Gerontology & Geriatrics Education

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/wgge20

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To cite this article: Hiroko Kiyoshi-Teo, Claire McKinley-Yoder, Olivia Ochoa-Cosler, Erin Lemon, Sydnee Stoyles, Ruth Tadesse, Julie McGuire & David S. H. Lee (2021): Feasibility study of student-led fall prevention care management: reducing fall risks in assisted living facilities, Gerontology & Geriatrics Education, DOI: 10.1080/02701960.2021.1969387

To link to this article: https://doi.org/10.1080/02701960.2021.1969387

Published online: 31 Aug 2021.

GERONTOLOGY & GERIATRICS EDUCATION
https://doi.org/10.1080/02701960.2021.1969387

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Feasibility study of student-led fall prevention care management: reducing fall risks in assisted living facilities

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ABSTRACT

Falls are common in Assisted Living Facilities (ALFs). We evaluated the feasibility, acceptability, and preliminary impact of student-led Fall Prevention Care Management (FPCM) on reducing fall risks in ALFs. Residents who were age ≥65, had a fall in the previous year Or considered high fall risk at the facility, and who had a MoCA cognition score>15 were enrolled. The FPCM interventions were semi-structured to facilitate students' learning while addressing participants' unique fall risks. Twenty-five older adults in the U.S. completed the study (recruitment rate: 55%; retention rate: 64%). Participants rated the study as 87.16 (100 = excellent), and likelihood to recommend the study to others was 80.85 (100 = most likely). Participants were 84% female, mean age 88.6 years old. Fall risks such as fear of falling decreased from 16.05 to 15.12 (p = .022), fall prevention behaviors increased from 2.94 to 3.07 (p = .048), and the level of confidence to prevent falls increased from 63.38 to 78.35 (p = .015). Students commonly provided education and coaching on fall prevention strategies, and addressed emotional and behavioral aspects of fall prevention. With improvement with recruitment and retention, student-led FPCM intervention is a promising approach for fall prevention in ALF.

KEYWORDS

Fall prevention; care management; assisted living; students

Introduction

Residents of Assisted Living Facilities (ALFs) are especially vulnerable to accidental falls (Harris-Kojetin & Sengupta, 2016), however, interventions to address the unique fall risk factors for ALF residents are largely unknown (Cameron et al., 2018). Residents of ALFs are four times as likely to experience a fall (Carder, Tunalilar, Elliott, & Dys, 2018) compared to older adults living in the community (Centers for Disease Control and Prevention, 2016). ALF residents have complex health needs putting them at higher risk for falling. Approximately 54% of ALF residents are over 85 years old, almost 40% of residents require assistance with three or more activities of daily living (ADL), and more than 75% of residents have at least two chronic illnesses (Caffrey et al., 2012). Furthermore, residents have higher fall risks related to medications and nutrition. ALF residents are known to use a mean of eight medications daily (Briesacher et al., 2002) and eliminating high fall risk

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medications that have side effects such as confusion, hypotension, or dizziness, are one of the key interventions to reduce fall risks (Centers for Disease Control and Prevention, 2016). Nutritional status is an independent predictor of falls for older adults that is potentially modifiable (Chien & Guo, 2014). ALF residents are known to be especially at risk for increased fall risk due to sarcopenia (age-related muscle loss)(Moreland, Richardson, Goldsmith, & Clase, 2004). Addressing fall prevention with focus on ALF residents is urgently needed because they represent the largest number of institutionalized older adults in the United States (Caffrey et al., 2012) with 28,900 ALFs (National Center for Health Statistics (U.S.), 2019). However, unlike nursing homes where fall prevention is a nationally recognized priority (Stevens et al., 2012), organized efforts to decrease adverse events such as falls in ALFs have been slow. This could be due to lack of data about the nature of the fall or what precipitated the fall in residents living in the ALF (Silva-Smith, Kluge, LeCompte, & Snook, 2013). Strong evidence exists showing individualized and multifactorial fall prevention interventions are critical to reducing fall risks in older adults (Cameron et al., 2018; Gillespie et al., 2012). Individualized approaches are especially needed for ALF residents because of their unique health and ADL needs. A care management approach is a promising to address self-management of complex chronic conditions and is actively studied to be utilized for fall prevention (Phelan, Pence, Williams, & MacCornack, 2017; Reuben et al., 2017).

We propose involving health professional students to systematically prevent falls through a care management approach. This addresses the care management challenges of resource intensiveness and cost (Donelan et al., 2019; Robert Wood Johnson Foundation, 2009) while providing an excellent service-learning opportunity for the students. Smits et al. (2017) presented how students can be part of a professional team in reducing falls in their Dutch government-led "Care for Better program." Nursing students are well suited for to take part of care management for fall prevention as they will have a significant role in leading health care management to coordinate care and support self-care (Donelan et al., 2019). With appropriate training and support, nursing students are known to successfully provide care coordination for clients with complex needs such as mental illness (Samuels-Dennis, Xia, Secord, & Raiger, 2016) and to reduce emergency department visits (Bradley et al., 2018). Specific to fall prevention, Patton (2018) described the importance of nursing students to have more training be more proficient with fall prevention.

Descriptive and interventional research studies on fall prevention in ALF are limited (Cameron et al., 2018). Student-led care management is a unique way to provide individualized fall prevention care while providing service-learning opportunity for students. The goal of this study was to identify the feasibility, acceptability, and initial impact of a student-led Fall Prevention Care Management (FPCM) intervention to reduce fall risks of older adults living in ALFs.

Methods

Design, context & setting

This study was a prospective single-arm research study conducted at two ALFs in the Northwestern U.S. This project builds on an existing partnership between the Interprofessional Care Access Network (I-CAN) at Oregon Health & Science University

(OHSU) School of Nursing and City of Gresham Fire Department's Community Assistance Response (CARES) program, funded by the Health Research & Services Administration. Based on previous projects, students identified that a significant number of Emergency Medical Services (EMS) calls originated from ALFs for resident falls, including non-urgent and non-injurious falls (McKinley Yoder & Pesch, 2020). At the request of the Fire Department CARES program, staff and researchers at OHSU developed this study to reduce high volumes of fall-related-EMS calls and gained funding by OHSU Hartford Center for Gerontological Excellence. The study team chose study sites by contacting facilities with a high number of fall-related EMS calls. Ultimately, two ALFs agreed to participate in the study and assigned a site nurse manager (Site A) and executive director (Site B) as study liaisons to implement the study at each of the sites. The study was approved by OHSU Institutional Review Board.

Participants

Residents of two ALFs were invited to the study using the following approach. First, a study information session was offered at each of the facilities. Then, the study team met with a facility liaison from each site to identify individuals who met the study screening criteria. Once these residents were identified, facility liaison delivered the study invitation letter to eligible residents, and the study team visited them for recruitment. For this feasibility study, our goal was to recruit at least 30–35 individuals based on the median sample size of feasibility and pilot studies (Billingham et al., 2013). No incentives were provided for study participation.

Inclusion and exclusion criteria

Study participants were to be age ≥ 65 years old, at high risk for falling as defined for the study, and met the study cognition criteria. We defined high risk individuals as: 1) having a recorded fall within the past year or 2) individuals the facility liaison considered at high risk for falling even without a previously recorded fall. We needed to rely on non-documented and subjective fall information as fall data were not consistently documented (Site A) or did not exist (Site B). For the cognition criteria, we initially planned to exclude residents with a documented diagnosis of dementia in facility health records. However, because documentation of dementia diagnosis was not a reliable marker for residents' cognitive abilities, we collaborated with the facility liaison to identify potential participants and to conduct further cognitive testing. Approximately 50% of older adults do not want to talk about fall prevention (Stevens et al., 2012). Further, because there can be stigma about a cognitive assessment, we modified the protocol so that documented dementia alone would not be an exclusion criterion, instead, their score on the MoCA would be used (Nasreddine et al., 2005). Scores for MoCA have a range of 0–30, and individuals with a score of 23 or below are suspected of having mild cognitive impairment (Carson, Leach, & Murphy, 2018). When we started MoCA assessments, residents who scored less than 23 were still able to have a thoughtful and constructive conversation about fall prevention. Upon consultation with a geriatric physician expert, we decided to exclude individuals only when the

MOCA score was less than 15. Thus, the study ultimately included individuals with mild to moderate cognitive impairment based on MOCA score. Residents in memory-care settings were excluded from the study.

Measurements

Project feasibility was evaluated by the rate of recruitment success and retention of study participants through the six weekly visits. Acceptability was evaluated by participants' ratings of their experience with the study and their likelihood of recommending the FPCM to other residents. These two questions were asked by study staff not involved in providing the FPCM to reduce social desirability bias. Participant cognition was assessed by MoCA (Nasreddine et al., 2005), and nutritional status was assessed by Mini-Nutritional Assessment (MNA®; Guigoz, Lauque, & Vellas, 2002). We also gathered baseline characteristics such as age, gender, insurance status, diagnosis, and medications through facility health records. To evaluate the preliminary impact of FPCM, we used Stopping Elderly Accidents, Injuries, and Deaths (STEADI) fall risk assessment questions (i.e., fall in the past year, worry about falling, and feel unsteady when standing or walking) (Stevens & Phelan, 2013); Importance and Confidence Scale (2-items; Kiyoshi-Teo, Northrup-Snyder, et al., 2019); identification of concerns about falling using the 7-item Fall Self-Efficacy Scale International Short (FESI-S; Kempen et al., 2008); and daily activities to prevent falls using the 24-item version of Fall Behavioral Scale (FaB; Clemson, Bundy, Cumming, Kay, & Luckett, 2008) to capture participants' engagement with fall prevention. Students described their care management interventions by providing a dichotomous response to potential FPCM topics (e.g., education and coaching) and SOAP (Subjective-Objective-Assessment-Plan) documentation. All documents were stored in HIPAA protected REDCap (Research Electronic Database Capture) database (Harris et al., 2009) hosted by OHSU.

Student-led fall prevention care management intervention

Once participants consented, two nursing students completed six one-hour weekly FPCM visits with participants. Prelicensure baccalaureate students participated in this study as part of their clinical practicum in chronic illness or population health nursing courses. As part of the project orientation, students received a refresher one-hour workshop that included care management, care of older adults, fall prevention, evidence-based care, and motivational interviewing (Miller & Rollnick, 2012). The *Menu of Options for Fall Prevention* tool (Kiyoshi-Teo, Northrup-Snyder, et al., 2019) was used as an evidence-based guide to facilitate patient-centered conversations related to fall prevention. Fall prevention resources from CDC and literature on study measurements were also provided for their evidence-based learning. Students completed human subjects protection training modules and received additional training by the PI as determined by OHSU IRB (#19,182) prior to starting the study. Students were supervised by the clinical course faculty who were registered nurses with graduate degrees.

The goal of the FPCM intervention was to decrease participants' fall risks by addressing their health risks and motivation using a patient-centered approach. The study provided the structure and resources, but students were to be semi-independent to apply their nursing

process and clinical judgment skills to address patient's priority issues to decrease fall risks. Faculty ensured that semi-independent student practice provided safe and quality care for participants while students were meeting course objectives and maintaining the study rigor. The study had the following structures: participant visits, faculty support, documentation, and opportunity for pharmacy and nutrition consultations. The study designated that students provide six one-hour visits, and that they meet weekly in person. The FPCM visits were structured as following: Visit 1 consisted of introductions, relationship development, and baseline fall risk measurements; Visit 2 focused on fall risk measurements and additional assessments; Visits 3–5 were non-structured, and the focus of these visits was decided jointly by students and participants; Visit 6 focused on concluding the visits and post-intervention fall risk measurements. During the FPCM visits, we expected that students partner with participants to reduce fall risks by making environmental modifications, facilitate behavioral change, enhance their use of medications and their diet to address conditions that may increase the fall risk. In order to ensure the students' learning on their objectives for the clinical practicum, faculty roles were critical. Clinical practicum objectives for chronic illness and population health nursing courses included delivering patient-centered care, managing chronic illness management and facilitating self-care, being part of an inter-professional care team, and demonstrating understanding of ethics and scope of nursing, clinical judgment, and nursing process. Faculty were available to discuss students' plan for the day, and to debrief how the day went to ensure students' learning was appropriate for their level of training and for the course. Faculty were immediately available to consult students during the day as well. Furthermore, the faculty met with the facility liaison on weekly basis to provide updates on the care management interventions, and to gain additional insights about participants. Faculty also provided feedback on student documentations. Documentations included completion of designated study measurements, SOAP note (Subjective, Objective, Assessment, and Plan clinical documentation), and consultation requests to the nutrition and pharmacy consultants. A faculty from the OHSU Human Nutrition Program and OHSU College of Pharmacy were available as interprofessional team members to offer their expertise through FPCM consults.

Data analysis

The feasibility of this project was evaluated by the percentage of ALF residents who consented among the total number of eligible individuals who were invited, and the percentage of participants who completed at least four of six study visits. We considered the study successful when more than 60% of eligible individuals consented and 75% of the study visits were completed. Recruitment of participants for fall prevention programs is challenging (Lach & Noimontree, 2018), thus we determined 60% to be a reasonable recruitment criteria. We used consent rates and not enrollment rates because we were interested in understanding participants' intent to participate. The acceptability of the study was determined by the participant's responses to the questions: "How would you rate being part of the study?" and "Would you recommend this to others?" We considered 75% to be acceptable for the study rating and likelihood to recommend the study.

Descriptive analyses (mean and frequencies) were used to describe baseline characteristics of study participants. Comparisons between the two facilities were made using two-sample t-tests for continuous measures and Fisher's exact test for categorical measures due

to small expected cell counts. To evaluate the preliminary impact of the FPCM intervention, we conducted pre-post comparison of STEADI fall risk questions, FESI-S, FAB, and levels of importance and confidence to prevent falls using one-group comparison (McNemar's Chi-squared test and paired t-tests). We also calculated effect size to determine the impact of the intervention using standard deviation from Visit 1. Analysis was completed using R (R Core Team, 2020) and alpha was set at .05.

Results

Feasibility – study consent rate and retention

A total of 77 individuals were identified as eligible for the study from January 2019 to March 2020. The CONSORT flow diagram (Figure 1) details how we reached the final consented study sample of 25 (55.2%) participants. We were unable to meet our pre-determined feasibility criteria for consenting. To further challenge our sample size, 12 individuals had to be excluded from the study after they had been consented (See Figure 1). Once participants were enrolled, 64% (n = 16) of participants completed at least 75% of the six visits, meeting the feasibility criteria for retention.

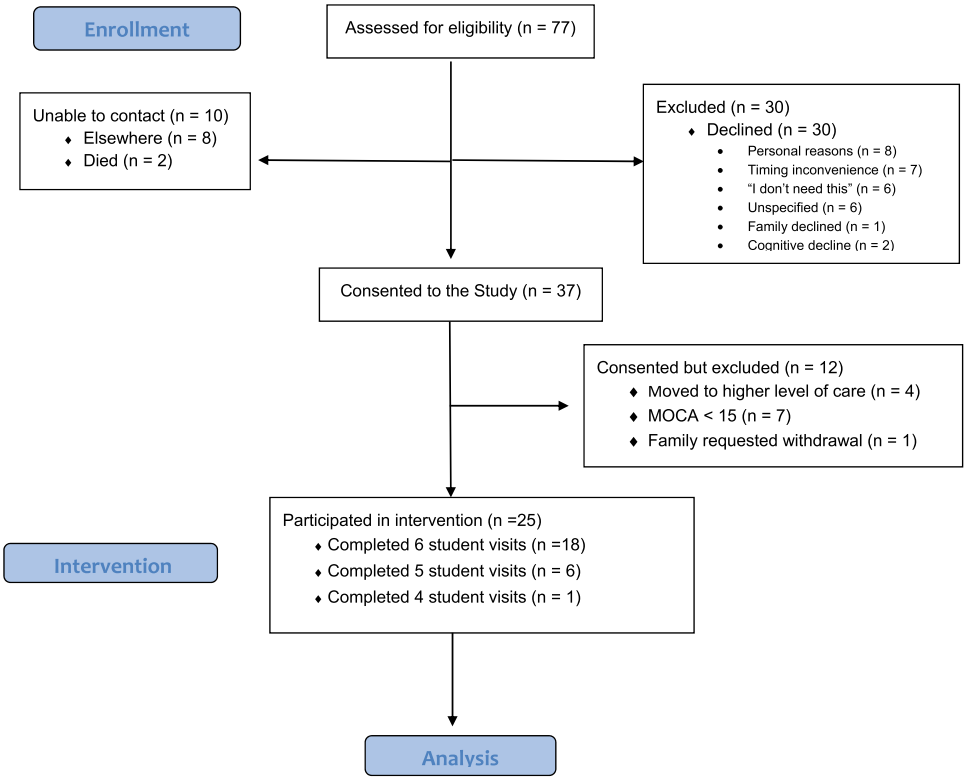

Figure 1. CONSORT flow diagram.

Acceptability – participants' experience of care management

Participants reported a mean score of 87.16 (*SD* = 15.3) on a 1–100 rating scale (100: excellent) of their experience in this study. The mean likelihood of recommending the study to other residents was 80.85 (*SD* = 27.87) (100: most likely). Thus, we met our acceptability goals. Neither of the acceptability variables differed significantly by site (p = .260 and p = .846, respectively).

Characteristic of the study site and participants

Both study sites had one full-time registered nurse to oversee residents' care, one resident activity coordinator, and one part-time fitness instructor. Neither site has a dietitian or spiritual care provider on site. Participants were mostly female (84%) with an average age of 88.59 (*SD* = 6.58). Many of residents had multiple chronic conditions and the mean number of diagnoses was 3.60 (*SD* = 1.76). Common health conditions in the 25 participants included hypertension (64%), heart disease (60%), and diabetes (40%). The mean MOCA score was 21.00 (*SD* = 4.00). Approximately half (56%) reported having had at least one fall in the prior year. Residents at the two different facilities were similar in baseline characteristics except for the experience of problematic pain (Table 1).

Fall prevention care management

Student care management interventions

Descriptions of specific interventions to address the unique needs of participants are listed in Table 2. Students offered a broad range of interventions through FPCM. Students provided interventions which addressed emotional and behavioral needs, readiness to change and biases, and education and coaching on fall prevention strategies. Examples of emotional needs included complex topics such as grief due to the loss of spouse and social isolation within communal living arrangement that ALF provided. Behavioral needs included concerns about walking outside their room, and support around making the shift to leave their room and walk in the hallway or outside. Fall prevention topics commonly covered during FPCM included exercise and physical therapy, use of mobility aids, diet and hydration, daily behaviors, and environment.

Nutrition status and consult

Participants had an average BMI of 28.09 (*SD* = 7.13), which falls into the overweight category, but the mean MNA®score was 10.77 (*SD* = 2.98), indicating "at risk of malnutrition." Twenty participants had nutrition consultations. The most common concerns noted in the consult requests were related to hydration, food intake, weight maintenance, bowel management, and glycemic control. Concerns with hydration were the most prominent and often were linked to blood pressure and frequent urination (n = 9). Hydration recommendations aimed to increase and maintain fluid intake without increasing the need for nighttime urination. All consult recommendations were first reported back to the participant to honor a patient-centered care approach. Only four participants indicated they had made nutrition-related changes at the sixth study visit.

Table 1. Baseline characteristics of study participants.

	Total (N = 25) Mean±SD or N(%)	Site A (N = 10) Mean±SD or N (%)	Site B (N = 15) Mean±SD or N(%)	t-statistic	DF	p-value
Characteristic						
Female	21 (84%)	8 (80%)	13 (87%)			1.000
Age (years)	88.59 ± 6.58	87.67 ± 7.86	89.20 ± 5.79	−0.53	15.40	0.605
Time since admit (years)	2.17 ± 2.09	2.08 ± 2.22	2.22 ± 2.10	−0.15	13.76	0.886
White, non-Hispanic race	25 (100%)	10 (100%)	15 (100%)			NA
Insurance status [a]						
Medicare Insurance	23 (92%)	9 (90%)	14 (93%)			1.000
Medicaid Insurance	1 (4%)	1 (10%)	0 (0%)			0.400
Managed Care Insurance	4 (16%)	1 (10%)	3 (20%)			0.627
Private Insurance	7 (28%)	5 (50%)	2 (13%)			0.075
Health-related						
Number of diagnosis	3.6 ± 1.76	4.50 ± 1.65	3.00 ± 1.60			0.036*
Diagnosis [b, c]						
Hypertension	16 (64%)	8 (80%)	8 (53%)			0.350
Heart Disease	15 (60%)	8 (80%)	7 (46.7%)			0.211
Diabetes	10 (40%)	4 (40%)	6 (40%)			1.000
Depression	7 (28%)	4 (40%)	3 (20%)			0.525
Osteoarthritis	7 (28%)	4 (40%)	3 (30%)			0.525
Osteoporosis	7 (28%)	3 (30%)	4 (27%)			1.000
MoCA*	21.00 ± 4.00	20.10 ± 3.84	21.60 ± 4.17	−0.92	20.54	0.366
General Health[b]						
Excellent	2 (8%)	2 (20%)	0 (0%)			0.472
Very Good	7 (28%)	2 (20%)	5 (33%)			
Good	10 (40%)	4 (40%)	6 (40%)			
Fair	4 (16%)	2 (20%)	2 (13%)			
Poor	1 (4%)	0 (0%)	1 (7%)			
Mobility[d]						
Does not go out of the room	5 (20%)	3 (30%)	2 (13%)			0.615
Goes out of the room	19 (76%)	7 (70%)	12 (80%)			
Pain problematic [b]						
No	11 (44%)	2 (20%)	9 (60%)			0.036*
Yes	12 (48%)	8 (80%)	4 (27%)			
Blood Pressure taken during Visit 1						
Systolic, M ± SD	137.23 ± 15.17	142.67 ± 16.94	133.46 ± 13.19	1.37	14.43	0.192
Diastolic, M ± SD	70.32 ± 10.21	71.44 ± 13.09	69.54 ± 8.17	0.39	12.30	0.705
Individuals who self-reported fall in the past year ≥1	14 (56%)	6 (60%)	8 (53%)			1.000
Resulted in calling emergency services	3 (12%)	1 (10%)	2 (13%)			0.748
Resulted in receiving medical treatment	4 (16%)	2 (20%)	2 (15%)			1.000
Nutrition-related						
Mini-nutritional assessment score, M ± *SD*	10.77 ± 2.98	9.50 ± 2.83	11.50 ± 2.90	−1.58	15.03	0.135
Body mass index, M ± *SD*	28.09 ± 7.13	27.52 ± 9.63	28.43 ± 5.50	−0.26	11.19	0.800
Weight, M ± *SD*	164.37 ± 51.21	167.37 ± 69.69	162.37 ± 36.91	0.21	12.40	0.839
>5% change in weight in the the past 3 months	6 (24%)	3 (30%)	3 (20%)			0.466
Moderate to severe change in food intake[a]	8 (32%)	3 (30%)	5 (33.3%)			0.391
Meidcation-related						
Number of routine medications	10.88 ± 2.99	10.60 ± 2.32	11.07 ± 3.43	−0.41	22.98	0.689
Concerns about medications or side effects	8 (32%)	5 (50%)	3 (20%)			0.203

Notes: [a] Does not equal 100% due to use of >1 type of insurance per participant. [b] One or more participants did not answer. [c] Does not equal 100%, participants often had more than one diagnosis; other diagnosis included cancer (2%), cognitive impairment (2%), eye disease (3%), incontinence (2%), lung disease (4%), Parkinson's disease (1%), stroke (2%). [d] Mini Nutritional Assessment questions asks if "Are you able to get out of a bed or a chair, but unable to go out of your home/apartment" or "'Are you able to leave your home/apartment?'

Test of difference between Site 1 and Site 2 were conducted using t-tests (continuous variables%) or Fisher's Exact tests (categorical variables%).

* $p < .05$; ** $p < .01$.

Table 2. The fall prevention care management interventions and count of participants who received them.

Care management categories and interventions	Count of participants who received the intervention (N)	Illustrative cases
Communication, motivation, readiness, biases		
Listening and addressing emotional needs	23	ID 102: Grief after death of spouse leading to increased alcohol intake; ID 203: Social isolation following stroke
Improving motivation to prevent falls	21	ID 201: Afraid of falling especially outside of the room; ID 203: Not sure how she can use cane instead of walker while still being safe
Providing intervention based on level of readiness	19	ID 101: No interest in use of assistive devices yet experiencing frequent falls; ID 103: Want to be less worried about falling but my body is not reliable
Reducing biases related to falls and aging	18	ID 203: Embarrassed about incontinence and not want to ask for help
Education/coaching		
Exercise/physical therapy	17	ID 208: "I'm really an active person . . . I should do more"
Mobility aids (walker, cane, grabber)	15	ID 107: Incorporating use of walker as a daily habit; ID 111: Safety precautions when using walker
Diet/hydration[a]	15	ID 213: Insomnia leading to miss breakfast and other meals; ID 105 Reducing sodium to decrease dependent edema and shortness of breath (N)
Daily behaviors[b]	14	ID 105 & 209: Help with toileting; ID 203: Managing stairs safely
Blood pressure	10	ID 106: Management of dizziness through hydration (N)
Others		
Environmental modifications	8	ID 211 & 212: Motivation and practical advice to remove multiple boxes in the room to reduce clutter; ID 101: Practical suggestion to position oxygen tubing (bathroom to bed) for safety.
Care coordination with staff	8	ID 114: Communication of pharmacy consult results to participant's primary care team (P); ID 209: Communication with nursing manager at assisted living facility regarding his recent fall
Care coordination with consultants	8	Nutrition and pharmacy consults
Education/coaching on sensory aids (glasses, hearing aides)	6	ID 104: Contacting social worker to replace missing dentures and eyeglasses
Medication management[c]	5	ID 101: Adjusting diuretic medications (P); ID 113: Adjusting diabetes medication (P); ID 206: Adjusting pain medication (P)
Care coordination with family	2	ID 218: Coordinating with daughter for dietary changes (N)

(N) indicates nutrition consultation focus. (P) indicates pharmacy consultation focus.

Medication use and consult

Participants had a mean of 10.88 medications (SD = 2.99), and 32% had concerns about medications or side-effects. Of 11 participants who received medication consultation, common topics addressed were: falls (n = 9), pain (n = 7), sleep or sedative side effects (n = 7), and age-related drug interactions (n = 4). None of the consult recommendations resulted in medication changes by the sixth study visit.

Table 3. Pre-post comparison of fall risk factors.

	Visit 1 Mean±SD or N (%)	Visit 6 Mean±SD or N (%)	t-statistic	Chi-square test statistic	DF	*p-value*	*Effect size*
Worry about falling	20 (80%)	19 (40%)		2.70	1	0.100	–
Feel unsteady	19 (76%)	10 (40%)		1.63	1	0.201	–
Level of *importance* to prevent falling [a]	88.75 ± 23.54	85.71 ± 25.60		−0.29	20	0.775	−0.07
Level of *confidence* to prevent falling [b]	63.38 ± 29.88	78.35 ± 18.25		2.71	19	0.014*	0.59
FESI-S [c]	16.05 ± 4.77	15.12 ± 5.32		−2.63	12	0.022*	−0.58
FAB [d]	2.94 ± 0.40	3.07 ± 0.37		2.10	21	0.048*	0.37

N = 25. Missing values: Worry about falling Visit 6 (5), feel unsteady Visit 6 (4), . a & b: rating from scale of 0–100. 100 represents most important/comfident; c: Fall Self-Efficacy Scale International Short (FESI-S); b: Fall Behavioral Scale. Effect sizes for worry about faling and feel unsteady cannot be reliablly calculated due to dichotomous nature of the variables with small sample size; * $p < .05$; ** $p < .01$.

Preliminary impact of FPCM -changes in fall risks-

Many of participants' fall risks improved after the FPCM intervention (Table 3). The FESI-S score that measures fear of falling decreased from a mean of 16.05 (SD = 4.77) to 15.12 (SD = 5.32, p = .022) indicating a decrease in concerns related to falling. The FaB score that measures the frequency of fall prevention behaviors increased from a mean score of 2.94 (SD = 0.40) to 3.07 (SD = 0.37, p = .048) indicating that participants were incorporating more fall-prevention and less risky behaviors. Level of confidence in preventing falls improved from 63.38 (SD = 29.88) to 78.35 (SD = 18.25, p = .015). The level of importance in preventing falls remained high at a mean score of 88.75 (SD = 23.54) and 85.71 (SD = 23.54, p = .775). There were positive changes to CDC fall risk questions. However, the changes were not significant. Frequency of participants who report *worrying about falling* decreased from 80% to 40% (p = .100) and frequency of participants who report *feeling unsteady* decreased from 76% to 40% (p = .201) at the end of 6 visits. There were no significant differences between results by the study site, MOCA score, or fall history for FESI-S, FaB, confidence, importance, worry about falling, or unsteadiness.

The effect size of FPCM for FESI-S and FaB yielded preliminary positive findings. Effect size standardizes the results by converting the units to standard deviations (Cohen, 1988). For FESI-S, FPCM had a moderate effect of −0.58, meaning that the average difference for FESI-S was a drop of 0.58 standard deviations between Visits 1 and 6 when participants had completed the FPCM intervention. The effect size for FAB was −0.37, indicating small to medium effect (Cohen, 1988), indicating a drop of 0.37 standard deviations between Visits 1 and 6.

Discussion

This study met the acceptability criteria and partially met the feasibility criteria for student-led FPCM intervention to reduce fall risks in older adults with high fall risk living in ALFs. Students had first-hand experience to provide broad range of interventions tailored to the participants through the FPCM intervention. The intervention had positive impact on participants' fall risk by decreasing fear of falling and improved participants' engagement with fall prevention. Despite the small sample size, the study findings provide further evidence that students can be assets to provide care management to address fall risks in ALFs.

The study did not meet the feasibility criteria for consenting. Two factors were notably related to older adults' disinterest with fall prevention research. First, high fall risk individuals at ALFs did not consider fall prevention to be relevant to them. At least six residents that we invited to the study verbalized that they do not need additional fall prevention intervention. This aligns with prior studies indicating that only 25% of high fall risk inpatients considered themselves to be at risk for falling (Kiyoshi-Teo, 2017) and 25–34% of older adults consider fall prevention to be relevant for others but not themselves (Haines, Day, Hill, Clemson, & Finch, 2014). Second, we learned from participants that residents were not inclined to talk about fall prevention due to fear that they may need to pay more for services, move to a higher level of care, or would worry their family. Thus, in addition to older adults' general preference not to talk about fall prevention (Stevens et al., 2012), ALF residents had contextually-bound reason not to discuss strategies to keep them safe and not fall which differed from hospitalized older adults' perspectives (Kiyoshi-Teo, Northrup-Snyder, & Izumi, 2020). Our findings highlight the importance of identifying context-specific strategies to recruit high fall risk older adults into fall prevention research.

The FPCM intervention is an example of a team-based and person-centered approach to assist individuals in managing high fall risk conditions as described by the Agency for Healthcare Research and Quality (Agency for Healthcare Research and Quality, 2014). Nursing students worked with pharmacist and nutritionist to provide interprofessional team-based care management to address fall risks with older adults. In the future, inclusion of students from interprofessional schools will be expected to enrich this authentic practice-based learning opportunity and expand on the impact that students can have on fall prevention. We used the Menu of Options as a patient-centered approach to discuss fall risks and prevention strategies because it is more inviting if older adults have options as to what to discuss about fall prevention. Further development of FPCM to create a sustainable and scalable structure that can address emotional and behavioral needs of high fall risk older adults living in ALFs would be paramount.

The student-led FPCM intervention had positive impact on participants by addressing a broad range of topics related to fall prevention unique to each individual. The students' consultation requests identified that study participants were experiencing unmet needs related to nutrition and medication management as reported in the literature (Chou, Tong, & Brandt, 2019; Trevisan et al., 2019). While nutrition recommendations did result in changes for some participants, no changes resulted from medication recommendations. For the future FPCM, the structure and faculty support for consultations can be improved. As we began the study we found that students were new to being part of inter-professional communication and had never written consult requests. Even with faculty guidance some students were not able to complete their consult requests during the six-week period. Medication consultation was especially challenging as illustrated by only eleven consults requests being completed. On average, participants were using more than 10 medications, mostly long-term use medications, and adjustment of medications was complex. At times, multiple communications had to take place among students, faculty, pharmacist consultant, participants, family, and provider in order for the pharmacist consultant to identify appropriate medication recommendations. Furthermore, participants voiced their hesitancy to bring up the pharmacist consultant's recommendations out of respect for the prescribing provider. For the future, more student guidance related to inter-professional

communication and improved structure to address the complexity of medication management will be beneficial. Additional interventions and longer follow-up may be needed to facilitate changes in nutrition and medication and to capture the process of change.

During the study, an adapted model of Swiss Cheese Model (Reason, 2000), well-known in the patient safety literature, was used to help students understand multi-faceted and inter-related needs of high fall risk older adults. We used the "Swiss Cheese Model of Fall Prevention" to explain how falls occur when multiple fall risks align (holes in each layer of "cheese" align) and how the combination of latent conditions along with active deficiencies or unmet needs contribute to falls. This model is helpful in visualizing how care management can be beneficial for fall risk reduction.

Our study provided preliminary evidence that student-led care management was associated with decreased fear of falling and increased engagement with fall prevention among older adults living in ALFs. This aligns with findings from a systematic review that multifactorial interventions provide the most consistent evidence to reduce the fear of falling (Zijlstra et al., 2007). From our small study, we found that FPCM intervention had a moderate effect on fear of falling. This adds to previously reported effect sizes of .03-.42 (Jung, Lee, & Lee, 2009; Kiyoshi-Teo, Northrup-Snyder, et al., 2019). Direct comparison of the impact of FPCM on the frequency of employing fall prevention behaviors in daily routines is difficult across varying study settings. However, the role of FPCM in improving daily fall prevention behavior is promising.

Despite the encouraging findings from the study, the study had three major limitations. First, the study was only able to enroll a small number of participants who are mostly female. There were significant challenges associated with recruiting target high fall risk older adults when the topic of fall prevention is an avoided subject in general. Many high fall risk individuals had more than mild cognitive impairment, indicating the need for future studies to be inclusive of moderate and severe cognitive impairment. Further, the health of ALF residents was not always stable. During the study, four participants were moved to higher acuity care settings. Although recruitment was a challenge, retention was favorable based on overall positive experience reported. Thus, further research to identify ideal recruitment strategies for high fall risk older adults is warranted. Second, we were not able to examine the impact of FPCM on fall rates. Historical fall rates were not documented consistently, and residents did not necessarily report falls to the staff unless they needed assistance getting up. Tracking of prospective falls required additional resources, which neither the study team nor the two ALFs that participated in the study had. However, Site A did start the process of tracking fall rates at the individual level during the study period. Unfortunately, we were not able to gain access to these data due to change in ownership and management. In the future, a dedicated quality improvement coordinator at the ALF would be ideal to track fall data and to be part of the care management team for fall prevention. Third, involving students to deliver FPCM had pros and cons. Students were excellent at engaging older adults, and providing person-centered fall prevention care. However, the downside was that it was challenging for the study to involve with a new group of students every 11-week academic term. Although some students excelled at being part of FPCM and thrived in this semi-structured clinical, others did not. This difference was not consistent based on the level of training or the course. Thus, the richness of the intervention varied by student. Although we anecdotally know that this experience led to stimulating students' new interest in care of older adults,

for the future, we would be interested in involving students who are specifically interested in the care of older adults and committed to the study for a year through an elective course or honors program. Although there were challenges with recruitment, our study provided preliminary evidence that student-led care management can be associated with reduced fear of falling and increased patient engagement in fall prevention. The FPCM intervention was able to address complex and interrelated health needs related to fall risks of older adults residing in ALFs. Innovative approaches such as student-led FPCM to enhance fall prevention efforts in assisted living should be considered.

Acknowledgments

We deeply thank assisted living residents and staff who welcomed us to the facility, students and faculty in Chronic Illness II and Population Health nursing courses at Oregon Health & Science University.

Funding

This project was made possible through the Hartford Award for Research and Practice supported by Oregon Health & Science University School of Nursing Hartford Center for Gerontological Excellence.

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