



Lynette Mackenzie
Lindy Clemson

Can chronic disease management plans including occupational therapy and physiotherapy services contribute to reducing falls risk in older people?

Background

Exercise and home modifications are effective interventions for preventing falls. Chronic disease management (CDM) items are one way for general practitioners (GPs) to access these interventions. This study aimed to evaluate the outcomes and feasibility of using CDM items for occupational therapy (OT) and physiotherapy (PT) sessions to address falls risk.

Methods

A pre-post pilot study design was used to evaluate five collaborative sessions shared by a private OT and PT using CDM items and a GP management plan. Pre and post intervention measures were used to evaluate outcomes for eight patients aged ≥ 75 years from two GP practices.

Results

At 2 months post-intervention there were significant improvements in everyday functioning ($P = 0.04$), physical capacity ($P = 0.01$) and falls efficacy ($P = 0.01$). Adherence to the intervention was excellent.

Discussion

Falls prevention interventions can be effective in primary care settings and sustainable pathways need to be developed to ensure access for older people at risk.

Keywords

ageing; accidental falls; chronic disease; community health services; preventive medicine

Falls are a major threat to the health and well-being of older people, and the health costs of falls are escalating.¹ Falls lead to significant negative personal consequences, such as functional decline and increased risk of early hospitalisation, long-term care or mortality.² Balance and strength exercise programs and home modification interventions are effective in preventing falls.³⁻⁵ Each year, 45–50% of people aged over 75 years fall⁶⁻⁷ and 30% of falls result in injuries that reduce mobility and independence.² For the purposes of this paper a fall is defined as 'an unexpected event in which the participants come to rest on the ground, floor, or lower level'⁸

Falls are often the first sign of the onset of frailty and may not be reported by older people to busy general practitioners (GPs). However, GPs are in an ideal position to reduce the risk of falls as they come into contact with many older people in the community and are referral agents for other community services.⁹ However, referrals for exercise and home modification interventions for falls prevention provided by occupational therapists (OTs) and physiotherapists (PTs) have not been routinely implemented in general practice.¹⁰⁻¹² Among older people attending general practice, the risk of falls has been identified in 50% of patients,¹³ and in another study¹⁴ screening increased the identification of fallers threefold. Therefore, early identification of falls risk in the primary care setting is needed. The most recent community falls prevention guidelines² recommend that GPs should ask older people about their history of falls at least once a year.

Recommendations for the primary care management of older people at risk of falls advocate interventions combining medical diagnosis, management and risk assessment.¹⁵ These services could be provided collaboratively by the GP, PT and OT providers in the community. This pilot study was developed to: 1) evaluate an innovative falls prevention intervention and 2) test its feasibility in practice by using existing chronic disease management (CDM) items to link GPs and relevant allied health practitioners (AHPs) in providing falls prevention for older people.

Methods

This pilot study design was a pre-post study of the outcomes of the falls prevention intervention protocol with a small group ($n = 8$) of patients aged over 75 years from two GP practices. Pilot studies are recommended as preparation for larger studies.¹⁶

Participant recruitment

GP practices in two locations (urban Sydney and semi-rural NSW) were identified and invited to participate. Two GPs consented and received training materials about the procedures for the pilot study. Private OT and PT practices that were registered as Medicare providers were recruited in each location of the GP practices. The researchers provided in-person training for OTs and PTs about the tools to be used and the falls prevention intervention protocol.

Lists of patients aged ≥ 75 years from each participating GP practice were generated using practice software. GPs excluded deceased persons or people with medical contraindications to participation. Twenty patients from each practice were randomly selected and letters

from the GP were sent to them, inviting them to participate in the pilot study. The first four consenting patients from each practice were recruited for the study after telephone screening by a researcher. Inclusion criteria were eligibility for a CDM program, age ≥ 75 years and having had a fall in the past year or being concerned about falls. Exclusion criteria were being unable to understand the study information or give informed consent to participate, an unstable or progressive medical condition, severe physical disability, moderate-to-severe cognitive impairment or having already received allied health enhanced primary care items that year.

Data collection

The primary outcome measure was fall events. Study participants completed a falls calendar to record fall events for 3 months following the intervention. Monthly calendar reports were sent back to researchers using reply paid envelopes. An independent researcher not involved with the intervention conducted a home visit with each participant at baseline before the intervention was implemented. Another researcher conducted follow-up visits two months after the intervention was completed. Secondary outcome measures used were self-reported history of falls and fall injuries in the past 12 months, the Abbreviated Geriatric Depression Scale¹⁷, Short Physical Performance Battery,¹⁸ Modified Falls Efficacy Scale,¹⁹ Home Falls and Accidents Screening Tool,²⁰ Physical Activity Scale for the Elderly (PASE),²¹ and Late Life Function and Disability Instrument (LLFDI).²² Only the PASE²¹ requires users to purchase a manual; all other outcome measures are freely available for use with materials published on the internet.

Intervention

Details of the implementation of the falls prevention intervention are presented in *Table 1*. The intervention period consisting of direct contact with the participant lasted 6 weeks. Therapists followed their usual billing procedures to claim the CDM rebate and could claim \$100 per session from the research project to cover any gaps in usual private practitioner rates. Exercise adherence was recorded using self-reported exercise logs completed by participants each week. Home modifications were arranged using

Table 1. Falls prevention intervention	
Step 1	Patient attends a GP appointment to set up the GP management plan and review any medical concerns that may increase falls risk (eg. medication review, where necessary)
Step 2	Referrals made to occupational therapy and physiotherapy
Step 3	Week 1 of intervention: home visit by physiotherapist to: <ul style="list-style-type: none"> • Assess level at which to start Otago exercise program • Devise an exercise program • Explain exercise diary for patient to maintain • Provide appropriate ankle weights for the exercise program
Step 4	Week 1 of intervention: home visit by occupational therapist <ul style="list-style-type: none"> • Home safety audit using the Westmead Home Safety Assessment • Negotiate a home and community safety plan with the patient. • Review findings on the Falls Behaviour scale (FaB) and make recommendations • Review progress with the Otago exercise program and make appropriate changes where necessary • Refer for home modifications where necessary
Step 5	Week 2 of intervention: home visit by physiotherapist <ul style="list-style-type: none"> • Review and upgrade Otago exercise program • Follow up on progress with home safety recommendations and modifications
Step 6	Week 5 of intervention: home visit by occupational therapist <ul style="list-style-type: none"> • Review progress of Otago exercise program • Review progress of implementation of home safety recommendations and installation of home modifications or assistive technology • Check adherence to exercise program and problem solve any issues
Step 7	Week 6 of intervention: home visit by physiotherapist or occupational therapist <ul style="list-style-type: none"> • Review stage of Otago exercise program and recommend strategies to continue exercise routines in daily life • Identify an individual plan to continue with adherence to falls prevention advice • Identify an individual plan to avoid relapse or to work through a relapse and re-address the falls prevention plan • Ensure the home safety recommendations and home modifications are implemented appropriately
Step 8	Report back to GP on completion of the GP management plan

usual community services, and \$60 per person was made available to fund small items.

The Otago Exercise Program is an individualised home-based program that is clinically and significantly effective in preventing falls over five sessions.²³ The Westmead Home Safety Assessment²⁴ is the gold standard home safety assessment used by OTs, in combination with priority setting, for evaluation of functional capacity within the context of their environment.

Data analysis

Individual scores for each of the outcome measures were calculated using procedures recommended by published manuals to obtain standardised scores. Data were entered into SPSS and descriptive analyses summarised the pre and post measures for participants at baseline and follow-up. As the sample size was small, a non-parametric test (the Wilcoxon signed rank test) was used to evaluate any pre-post study differences in outcome measurements.

Table 2. Participant profile (n = 8)

	Mean	95% C.I
Age (years)	81.3	78.9–83.6
Number of hazards (Westmead Home Safety Assessment)†	12.3	5.2–19.3
Falls Behavioural Scale (FaB) score††	2.8	2.5–3.1
GP Cognitive Screening Tool Score‡	8.8	8.2–9.3
Abbreviated Geriatric Depression Scale‡‡	3.0	2.2–3.8
	%	n
Women	87.5	7
Men	12.5	1
Lives alone	75	6
Self-reported loss of balance at home	37.5	3
Self-reported loss of balance outside the home	25	2
Self-reported slip/trip outside the home	37.5	3
Self-reported fall at home	12.5	1
Self-reported fall outside the home	12.5	1
†Out of a possible score of 72		
††Out of a possible score of 30: normative scores for women = 2.92, and for men 3.15.		
‡Out of a possible score of 9: 9 = no significant cognitive impairment, 5–8 = more information required, 0–4 = cognitive impairment.		
‡‡Out of a possible of 15: 6–10 = mild to moderate depression; 11–15 = severe depression.		

Ethics

Ethics approval was granted by the University of Sydney Human Research Ethics Committee (reference number 11-2009/12231).

Results

The response rate for participation was 41% of Sydney patients and 40% of semi-rural NSW patients out of the 20 invitations given to each practice. This was higher than expected and some consenting participants could not be included as the pilot study had capacity for only eight participants. *Table 2* presents the profile of the eight participants (four from each practice) who were selected for the study. Two participants self-reported a previous fall causing injuries; one was admitted to hospital as a result, but neither had experienced fractures.

Table 3 presents the outcomes following the intervention. Improvements in functioning on all the outcome measures were noted and home hazards were reduced. Significant improvements were identified for the management scale of the LLFDI (0.04), The Modified Falls Efficacy Scale (0.01) and the Short Physical Performance Battery (0.01).

Table 4 outlines the fall events recorded in the 3 months following the intervention. Two participants reported a fall (one had two falls). Two of the falls took place outside the home, and four out of 11 slips or trips took place outside the home. Fallers had higher depression scores than those who had not fallen (3.5, compared with 2.8) at baseline.

Discussion

Some outcomes showed statistically significant improvements in scores, indicating that these improvements were not due to chance. However, a clinically important difference in scores would be more concerned with the magnitude of the changes for patients. The ranges of scores in the outcome measures indicated that with the exception of the PASE instrument all the poorer performing participants improved in their functioning and home hazards were reduced following the intervention. The minimum improvements required for these scores to indicate a clinically significant improvement are yet to be determined from this small sample. Qualitative data collected from GPs, therapists and clients following the study may shed some

light on the perceived levels of improvement as a result of the intervention.

Despite the small sample, results confirmed the feasibility of offering a falls prevention program for community-dwelling older people cooperatively between GPs and private OTs and PTs using the CDM items. The response rate from older people was higher than expected and indicates a willingness to address falls prevention, especially when an invitation is made by their GP. Some significant gains were made in reducing the falls risk of older people, indicating the potential gains to be made with implementing this in routine practice.

The processes for accessing and delivering the falls prevention intervention worked well in practice. Training materials for OTs and PTs were developed and trialled successfully and training sessions took about an hour to conduct. This was necessary as the AHPs were unfamiliar with the Otago exercise program or the Westmead home safety assessment prior to the study. Informal feedback indicated that implementing the Otago program and the Westmead assessment could be achieved within the time allocated for a home visit by therapists. Identifying potential participants from the GPs caseloads also presented few problems in making the intervention available.

Despite some funds being made available for minor modifications, these were not drawn upon by the study participants, and usual services available in the community were used or participants paid for their own modifications. This indicates that such interventions could routinely be made available to older people using existing resources with some changes to everyday practice procedures and targeted education.

Although GPs are in a key position to identify older people at risk of falls and coordinate their management, there are barriers for GPs in making full use of CDM items.²⁵ Despite only five sessions being available for referral to AHPs, this study has indicated that a package of services from OTs and PTs meeting this requirement can contribute to reducing falls risk.²⁶ OTs and PTs in the community could market such a package to GPs to make the take-up of a falls prevention management plan more likely.¹² There are, however, issues for private therapists in having to charge patients for additional expenses that

Table 3. Pre and post intervention measures

Measure	Mean at baseline (range/SD)	Mean at follow up (range/SD)	P value*
LLFDI disability score†	51.8 (41.4–61.1/6.1)	55.6 (48.1–59.9/3.6)	0.09
LLFDI disability/social score	47.5 (34.6–58.4/7.9)	50.9 (43.6–54.9/3.8)	0.17
LLFDI disability/personal score	59.3 (44.7–73.9/11.2)	71.6 (51.7–83.9/13.7)	0.09
LLFDI limitation score	70.2 (60.6–83.4/7.2)	72.1 (65.6–77.6/3.5)	0.57
LLFDI instrumental score	69.1 (61.4–82.7/6.2)	70.7 (65.5–76.3/3.1)	0.39
LLFDI management score	83.9 (67.5–100.0/11.2)	94.7 (78.3–100.0/8.1)	0.04**
LLFDI function score	58.2 (52.5–60.8/2.7)	59.3 (54.8–68.8/4.7)	0.67
PASE score††	129.7 (64.0–168.5/33.7)	138.4 (50.0–230.5/58.9)	0.10
Modified falls efficacy score†††	120.1 (108–130/8.7)	136.0 (130–140/3.2)	0.01**
Short physical performance battery‡	7.1 (4.0–10.0/1.8)	9.3 (7.0–11.0/1.6)	0.01**
HOME FAST score‡‡	7.5 (5.0–10.0/2.1)	6.0 (3.0–9.0/1.9)	0.26

*P value calculated using Wilcoxon signed rank tests.
 **Significant differences detected at P < 0.05
 †All LLFDI scores are out of a possible 100: lower scores = increased disability and functional impairment
 ††Out of a possible score of 400: norm for men aged ≥75 = 101.8 and for women aged ≥75 = 62.3
 †††Out of a possible score of 140: higher scores indicate more confidence in undertaking activities without falling
 ‡Out of a possible score of 12: higher scores = better physical performance
 ‡‡Out of a possible score of 25: lower scores = less home hazards related to falls risk

need to be managed to make these programs more accessible to older people in the community.²⁶

The sample size is a clear limitation. A larger sample would need to be recruited for any of the findings to be generalised and for effect sizes to be determined. A minimum follow-up period of 12 months is recommended for falls prevention research;⁹ however, this study was restricted to a 3-month period. A randomised controlled trial with a long enough follow-up period would clearly identify if this intervention could reduce the risk of falls and the number of falls experienced by older people in the community.^{12,26}

This raises questions about the necessity of using all five subsidised visits to implement a falls prevention program, and whether or not such interventions could be conducted in groups. Most therapists believe that five sessions are the minimum required to be effective²⁶ and evidence indicates that the Otago program is effective over five sessions.²³ As home modifications are an effective intervention,⁴ and regular exercise can be effectively adhered to in the home,²³ conducting this falls prevention intervention in the home is important.

Conclusion

Despite the limitations, the study has presented a combination of interventions, delivered as

Table 4. Fall events reported in 3-month calendar follow-up period

	Event type	No. reported/no. of participants	Circumstances
Month 1	Slip/trip	5/3	Tripped on stairs at home Caught foot on step of deck Walking while shopping At a dental appointment Carrying too many things at home
	Fall	2/2	Knocked over by a small child at home crossing the road
Month 2	Slip/trip	2/2	Walking on a spongy carpet Caught foot on a wheelchair visiting a friend in hospital
	Fall	2/2	Knocked over by a small child at home crossing the road
Month 3	Slip/trip	4/3	Pedestrian crossing Untidy studio at home Step at home
	Fall	1/1	Fell on broom while gardening

a package of services, which is a unique falls prevention approach to date. The program has had encouraging outcomes at 3 months of follow up, demonstrating that the approach is feasible and potentially effective in reducing falls risk in a primary care setting. The implementation of the intervention could be economically viable for therapists: training is minimal and materials are available for adoption at minimal cost, making this program an essential strategy as the population

ages. Further analysis of qualitative data will reveal the perceptions of GPs, therapists and patients about the benefits of the program from their perspectives.

Implications for general practice

- Falls risk management is important in primary care as fall injuries lead to very serious outcomes for patients.

- Many falls risks are not obvious during consultations and patients at risk may need to be identified within caseloads.
- Referral for evidence-based falls prevention interventions to OT and PT should be considered by GPs.
- Referral for a package of falls prevention interventions through a CDM plan can enhance outcomes for older people in the community.

Authors

Lynette Mackenzie PhD, MEdStud, BEdStud, BSc (OT), DipOT, Associate Professor Occupational Therapy, Faculty of Health Sciences, Discipline of Occupational Therapy, University of Sydney, NSW. Lynette.Mackenzie@sydney.edu.au

Lindy Clemson PhD, MAppSc (OT), BAppSc (OT), DipOT, Professor of Ageing and Occupational Therapy, Faculty of Health Sciences, Ageing Work and Health Research Unit, University of Sydney, NSW

Competing interests: None.

Provenance and peer review: Not commissioned; externally peer reviewed.

References

- Moller J. Projected costs of fall related injury to older persons due to demographic change in Australia. Canberra: Commonwealth Department of Health & Ageing, 2003. Available at [www.health.gov.au/inter-net/main/publishing.nsf/Content/D2F2014ED7944D70CA257BF000199E5D/\\$File/falls_costs.pdf](http://www.health.gov.au/inter-net/main/publishing.nsf/Content/D2F2014ED7944D70CA257BF000199E5D/$File/falls_costs.pdf) [Accessed 15 January 2014].
- Australian Commission on Safety and Quality in Healthcare. Falls prevention best practice guidelines (community). Available at www.cqc.health.nsw.gov.au/programs/falls-prevention#resources [Accessed 4 October 2013].
- Sherrington C, Whitney J, Lord S, Herbert R, Cumming R, Close J. Effective approaches to exercise in the prevention of falls: A systematic review and meta-analysis. *J Am Geriatr Soc* 2008;56:2234–43.
- Clemson L, Mackenzie L, Ballinger C, Close J, Cumming R. Environmental interventions to prevent falls in community dwelling older people: A meta-analysis of randomized trials. *J Aging Health* 2008;20:954–71.
- Gillespie LD, Robertson MC, Gillespie WJ, et al. Interventions for preventing falls in older people living in the community. *Cochrane Database of Systematic Reviews* 2012, Issue 9. Art. No:CD007146. DOI: 10.1002/14651858.CD007146.pub3.
- Lord S, Tiedemann A, Chapman K, et al. The effect of an individualized fall prevention program on fall risk and falls in older people: a randomized, controlled trial. *J Am Geriatr Soc* 2005;53:1296–304.
- Clemson L, Cumming R, Kendig H, Swann M, Heard R, Taylor K. The effectiveness of a community-based program for reducing the incidence of falls among the elderly: A randomized trial. *J Am Geriatr Soc* 2004;52:1487–94.
- Lamb S, Jorstad-Stein E, Hauer K, Becker C. Development of a common outcome data set for fall injury prevention trials: The Prevention of Falls Network Europe consensus. *J Am Geriatr Soc* 2005;53:1618–22.
- Sims J. Health promotion and older people: the role of the general practitioner in Australia in promoting health ageing. *Aust N Z J Public Health* 2000;24:356–59.
- McMurdo M, Harper J. Falls, bones and the primary care team. *European Journal of General Practice* 2003;9:10–12.
- Monagle S. Reducing falls in community dwelling elderly. The role of GP care planning. *Aust Fam Physician* 2002;31:1111–15.
- Mackenzie L, Clemson L, Roberts C. Occupational therapists partnering with general practitioners to prevent falls: Seizing opportunities in primary health care. *Aust Occup Ther J* 2013;60:66–70.
- Sturmburg J. Health assessments in general practice. *Aust Fam Physician* 2002;31:384–87.
- Wenger NS, Roth CP, Shekelle PG, Young RT, Solomon DH, Kamberg CJ. A practice-based intervention to improve primary care for falls, urinary continence, and dementia. *J Am Geriatr Soc* 2009;57:547–55.
- Swift C. Identifying risk can reduce fall rates. *The Practitioner* 2007;251:39–42.
- Feeley N, Cossette S, Côté J, et al. The importance of piloting an RCT intervention. *Can J Nurs Res* 2009;41:85–99.
- Friedman B. Psychometric properties of the 15-item Geriatric Depression Scale in functionally impaired, cognitively intact, community-dwelling elderly primary care patients. *J Am Geriatr Soc* 2005;53:1570–76.
- Guralnik J. A short physical performance battery assessing lower extremity function: Association with self-reported disability and prediction of mortality and nursing home placement. *J Gerontol A Biol Sci Med Sci* 1994;49:M85–M94.
- Hill K, Schwartz J, Kalogeropoulos A, Gibson S. Fear of falling revisited. *Arch Phys Med Rehabil* 1996;77:1025–29.
- Mackenzie L, Byles J, Higginbotham N. Designing the Home Falls and Accidents Screening Tool (HOME FAST): Selecting the items. *Br J Occup Ther* 2000;63:260–69.
- Washburn R, Smith K. The Physical Activity Scale for the Elderly. *J Clin Epidemiol* 1993;46:153–62.
- Jette A. Late life function and disability instrument: I. Development and evaluation of the disability component. *J Gerontol A Biol Sci Med Sci* 2002;57:M209–16.
- Campbell A. Randomised controlled trial of a general practice programme of home based exercise to prevent falls in elderly women. *BMJ* 1997;315:1065–69.
- Clemson L. Home falls hazards and the Westmead Home Safety Assessment. West Brunswick, Australia: Co-ordinates Publications, 1997.
- Preen D, Bailey B, Wright A. Willingness of general practitioners to participate in enhanced primary care discharge care planning. *Med J Aust* 2006;184:90–91.
- Middlebrook S, Mackenzie L. The Enhanced Primary Care program and falls prevention: Perceptions of private occupational therapists and Physiotherapists. *Aust J Ageing* 2011;31:72–77.

correspondence afp@racgp.org.au