, in addition to providing a falls prevention booklet. Education included: personal risk factors (health, mobility, medicines, vision, footwear); environmental risk factors (home and garden); how to reduce injuries; and planning to get help in the event of a fall.

Control Arm

Participants in the control group also received the falls prevention booklet and monthly phone calls to ascertain details about any recent falls.

6-Month Data Collection

Outcome measurements collected at baseline were repeated at 6 months for all participants. In addition, all participants were interviewed to explore their perceptions of the 6-month period since hospital discharge and, for those in the intervention group, of the feasibility and acceptability of the intervention. As far as possible, the interviewer (C. Meyer) was blinded to group allocation during the interview until intervention questions were asked.

All interviews were conducted in participants' homes, audio-recorded, professionally transcribed, and checked for accuracy against the original recording (C. Meyer).

Data Analysis

Frequency analysis was undertaken for all demographic data. Number of falls was calculated for all participants using monthly phone call information. Falls rate for the intervention and control group was calculated per 1,000 days.

Although this pilot study required no formal sample size calculation, outcome data were analyzed using paired sample t tests to compare pre- and postscores, and independent sample t tests to compare groups (intervention vs. control). All statistical tests were two-sided and p values considered significant at <.05. Statistical Package for Social Scientists (version 21; IBM Corp., Armonk, NY) was utilized.

For qualitative data, initial descriptive topic coding was undertaken independently by two reviewers (E. Renehan and C. Meyer), guided by the interview questions. Open coding followed to identify recurring patterns within the data. Codes were applied to the data and then grouped according to key variances and similarities, contextualized with emerging phenomena. A third reviewer (D. Goeman) appraised any discrepancies.

Results

Baseline Findings

Approximately 60 people were approached to participate; 37 agreed to be phoned by the research team, and 13 undertook the baseline assessment. Baseline assessments were of approximately 1-hr duration, with the interview component taking an average of 20 ($SD = 7$) minutes, ranging from 11 to 30 min. Participants had an average age of 82.2 years ($SD = 9.7$), with slightly more females than males (53.6%). The majority lived alone in the community or retirement villages (92.3%) and over half were widowed (53.8%). On average, participants had 5.6 ($SD = 2.7$) health conditions, utilized 7.8 ($SD = 2$) health services, and were prescribed 11.0 ($SD = 5.3$) medications. Most participants reported two or more falls in the past 12 months, equating to a retrospective falls rate of 5.3 falls per 1,000 days. Over half experienced severe injury from their most recent fall (53.9%; see Table 1 for details). Fall locations

Table 1 Baseline Characteristics

	All participants (n = 13)	Intervention group (n = 7)	Control group (n = 6)
Age (years; mean ± SD)	82.2 ± 9.7	84.0 ± 6.4	75.8 ± 11.6
Gender (%)	• Female: 53.8 • Male: 46.2	• Female: 57.1 • Male: 42.9	• Female: 50.0 • Male: 50.0
Highest education level (%)	• Primary: 15.4 • Secondary: 46.2 • Tertiary: 38.4	• Primary: 0 • Secondary: 71.4 • Tertiary: 28.6	• Primary: 33.3 • Secondary: 16.7 • Tertiary: 50.0
Identified ethnicity (%)	• Australian: 84.6 • Indian: 7.7 • Aboriginal and Torres Strait Islander: 7.7	• Australian: 85.7 • Indian: 14.3	• Australian: 83.3 • Aboriginal and Torres Strait Islander: 16.7
Marital status (%)	• Widowed: 53.8 • Divorced/separated: 23.1 • Never married: 15.4 • Married: 7.7	• Widowed: 57.1 • Divorced/separated: 28.6 • Never married: 14.3 • Married: 0	• Widowed: 50.0 • Divorced/separated: 16.7 • Never married: 16.7 • Married: 16.7
Living arrangements (%)	• Lives alone—community: 76.9 • Lives alone—retirement village: 15.4 • Lives with spouse—community: 7.7	• Lives alone—community: 71.4 • Lives alone—retirement village: 28.6 • Lives with spouse—community: 0	• Lives alone—community: 83.3 • Lives alone—retirement village: 0 • Lives with spouse—community: 16.7
Number of health conditions (mean ± SD)	5.6 ± 2.7	4.7 ± 1.5	6.7 ± 3.5
Number of health services utilized (mean ± SD)	7.8 ± 2.0	7.1 ± 1.8	8.5 ± 2.2
Number of medications (mean ± SD)	11.0 ± 5.3	11.3 ± 3.2	10.7 ± 7.4
Length of hospital stay (days; mean ± SD)	13.8 ± 15.9	7.2 ± 5.4	20.4 ± 20.5
Number of falls in past 12 months (mean ± SD)	1.9 ± 0.9	1.9 ± 1.1	2.0 ± 0.6
Injury from most recent fall (%)	53.8	42.9	66.7
severe (e.g., fracture)	7.7	14.3	0
minor, no medical attention	15.4	28.6	0
minor requiring medical attention	23.1	14.3	33.3

were inside the home (38.5%), outside the home (30.8%), and in the community (30.8%). Causes of the falls were broad ranging and included trips (23.1%), slips (15.4%), loss of balance (15.4%), fainting (15.4%), dizziness (7.7%), knees gave way (7.7%), and unknown (23.1%).

Thirteen people were randomized into the intervention arm ($n = 7$) and control arm ($n = 6$). Figure 1 shows trial progress of participants. Ten participants completed 6-month assessments, an average of 205 ($SD = 9.1$) days after baseline assessment ($n = 5$ for intervention arm, $n = 5$ for control arm). Reasons for withdrawal from intervention were not interested ($n = 1$) and death ($n = 1$); and for the control group, ill health ($n = 1$). Demographic data are displayed in Table 1.

Overall, participants in both groups were at high falls risk at baseline: intervention participants with a mean Falls Risk for Older Person—Community score of 21.9 ($SD = 2.7$) and control group participants with a mean score of 22.7 ($SD = 4.5$). Quality of life (AQoL-8D) scores were lower than age-related norms for both groups at baseline: intervention group mean = 0.53 ($SD = 0.12$), control group mean = 0.49 ($SD = 0.13$). About 69.2% of the cohort were classified as frail at baseline (57.1% intervention group, 83.3% control group), whereas the remainder were considered prefrail. Most participants had independent functional capacity (57.1% for intervention group, 50% for control group). Participants in both groups used an average of three FRIDs at baseline (ranging

from 2 to 4 in the intervention group and 0 to 7 in the control group).

Trial Outcomes

Overall, five falls were reported over the study period, three in the intervention group (by two people), and two in the control group. Falls rate for the sample was 2.4 falls per person per 1,000 days. Four postdischarge falls resulted in rehospitalization (concussion, chest pain, symptomatic atrial fibrillation, and ankle injury) and one required minor medical attention (head laceration). Reasons for the falls reported by participants included dizziness/fainting ($n = 3$), slipping on a wet floor ($n = 1$), and tripping in the home ($n = 1$). Health service usage was similar pre- and postintervention, with 7.8 ($SD = 2.0$) services used at baseline and 7.1 ($SD = 1.8$) services used at 6 months for intervention group and 8.5 ($SD = 2.2$) for control group.

Participants received on average seven home visits ($SD = 1.7$) for exercise and education delivery with monthly phone calls. Home visit frequency was slightly higher than the Otago programme specifications, accounting for individualized adjustments of the program for those who had been ill or admitted to a hospital. No participants fully completed their exercise log book/calendar; therefore, adherence to exercise was unable to be quantified. Anecdotally, the exercise physiologist noted participants completed
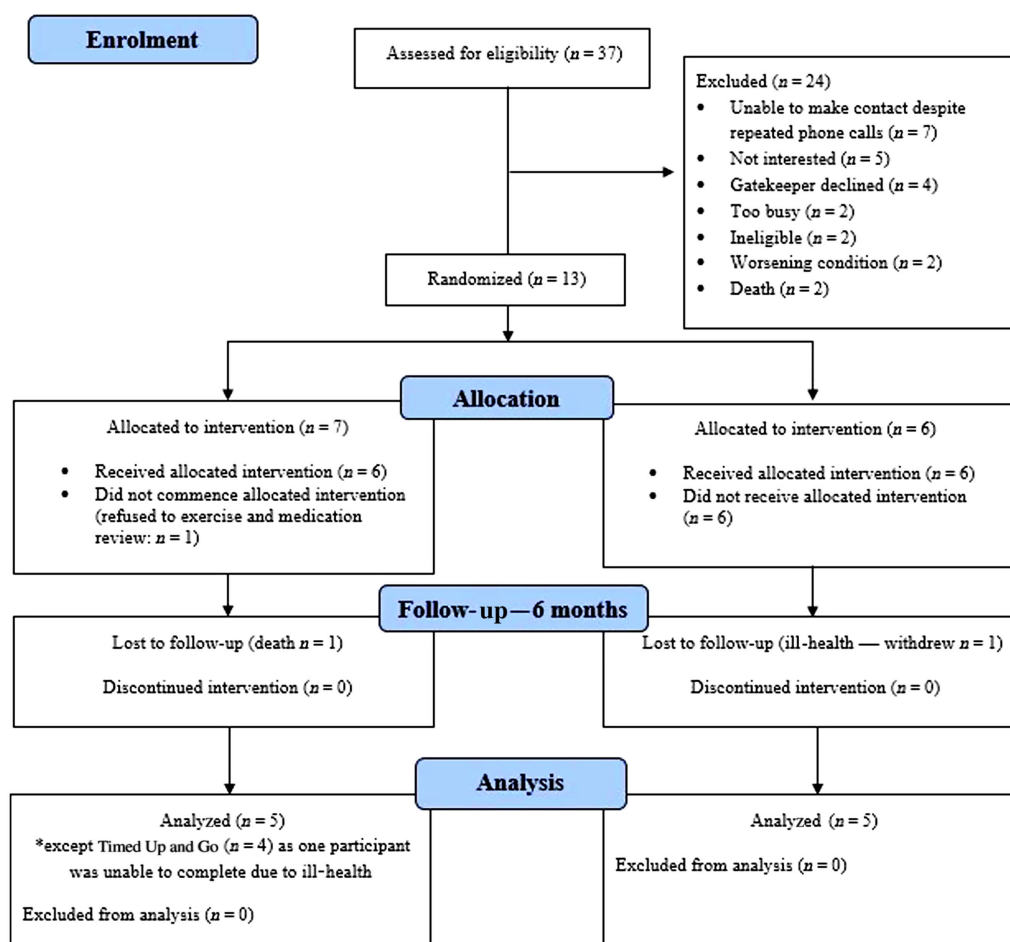

Figure 1 — Participant flow.

exercises when she was present, with minimal independent completion of exercises between visits. For medication review, pharmacists visited participants at home on average 20.5 ($SD = 11.6$) days after their baseline visit to complete the one-off medication review.

At 6 months, there was a trend toward reduction in falls risk from high to mild–moderate for both groups, with fear of falling decreasing slightly in the control group and increasing slightly for the intervention group at 6 months (Falls Efficacy Scale—International score). Eighty percent of intervention group participants ($n = 4$) had one FRID ceased by 6 months, whereas none of the control group ceased a FRID. For quality of life, there was essentially no change for intervention or control group participants over 6 months (Table 2). Fifty percent of the cohort improved their frailty score from frail to prefrail by 6 months (60% intervention group, 80% control group), with none returning to "not frail." Change in independence in activities of daily living was variable, with 40% reporting improvements (one intervention, three control), 30% reporting the same level (one intervention, two control), and 30% reporting decreases (all intervention) at 6 months (Table 3).

Qualitative Findings

Overall, eight key areas were identified in line with questioning, categorized under three domains. For "*feedback on intervention,*" identified themes were "benefits of the intervention," "reasons for nonadoption of intervention," "suggestions for improvement," and "potential confounders for control group." "*Impacts on quality of life*" was a theme on its own, with "*falls outcomes*" subdivided into "falls prevention is common sense," "I don't want to have another fall," and "I know how to fall."

Feedback on intervention. From the interviews, three areas emerged in relation to the intervention: benefits of the intervention, reasons for nonadoption of intervention, and suggestions for improvement.

Benefits of the intervention: Most participants felt the exercise intervention had been helpful and increased their concentration, range of motion, and/or confidence levels, despite this not being supported by the quantitative fear of falling data. Some participants

Table 2   Outcomes at Baseline and 6 Months

	Intervention group		Control group	
	N	(mean ± SD)	N	(mean ± SD)
Quality of life—AQoL-8D (score range 0–1)				
baseline	7	0.5 ± 0.1	6	0.5 ± 0.1
6 months	5	0.5 ± 0.1	5	0.6 ± 0.2
Falls outcomes				
falls risk—FROP-Com (score range 0–63)				
baseline	7	21.9 ± 2.7	6	22.7 ± 4.5
6 months	5	19.2 ± 6.8	5	19.2 ± 6.8
fear of falling—FES-I (score range 0–64)				
baseline	7	31.6 ± 6.9	6	33.5 ± 6.7
6 months	5	36.0 ± 11.8	5	30.2 ± 10.2

Note. AQoL-8D = assessment of quality of life-8 dimensions; FROP-Com = falls risk for older person—community; FES-I = falls efficacy scale—international.

expressed a desire for the exercise support to continue, as they felt they were not as confident in falls prevention as they could be:

> Yes, good. [name] she came here the other day. She gave me the exercises. I like it, yeah. I mean it's good for me for movement and this and that. It's very good, I feel confident in what she does. . . . They have helped me a lot. She came the other day and I wish she can come again, you know, just give me that little bit of confidence. (P12, female, intervention group)

> Very helpful indeed, yes. Well, it stopped me having falls, I'm sure . . . certainly the exercises were wonderful. They concentrate your mind, as they say. . . . So, I think the program is an excellent one. (P1, female, intervention group)

The education and medication review components were less frequently commented on; however, one family member, coincidentally present during interview, commented on his mother's blood pressure medication, "She was on two before all of this occurred and now it is down to one after the review of her medication." In contrast, another person did not respond positively to the medication review.

> She did, she threw out most of the bloody things I've had to go and buy again. My calcium tablets, oh and my—oh, little red pills I have, I could have throttled her [laughs]. I said I'm going back on them. . . . I know my calcium and if my calcium gets low, I'm in danger . . . but she said, no you don't need them anymore, your calcium's right. (P3, male, intervention group)

Reasons for nonadoption of intervention: Participants reported noncompletion of exercises between exercise physiology visits due to being too lazy, lacking motivation, having poor memory, and/or feeling their current activities were sufficient and extra exercises were not necessary.

> I was too bloody lazy [laughs]. I couldn't be bothered . . . sometimes I forget them. (P3, male, intervention group)

> I can't be bothered. . . . I think, well, they're not necessary, you know? That's my attitude with the exercises and yet I know they are good for me. (P5, female, intervention group)

Memory may also have impacted people's perceptions of medication reviews, with little recall of the pharmacist visit or outcomes of the visit.

> I've got a vague idea that they did check my medication. . . . I thought, oh, that's strange that they're checking my medication. (P8, female, intervention group)

Suggestions for improvement: Potential improvements for future programs included suggestions for more frequent exercise physiology visits to assist exercise adherence.

> Too long I think. Oh, because she would ask me when she would come have I been doing the exercises and I have to be truthful and say no, whereas if she came earlier, I would do the exercises. (P5, female, intervention group)

Potential confounders for control group: Quantitative data analysis, supported by the interview findings, showed the control group (usual care not withheld) at 6 months receiving a greater amount of health services, such as personal care, physiotherapy, or podiatry, instigated by family members or healthcare services post subsequent falls or hospitalizations, than the intervention group.

Some services have been increased. My caretaker, they're going to be increased to three days a week now because it's just, like I can get myself something to eat but that's about it. It's like I have to wait until somebody's here before I shower because I'm worried that I'm going to fall. (P11, male, control group)

Most people in the control group made specific mention of non-trial-related exercise interventions (physiotherapy, tai chi) for injury and/or balance rehabilitation postfall.

Physio is working on me. I'm going once a week. . . . She's very good. . . . She works on the shoulder and my hip. She gives me exercises when I'm in there. (P6, female, control group)

I'd fractured two vertebrae. That's why I'm still having trouble because they said there's nothing you can do, just painkillers and rest. Since then I've been doing everything that they said to do—exercises. I have a physio come in once a week. She gives me a massage and puts me through exercises. (P13, female, control group)

I've also had the physiotherapist, and she sort of gave me exercises to do and balance things and took me walking. . . . I don't do them now. . . . I'm doing tai chi on Monday afternoon and Friday afternoons. That should help, I think. (P7, female, control group)

Impacts on quality of life. People in the intervention group expressed concerns related to quality of life such as a decrease or restrictions in activities (social and physical), other health conditions, and feeling housebound.

As far as company and interrelationships with other human beings, I have very little [quality of life] except my son and daughter. But I'm with a group now, which I enjoy enormously. I didn't so much for about three or four weeks, but now I don't think they can stop me but there's plenty of competition. . . . It's been a great help, just the once a week. . . . I can't go anywhere because I can't go on my own. (P1, female, living alone, intervention group)

The quality—yes, because I'm used to flitting in, in and out and up the street and down, and doing all those things. Now I just sit by the window, watching the birds go by. (P8, female, living alone, intervention group)

Conversely, all control participants showed small increases in their quality of life scores at 6 months, expressed through interviews as being back in their old routines, having strong family and friend support networks, and/or increased social/physical activities.

I go to the center for lunch and then have the tai chi and do the craft on the Wednesday. . . . That helps with my concentration. . . . The psychologist comes once a fortnight. She's been wonderful, encouraging me and challenging me [laughs]. I felt that I couldn't let her down, so I've made a special effort. (P7, female, living alone, control group)

No, I think it's improved, yeah. I'm well looked after. That's the main thing. The two girls look after me beautifully, but then I've got another two from the congregation. (P13, female, living alone, control group)

Improved quality of life was also evident for another person in the control group who moved into a residential care facility during the study period, with subsequent relief of previous caregiving duties and creating meaning in his new environment.

Excellent, really good. You've only got to look around this room and see how I've created different things. . . . This is what I've suddenly realized that I can make my life 100 percent better by being aware I can create all this. . . . This is the beauty of this place, they give you all your meals and do all your washing for you and then come in of a night and tuck you into bed. . . . I've created a whole new atmosphere in this place by making them laugh. (P2, male, moved to residential aged care, control group)

Falls outcomes. From the interviews, three key themes emerged in relation to falls outcomes: "falls prevention is common sense," "I don't want to have another fall," and "I know how to fall."

Falls prevention is common sense: Participants had mixed responses regarding the importance of preventing falls. For some, there was a need to be aware and careful.

To prevent falls? Well, I think at all times you've got to be aware that—I've only got to misjudge going off the path. . . . A couple of times I've gone off the path with my walker and gone over, but the fence saved me each time. I put my hand out and got my balance, straighten the walker up. (P2, male, moved to residential aged care, control group)

However, most participants negated the importance of falls prevention, either stating that they did not think they were going to fall or viewing falls as careless and falls prevention as common sense.

Not particularly because I don't think I'm going to fall. That's the whole thing, the way I look at it. I'm not going to fall. (P5, female, living alone, intervention group)

I was moving too quickly . . . that was carelessness really and sandals that I hadn't worn before and won't wear again. No, I don't think so. I think it's just . . . common sense really for me now. (P6, female, living alone, control group)

I don't want to have another fall: Noncommittal views about falls prevention were expressed, yet at the same time most were concerned about future falls, including the impact on confidence and potential injury.

It just fixes your confidence, you know . . . because what did I do, I didn't do anything. (P1, female, living alone, intervention group)

I am worried about—concerned about falling, obviously. Yeah, well, because anything, you know, with the hard surfaces is always going to be worse than, say, perhaps the carpet. Although, depending on the way I fell, if I hit my head and then went down then that could cause damage to the neck. So it's—I'm constantly looking at things and assessing how the best way to do it. (P11, male, living alone, control group)

Taking care and not rushing were commonly stated as strategies to prevent falls.

I try to be careful, that is the one thing I do try to be careful when I am walking and all that, see how I am walking and where I am going. . . . I don't want to rush and go in there and

Table 3   Categorical Outcome Measures all Groups

	N	Intervention group	N	Control group
Frailty				
presence of frailty (Frailty Index)				
baseline (%)	7	• Prefrail: 42.9 • Frail: 57.1	6	• Prefrail: 16.7 • Frail: 83.3
6 months (%)	5	• Prefrail: 60.0 • Frail: 40.0	5	• Prefrail: 80.0 • Frail: 20.0
Physical function				
functional capacity (Katz ADL)				
baseline (%)	7	• Level A: 57.1 • Level B: 28.6 • Level C: 14.3	6	• Level A: 50.0 • Other: 33.3 • Level B: 16.7
6 months (%)	5	• Level A: 40.0 • Level B: 20.0 • Level C: 20.0 • Level D: 20.0	5	• Level A: 60.0 • Level B: 20.0 • Level C: 20.0

Note. ADL = activities of daily living.

things like that. I don't want to have another fall. (P12, female, living alone, intervention group)

I worry that I'll fall when I try to speed up and say I've got to do this quickly because I've got to do this next thing. I might do it quickly well—or I tend to say, well, I've done it too fast. So I'm aware that I can fall just as easy as the next one. (P2, male, living in residential aged care, control group)

By contrast, two participants reported that falling did not bother them, related to their belief in being "sensible" and that other health issues were more pressing than a "minor" fall.

No, because now I'm extra, extra careful and I think, oh don't do that. I feel a bit wonky, I say, oh watch yourself. . . . That's one thing I'm sensible about. I'm not sensible about anything else. (P8, female, living alone, intervention group)

Well a fall, that's the minor thing. . . . Then they discovered something and cancer. We're getting to learn to live with it. (P3, male, living alone, intervention group)

I know how to fall: Of note was a lack of concern in the potential for injury from a fall, despite being concerned about falling. For some, there was a belief that they knew the best way to fall to minimize injury.

No, because as I start to suddenly be aware I go grab that, I've got balance then and that's my legs then. But other people, they'll just look at that and go ooh, and they'll sort of fall over. I said grab the walker quick, grab the walker. But I'm always aware of the best way to fall and that's be aware. There's another way then just falling over, lower yourself. (P2, male, control group)

Ah, depending on how you fall. See I've played football for years and I learnt to fall, boxing I learnt to fall, ice hockey I learnt to fall. Yeah, I'd go down on my shoulder. [Does it bother you to think about falling and hurting yourself?] No. (P3, male, intervention group)

Discussion

A mixed-methods design, with a pilot randomized controlled trial component, was used to explore whether a multifactorial intervention impacted falls risk and rates, fear of falls, FRID use, quality of life, and physical function in older adults hospitalized for a fall and the perceptions of older people on feasibility and acceptability of such a program. Unfortunately, the sample size was too small to report reliable statistical findings, but the mixed-method design lends itself to exploring the complexity of postdischarge falls prevention management. The intervention was designed around components of falls prevention with strong evidence (Gillespie et al., 2012), yet complexity can be seen in a number of the results. Falls risk appeared to decline in both groups, with an overall reduction in falls rates from 5.3 to 2.4 per 1,000 days. Falls risk-inducing drug reduction showed a potentially clinically significant improvement for the intervention group, and half the cohort moved from a classification of frailty to prefrail. The quantitative results are substantially confounded by the control group receiving usual care that potentially impacted results, such as in-home physiotherapy (potentially similar to the intervention) and referral to social groups (potentially impacting quality of life measures). Valuable lessons, however, were learned regarding feasibility of the intervention, with considerations and recommendations relating exercise, medication review, and education discussed in turn.

The exercise component of the multifactorial intervention was highly valued by intervention participants, more commonly reported in comparison to the education or medication review components. It is of interest that participants expressed the value of the exercise component despite lack of adherence to exercises between home visits. There was, however, little detectable change in quality of life in both groups. Over 75% of the entire cohort lived alone, with variable social and family networks. The intervention group participants expressed feelings of low motivation related to exercise completion, social isolation, and being housebound, with the control group, by contrast, reporting strong family and friend support networks and engagement with healthcare services, including physiotherapy. Referral to non-trial-related exercise programs was higher in the control group, though it was unknown whether this resulted from trial participation, albeit in the control group. Quality of life in falls prevention studies was found, through a recent systematic review, to show minimal improvements (Vaapio et al., 2008). To our knowledge, only one previous study has investigated quality of life outcomes for people who have been discharged from the hospital following admittance for a fall (de Vries et al., 2010). There is strong evidence that physical activity can enhance quality of life (Bize, Johnson, & Plotnikoff, 2007; Gillison, Skevington, Sato, Standage, & Evangelidou, 2009) and growing evidence that social and emotional benefits are primary motivators for the initiation and sustainability of physical activity (Gill et al., 2013). Taken together with the issues expressed by participants in this study, the social component plus physical benefits of exercise will need to be intertwined. Programs such as Stepping On that promote self-efficacy (with specific confidence related to falls) and independence in small-group settings could be trialed in this high-risk group (Clemson et al., 2004). Self-efficacy has been shown to influence exercise adoption and maintenance (Fielding et al., 2007), with adherence to structured exercise programs correlated with higher exercise-related self-efficacy (McAuley et al., 2011). Older people hospitalized for a fall, however, often feel overwhelmed and have competing priorities in the immediate postdischarge period (Meyer et al., 2018), perhaps

indicating a short-term restorative care approach (Ryburn, Wells, & Foreman, 2009), with in-home 1:1 support a better option.

Older people in this study continue to view falls and falls prevention as common sense, with an emphasis on being careful and not rushing, despite the education component of the study to the contrary. Many were unconcerned about injuring themselves if they fell despite having recently experienced severe injuries from a fall and expressed concerns of falling again in the future. Older people have a tendency to view falls prevention as "better for them than me" or to believe that falls are out of an individual's control (Child et al., 2012; Haines et al., 2014), lending weight to the difficulty of making falls prevention evidence-based strategies relevant to, and a priority for, older people.

Medication review of FRIDs by a general practitioner or pharmacist is considered a hallmark of falls prevention programs. The targeted medication review in this study resulted in 80% of the intervention group having one FRID ceased compared with no participants in the control group, a potentially clinically significant finding. Previous research has detailed limited evidence of the effectiveness of FRID withdrawal for falls prevention in older adults (Lee & Holbrook, 2017), but some evidence exists to suggest reduction in psychotropic medication use (which is one class of FRID) reduces falls rates and a prescribing modification program reduces falls risk (Gillespie et al., 2012). This study also highlighted that the medication reviews were either not remembered or met with apprehension. Further research is required to quantify the effectiveness of FRID withdrawal and medication optimization in relation to its effectiveness as a falls prevention strategy, potentially actively involving the primary nurse, in consultation with the pharmacist, through a community-based home nursing organization such as in this study setting. This strategy may alleviate some participants' concerns about medication reviews, given that it would be in consultation with a more familiar, trusted source—their nurse—and their pharmacist. Routine visits by the community nurse and/or personal care worker provide an ideal opportunity to monitor FRID deprescription and, potentially, remind older people to complete prescribed exercises.

The strength of this study lies in its pragmatic design and delivery within an existing community nursing organization, helping to address the knowledge gap of the viability of falls prevention interventions in real-life settings. The mixed-method design allowed participants to directly provide feedback on the acceptability and feasibility of the intervention and furthered understanding of the interplay between outcome measures and the reasons behind the complexity of responses. Study limitations included the low sample size, the proportion of study refusals (65%), and the inability to accurately determine participants' adherence to exercise. The control group continued to receive usual care, which sometimes included falls prevention interventions related to exercise (physiotherapy, tai chi, exercise groups), which is likely to have confounded the results. This limitation is common within interventions using usual care as the control arm and would be mitigated with the larger numbers of a correctly powered randomized controlled trial.

In summary, it is recommended that future multifactorial falls prevention interventions targeting older adults returning to the community after being hospitalized for a fall:

a. ensure in-home support and motivational strategies for regaining/maintaining functional capacity, particularly for those who have limited community access and/or support networks;

b. rebuild confidence through targeted education; and

c. maximize quality of life through inclusion of social support in the immediate postdischarge period.

Conclusion

A multifactorial intervention (home-based balance and strength training, targeted medication review, ongoing education) showed some promise of suitability for older people discharged from the hospital following a fall. This group of older people was shown to be a complex cohort with high degrees of frailty, multimorbidity, polypharmacy, frailty, and falls risk, and overall on the lower end for quality of life. Intervention group participants highly valued the exercise component of the intervention, possibly for its related social contact, whereas the control group also appeared to benefit from coincidental exercise through usual care options. Promising findings of FRID deprescribing also occurred. Further research is required to incorporate a social component to the evidence-based strategies used for intervention, utilizing existing structures and processes of community home nursing organizations.

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