Designing and evaluating falls prevention education with residents and staff in aged care homes: a feasibility study

Journal:	*Health Education*
Manuscript ID	HE-08-2021-0113.R3
Manuscript Type:	Original Article
Keywords:	Health education, design & evaluation, Partnering, Older people, Accident Prevention

Abstract

Purpose

The purpose of this study was to co-design a falls prevention education programme with aged care home residents and staff and evaluate its feasibility. The intention of providing the education programme was to assist residents to stay safe and mobile whilst reducing their risk of falling.

Design/methodology/approach

A two-phase mixed methods participatory design using a resident (n=6) and care staff (n=5) consumer engagement panel, pre and post programme resident (n=35) survey and semi-structured care staff interviews (n=8) was undertaken in two countries.

Findings

A poster, brochure, video and staff education guide featuring 12 safety messages depicting fall prevention behaviours were co-designed**.** Residents, supported by staff, perceived the falls prevention education programme as enjoyable and informative but there were no significant differences in capability, opportunity or motivation. However, several residents were observed enacting fall prevention behaviours such as, “If I feel unwell, I’ll ring the bell” and waiting for staff assistance. Challenges to programme demand, acceptability and implementation which may have impacted residents’ exposure and engagement with the programme were identified, along with recommendations to improve feasibility**.**

Originality

The use of bespoke resources, novel rhymes, positive messages emphasising safety and co-designing with residents themselves were welcomed points of programme difference.

Practical implications

When developing falls prevention education programmes partnering with residents and staff, providing choices to meet personal and aesthetic preferences along with frequent, shorter duration learning opportunities are important for translating education messages into actions.

Introduction

Internationally falls are a leading adverse event for older people (Morley *et al*., 2012; Oliver *et al.,* 2007), particularly those in aged care homes (ACH) who are three times more likely to fall compared with those residing in their own homes (Cooper, 2017). This cohort of older frailer people, described as "residents", are at greater risk of falling due to the high prevalence of disability (81.3%) and cognitive impairment (68.0%) that cause functional limitations, making daily living tasks a challenge (Burland *et al.,* 2013; Oliver *et al.,* 2007; Onder *et al.,* 2012). More than 50% of ACH admissions fall annually (Burland *et al.,* 2013; [redacted]) and concerningly between 25-30% of these falls result in physical injury, including hip fracture, head injuries and major lacerations (National Institute of Health Research, 2018, Morley *et al*., 2012; Oliver *et al.,* 2007). The consequences of a fall can be devastating for the older person with many experiencing physical and psychological trauma. This can result in functional decline, disability, fear of falling, depression and anxiety that lead to loss of independence and in some cases death (Oliver *et al.,* 2007; Onder *et al.,* 2012). Additionally, the estimated cost of falls per annum in Western Australia alone is $181 million dollars, whilst in the more population dense UK the cost is more than £2.3 billion pounds. This places a substantial economic burden on the healthcare systems (National Institute for Health and Care Excellence, 2018; Hendrie *et al*., 2004), hence preventing falls is an international priority from a humanitarian and economic perspective.

Previous research has identified that residents have low levels of knowledge and self-perceived risk regarding falls, falls risk factors and how to prevent falls, which may contribute to their limited uptake of falls prevention strategies ([redacted]

[redacted]; Mwanri and Fuller, 2003). Health education is a successful intervention in preventative care and disease self-management and is important in facilitating health behaviour change, including in falls prevention and in care homes (Ghisi *et al.,* 2014; Heng *et al.,* 2020; Hill *et al.,* 2015; Michie *et al*., 2014; Schoberer *et al.,* 2016). Education is recommended internationally as a component of a best practice multifactorial approach to falls prevention for older people (Australian Comission on Safety and Quality in Healthcare, 2009; My Home Life Cymru, 2018; NHS Care Directorate Scotland, 2016). Providing falls prevention education to residents is therefore an important strategy in targeting the problem of falls by changing falls prevention behaviours. However limited research has investigated residents' views regarding preferences and acceptability of falls prevention education in ACH settings. A recent systematic review reported that while residents are infrequently included in research, those without cognitive impairment had successfully undertaken advisory and collaborative roles in some qualitative designed studies (Backhouse *et al.,* 2016). Clinical trials of falls education for older people in hospital settings, that included community dwelling older adults and residents from ACH, demonstrated it was effective in reducing falls rates by 40% (Hill *et al.,* 2015), supporting the need for older people to receive high quality health education regarding falls prevention. Furthermore, without resident input it remains challenging for aged care providers to develop and improve acceptability and adherence to falls prevention programmes. One research study aimed to be inclusive by partnering with residents in ACH to determine their educational needs and preferences regarding fall prevention ([redacted]). Gaps in residents' knowledge of intrinsic falls prevention risk factors were identified along with preferences for personal fall prevention strategy reminder resources and education delivery in small discussion groups with a focus on

staying safe and functionally mobile. Some residents also felt care staff required education regarding how to best assist them to reduce their risk of falls ([redacted]). Studies in ACH settings have reported gaps in fall prevention education for care staff with requests for reminder resources and more opportunities to assist residents with falls prevention strategies, within the demands of their workload (Clancy and Mahler, 2016; [redacted]). These findings identify several gaps that require addressing in the design and delivery of falls prevention education programmes in the ACH setting, confirming the need for more research in partnership with residents and care staff. Therefore, the purpose of this study was to co-design a falls prevention education programme with residents and care staff and evaluate its feasibility in the ACH setting. The intention of providing the education programme was to assist residents to stay safe and reduce their risk of falling whilst maintaining their mobility.

Methods

Study design

A mixed methods participatory design was conducted in two phases between April 2019 and February 2020, as shown in Figure 1 (Creswell and Plano Clark, 2011). Participatory research broadly describes 'all partnered research' that includes co-design approaches involving researchers and community stakeholders (Goodyear-Smith *et al*., 2015; Salsberg *et al*., 2015). The participatory design was selected to ensure the research was responsive to the community stakeholders (ACH residents and staff) it intended to serve and thereby facilitate uptake of the findings (Goodyear-

Smith *et al*., 2015). The participatory principles of the 'Look-Think-Act' framework (Stringer and Genat, 2004) were applied. In this context 'Look' gathered collaborative information by empowering residents and staff to tailor the education programme utilising consumer engagement panels, 'Think' analysed and interpreted information gathered to co-produce programme resources and 'Act' implemented and evaluated the programme with stakeholders using pre and post programme resident surveys and semi-structured staff interviews.

Participants and setting

Five ACH, three in Australia and two in Wales, UK participated in the study. The co-nation design was intended to offer an international perspective representative of similarities and differences in countries that provided residential aged care services. The ACH ranged in size from 31-100 beds with a total capacity of 278 beds led by a care home manager. All sites provided similar 24-hour general care in a home-like environment for residents with low to high dependency care needs. Low care needs describe residents who are independent with or without equipment for some, but not all, functional mobility and self-care tasks. Conversely, high care needs describe residents' dependent on one or two members of staff and equipment, such as mechanical hoists, for functional mobility and self-care tasks. The three Australian ACH were operated by a single not-for-profit organisation and the two Welsh ACH were privately operated by independent companies. Professional staffing differed between countries with Australian ACH employing allied health staff, including nurses, physiotherapists and occupational therapists either full-time or mostly part-time (Australian Institute of Health and Welfare, 2012), whereas Welsh ACH had

limited access to allied health services on a 'needs only' basis via external agencies (Cook *et al*., 2017).

A purposive sample of residents and care staff participated. Inclusion criteria for residents were resided at the ACH for a minimum of three months, aged over 65years or above, English language skills and cognitive capacity (Abbreviated Mental Test Score >7/10) (Hodkinson, 1972) to respond to survey questions and give written informed consent. Inclusion criteria for care staff were employed at the ACH in a care role with direct resident contact for a minimum of three months and English language skills to respond to survey questions. All residents and care staff meeting the inclusion criteria were verbally invited to participate by the ACH liaison staff member at site resident and staff meetings.

Phase 1

Education programme and resource design

The preliminary education resources were designed by the lead researcher ([redacted]) based on prior falls prevention research evidence and resident falls education preferences in ACH settings (Cameron *et al.,* 2018; [redacted]). Behavioural change theory has been successfully used in patient falls prevention education programmes in hospital settings that were effective in reducing falls (Hill et al., 2015; Hill et al., 2016). The theory underpinning the intent of the education programme was the 'COM-B model' conceptualised by Michie, Atkins & West (2014). This model postulates that changing the behaviour of an individual or group involves determining their capability (C), opportunity (O) and

motivation (M) to engage in the new behaviour (B), such as undertaking a behaviour to prevent a fall. Residents' capability, opportunity and motivation to undertake falls prevention behaviours was assessed using closed responses to COM statements constructed in the questionnaires and measured using a 5-point Likert scale (Hartley, 2014). Open responses examined residents' awareness about falls and falls prevention knowledge (capability). In the post-programme questionnaire residents were also asked to share their thoughts and opinions regarding the programme delivery and acceptability of the poster, brochure and video resources (see Appendix 1). The questionnaire had been tested in a published study with residents in ACH settings in Australia and Wales ([redacted]). The education programme comprised of ACH falls epidemiology, falls risk factors for the ACH population and 12 novel safety messages (see Table 1) constructed to reduce the risk of falls. The safety messages with supporting graphics incorporated rhymes, as these have been shown to assist in effective processing and re-call of information across the lifespan (Nelson and Brooks, 1974; Vasse *et al.,* 2010). A 5-minute video, poster, brochure and staff education guide (file) were produced to provide alternative delivery choices.

<Insert Table 1 about here>

Data collection and procedure

Consumer engagement panels

The preliminary education programme resources were presented to consumer engagement panels of both residents and ACH staff volunteers. The panels were

undertaken in a private meeting room at one ACH in Australia and one in Wales. Each panel member was provided with a paper copy of the education resources for review and the video was screened on a smart television. Panels ran for approximately 30-45 mins, commencing with refreshments followed by a brief overview of the study, and were facilitated and documented by the lead researcher using a discussion guide. The guide contained a list of open-ended questions and prompts based on criteria outlined in the suitability assessment of materials for evaluation of health-related information for adults (Doak *et al*., 1996). This included asking participants to comment on each educational resource's content, literacy, graphics, layout, learning stimulation and cultural appropriateness.

Phase 2

Phase one informed co-production of the education programme resources by the research team. All research assistants (RA) were trained by the lead researcher (JFC).

Pre-programme survey

Participating residents were administered the pre-programme questionnaire in a private room at their ACH one-to-one by the RA reading out the questions and recording their responses verbatim. The RA then read back the resident's responses for checking and confirmation.

Education programme delivery

On completion of the pre-programme questionnaires residents were invited in small groups (n=5-6) to attend the education programme one-hour interactive discussion led by the lead researcher. Firstly, basic falls epidemiology and falls risk factors for the ACH population were discussed. Secondly the 12 safety messages, addressing falls risk factors such as vitamin D deficiency and poor balance, were discussed using the poster, brochure and video. The programme concluded with demonstrations of how residents could perform the fall prevention behaviours suggested in the safety messages. Care staff were invited to an education and training session at a time of lower activity during their shift. The training comprised of basic falls epidemiology, falls risk factors for the ACH population and how they could assist residents to perform the fall prevention behaviours using the safety messages, as described in the staff education guide. The participating residents were all given a copy of the poster and brochure and were asked to review them daily in their own time over a 3-4 week period. The care staff were asked to assist residents to display the poster in their room and prompt daily engagement with the poster and brochure when attending to residents. A copy of the video (USB) was provided to the ACH manager to screen on their lounge room smart television, for example when residents gathered there to watch the daily news bulletin. Copies of the poster, brochure and staff education guide were provided for each of the communal staff rooms at participating sites.

Post-programme survey and staff interviews

Research assistants returned to each ACH 3-4 weeks after the education and resources were delivered and conducted the post-programme survey with residents as described previously. Care staff that attended the education at each site were invited to

participate in a short semi-structured interview (see guide in Appendix 1) to discuss their thoughts on the education resources and their impact on residents. Interviews were digitally audio-recorded and conducted face to face by the RA. Copies of transcripts were provided to participants for member checking.

Data analysis

Phase 1

Qualitative responses from the consumer engagement panels were analysed using a deductive approach (Elo and Kyngäs, 2008). This type of approach was selected as previous knowledge around the research topic of falls prevention education aiming to change behaviours was known (Hill *et al.* 2015, Hill *et al.* 2016) but the theory was being tested in a different population and context (ACH). A category matrix that mapped the panel's suggested resource modifications against known criteria based on the suitability assessment of materials for evaluation of health-related information for adults was constructed (Doak *et al*., 1996). Content was specifically mapped to the COM-B model based on the education programme potentially increasing resident capability (through knowledge about falls prevention) together with raising motivation and opportunity (making it clear how and when safety messages could be enacted) (Michie *et al*., 2014).

Phase 2

Quantitative survey responses describing residents' levels of knowledge and awareness of falls risks capability, opportunity and motivation to enact fall prevention strategies were entered into SPSS version 22 (IBM SPSS Inc., Chicago IL, USA) and summarised using descriptive statistics. Differences between residents' pre and post questionnaire responses were examined using a Wilcoxon signed rank test (Portney and Watkins, 2009).

Qualitative open responses from the resident survey items and staff interviews were transcribed verbatim and managed using NVivo version 12 (QSR International Pty Ltd, 2018). Two independent researchers ([redacted]) read the transcripts multiple times for data familiarisation. A third researcher ([redacted]) was available to arbitrate any disagreement and facilitate consensus. Data were analysed using deductive content analysis (Elo and Kyngäs, 2008). Feasibility studies address the overarching questions can it work? does it work? and will it work? (Bowen *et al.,* 2009). A category matrix was constructed to examine feasibility using the appropriate 'areas of focus' identified by Bowen *et al.* (2009). These authors provide reasons for conducting feasibility studies, including that previous interventions had positive outcomes but in different settings than the one of interest. This applies in our study where falls prevention education that was successful in hospital settings (Hill *et al.* 2015, Hill *et al.* 2016) was being transferred to ACH settings. Areas of focus when examining feasibility are described as: Acceptability, Demand, Implementation, Practicality, Adaptation, Integration and, where required, Expansion (Bowen *et al.*, 2009). Data describing residents' and staffs' positive or negative responses regarding the falls prevention education programme were mapped against the areas of focus described (Bowen *et al.*, 2009). The consolidated criteria for reporting qualitative research (COREQ)

guidelines were followed when designing, conducting and reporting the study findings (Tong *et al*., 2007) see Appendix 2.

Ethical considerations

This research was approved by the participating Universities' Human Research Ethics Committees (019034F and REC649) and the governance boards of the participating ACH. All participants provided written informed consent.

Results

Phase 1

Six residents and five staff participated in the consumer engagement panels (Australia n=7, Wales n=4) providing feedback that informed the final co-production. Overall, both residents and staff agreed the education programme content facilitated capability, opportunity and motivation to engage with the safety messages and enact fall prevention behaviours. The modifications made to the education programme resources are detailed in Appendix 3a, changes served to improve visual clarity of the poster and brochure, comprehension of written text together with auditory clarity of the video. In the final iteration, changes were approved by participants viewing paper copies of the modified resources that had been emailed to the ACH managers.

Phase 2

Participant characteristics

Thirty-five residents participated in the pre-programme survey with 33(94.3%) completing the post-programme survey (n=2 deceased) and eight staff members completed post-programme interviews. The mean age of residents was 85.8 years (SD 8.1 years), 28 (80.0%) used a walking aid and 21 (60.0%) had experienced one or more falls since their admission to the ACH, characteristics of residents and staff are reported in Table 2.

<Insert Table 2 about here>

Residents' level of capability, opportunity and motivation to enact falls prevention behaviours pre and post education programme

The quantitative findings provided limited support for intervention feasibility. Comparative analysis of residents' responses to the survey (Likert scale responses) regarding their falls risk awareness along with confidence, opportunity and motivation to reduce their risk of falling pre and post programme showed no significant differences (see Appendix 3b). A small positive trend was noted regarding residents feeling increasingly confident in their ability to take the necessary actions to remain safe (pre 68.6% versus post 81.8%) following the programme but only moderate agreement that they had a clear plan of what they would do to stay safe. Qualitative findings were predominantly supportive of the intervention producing behaviour change. Residents demonstrated some baseline knowledge and awareness (capability) of intrinsic falls risk factors such as muscular weakness, poor vision and balance.

However, when asked what they currently do to stay safe/prevent falls addressing extrinsic risk factors predominated, such as wearing appropriate footwear, de-cluttering their environment, using their walking aid and other safety equipment such as handrails. After the education there was some perceived improvement in capability with one Australian resident commenting, 'I'm more aware of what I do, it [the education] has probably made me think more [about my safety]'. A fifth (N=7, 20.0%) of the residents recalled programme safety messages addressing intrinsic falls risk factors such as drinking regularly to avoid dehydration, considering continence issues and slowing position changes for postural hypotension, with one 77-year-old Australian male physically demonstrating his capability and motivation to the RA, 'I don't suddenly get up…I steady myself when I stand.' However, most residents reported the same extrinsic strategies for staying safe/preventing falls as at baseline with a few commenting on messages they had newly adopted over the past weeks. One motivated 92-year-old Australian female resident had taken the opportunity to make sure areas were well lit explaining, 'You must have sufficient light' and another 94-year-old Welsh female talked about improved awareness (capability) in checking her environment stating, 'I'm careful to make sure the path in front of me is clear'.

Acceptability of the falls prevention education programme

Overall resident and staff reactions to the falls prevention education programme were positive as the learning experience was perceived as enjoyable and informative. All staff reported they had some prior experience of falls prevention education; however, they felt the use of bespoke resources, positive messages emphasising safety and co-designing with the residents themselves were welcomed points of difference enabling

engagement. One Australian staff member (S2) recalled, 'Yes, I like the…different way of looking at it. The education I've done has been a little bit just text book and repetitive, whereas this with the sayings [rhyming safety messages], you remember them…it sticks in your head a bit more', another Australian staff member (S3) commented, 'I think it was delivered [interactive discussion] in a way that everyone could understand…I didn't go to sleep! [laughs]'. Staff embraced the participatory research design as they felt it valued theirs, and the residents' opinions commenting, 'Trying to get the residents more involved as well was the great thing, that was really different, having the residents be a part of it was fantastic' (Welsh staff, S2).

The education resource design aesthetics were appreciated by most residents (n=21, 60.0%) as enabling engagement with learning one commented, 'Liked it, good, very well done, the colour [yellow] is nice and bright…easy to see' (80-year-old female, Wales) and another added, 'I think that it's very clever [the safety rhymes]…I've read it through several times' (91-year-old male, Wales). The pictorial design elements were also perceived as an enabler, an 83-year-old Australian female commented 'The little pictures help because you can put yourself in that position. A picture tells a story…It's heightened my awareness'. Conversely 7(29.0%) residents expressed dislike for the colour or design which acted as a barrier for engagement with learning one commented, 'It's a boring old people's picture, I don't like the yellow, needs something more modern' (83-year-old female, Australia). Two residents with eye disease (from Australia and Wales) felt the brochure was hard to read, as the font and pictures were smaller than on the poster. Many residents found the questionnaires' 5-point Likert scale responses too complicated, expressing preferences to simply answer 'yes or no' rather than select a level of agreement. The staff education guide was perceived by the eight interviewees to have been well designed for engaging in

learning the safety messages for themselves and to assist residents, with positive feedback on clarity, uniqueness and imagery. A Welsh staff member (S8) commented, 'We can see what we have to do to help prevent the falls, but it's like…in a positive way [emphasising safety]'.

Demand for falls prevention education

Staff and residents in both countries expressed demand for falls prevention education as they had experienced a fall or attended residents' who had fallen in the past month witnessing the trauma first-hand. One Australian staff member (S1) stated, 'I think it's a really good thing for everyone…to keep on pushing it [falls prevention education] definitely keep on pushing it out there' and a Welsh resident concluded, 'It's helping us to be safer…I think it's a very good thing'. Only a limited proportion of residents (approximately 15-20%) met the inclusion criteria for participation due to high levels of cognitive impairment in the ACH population (Australian Institute of Health and Welfare, 2020). Two contrary views were expressed that negated the need for falls prevention education where residents believed, 'It's just common sense' (80-year-old female, Australia) and another pointed out, 'We don't need this information as the staff are always here…they do everything' (88-year-old female, Wales).

Implementation of the programme in the ACH setting

Barriers and enablers in executing the education programme were identified. The education resources being added to the ACH environment resulted in observed enactment of the safety messages by both residents and staff. Staff at one Welsh site

stated that having the programme as a daily handover agenda item served as a useful reminder. Eighteen (71%) residents provided positive feedback regarding learning some safety messages from the poster, one resident reflected, 'It's good [the poster], I don't mind having it in my room, it makes you keep it in mind that you can ring the bell and get in touch with them if there's anything wrong' (85-year-old female, Australia). Four staff members reported they had observed a few residents translating some safety messages into practice after the posters were displayed on the residents' walls. For example, 'I think you can see a lot more people calling [using bell] if they feel a bit unsafe or they say oh I'm feeling a bit dizzy…they won't get up they'll ring the bell' (Australian staff member, S6). Five staff members felt seeing the posters displayed on the residents' walls had made them aware that some of their daily tasks with resident contact were opportunities to help learn safety messages. This was enacted by a Welsh staff member (S7), 'I sit there I talk to them [residents] and I say if it's not nice and bright I'll put on the light' and an Australian staff member (S6), who had begun checking bedside jugs were accessible and filled with water during her shifts stating, '…and she [researcher] said about the water, having a drink, hydration'. Eight (24.2%) residents felt the brochure enabled learning as it was compact and easily shared, one 99-year-old Australian male resident demonstrated this, 'I passed it on to a new lady, I understand she's had a fall. I'm encouraging her to use her wheels [wheeled walking frame] at all times'. The video was perceived as unanimously positive for engaging learning due to its visual appeal. Two residents explained, 'We all watch TV…I think showing a video [to everyone here] would be a good idea…to show why older people fall, they said glasses [bi-focal] could cause it [a fall]' (85-year-old male, Australia) and 'If you like movies…the video sticks in your mind more than anything' (82-year-old female, Australia).

We encountered some barriers with programme implementation that may have compromised residents' exposure to and engagement with the falls prevention education resources. Seventeen (51.5%) residents stated they had not received any reminders from the staff to engage with the resources and safety messages during the study period. At one site the poster was not displayed in residents' rooms as staff perceived displaying a poster was not conducive with their interpretation of their ACH policy of 'providing a home-like environment'. The RAs also reported that on their post-programme visit with some residents, posters had not been displayed in a place where they could easily view. Twenty-four (72.7%) residents reported using a brochure (a loose sheet of folded card) to deliver the safety messages was a barrier as staff or family members frequently tidied them away or residents misplaced them, hence the brochure had fewer reviews. The opportunity for residents to autonomously view the video following the education session was very limited as none had the personal technology to take away their own copy for review. Only five residents (15.2%) from one Australian site, where the video was screened three times by the care manager on a communal TV, were able to provide feedback.

Practicality of delivering the education programme

We identified some practical recruitment barriers at three levels namely, organisation, site and resident. At organisational level we encountered withdrawal of an aged care provider due to the need to attend to other issues (i.e., meeting accreditation requirements) and at individual site level withdrawal due to an infectious disease outbreak. Staff also reported that their colleagues who had not attended the staff education session were mostly 'too busy' to fully engage with the education guide

during their shifts, despite copies being readily available in the staff meeting areas. Access to residents and staff for post-programme data collection posed some difficulties due to competing priorities at sites. These included, for example, residents having spontaneous family visits.

Adaptation and Integration of the education programme

All participants (residents and staff) provided valuable feedback on the falls prevention education programme that led to adaptations to make it more acceptable for implementation and hence more likely to be integrated into clinical practice. For example, one Australian staff member (S5) suggested for future programme roll out, 'frequency... instead of having everything all at once [12 safety messages]…focus on one thing at a time, it allows that person to focus on that one thing, throughout the week they are thinking about it and the next week they learn another one'. Detailed recommendations are shown in Table 3 mapped to the relevant feasibility areas of focus (Bowen *et al*., 2009).

<Insert Table 3 about here>

Discussion

This feasibility study provides new insights regarding how to design and deliver effective falls prevention education with residents and care staff in the ACH setting. Having residents participate in the programme design was perceived as refreshingly different and worthwhile by both staff and residents in Australia and Wales, with

diverse views expressed. This was similar to studies of community dwelling older people that showed participants are more likely to adopt fall prevention messages when they are involved in the design, where their needs and preferences can be incorporated (Bulsara *et al.,* 2016; de Jong *et al.,* 2019; Hill *et al.,* 2016; Mwanri and Fuller, 2003).

There was some evidence suggesting that safety messages had been learnt and new behaviours adopted in both countries. Residents were observed enacting safety strategies, such as ensuring an area was well lit or steadying themselves after they stood up, supported by staff, in their daily activities. These observed behaviour changes could be attributed to providing residents with a range of well-designed education resources that could be read, heard or viewed accommodating their preferred learning style (Dreeben, 2010; Heng *et al.*, 2020).

For some residents our colour choice was not aesthetically pleasing and thus probably less acceptable for resource engagement. Utilising the yellow end of the colour spectrum is a strategy used to combat age-related changes to the eye, which include decreased function of the blue cone mechanism (Dittmar, 2001). Our findings showed that for some residents their personal aesthetic preference maybe more important than evidence-based colour selection. Hence customising printed resources for resident preferences could enable a more person-centred approach for improved engagement, in line with ACH cultural change recommendations that aim to empower residents in decision-making (Zimmerman *et al*., 2014).

We encountered several paradoxes similar to those reported by older people in hospital and community settings (de Jong *et al.,* 2019; Hill *et al.,* 2016), that challenged programme demand. The demand for resident falls prevention education was either trivialised as ‘just common sense’ or deemed irrelevant where the presence

of staff or family 'to do everything for me' negated the need to learn about keeping themselves safe (de Jong *et al.,* 2019; Hill *et al.,* 2016; Lee *et al.,* 2013). This suggests that more effort is required in changing the ACH culture of institutionalised task-based care to de-institutionalised models that foster a more person-centred approach facilitating independence (Zimmerman *et al*., 2014).

Implementation success was not observed to be nation dependent, rather it was associated with supportive site leadership by the ACH care manager. This was exemplified in Australia at one site where the care manager took responsibility for screening the video for residents to watch and in Wales one site care manager had the research project as a daily handover agenda item. This supportive leadership prompted staff to engage more with the educational resources and assist residents. Similarly, a realist evaluation of implementing falls prevention strategies in ACH reported that sites where care managers had invested in and prioritised falls prevention interventions was an important mechanism for implementation success ([redacted]). Our study identified some non-adherence related to resident engagement with the education resources. Non-adherence in health care has been classified into three types, we encountered Type II in which participants want to comply with the intervention, but the environment or conditions are not conducive with adherence (Dreeben, 2010). Firstly, staff not understanding the importance of putting up the poster or placing it where residents were able to easily view it in their rooms contributed to non-adherence in both countries. Consequently, these actions may have prevented motivated residents in engaging with the safety messages and possibly compromised resident safety. A study evaluating care staff fall prevention knowledge and awareness in ACH reported low levels of falls risk awareness in residents they cared for and similarly identified gaps in care staff knowledge that were

detrimental to resident safety. This suggests that care staff are unlikely to identify and assist residents at risk of falling if falls prevention education is not mandatory and ongoing ([redacted]). Secondly, staff reported they were too busy to engage with the education resources and consequently more than half the residents reported staff had not reminded them to engage with the safety messages. Staff having limited time to engage in research project activity and workplace learning have been reported as barriers to enabling research in other ACH studies ([redacted]; National Institute of Health Research, 2018). In addition, workload time pressure has been identified as a barrier to care staff having the opportunity to assist residents with falls prevention. This may be attributed to additional duties being added to the care staff role, such as cleaning and laundry, which requires addressing at the management level ([redacted]).

A key difference in context between the two countries was the staffing mix. The absence of professional staff in Wales, such as physiotherapists who often have a responsibility for falls prevention, appeared to have minimal impact on residents' levels of knowledge. This may partly be explained by the low direct contact time physiotherapists in ACH settings have to spend with residents, which on average is only 2.3% of an eight hour shift combined with responsibilities across other areas of chronic and acute care management (Leemrijse *et al*., 2007).

Our findings highlighted a translation gap remains, in that many residents, despite having some knowledge and awareness of falls risks, were still unclear on how to translate safety education into action. A systematic review of educational interventions to empower ACH residents reported that individually tailored education

programmes using structured educational strategies were successful in empowering residents to improve health care behaviour (Schoberer *et al.,* 2016). This suggests that adapting future falls prevention education programmes for residents to utilise a tailored approach may be beneficial in improving translation.

Strengths and limitations

We partnered with residents and staff as co-designers of the falls prevention education programme enabling an informed and authentic perspective. This acknowledged the recommendation for adopting a more ethical approach to research design by conducting research in partnership 'with' a community rather than doing research 'on' a community (Blumenthal *et al.,* 2013; National Institute of Health Research, 2016). However, co-designing in this setting was challenging as participation across all phases of the research was seen as an additional burden by many residents with complex comorbidities and frailty, resulting in limited numbers wanting to volunteer. This was a feasibility study with a small sample therefore findings may not be generalizable to other ACH settings. Nonetheless, it was conducted in five ACH in two countries where similar resident and staff views were expressed, which adds credibility to the findings. Residents in this study found responding to a 5-point Likert scale too complicated, which may have jeopardised the reliability of the quantitative findings, despite the questionnaire having been tested previously in ACH and approved by the consumer panel. However, the mixed methods design provided rich qualitative data that strongly contributed to the credibility of recommended programme adaptations. We confirmed a need for expanding the intervention as residents with cognitive impairment, who make up more than half of the ACH

population (Australian Institute of Health and Welfare, 2020; Onder *et al.,* 2012), were not included in this study as the education programme was primarily designed for those residents with better levels of cognition. Previous work, including in falls education, shows that older people with limited cognition have differing learning needs compared to those with intact cognition (Montero-Odasso and Speechley, 2018; Vasse *et al.,* 2010). For example, loss of the ability to comprehend text would require adapting message delivery to alternative more understandable formats, such as using gestural cues that are easier for residents living with cognitive impairment to interpret (Vasse *et al.,* 2010). In addition, involving family members of residents living with cognitive impairment alongside them through the co-design phases could facilitate proxy participation in developing meaningful programme adaptations (Peach *et al*., 2017). Therefore, we plan to work similarly with residents who have limited cognition, their family and staff in co-designing programme a that best meet their needs.

Conclusion

Designing a fall prevention education programme with residents and care staff supported positive behaviour change. Findings also identified barriers and subsequent recommendations to improve the feasibility of delivering the programme to residents in ACH settings. Residents confirmed a 'one size fits all' approach is not acceptable and suitable choices must be provided in both programme resource format and aesthetics if they are to engage with and enact safety messages. Care staff also need to be knowledgeable regarding fall prevention and be afforded the opportunity to assist residents in translating safety messages into action as part of everyday care. Further

research is required to trial the effectiveness of falls prevention education for residents incorporating the programme adaptations identified.

References

Australian Commission on Safety and Quality in Healthcare (2009), "*Implementation Guide for Preventing Falls and Harm From Falls in Older People: Best Practice Guidelines for Australian Hospitals and Residential Aged Care Facilities*", available at: https://www.safetyandquality.gov.au/sites/default/files/migrated/Guidelines-RACF.pdf (accessed 8 December 2020).

Australian Institute of Health and Welfare (2020), "Australia's Health 2020: Dementia", available at: https://www.aihw.gov.au/reports/australias-health/dementia (accessed 8 December 2020).

Backhouse, T., Kenkmann, A., Lane, K., Penhale, B., Poland, F. and Killett, A. (2016), "Older care-home residents as collaborators or advisors in research: a systematic review", *Age and Ageing*, Vol. 45 No. 3, pp. 337-345.

Blumenthal, D., DiClemente, R., Braithwaite, R. and Smith, S. (2013), *Community-Based Participatory Health Research: Issues, Methods and Translation to Practice*. Springer, New York, NY.

Bowen, D.J., Kreuter, M., Spring, B., Cofta-Woerpel, L., Linnan, L., Weiner, D., Bakken, S., Patrick Kaplan, C., Squiers, L., Fabrizio, C. and Fernandez, M. (2009), "How we

design feasibility studies", *American Journal of Preventative Medicine*, Vol. 36 No.5, pp. 452-457.

Bulsara, C., Khong, L., Hill, K. and Hill, A. (2016), "Investigating community perspectives on falls prevention information seeking and delivery: older person perceptions regarding preferences for falls prevention education using a world café approach", *Journal of Community Psychology*, Vol. 44, pp. 937-944.

Burland, E., Martens, P., Brownell, M., Doupe, M. and Fuchs, D. (2013), "The evaluation of a fall management program in a nursing home population", *The Gerontologist*, Vol. 53 No. 5, pp. 828-838.

Cameron, I.D., Dyer, S.M., Panagoda, C.E., Murray, G.R., Hill, K.D., Cumming, R.G. and Kerse, N. (2018), "Interventions for preventing falls in older people in care facilities and hospitals", *Cochrane Database of Systematic Reviews*, Vol. 9.

Clancy, A. and Mahler, M. (2016), "Nursing staffs' attentiveness to older adults falling in residential care - an interview study", *Journal of Clinical Nursing*, Vol. 25 No. 9-10, pp. 1405-1415.

Cooper, R. (2017), "Reducing falls in a care home", available at: https://bmjopenquality.bmj.com/content/6/1/u214186.w5626 (accessed 2 May 2021).

Creswell, J.W. and Plano Clark, V.L. (2011), *Designing and Conducting Mixed Methods Research*, SAGE, Los Angeles, CA.

Doak, C.C., Doak, L.G. and Root, J.H. (1996), *Teaching patients with low literacy skills*, J.B. Lippincott, Philadelphia, PA.

de Jong, L.D., Francis-Coad, J., Wortham, C., Haines, T.P., Skelton, D.A., Weselman, T. and Hill, A.M. (2019), "Evaluating audio-visual falls prevention messages with community-dwelling older people using a world café forum approach", *BMC Geriatrics*, Vol. 19 No. 1, e345.

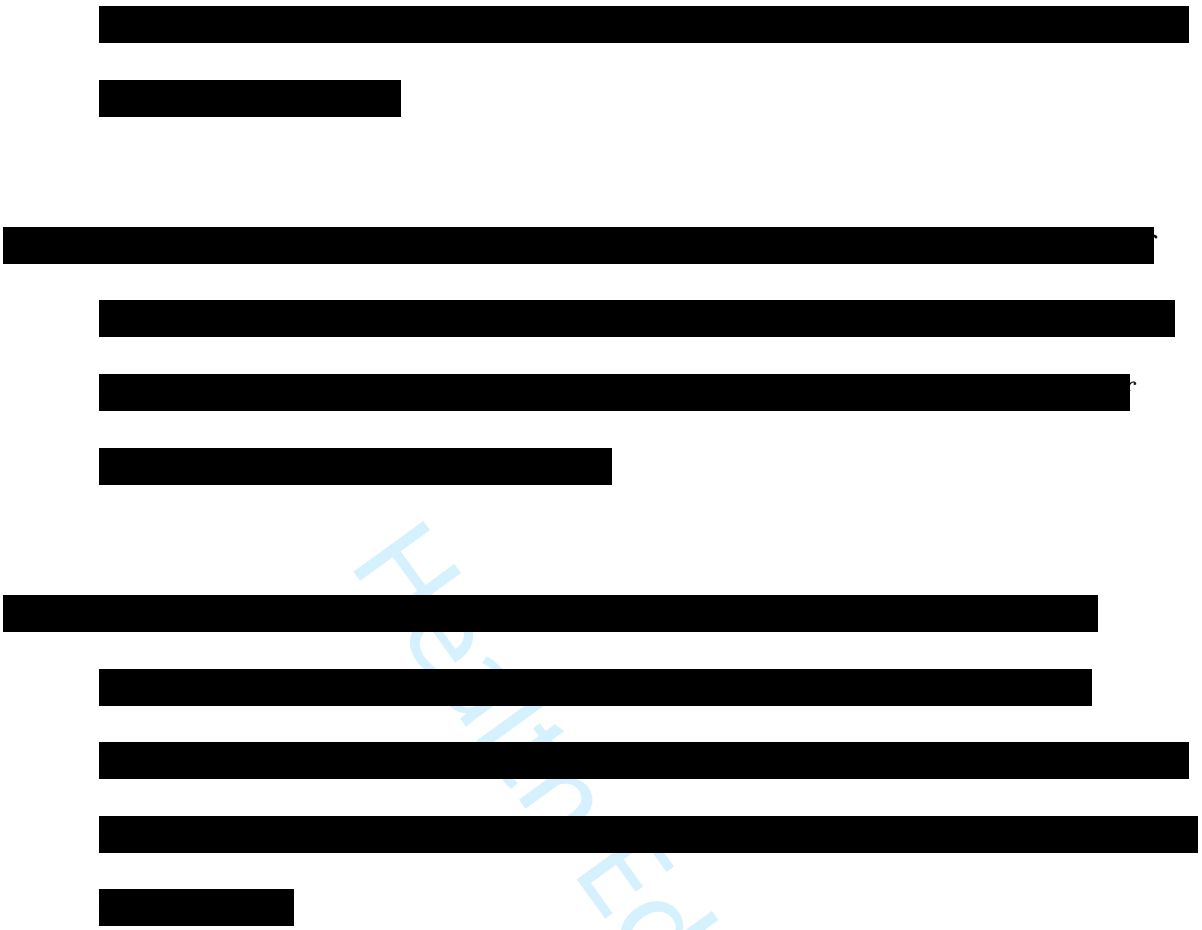
Dittmar, M. (2001), "Changing colour preferences with ageing: a comparative study on younger and older native Germans aged 19-90 years", *Gerontology*, Vol. 47 No. 4, pp. 219-226.

Dreeben, O. (2010), *Patient Education in Rehabilitation*. Jones and Bartlett, Sudbury, MA.

Elo, S. and Kyngäs, H. (2008), "The qualitative content analysis process", *Journal of Advanced Nursing*, Vol. 62 No. 1, pp. 107-115.

[redacted]

[redacted]



Ghisi, G.L., Abdallah F., Grace, S.L., Thomas, S. and Oh, P. (2014), "A systematic review of patient education in cardiac patients: do they increase knowledge and promote health behavior change?", *Patient Education and Counceling*, Vol. 95, No. 2, pp.160-174.

Goodyear-Smith, F., Jackson C. and Greenhalgh, T. (2015), "Co-design and implementation research: challenges and solutions for ethics committees", *BMC Medical Ethics*, Vol. 16, e78.

Hendrie, D., Hall, S.E., Arena, G. and Legge, M. (2004), "Health system costs of falls of older adults in Western Australia", *Australian Health Review*, Vol. 28 No. 3, pp. 363-373.

Heng, H., Jazayeri, D., Shaw, L., Kiegaldie, D., Hill, A.M. and Morris, M. (2020), "Hospital falls prevention with patient education: a scoping review", *BMC Geriatrics*, Vol. 20, e140.

Hill, A.M., Francis-Coad, J., Haines, T.P., Waldron, N., Etherton-Beer, C., Flicker, L., Ingram, K. and McPhail, S.M. (2016), " 'My independent streak may get in the way': how older adults respond to falls prevention education in hospital", *BMJ Open*, Vol. 6 No. 7, e012363.

Hill, A.M., McPhail, S.M., Waldron, N., Etherton-Beer, C., Ingram, K., Flicker, L., Bulsara, M. and Haines, T.P. (2015), "Fall rates in hospital rehabilitation units after individualised patient and staff education programmes: a pragmatic, stepped-wedge, cluster-randomised controlled trial", *Lancet*, Vol. 385 No. 9987, pp. 2592-2599.

Hodkinson, H. (1972), "Evaluation of a mental test score for assessment of mental impairment in the elderly", *Age and Ageing*, Vol. 1 No. 4, pp. 233-238.

Lee, D.C., McDermott, F., Hoffmann, T. and Haines, T.P. (2013), "'They will tell me if there is a problem': limited discussion between health professionals, older adults and their caregivers on falls prevention during and after hospitalization", *Health Education Research*, Vol. 28 No. 6, pp. 1051-66.

Leemrijse, C.J., de Boer, M.E., van den Ende, C.H., Ribbe, M.W. and Dekker, J. (2007), "Factors associated with physiotherapy provision in a population of elderly nursing home residents: a cross sectional study", *BMC Geriatrics*, Vol. 7 No. 7, e1-8.

Michie, S., Atkins, L. and West, R. (2014), *The Behaviour Change Wheel: A Guide to Designing Interventions*, Silverback, Sutton, UK.

Montero-Odasso, M. and Speechley, M. (2018), "Falls in cognitively impaired older adults: implications for risk assessment and prevention", *Journal of the American Geriatrics Society*, Vol. 66 No. 2, pp. 367-375.

Morley, J.E., Rolland, Y., Tolson, D. and Vellas, M. (2012), "Increasing awareness of the factors producing falls: the mini falls assessment", *Journal of the American Medical Directors Association*, Vol. 13, pp. 87-90.

Mwrani, L. and Fuller, J. (2003), "Falls in the elderly: challenges and opportunities in the rural settings: the Whyalla case. Preliminary report", *Health Education*, Vol. 103 No. 5, pp. 296-304. doi:10.1108/09654280310499073

My Home Life Cymru (2018), "Staying On My Feet, Falls Prevention: Best Practice Guide for Care Homes in Wales", available at: https://www.cadr.cymru/en/news-info.htm?id=79 (accessed 8 December 2020).

National Institute of Health and Care Excellence (2018), "NICE impact falls and fragility fractures", available at:

https://www.bgs.org.uk/sites/default/files/content/resources/files/2018-08-29/NICE-Impact-falls-and-fragility-fractures.pdf (accessed 1 October 2021).

National Institute of Health Research (2016), "Going the extra mile: Improving the nation's health and wellbeing through public involvement in research",available at: https://www.nihr.ac.uk/documents/about-us/our-contribution-to-research/how-we-involve-patients-carers-and-the-public/Going-the-Extra-Mile.pdf (accessed 2 May 2021).

National Institute of Health Research (2018), "ENRICH Enabling Research in Care Homes: Testing Methods in The Real World",available at: https://enrich.nihr.ac.uk/wp-content/uploads/2019/08/ENRICH-17-Testing-Methods-In-The-Real-World.pdf (accessed 8 December 2020).

Nelson, D. and Brooks, D. (1974), "Relative effectiveness of rhymes and synonyms as retrieval cues", *Journal of Experimental Psychology: General*, Vol. 102, pp. 503-507.

NHS Care Inspectorate Scotland (2016), "Managing Falls and Fractures in Care Homes for Older People - Good Practice Resource",available at: https://www.careinspectorate.com/images/documents/2737/2016/Falls-and-fractures-new-resource-low-res.pdf (accessed 8 December 2020).

Oliver, D., Connelly, J.B., Victor, C.R., Shaw, F.E., Whitehead, A., Genc, Y., Vanoli, A., Martin, F.C. and Gosney, M.A. (2007), "Strategies to prevent falls and fractures in

hospitals and care homes and effect of cognitive impairment: systematic review and meta-analyses", *British Medical Journal*, Vol. 334, pp. 82-87.

Onder, G., Carpenter, I., Finne-Soveri, H., Gindin, J., Frijters, D., Henrard, J.C., Nikolaus, T., Topinkova, E., Tosato, M., Liperoti, R., Landi, F. and Bernabei, R. (2012), "Assessment of nursing home residents in Europe: the services and health for elderly in long term care (SHELTER) study", *BMC Health Services Research*, Vol.12, e5.

Peach, T., Pollock, K., van der Wardt, V., das Nair, R., Logan, P. and Harwood, R.H. (2017), "Attitudes of older people with mild dementia and mild cognitive impairment and their relatives about falls risk and prevention: a qualitative study", *PLoS ONE*, Vol. 12 No. 5, e0177530.

Portney, L. and Watkins, M. (2009), *Foundations of Clinical Research: Applications to Practice*, Pearson, Prentice Hall, Upper Saddle River, NJ.

Salsberg, J., Parry, D., Pluye, P., Macridis, S., Herbert, C.P. and Macaulay, A.C (2015), "Successful startegies to engage research partners for translating evidence into action in community health: a critical review", *Journal of Environmental Public Health*, Vol. 2015, pp. 1-15.

Schoberer, D., Leino-Kilpi, H., Breimaier, H.E., Halfens, R.J. and Lohrmann, C. (2016), "Educational interventions to empower nursing home residents: a systematic literature review", *Clinical Interventions in Aging*, Vol. 11, pp. 1351-1363.

Stringer, E.T. and Genat, W.J. (2004), *Action Research in Health*, Pearson, Prentice Hall, Upper Saddle River, NJ.

Tong, A., Sainsbury, P. and Craig, J. (2007), "Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups", *International Journal for Quality in Health Care*, Vol. 19 No. 6, pp. 349-357.

Vasse, E., Vernooij-Dassen, M., Spijker, A., Rikkert, M.O. and Koopmans, R. (2010), "A systematic review of communication strategies for people with dementia in residential and nursing homes", *International Psychogeriatrics*, Vol. 22 No. 2, pp. 189-200.

Zimmerman, S., Shier, V. and Saliba, D. (2014), "Transforming nursing home culture: evidence for practice and policy", *The Gerontologist*, Vol. 54 No. S1, pp. 1-5.

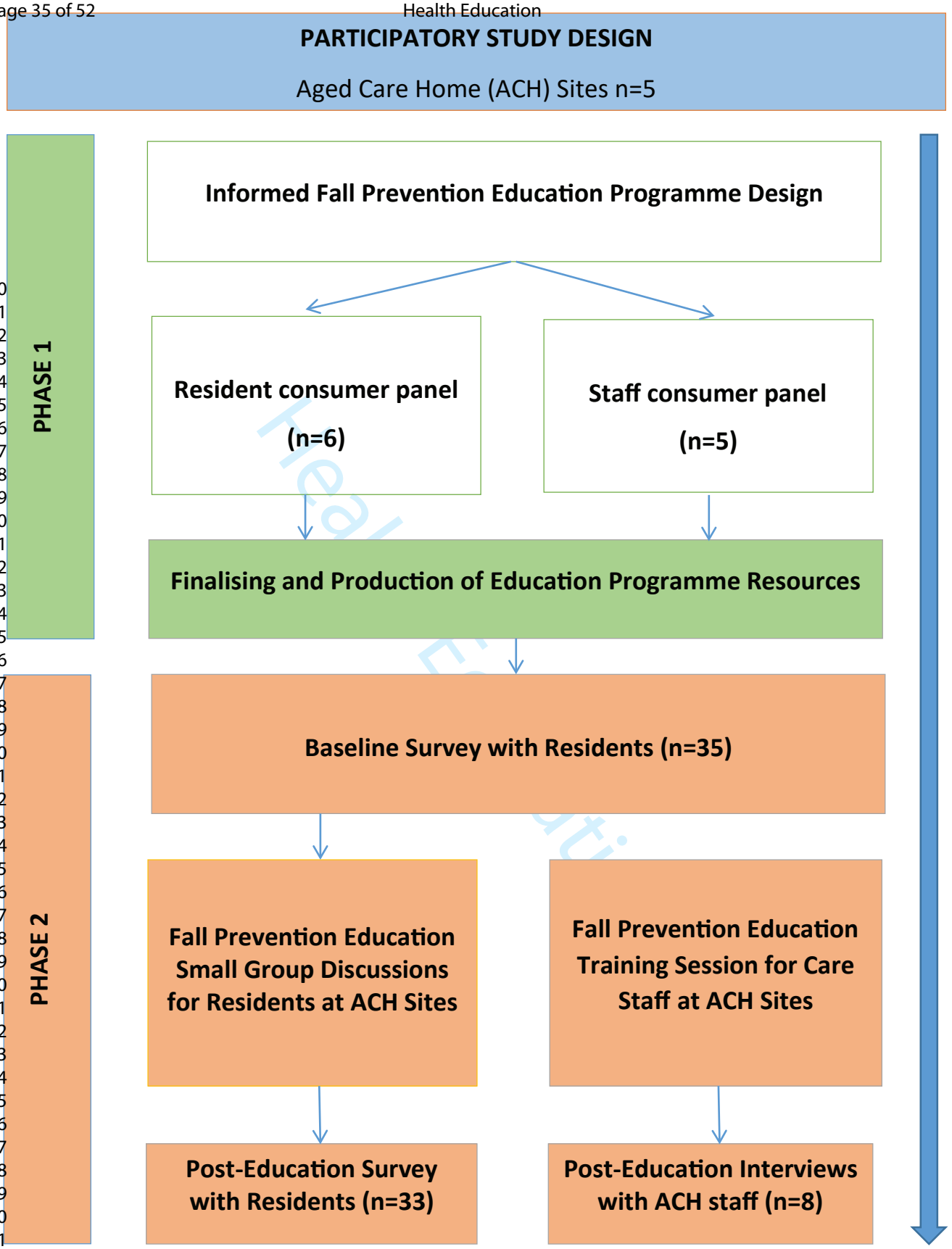


Figure 1. Participatory Study Design

Table 1. *Safety messages*

	Message and Explanation
1	**"If I feel unwell, I'll ring the bell"** • If you feel unwell, dizzy or a bit unsteady tell your care staff immediately • Getting checked early may prevent an illness developing or a fall from happening
2	**"My walking aid is near and my route is clear"** • Check your walking aid is within your reach at all times • Ask the staff to show you the best way to walk or use your walking aid • Have a look around in the direction you are planning to walk so your pathway is clear
3	**"I need to hear and see so it's safer for me"** • Make sure you always wear your glasses when you are moving around • Clean your glasses regularly • Have your eyes checked 6-12 months • Wear your hearing aids when you are moving around and switch them on
4	**"If it's not nice and bright I'll put on the light"** • Put the light on if you are moving around when it's night time or light levels are low
5	**"I'll choose with care the clothes I wear"** • Checking the fit of clothing so that hemlines aren't dragging on the ground will help avoid tripping or slipping • Comfortable clothing will enable you to move freely
6	**"My supportive shoes are the ones I'll use"**

- Choosing a shoe with good supports, like laces or straps and thinner soles, will help you feel the ground beneath you
- Never walk around in stockings or socks only
- Have regular foot checks, talk to your Chiropodist or Doctor

7 **"When changing position I'll make safety my mission"**

- Pause when you move from one position to another, like standing up from sitting
- This allows our blood pressure time to adjust, if you feel wobbly or dizzy sit back down and call for assistance

8 **"Being steadier and stronger helps me stay well longer"**

- Having better balance and stronger muscles help us to stay steady and move around well
- Ask the Physio about exercises that might help you to feel steady and stronger

9 **"Having enough Vitamin D is helpful for me"**

- Our levels of Vitamin D may be lower as we get older. We need vitamin D to help our muscles and bones stay strong
- Taking a vitamin D supplement can be helpful so ask your Nurse or Doctor

10 **"Knowing my medications can avoid complications"**

- Some medications can have side effects that may make you feel drowsy and unsteady on your feet
- Tell your care staff or Doctor if you notice any changes when taking your medications

11 **"I'm thirsty I think I'll be sure to have a drink"**

- Have regular drinks throughout the day

- Water is best
- Keep a jug or water bottle close by

12 **“I have a toileting plan to go safely when I can”**

- Try not to leave it too long to walk to the toilet so you don’t need to hurry
- If you need to go to the toilet at night make sure you have a lit pathway
- Talk to your care staff about planning a visit to the toilet

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Table 2. *Resident and staff characteristics*

Resident Characteristics	Australia n=25 (100%)	Wales n=10 (100%)	Combined n=35 (100%)
Gender, Female n (%)	20 (80.0)	8 (80.0)	28 (80.0)
Age (years)			
Mean (SD)	86.1 (SD 8.9)	85.0 (SD 5.6)	85.8 (SD 8.1)
Range	65 - 99	79 - 94	65 - 99
Length of stay at ACH (months)			
Mean (SD)	31.6 (SD 40.8)	17.2 (SD 9.3)	27.5 (SD 35.2)
Range	3 - 188	3 - 30	3 - 188
Ambulant n (%)	25 (100.0)	10 (100.0)	35 (100.0)
Uses walking aid n (%)	19 (76.0)	9 (90.0)	28 (80.0)
Single-point stick	2 (8.0)	0	2 (5.7)
Quadruped stick	1 (4.0)	2 (20.0)	3 (8.6)
2 Wheeled walker	1 (4.0)	6 (60.0)	7 (20.0)
3 Wheeled walker	2 (8.0)	0	2 (5.7)
4 Wheeled walker	13 (52.0)	1 (10.0)	14 (40.0)
Fallers since admission n (%)	16 (64.0)	5 (50.0)	21 (60.0)
Number of falls n (%)			
1 fall	7 (28.0)	0	7 (20.0)
2 – 10 falls	8 (32.0)	4 (40.0)	12 (34.3)
More than 10	1 (4.0)	1 (10.0)	2 (5.7)
Staff Characteristics	Australia n=6 (100%)	Wales n=2 (100%)	Combined n=8 (100%)
Gender, Female n (%)	6 (100)	2 (100)	8 (100)
Age (years)			
Mean (SD)	39.8 (SD 14.9)	62.5 (SD 2.1)	45.5 (SD 16.4)
Range	24 - 62	61- 64	24-64
Length of employment at ACH (months)			
Mean (SD)	63.00 (SD 38.1)	91.0 (SD 41.0)	70.0 (SD 38.0)
Range	18 - 120	62 - 120	18 - 120
Designation	6 (100.0)	2 (100.0)	8 (100.0)

Occupational Therapist	1 (16.7)	0	1 (12.5)
Enrolled Nurse	2 (33.3)	0	2 (25.0)
Nursing Care Assistant	1 (16.7)	2 (100.0)	3 (37.5)
Therapy Assistant	2 (33.3)	0	2 (25.0)

Notes: ACH – Aged Care Home(s), SD – Standard Deviation

Table 3. *Recommendations for improving falls prevention education programme feasibility*

Feasibility criteria	**Recommended adaptations**
Improve intervention acceptability	• Provide residents with the opportunity to personalise their chosen resource (either poster or brochure via electronic copy) to meet their aesthetic preferences • Re-design the brochure with larger font and more spacing between messages • Modify questionnaire responses to simpler format (Yes/No/Unsure) and pilot for better understanding and reliability
Increase intervention demand for future expansion	• Co-design programme adaptations with residents living with cognitive impairment, their family and staff to meet their specific needs (aiding recruitment)
Improve ability to implement the intervention and integrate into practice	• Researchers to embrace participatory designs and increase opportunities for participants to contribute to all aspects of the research (design, delivery, evaluation and dissemination) to improve integration of the programme into practice • Break down the program into more manageable learning components e.g. having a weekly focus on a single safety message for a 12 week cycle (covering 12 messages) to facilitate learning • ACH management to provide frequent opportunities for residents to watch video e.g. play before

	screened movies or evening news on communal large screen increasing access • ACH management to provide learning opportunities for all staff enabling them to assist residents with programme engagement • ACH management to provide opportunity (through workload re-structure?) for staff to assist residents to enact safety messages on a daily basis • ACH management to establish accountability measures for staff assisting residents with safety message enactment e.g. using audit and feedback
Improve practicality for delivering the intervention	• ACH management to provide opportunity (through workload re-structure?) for staff to assist residents to enact safety messages on a daily basis • Researchers to identify and network with a number of ACH organisations as potential participants (preferably those with prior experience of research participation) to combat withdrawal

Notes: ACH - Aged Care Home(s)

Appendix 1

Resident Survey (questions only)

	Questions
1	I think that older people who are admitted to care homes (like this one) are at risk of falling over.
2	I think that I will fall over at some time whilst living here (in a care home)
3	I think that if an older person who lives in a care home falls over they are likely to get a serious injury (such as a sprain, broken bone or bumped head)
4	I think that if I were to fall over I would be likely to get a serious injury
5	I am aware of the things I need to do to stay safe and reduce my risk of falling
6	I am confident in my ability to do the things I need to do to stay safe and reduce my risk of falling
7	Why do you think older people fall over?
8	I feel positive about staying safe and reducing my overall risk of falling
9	I am provided with every opportunity to do the things I need to do to stay safe and reduce my risk of falling
10	In the next month, I intend to do the things I need to do to stay safe and reduce my risk of falling
11	I have a clear plan of how I will do the things I need to do to stay safe and reduce my risk of falling
12	Tell me what you currently do to stay safe and reduce your risk of falling
13	Is there anything that might make it difficult for you to do the things you need to do to stay safe and reduce your risk of falling?
14	**Pre**: Is there anything the staff could do to help you stay safe and reduce your risk of falling?

	Post: Did the staff remind you about the messages on the poster and brochure to help you stay safe and reduce your risk of falling?
15	**Pre:** Have you received any education (information) on how to stay safe and reduce your risk of falling? Would you mind telling us about it? **Post**: Can you tell me what you thought of the poster? Can you tell me what you thought of the brochure? Can you tell me what you thought of the video?
16	Any other comments?

Notes. COM-B application: Questions 1-5, 7, 12 & 13 relate to 'Capability', questions 9, 11 & 13 relate to 'Opportunity' and questions 6, 8 & 10 relate to 'Motivation'

Staff interview guide

Questions and prompts
□ Was this the first time you've undertaken falls prevention training? (If not) Was this experience different to previous occasions?
□ Regarding the training, what did you think worked well?
□ Did you learn anything new? Can you remember any of the safety messages (rhymes)?
□ What interested you most? Why? (prompt if needed: video, poster, training guide)
□ Were there any disappointments regarding the training or resources?
□ Did anything frustrate you?
□ Do you think there are any changes that should be made to the training guide? (Can you describe?)
□ Do you think there are any changes that should be made to the video? (Can you describe?)
□ Was there anything unexpected in the training? What questions were raised in your mind?
□ Who can you share the new information with?
□ Who can you problem solve with if needed?
□ Have you observed any (behaviour) changes in the residents who received the education program? (Prompt: undertaking measures to stay safe and reduce their falls risk)
□ Do you want to share any other thoughts on the safety/fall prevention training or resources?

COREQ (COnsolidated criteria for REporting Qualitative research) Checklist

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
Personal characteristics			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	4,5,6
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	Title page
Occupation	3	What was their occupation at the time of the study?	Title page
Gender	4	Was the researcher male or female?	Female
Experience and training	5	What experience or training did the researcher have?	PhD
Relationship with participants			
Relationship established	6	Was a relationship established prior to study commencement?	No
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	N/A
Interviewer characteristics	8	What characteristics were reported about the inter viewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	N/A
Domain 2: Study design			
Theoretical framework			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	3,6
Participant selection			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	4
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	4
Sample size	12	How many participants were in the study?	7
Non-participation	13	How many people refused to participate or dropped out? Reasons?	7
Setting			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	3,4,5
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	4,5
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	Table 2
Data collection			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	Yes
Repeat interviews	18	Were repeat inter views carried out? If yes, how many?	N/A
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	4,5,6
Field notes	20	Were field notes made during and/or after the inter view or focus group?	4
Duration	21	What was the duration of the inter views or focus group?	30-45 mins
Data saturation	22	Was data saturation discussed?	N/A
Transcripts returned	23	Were transcripts returned to participants for comment and/or	6

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	
Domain 3: analysis and findings			
Data analysis			
Number of data coders	24	How many data coders coded the data?	6
Description of the coding tree	25	Did authors provide a description of the coding tree?	6
Derivation of themes	26	Were themes identified in advance or derived from the data?	N/A
Software	27	What software, if applicable, was used to manage the data?	6
Participant checking	28	Did participants provide feedback on the findings?	6
Reporting			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	9,10,11,12
Data and findings consistent	30	Was there consistency between the data presented and the findings?	9-13
Clarity of major themes	31	Were major themes clearly presented in the findings?	N/A
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	9-13

Developed from: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

Once you have completed this checklist, please save a copy and upload it as part of your submission. DO NOT include this checklist as part of the main manuscript document. It must be uploaded as a separate file.

Appendix 3

eTable a. *Education programme modifications*

	Modifications
Poster & Brochure	• Image and text order flipped so images preceded text when reading from left to right • Text bubbles were connected to images • Borders were added to all images for visual clarity • Two replacement photographs were added with a clearer background for the exercise demonstration and close-up of the call bell
Video	• Voiceover by the lead researcher for clarity and accuracy of information • Copied onto USB drives in mp4 format for all participating sites to view on either a smart TV, computer screen or tablet
Staff Education Guide	• Additional text explanations of the care staff role in assisting residents to reduce their risk of falling using the resources were added to improve readability and understanding
Print format	• Poster single side A3 matt paper 300 dpi Times New Roman (bold) font 60 • Brochure double sided A4 (folded) matt paper 300 dpi • Staff education guide double sided A4 (flip format binded) matt paper 300 dpi Calibri (body) font 16-22

eTable b. *Comparison of residents' capability, opportunity and motivation to prevent falls*

Item	SA *Pre / Post	A *Pre / Post	U *Pre / Post	D *Pre / Post	SD *Pre / Post	p value
I think that older people who are admitted to care homes (like this one) are at risk of falling over	7/4	12/18	5/4	11/6	0/1	0.258
I think that I will fall over at some time whilst living here in a care home	5/4	18/16	4/5	7/7	1/1	0.703

Item	SA *Pre / Post	A *Pre / Post	U *Pre / Post	D *Pre / Post	SD *Pre / Post	p value
I think that if an older person who lives in a care home falls over they are likely to get a serious injury (such as a sprain, broken bone or bumped head)	5/6	19/20	6/5	5/2	0/0	0.315
I think that if I were to fall over I would be likely to get a serious injury	3/4	16/12	9/8	7/9	0/0	0.325
I am aware of the things I need to do to stay safe and reduce my risk of falling	9/11	22/21	3/1	1/0	0/0	0.317

Item	SA *Pre / Post	A *Pre / Post	U *Pre / Post	D *Pre / Post	SD *Pre / Post	p value
I am confident in my ability to do the things I need to do to stay safe and reduce my risk of falling	3/6	21/21	4/1	7/4	0/1	0.224
I feel positive about staying safe and reducing my overall risk of falling	5/3	24/24	2/1	4/5	0/0	0.711
I am provided with every opportunity to do the things I need to do to stay safe and reduce my risk of falling	10/5	23/26	2/1	0/1	0/0	0.134

Item	SA *Pre / Post	A *Pre / Post	U *Pre / Post	D *Pre / Post	SD *Pre / Post	p value
In the next month, I intend to do the things I need to do to stay safe and reduce my risk of falling	5/8	26/22	3/2	1/1	0/0	0.475
I have a clear plan of how I will do the things I need to do to stay safe and reduce my risk of falling	3/6	17/14	7/1	8/12	0/0	0.933

Notes: SA Strongly Agree, A Agree, U undecided, D Disagree, SD Strongly Disagree
*Pre-intervention / Post-intervention
Missing data n=2 (Post-intervention)