

Visiting Nurses May Cost-Effectively Reduce Falls in the Elderly

Robertson MC, Devlin N, Gardner MM, Campbell AJ. Effectiveness and economic evaluation of a nurse delivered home exercise programme to prevent falls. 1. Randomised controlled trial. *BMJ* 2001;32:697-701.

Study Overview

Objective. To determine the effectiveness of a trained visiting nurse individually prescribing a home-based exercise program to reduce falls and injuries in elderly people and to estimate its cost-effectiveness.

Design. Randomized controlled trial.

Setting and participants. 240 women and men, aged 75 years and older, recruited from 17 general practices in New Zealand. Patients excluded were unable to walk around their own residence, already receiving physiotherapy at the time of the recruitment, or unable to understand the requirements of the trial.

Intervention. The program consisted of a set of muscle strengthening and balance training exercises. The nurse who performed the intervention attended a 1-week training program; she did not have any previous experience in prescribing exercise. The intervention took place at weeks 1, 2, 4, and 8, with a booster at 6 months. Participants were expected to exercise for about 30 minutes at least 3 times per week and to walk at least twice per week for 1 year. Compliance was monitored via monthly postcards sent by participants. For months when no home visits were scheduled, the nurse telephoned participants to maintain motivation and discuss any problems.

Main outcome measures. The main outcome measure was fall occurrences over 1 year. Subjects reported their falls by filling out a monthly postcard. A detailed telephone interview was conducted by an independent assessor who was blinded to group allocation to determine the circumstances and severity of falls. A serious fall was defined as one that required hospital admission with an injury, resulted in fracture, or required stitches. A moderate fall consisted of a fall with minor bruises, abrasions, sprains, cuts, or reduction in physical function for at least 3 days. Serious falls were confirmed by hospital and/or general practice records; a blinded investigator classified the fall events.

Costs were considered from a societal perspective. The

cost-effectiveness ratio was calculated as incremental cost over incremental effect. The incremental effect was measured by calculating the difference between the number of falls and the number of falls resulting in serious or moderate injuries in the 2 groups. The incremental cost was the change in resource use resulting from the exercise program. Sensitivity analysis was also performed.

Main results. Out of 590 patients screened, 240 eligible patients chose to participate. The median age was 80.9 years. In the control group, 119 started the program and 98 completed the trial. In the intervention group, 121 started the program and 109 completed the trial. There were 109 falls in the control group and 80 in the exercise group; this corresponds to a 46% reduction (incidence rate ratio, 0.54 [95% confidence interval {CI}, 0.32 to 0.90]; $P = 0.019$). The number of moderate falls was similar (40), but the number of serious falls differed significantly (9 in the control group versus 2 in the exercise group [relative risk, 4.6 {95% CI, 1.0 to 20.7}; $P = 0.033$]). When looking at age-groups, the reduction in the number of falls was statistically significant only for the patients aged 80 years and older (81 versus 43; $P = 0.007$) but not for the patients aged 75 to 79.

The cost of implementing the program was \$NZ432 per person. The incremental cost per fall prevented was \$NZ1803. When hospital costs were taken into account, the cost per fall prevented was \$NZ155. The cost per fall with an injury that could be prevented ranged from \$NZ5603 to \$NZ9437, depending on different cost scenarios. The cost-effectiveness of the exercise program was much better for the patients aged 80 years and older: \$NZ682 per fall prevented and \$NZ1852 per injurious fall prevented.

Conclusion. A home exercise program administered by a trained visiting nurse can reduce the risk of falls. It is also more cost-effective in patients aged 80 years and older compared with younger patients.

Commentary

Falls are a major health hazard for elderly people. The cost to society is very high and has been estimated at \$12.6 billion per year [1]. The risk of falling increases dramatically with age

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(50% risk for patients > 80 years) [2]. Institutionalized patients are at even higher risk. We know from previous studies that exercise programs given by physiotherapists decrease the risk of falls [3,4]. This study is the first that looked at efficacy and cost-effectiveness of a trained visiting nurse program.

Robertson et al's study has several merits. It was a randomized controlled trial with relatively few patients who dropped out. The intervention was simple and relatively inexpensive. Additionally, they took great care in trying to account for all the costs involved. They also performed a sensitivity analysis, which makes the validity of their results more robust.

The problems with this study are typical of cost-effective analyses. Costs are more variable than other outcomes. For example, the costs here were calculated for New Zealand and may be different in other countries. Additionally, they did not consider time in this analysis nor did they use a discount ratio to calculate costs. It would be interesting to see if the validity of these results would persist beyond 1 year. As it was not a comparison study, we do not know how the program compares in terms of efficacy and cost-effectiveness to other interventions, such as home-based therapy with a physiotherapist.

This study was performed in 1 center. In the same issue, the authors published another study looking at the same intervention in multiple centers [5] and tried to determine if the results were reproducible. The results were different; 1 major difference was the number of patients enrolled (450 versus 240). The other major findings were that the number of falls was reduced by 30%, but the number of serious injuries was not statistically different. This second study, however, had limitations; the most important was that it was not a randomized controlled trial. Further studies should be done to determine which subgroup of patients would benefit the most from such home-based programs and to determine how much can be gained by using a visiting nurse versus a physiotherapist.

Applications for Clinical Practice

The implementation of a home-based exercise program to prevent falls seems to be effective in patients over the age of 80. Results of the cost-effectiveness analysis may be difficult to apply to the United States, where the cost of care may substantially differ. It seems, however, that the program should be considered by agencies providing home-based services as it is relatively inexpensive and simple to implement. In addition, visiting nurses, as opposed to physiotherapists, can perform additional tasks besides delivering the exercise program (ie, nurses can provide general medical care). When taking these aspects into account, visiting nurse programs to prevent falls may be even more cost-effective, but further studies should be done to determine if this hypothesis is valid.

– Review by Benoit Tonneau, MD

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