

ORIGINAL ARTICLE

Reducing Risk of Falling in Older People Discharged From Hospital: A Randomized Controlled Trial Comparing Seated Exercises, Weight-Bearing Exercises, and Social Visits

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ABSTRACT. Vogler CM, Sherrington C, Ogle SJ, Lord SR. Reducing risk of falling in older people discharged from hospital: a randomized controlled trial comparing seated exercises, weight-bearing exercises, and social visits. *Arch Phys Med Rehabil* 2009;90:1317-24.

Objective: To compare the efficacy of seated exercises and weight-bearing (WB) exercises with social visits on fall risk factors in older people recently discharged from hospital.

Design: Twelve-week randomized, controlled trial.

Setting: Home-based exercises.

Participants: Subjects (N=180) aged 65 and older, recently discharged from hospital.

Interventions: Seated exercises (n=60), WB exercises (n=60), and social visits (n=60).

Main Outcome Measures: Primary outcome factors were Physiological Profile Assessment (PPA) fall risk score, and balance while standing (Coordinated Stability and Maximal Balance Range tests). Secondary outcomes included the component parts of the PPA and other physical and psychosocial measures.

Results: Subjects were tested at baseline and at completion of the intervention period. After 12 weeks of interventions, subjects in the WB exercise group had significantly better performance than the social visit group on the following: PPA score ($P=.048$), Coordinated Stability ($P<.001$), Maximal Balance Range ($P=.019$); body sway on floor with eyes closed ($P=.017$); and finger-press reaction time ($P=.007$) tests. The seated exercise group performed better than the social visit group in PPA score ($P=.019$) but for no other outcome factor. The seated exercise group had the highest rate of musculoskeletal soreness.

Conclusions: In older people recently discharged from the hospital, both exercise programs reduced fall risk score in older

people. The WB exercises led to additional beneficial impacts for controlled leaning, reaction time, and caused less musculoskeletal soreness than the seated exercises.

Key Words: Accidental falls; Exercise therapy; Muscle weakness; Rehabilitation.

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PEOPLE RECENTLY DISCHARGED from hospital are at increased risk of falls and readmission to hospital.^{1,2} The increased fall risk associated with medical problems¹ is likely exacerbated by acute illness and relative inactivity while in hospital.

However, in the only adequately powered study of exercise for prevention of falls in people after discharge from hospital, Latham et al³ found no benefits from seated resistance exercises on muscle strength or fall rates. This exercise regimen was difficult to progress and caused a high rate of musculoskeletal injury. Similar studies have also found that some strengthening programs do not improve lower-limb strength.^{4,5}

Recent studies have designed and evaluated strengthening programs that involve the addition of resistance to exercises performed in WB positions (ie, standing, walking) that mimic daily activities.⁶⁻¹¹ These programs have been shown to have a greater effect on daily task performance (ie, sit-to-stand)¹¹ than seated strengthening exercises. However, such exercises may be more difficult to perform in an unsupervised home program.

With these issues in mind, we developed an exercise program aimed at improving strength and balance that could be conducted in WB positions.

We conducted a randomized controlled trial to compare the effects of this WB program, seated strengthening exercises, and a no-exercise social visits program on risk factors for falls and musculoskeletal soreness.

METHODS

Subjects and Recruitment

Inpatients from Aged Care and Rehabilitation, General Medicine and Orthopaedics Services, Royal North Shore and Hornsby Ku-ring-gai Hospitals, northern Sydney, Australia, were screened for eligibility by a geriatrician (C.M.V.) and

List of Abbreviations

ADLs	activities of daily living
CG	control group
CI	confidence interval
PPA	Physiological Profile Assessment
SR	seated progressive resistance training
WB	weight bearing

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approached regarding participation after leaving hospital. Eligible subjects were 65 years or older. Subjects were excluded if they had medical contraindications to exercise,^{12,13} if they were cognitively impaired (Mini-Mental State Examination score <24 out of 30¹⁴), or if they were to be discharged to a high-care residential facility for the aged. Three hundred eleven subjects were eligible and provided written informed consent.

Baseline assessments were conducted after subjects had returned home, were medically fit to exercise, and had completed hospital-related rehabilitation (within 3 months of discharge). One hundred eighty subjects completed the baseline assessments and were then randomized to 1 of 3 groups: SR, WB exercises, and the CG (frequency-matched social visits) (fig 1).

Randomization (independent of baseline assessment results) was performed in blocks of 15 subjects by computer-generated random numbers. Group allocations for each subject were concealed in opaque envelopes. The outcome assessor remained unaware of group allocation. Ethical approval was obtained from the local health service human research ethics committee.

Interventions

Three experienced physical therapists delivered the interventions to subjects at their homes or at a low-level aged-care facility. The physical therapist visited 8 times in 12 weeks to individually prescribe and ensure correct performance of each exercise, and to progress the exercises when the subject was capable. Subjects were asked to exercise 3 times a week.

Seated exercises. This group was prescribed exercises to be performed while sitting on a standard dining room chair.

Exercises targeted hip flexion, extension, abduction, knee flexion and extension, and ankle plantar- and dorsiflexion. An increasing amount of resistance from cuff weights and exercise bands was added to the exercises with the aim of a 10 to 12 repetition maximum load (ie, the weight that could only be lifted 10–12 times). Weights began at 0.5kg and were progressed according to participant capability in 0.5kg increments.

Weight-bearing exercises. Subjects assigned to this group were prescribed exercises to be performed while standing, with a chair or bench for support if required. Lower-limb strength was targeted with exercises such as heel raises, partial squats, sit-to-stand, and stepping forward and sideways up onto blocks. Resistance was provided with weight-loaded waist belts, aiming for a 10 to 12 repetition maximum load. Additional exercises aimed to enhance WB task performance and included: reaching and leaning in standing, tapping one foot onto and off a block, controlled anteroposterior weight shifts and controlled pelvic hitches, tandem standing and walking, and getting up off the floor.¹⁵ If a participant was judged to be unable to complete all of the exercises, priority was given to the exercises that primarily targeted strength. (More details of the exercises are available from the authors on request.)

Social visit group. Subjects randomized to the social visit group were visited with the same frequency as the exercise group subjects by a research assistant. The 1-hour visits consisted of playing board games or cards, and general conversation. No exercises or walking were done during these visits.

Safety while exercising. Subjects received written instructions with illustrations of the exercises and safety information. Participants randomized to SR were instructed on safe ways to set

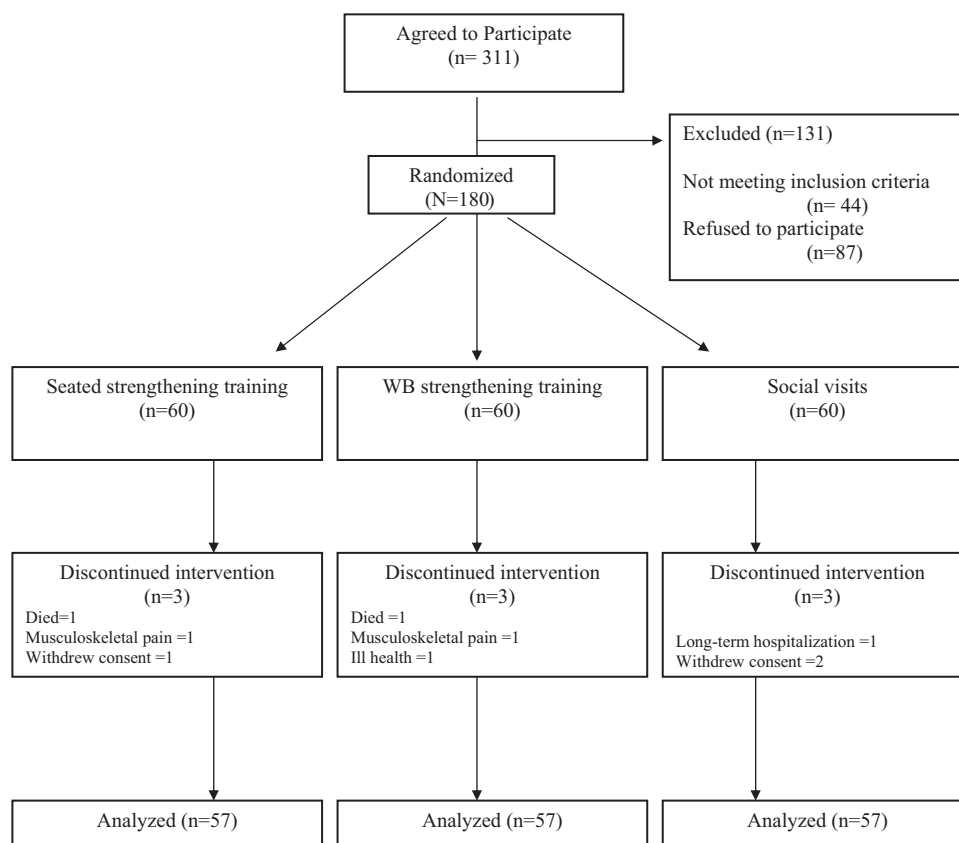


Fig 1. Subject flow through the study.

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