The Effectiveness of a Nurse-led Home Exercise Program on Fall Prevention Among Community-dwelling Elderly

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BACKGROUND

- It is estimated that in every 32 minutes, an elderly is admitted to the emergency department due to an injury sustained from a fall.[1]

- Almost one in three elderly aged ≥60 experienced recurrent falls.[1]

- Falls are the leading cause of disability and death among elderly, resulting in high healthcare cost. Therefore, it is of high urgency to implement strategies to tackle this problem.

- A Cochrane review reported that exercise, especially those focused on balance and functional training, demonstrated reduction of falls among community-dwelling elderly in several studies, when compared with an inactive control group.[2]

- Therefore, we designed a home-based exercise program to focus on balance, functional and strength retraining that can be learnt easily by the elderly and performed at home at their own convenience. It was taught by the community nurses.

OBJECTIVE

To evaluate the effectiveness of a nurse-led home-based exercise program on fall prevention among community-dwelling elderly

METHODOLOGY

Cluster Randomised Trial
- 6 Senior Activity Centres (SACs) were identified and randomised
- From August 2018 to March 2019

→ 3 SACs →

Control group (CG)
Usual care:
- Fall-risk screening test
- Fall prevention education

↓ 3 SACs ↓

Intervention group (IG)
- Taught by community nurses a home-based exercise program, consisting 4 exercises focused on balance & functional training
- Figure 1: (1) feet together or feet in tandem, (2) marching on the spot, (3) sit-to-stand, (4) chair squat (in clockwise direction from top left)
- Recommended duration: twice daily, each session approximately 15 – 20 minutes)
- First teaching session was followed by a booster session two weeks later.
- Elderly compliance to the home-based exercise program will be monitored through self-report for 10 weeks.
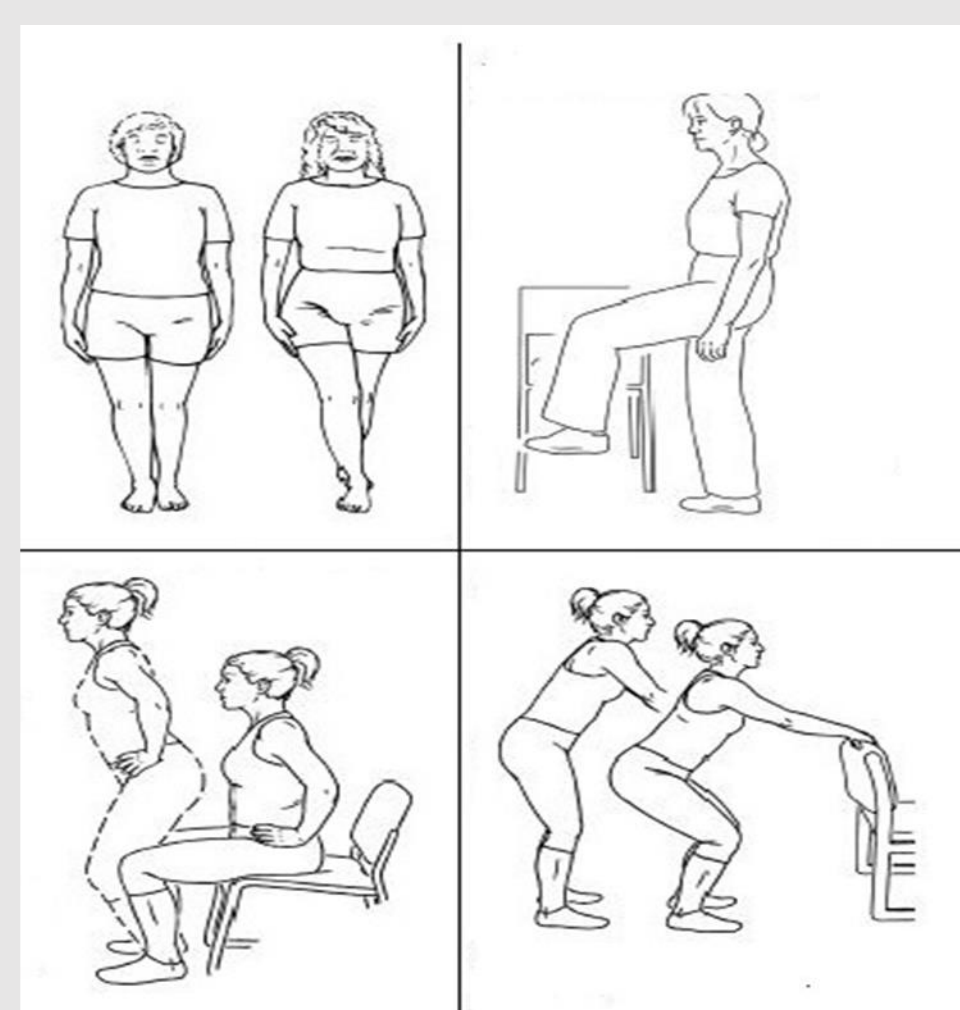

Figure 1. Four types of exercises taught

❖ Inclusion criteria:
> Community-dwelling elderly aged ≥ 60 years old
> Identified as high-risk for falls (based on the nurses' risk assessment tool
> Able to ambulate independently with or without walking aid
❖ Exclusion criteria: Diagnosed with mental health disease or cognitive impairment (e.g. dementia)

Outcomes of interest (measured after 3 months)

Primary:
- Number of elderly who fell at least once
- Short Physical Performance Battery (SPPB) score

Secondary:
- Modified Fall Efficacy Scale (mFES) score
- Number of elderly with a fall-related hospitalisation or Emergency Department (ED) visit

RESULTS

❖ 60 elderly (IG, n = 43; CG, n = 17) were recruited. 11 participants were lost to follow-up (IG, n = 10; CG, n = 1) but were not significantly different from participants who completed at baseline.
❖ Of all participants who completed (n = 49), mean age was 77.49 (SD 8.49). 63.3% (n = 31) were female, majority (89.8%, n = 44) were Chinese. About half (51.0%, n = 25) had a prior history of fall during the past 1 year.
❖ Baseline SPPB median was 7.0 (IQR 5.0 – 8.5).
❖ IG compliance to exercise program was low, with majority (73.4%) achieving less than half of the recommended frequencies.

❖ At 3-month, 21.2% (n = 7) in IG and 18.8% (n = 3) in CG fell at least once but with insignificant statistical difference, p = 1.000.
❖ No significant between-group difference was detected on all other outcomes, i.e. change in SPPB score, change in mFES score & number of elderly with fall-related admission and ED visit.

Table 1. Between-group comparison of outcomes at 3-month

	Total (N = 49)	Intervention group (n = 33)	Control group (n = 16)	
	n (%)	n (%)	n (%)	p-value
Elderly who fell at least once at 3-month	10 (20.4)	7 (21.2)	3 (18.8)	1.000[a]
Elderly who had at least one fall-related admission at 3-month	1 (2.0)	0 (0.0)	1 (6.3)	0.327[a]
Elderly who had at least one fall-related ED visit at 3-month	1 (2.0)	0 (0.0)	1 (6.3)	0.327[a]
	Median (IQR)	Median (IQR)	Median (IQR)	p-value
Change in SPPB score (3-mth score minus baseline score)*	0.0 (-1.0 – 2.0)	1.0 (-1.0 – 2.0)	0.0 (-1.0 – 1.0)	0.397[b]
Change in mFES score (3-mth score minus baseline score)#	0.11 (-0.34 – 0.65)	0.0 (-0.36 – 0.45)	0.48 (-0.04 – 1.03)	0.059[b]

Analysis excludes participants who were lost to follow-up, n = 11.
IQR = Inter-quartile range (25 percentile – 75 percentile)
[a] Fisher's Exact test
[b] Mann-Whitney U test
*Higher score denotes higher performance. A negative value of change in SPPB score denotes poorer performance at 3-mth.
#Higher score denotes higher confidence of not falling. A negative value of change in mFES score denotes lower confidence at 3-mth.

DISCUSSION

The home-based exercise intervention did not show a significantly lower proportion of elderly who fell as compared to usual care. This finding is not surprising since literature, to date, has revealed inconsistent findings on the effectiveness of exercise programmes.[2,3]

Nonetheless, the insignificance of the intervention can be attributed to the low compliance rate of the IG. This rationale concurs with the finding by Maritz et al. Maritz et al. attributed the significant improvement demonstrated by the 10-weeks group exercise intervention to its high attendance rate (87%), which was a result of the provision of incentives.[4]

Apart from incentives, social connectedness and support from others may also affect elderly motivation and compliance to exercise.[5] Our intervention required elderly to exercise on their own accord at home, unlike group-based exercises. The absence of interactions and peer support reduced the participants' inclination to exercise, especially in unmotivated elderly.

The insignificant difference in physical performance (as measured by SPPB) and fear of falling (as measured by mFES) may also be similarly attributed to the low compliance rate in IG. Attrition rate in IG was also high (24%), as elderly verbalised disinterest to continue. Anecdotal report on the reasons of not doing the exercise, as verbalised by the elderly, include "no time", "walking around is enough", and "prefer to do my own exercises". In light of this, strategies to increase elderly motivation and compliance to exercise are crucial to implementation of any exercise interventions.

Limitations:
❖ Due to manpower constraint, a randomised controlled trial (RCT) was not possible, hence creating a potential bias between the intervention and control population. Additionally, the study power was limited by its small sample size. Future studies should adopt a RCT design with a larger sample size.
❖ The compliance in IG was low, hence possibly causing the intervention to fail to demonstrate the desired effects. Future studies on fall interventions should involve deliberate planning on measures to increase compliance.

Conclusion:
Strategies to increase compliance are pivotal, such as provision of incentives and incorporating group-based exercises. Additionally, future research should adopt a RCT design, and if possible, to extend to a larger sample size.

References:
1. Khalik, S. (2015 July 3rd). Project to reduce seniors' risk of falling. The Straits Times. Retrieved March 2, 2019, from https://www.straitstimes.com/singapore/health/project-to-reduce-seniors-risk-of-falling
2. Sherrington, C et al. (2019). Exercise for preventing falls in older people living in the community. Cochrane Database of Systematic Reviews. https://doi.org/10.1002/14651858.CD012424.pub2
3. Gillespie LD, Robertson MC, Gillespie WJ, et al. (2009). Interventions for preventing falls in older people living in the community. Cochrane Database Syst Rev, 2: CD007146.
4. Maritz, C., Patel, N., Varughese, L., & Yecco, A. (2013). The Effects of a 10-Week Group-Based Exercise Program on Lower Extremity Strength, Balance and Functional Mobility in Community- Dwelling Older Adults: A Pilot Study. Int J Phys Med Rehabil, 1(6).
5. O'Brien Cousins, S. (2003). Grounding theory in self-referent thinking: Conceptualizing motivation for older adult physical activity (Vol. 4).