

There is evidence that strengthening exercises improve the ability of frail seniors living in residential facilities to transfer

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CLINICAL SCENARIO: Frail elderly residents of a long term care facility are mechanically lifted when they cannot transfer without assistance. Mechanical lifting ensures resident and staff safety, but decreases the opportunity for functional exercise. This may lead to further loss of strength, mobility and quality of life as residents lose their independence. Strengthening exercises are used by physiotherapists to improve function.

FOCUSSED CLINICAL QUESTION:

Are strengthening exercises effective in restoring the ability of frail seniors living in a residential facility to transfer?

SUMMARY of Search, 'Best' Evidence' appraised, and Key Findings:

- 5 studies identified by the database search met the inclusion criteria: one systematic review and 4 randomized controlled trials (RCTs)
- The systematic review (Rydwik et al, 2004) concluded that physical training improved strength, mobility (including transfers) and range of motion, but there was contradictory evidence to support improvement in balance, gait, personal activities of daily living (such as dressing and feeding) and endurance.
- Two studies (Baum et al, 2003, and Ouslander et al, 2005) concluded that a strength training program showed statistically significant improvement in function, such as sit to stand ability and transfers.
- One study (Littband et al, 2006) concluded that strengthening exercises improved function, but did not demonstrate this using statistical analysis.
- One study (Marijke et al, 2006) concluded that strength training did not improve functional skills.

CLINICAL BOTTOM LINE:

There is evidence to support the use of strengthening exercises for restoring the ability of frail seniors living in a residential facility to transfer.

Limitation of this CAT: This critically appraised paper has not been peer-reviewed by one other independent person.

SEARCH STRATEGY:

Terms used to guide Search Strategy:

- **P**atient/Client Group: frail elderly living in a residential facility
- **I**ntervention: strengthening exercises
- **C**omparison: no exercise intervention
- **O**utcome: improved activities of daily living (ADL)

Databases and sites searched	Search Terms	Limits used
CINAHL Medline PubMed Embase EBM reviews PEDro	Exercise OR therapeutic exercise OR muscle strengthening OR progressive resistance training AND Elderly OR aged OR geriatric OR frail seniors AND Residential facilities OR homes for the aged OR nursing homes AND Activities of daily living OR transfers OR functional status	English language Humans 1996-2007 Age 65+

INCLUSION and EXCLUSION CRITERIA

- Inclusion: Elderly, >65 years, male or female, human, English, studies published 1996-2007, live in residential facility
- Exclusion: <65 years, community dwelling, exercise without strengthening component

RESULTS OF SEARCH

Five relevant studies were located and categorised as shown in Table 1 (based on Levels of Evidence, Greenhalgh, 1997)

Table 1: Summary of Study Designs of Articles retrieved

Study Design/ Methodology of Articles Retrieved	Level	Number Located	Author (Year)

Systematic review	1	1	Rydwik, E., Frandin, K. & Akner, G. (2004)
Randomised controlled crossover trial	2	2	Baum, E., Jarjoura, D., Pollen, A., Faur, D., & Ruteki, G. (2003)
			Ouslander, J., Griffiths, P., McConnell, E., Riolo, L., Kutner, M. & Schelle, J. (2005)
Randomised controlled trial	3	2	Marijke, J., Paw, C., van Poppel, M. & van Mechelen, W. (2006)
			Littbrand, H., Rosendahl, E., Lindelöf, N., Lundin-Olsson, L., Gustafson, Y., & Nyberg (2006)

BEST EVIDENCE

The following study was identified as the 'best' evidence and selected for critical appraisal. Reasons for selecting this study were:

- Highest level of evidence
- High total number of participants

SUMMARY OF BEST EVIDENCE

Table 2: Description and appraisal of systematic review by Rydwik, E., Frandin, K. & Akner, G. (2004). Effects of physical training on physical performance in institutionalized elderly patients (70+) with multiple diagnoses *Ageing*, 2004; 33:1

Aim/Objective of the Systematic Review:

To describe the effect of different types of physical training on physical performance in institutionalized elderly patients with multiple diagnoses.

Study Design: Systematic review

Search strategy: Literature search on PubMed, Medline, CINAHL, AMED, PEDro, and from references in articles and related articles. The search was conducted on four different occasions between September 2000 and August 2002.

Selection criteria: Randomized clinical trials, original studies only, published 1980-2002, published in referee-reviewed journals. Intervention programs consisting of physical training. Subjects mean age 70+, with multiple diagnoses and living in an institution.

Participants: 16 RCTs, samples ranged from 11-392 participants. Total n=1193, intention to treat 1179. Multiple diagnoses, mean age=82, 93% female, varied baseline comparability.

Methods: Following a literature search, the included studies were individually rated for structured evaluation of the methodological quality using a modified Cochrane Collaboration form. Studies were rated for homogeneity, comparability of baseline data, adequate randomization, drop out description and percentage, number of subjects, intervention description, placebo controlled, adequate control group, co-interventions avoided, compliance measured, adequate subjects, blinded subjects, relevant outcome measures, blinded assessments of outcome, adequate exercise period, intention to treat analysis, and statistical frequencies. Total points out of 100 were calculated. The authors also rated the exercise programs according to the type of physical training (strength, mobility, gait, personal ADL, balance, endurance, and range of motion) and assessed their individual effect on the participants in the domains of strength, mobility, gait, ADL, balance, endurance and range of motion as significant increase, significant decrease, not significant or not reported.

Intervention Investigated:

Control: No physical exercise, and variations between the groups where some participated in social activities, or there was no information provided.

Experimental: A program of physical training to include one or more of strength, balance, aerobic, mobility, gait, range of motion or ADL training. Training frequency ranged from daily to three times a week, with duration from 8 weeks to one year, dose 10 minutes to one hour. Treatment providers not reported.

Outcome Measures:

Structured evaluation of methodological quality of each study: high quality 61-100, medium quality 31-60, low quality <30.

Assessment variable of strength, mobility, gait, ADL, balance, endurance and range of motion: significant increase, significant decrease, or no significant change.

Assessment of the type of physical training with a significant positive effect of training.

Main Findings

In this study, the ability to transfer is included in the mobility definition. There was strong evidence for a positive effect on strength and mobility, moderate evidence for a positive effect on range of motion, and contradictory evidence for the effect on gait, personal ADL, balance and endurance. No RCT showed any negative results of physical training.

Original Authors' Conclusions: More studies are required, with larger sample sizes, more specific interventions and assessments, and a greater focus on clinically relevant outcomes such as endurance and ADL, as well as quality of life and mortality.

Critical Appraisal:

Validity The authors reviewed RCTs from 1980-2002 to find as many appropriate studies as possible. This covered frequently referenced work cited in the other studies. While the study population is homogenous and there is adequate randomization and controls, there is heterogeneity regarding the number of subjects and types of training and assessments, which reduces the strength of the results. The authors suggested that the outcome measurement tools for each RCT may not be appropriate for the population under study, who had multiple diagnoses. There is difficulty with lack of blinded subjects and placebo treatments in evaluating physical interventions. It is important to use blinded evaluators, but only two RCTs did this. Selection bias occurs due to the use of volunteers and cluster samples. The original Cochrane collaboration evaluation form was designed for back and neck pain and the form was modified for this study, so the validity of the form is unknown but the assessment is repeatable. Consensus was reached on each criterion, which improved the methodological rigor.

Interpretation of Results All RCTs are not of high methodological quality, as the total point values of the studies ranged from 24-75 out of 100, with a median of 53. Other statistical values were not provided. The ratings of significant increase, decrease, and no change in ability were provided and represented in table and graph form. Physical training was shown to improve physical function in many domains including strength, mobility and range of motion. Mobility training is reported in almost all the studies as resulting in significant improvement.

Summary/Conclusion: There is strong evidence that physical training improves muscle strength, mobility (including transfers) and range of motion. The review had contradictory evidence regarding improvement in gait, personal ADL, balance and endurance.

IMPLICATIONS FOR PRACTICE, EDUCATION and FUTURE RESEARCH

- Exercise programs are already used in the elderly institutionalized population to improve muscle strength, mobility and range of motion. Based on this systematic review, exercise programs should continue to be offered.
- Exercise can be used to restore the ability of frail elderly living in residential facilities to transfer, which will increase their independence and potentially decrease the workload for care staff.
- While exercise programs can be delivered by trained rehabilitation assistants, physiotherapists should monitor individual residents to assess the effectiveness of the program.
- Future research needs to be undertaken using relevant outcome measures and specific interventions to prescribe standardized exercise programs which can be used in the residential geriatric population.

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