Resistance exercises or vitamin D did not improve physical health or reduce falls in frail older people

Latham NK, Anderson CS, Lee A, et al. A randomized, controlled trial of quadriceps resistance exercise and vitamin D in frail older people: the Frailty Interventions Trial in Elderly Subjects (FITNESS). *J Am Geriatr Soc* 2003;51:291-9.

QUESTION: In frail older people, does a home based programme of quadriceps resistance exercise or vitamin D supplementation improve physical health and reduce falls?

Design

Randomised (allocation concealed), blinded (clinicians, patients, and outcome assessors), controlled, factorial design trial with 6 months of follow up.

Setting

5 teaching hospitals in Auckland, New Zealand and Sydney, Australia.

Patients

243 people admitted to geriatric rehabilitation units (inpatient or day wards) who were ≥ 65 years of age (mean age 79 y, 53% women), considered frail (≥ 1 health problem or functional limitation [eg, dependency in an activity of daily living, prolonged bed rest, impaired mobility, or a recent fall]), and had no indication or contraindication for the study treatments. Exclusion criteria included poor prognosis, severe cognitive impairment, physical limitations restricting adherence to the exercise programme, unstable cardiac status, and large ulcers around the ankles. Follow up was 91%.

Intervention

Patients were allocated to resistance exercise (n=120) or attention control (n=123) and to vitamin D (six 1.25 mg tablets of calciferol) (n=121) or placebo (n=122). The quadriceps resistance exercise involved warm up stretches and 3 sets of 8 repetitions of knee extensions using ankle cuff weights in a seated position 3 times per week for 10 weeks. Patients were monitored weekly by a physiotherapist, with alternating telephone calls and home visits. The attention control group received frequency matched telephone calls and home visits from the physiotherapist.

Main outcome measures

Self rated physical health (health related quality of life [HRQoL]) using the physical component score of the Medical Outcomes Study 36 item short form questionnaire at 3 months, and falls over 6 months. 25-hydroxyvitamin-D (25-OH-D) concentrations were measured by radioimmunoassay. Adverse events were assessed.

Main results

Analysis was by intention to treat. Resistance exercises did not improve HRQoL or reduce the incidence of falls more than attention control (table). In only 1 measurement (timed up and go) did the groups differ, and the difference favoured attention control (p=0.045). Musculoskeletal injuries were more frequent in the resistance exercise group (18 v 5 people, relative risk 3.6, 95% CI 1.5 to 8.0). Vitamin D supplementation had no effect on HRQoL or incidence of falls (table), although 25-OH-D concentrations were higher in the vitamin D group than the placebo group (change from baseline to 3 mo 9 v 0 ng/ml).

Conclusions

In frail older people, neither a home based quadriceps resistance exercise programme nor vitamin D supplementation improved physical health or reduced the risk of falls. Resistance exercise led to a higher incidence of musculoskeletal injuries.

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Resistance exercise v attention control and vitamin D v placebo in frail older people*

Outcomes	Comparison	Score	Mean difference (95% CI)	
Mean physical component score of 36 item short form questionnaire at 3 months	Resistance v control	34 v 35	-1 (-4 to 1)	
	Vitamin D v placebo	35 v 35	0 (-2 to 3)	
		Event rates	RRR (CI)	NNT
	Resistance v control	54% v 58%	7.9% (-16 to 27)	Not significant
			RRI (CI)	NNH
Proportion of people who fell over 6 months	Vitamin D v placebo	59% v 53%	13% (-11 to 43)	Not significant

*Abbreviations defined in glossary; RRR, RRI, NNT, NNH, and CI calculated from data in article.

COMMENTARY

Previous studies have shown the beneficial effects of exercise for older adults,¹⁻³ but no consensus exists on the appropriate quantity, quality, or intensity of exercise necessary to promote improved health and function in this population. Hence, it is difficult to know what would work best for frail older adults. Latham *et al* and Schnelle *et al* explore the transferability of what has been learnt in clinical research into the delivery of efficient and cost effective interventions in 2 groups of frail older adults.

The goal of the study by Latham *et al* was to identify an intervention that could be easily and inexpensively incorporated into existing home healthcare services. To decrease the complexity and improve the feasibility of the intervention, Latham *et al* selected 1 component of a multifaceted exercise programme and a 1 time dose of vitamin D for testing. However, neither simple quadriceps training nor vitamin D supplementation alone was sufficient to prevent falls in older adults who had recently been admitted to hospital.

The purpose of the study by Schnelle *et al* was to determine if reducing the incidence of costly health conditions could offset additional staffing requirements needed to implement the intervention. However, the study was powered for a 16% improvement in outcomes, rather than the more modest 10% improvement achieved in the study. According to Schnelle *et al* and others,⁴ direct comparison of costs without weighting improvements in functionality and other desired outcomes may not be the best approach to determine if an intervention is worth the extra cost.

The results of these studies are relevant to nurses who work in long term care and community settings with frail older adults. The findings increase our knowledge of factors that affect the translation of clinical research into everyday practice. Firstly, the intervention dose must be carefully considered; single strategies may not be effective for individuals with complex problems and needs. As Latham *et al* noted, an exercise programme using more muscle groups or performed for a longer duration may have been more effective, and other studies have shown the effectiveness of more complex exercise regimens, albeit not typically on

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An exercise and incontinence intervention did not reduce the incidence or cost of acute conditions in nursing home residents

Schnelle JF, Kapur K, Alessi C, et al. *Does an exercise and incontinence intervention save healthcare costs in a nursing home population?* J Am Geriatr Soc 2003;51:161–8.

QUESTION: In nursing home (NH) residents, does an intervention combining low intensity exercise and incontinence care offset its costs by reducing selected health conditions?

Design

Cost effectiveness analysis of a randomised (allocation concealed)*, blinded (data collectors)* and outcome assessors), controlled trial with follow up at 8 and 32 weeks.

Setting

4 NHs in the US.

Patients

190 NH residents (mean age 88 y, 85% women) with urinary incontinence who did not have catheters, could follow a simple 1 step instruction, and were not on Medicare Part A reimbursement for post-acute skilled care or terminal illness. Follow up was 91% at 8 weeks and 78% at 32 weeks.

Intervention

Patients were allocated to an 8 month exercise programme (Functional Incidental Training [FIT]) (n=92) or to usual care (n=98). The FIT intervention was implemented every 2 hours during the day for 5 days per week and involved prompts to toilet and changing if wet, encouragement to walk (or wheel their wheelchairs), repeat sit to stands up to 8 times, and practise upper body resistance training (arm curls or arm raises) once per day when in bed. Patients were offered fluids after each exercise trial.

Main cost and outcome measures

Acute conditions relating to physical inactivity, incontinence, or immobility including conditions of the dermatological, genitourinary, gastrointestinal, respiratory, endocrine, neurological, and cardiovascular systems; and falls, pain, and psychiatric and nutritional

disturbances. Costs of tests and treatments were assessed using 1997–98 Medicare and Medicaid reimbursement amounts at a rate of 80%.

Main results

The FIT and usual care groups did not differ for the incidence of any acute conditions. Multivariable analyses were done to control for differences at baseline and follow up. When acute conditions were analysed together, FIT showed a non-significant 10% reduction in the number of fitness related sickness episodes. Of the acute conditions analysed separately, only falls showed a significant reduction (odds ratio 0.46, $p < 0.04$) associated with FIT. The groups did not differ for cost of assessment and treatment of acute conditions between baseline and intervention periods (table).

Conclusion

In nursing home residents, low intensity exercise plus incontinence care did not reduce the incidence or costs of acute conditions more than usual care.

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Cost of treating acute conditions with Functional Incidental Training (FIT) v usual care in nursing home residents†

Outcome	Baseline period		Intervention period	
	FIT	Usual care	FIT	Usual care
Cost per resident per week (1997–98 US dollars)	\$30.38	\$36.81	\$24.42	\$38.36

†Difference between groups for change from baseline was not significant.

COMMENTARY—continued from previous page

such a frail population.⁵ The vitamin D supplementation dose was not sufficient to correct elevated parathyroid hormone concentrations that may be responsible for compromising muscle strength.⁵ Both calcium and vitamin D in sufficient quantities may be required to achieve the improvement sought.⁵

Secondly, cost of the intervention may not be the most appropriate criterion for adoption into practice. Although it was hoped that the benefits might be gained at no extra cost, this is rarely achieved in health care. Decisions about resource allocation should be made on the basis of information about costs and benefits. The exercise and incontinence intervention tested in the NH clinical trial⁶ on which the economic analysis was based resulted in improvement or prevented decline in mobility, upper body strength, and continence in most of the intervention group patients. However, Schnelle *et al* found that the staffing requirements needed to implement the intervention (1 aide to 5 patients) exceeded the staff resources available in most (92%) NHs and were not offset by reductions in other costly care. Staffing limitations may therefore prevent the successful transfer of this and similar exercise and incontinence interventions to NH clinical practice. The data reported in this study provide evidence that nurses' aide staffing ratios advocated in recent government studies and by consumer groups⁷ as necessary to provide high quality NH care are justified.

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