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Feature Article

Using a personalized DVD to prescribe an exercise program to older people post-hip fracture enhances adherence to the exercises – A feasibility study



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ABSTRACT

Optimum recovery from hip fracture has been linked to the provision of effective rehabilitation, but levels of adherence vary among older patients. In this feasibility study a novel personalized DVD was designed for four participants, which delivered a 5 week tailored home exercise program (HEP), with the participant being videoed completing their exercises. Treatment fidelity of the DVD HEP was evaluated, including participants' perceptions of and response to the DVD-HEP, which was explored using diaries and interviews and analyzed thematically. Secondary outcome measures including exercise adherence and self-efficacy for exercise were analyzed using descriptive statistics. Levels of adherence to the HEP were 1.2–3.5 times more than the minimum prescribed dose and participants demonstrated higher levels of self-efficacy for exercise. Adherence was found to be enhanced by physical improvement, positive self-reflection about engagement in the DVD-HEP, the format of the DVD, and increased self-efficacy. Personalized DVDs may be a feasible method of promoting adherence to home exercise programs among older patients.

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Introduction

Hip fractures are a substantial public health problem worldwide and result in substantial increased mortality.^{1,2} Older people who fracture their hip have a 5 to almost 8 fold increase in all-cause mortality during the first 3 months after hip fracture and this risk does not return to a pre-fracture mortality rate even after 10 years of follow up.³ Hip fractures also result in functional decline, with up to 50% of patients having a disability in walking at 12 months post fracture,^{4,5} and are also associated with loss of independence⁴ and moving into nursing home care.⁶

There is limited evidence about how to reduce the poor outcomes associated with hip fracture.^{7,8} Optimum recovery has been linked to the provision of effective rehabilitation.^{6,9} Although it is unclear what the ideal rehabilitation program should include, effective exercise programs have included higher exercise dose, muscle strengthening and functional exercises.^{5,7,8,10} However, how to promote adherence to exercise in older people is unclear.^{11–13}

Previous studies have confirmed that older people, including those with hip fracture, have low levels of adherence to exercise^{14–16} and identify perceived barriers to exercise which include lack of knowledge, depression, no interest, low outcome expectation, poor health, and low self-efficacy.^{11,17–21}

Digital video disc (DVD) technology has been used to provide training in adult populations and has shown generally positive effects in increasing adherence to exercises,^{22–25} although the small number of studies and limitations in trial designs limit conclusive findings. However this approach has not been investigated in older patients after hip fracture. These studies also provided targeted exercise programs which used a single intervention approach applied to a sub-group of a population.²⁶ No studies using DVD technology have designed a tailored or personalized exercise program using video of the patient themselves to construct the content of the DVD. This has the advantages of addressing specific characteristics of the individual in a tailored manner and may enhance training and self-efficacy by providing visual self-feedback, realistic exercise guidelines and a structured program.^{9,27–29} Tailoring allows for personal and direct content presentation based on elements such as likes or dislikes, needs, and health behaviors and has been shown to have positive outcomes when compared to non-tailored interventions.³⁰

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The aim of this pilot study was to investigate the feasibility of providing a home exercise program (HEP) using a personalized DVD on exercise adherence among older people who had previously fractured their hip. In addition we evaluated the impact of the personalized DVD-HEP on participant's self efficacy and outcome expectancy for exercise, the amount of time spent engaging in physical activity, participants' health-related quality of life and functional mobility at five weeks after commencing their HEP compared with their baseline measures.

Trial registration

The study was registered with the Australian New Zealand Clinical Trials Registry, registration number: ACTRN12613000350729 (<https://www.anzctr.org.au/Trial/Registration/TrialReview.aspx?id=363922>).

Methods

Design

A descriptive single group pilot study that provided a personalized DVD-HEP to older patients as part of their rehabilitation following a hip fracture. Pre-test – post-test measures were undertaken (each participant receiving intervention – each participant acting as their own control).

Participants and setting

A convenience sample of older adults who had fractured their hip at least 3 months prior to the study were recruited from the outpatient department at Swan Districts hospital in Western Australia. The aged care rehabilitation unit admits older patients who have fractured their hip for rehabilitation, immediately after they have had surgical intervention at an acute hospital. All potential participants were visiting their doctor for a medical post hospital appointment and had completed an inpatient and outpatient rehabilitation program, including follow up therapy and medical appointments. Inclusion criteria were: aged between 60 and 85 years; speaks English as a first language; cognitive ability to engage in a self-directed program [eligible if mini-mental state examination score (MMSE) > 23/30³¹; not currently completing an exercise program; medically stable (as assessed by hospital geriatrician); availability of a DVD player and television at home; finished any active rehabilitation post-hip fracture; below pre-morbid functional level of activity.

Exclusion criteria were sensory deficits that prevented hearing instructions or viewing a DVD on a television at home. Patients with medical diagnoses that were thought to predispose to a high risk of falls in the post discharge period, that could preclude performing a program safely at home (Parkinson's disease, recent history of stroke, or postural hypotension) were excluded from the study. On viewing the participant's medical record if there was any question about whether the participant would be able to perform a home program safely, they were reviewed by the hospital geriatrician for a final decision on inclusion eligibility.

Intervention

The intervention consisted of a structured five week HEP delivered through a 30 min DVD. The DVD was constructed by videoing each participant completing exercises which were personally designed and prescribed for them by their physical therapist. Each participant performed initial baseline measures to assess or identify deficits in HRQoL, activity limitations and impairments using assessment tools which were also used as outcome

measures. These tests were augmented with individual observation and assessment of the participant by the research physical therapists to gain additional information regarding participant deficits. Exercises that addressed each identified problem were then prescribed to the participant. Even though all participants had fractured their hip, each participant had different comorbidities and different impairments. Therefore each exercise program prescribed was personalized to the participant's impairments by the physical therapist researchers as if undertaking a normal clinical appointment. The impairments treated (targeted with differing intensities for each participant) were strength of the lower limbs, balance exercises, postural control and functional ability such as standing and walking, which are noted to be part of effective training interventions in older patients who have fractured their hip.^{7,10,19} The physical therapist was also shown in the footage providing feedback to the participant as they performed the exercises, and music played as background. The participant subsequently completed their HEP while viewing their DVD. The key parameters of making the DVD-HEP are shown in [Table 1](#).

Outcome measures

A range of outcome measures were chosen to determine the feasibility of providing a HEP using a DVD, including strategies that monitored the treatment fidelity.³²

These outcomes measured were: i) ability of the physical therapists to film a patient completing exercises with their therapist while using the outpatient setting of a rehabilitation department; ii) feasibility of producing the exercises onto a DVD to a standardized age friendly format that could be viewed on a home TV setting; iii) time for the exercise program to be recorded with the participant.; iv) ability of participants to comprehend both the visual and auditory components of the DVD.

Demographic characteristics of participants which were measured at baseline only were age, gender, time since hip fracture, use of walking aid and assistance received at home. Quantitative outcomes that measured adherence to the program as well as functional changes and self-efficacy for exercise, both of which would be expected to improve if an older person successfully engaged in a structured exercise program were also included. The following outcomes were measured at baseline and after 5 weeks.

Exercise adherence

Exercise adherence of participants was measured using a daily exercise diary that was issued to each participant, to complete for the 5 weeks of the program.

Efficacy for exercise

Self-efficacy for exercise was measured using the Self Efficacy for Exercise scale [SEE]^{33,34} and was measured at baseline and five weeks. The SEE scale used in this study was a modified 11 item scale which rates older adults responses to statements about barriers to exercise (scores range from 0 = not very confident to 10 = very confident; with a total possible score of 110). For example item one asks participants: "Would you exercise if you felt tired during or after exercise?"

Outcome expectancy for exercise measured using the Outcome Expectancy for Exercise scale-2 (OEE-2), measured at baseline and five weeks. The OEE-2 scale is a 13 item scale which rates older adults' responses against statements (both positive and negative) about the benefits of exercising.³⁵ To complete the OEE-2 scale the participant is asked to listen to a statement about exercise and respond using the options: strongly agree (1), agree (2), neither agree nor disagree (3), disagree (4), or strongly disagree (5). For

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