The cost effectiveness of a home hazard reduction program to reduce falls among older persons

Salkeld G, Cumming R G, O'Neill E, Thomas M, Szonyi G, Westbury C

Record Status

This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology

The study examined a home-hazard reduction programme (HHRP). An occupational therapist (OT) made an assessment of an elderly person's home using a standardised home assessment form. This usually took one hour. Recommendations were then made to reduce home hazards. Modifications included the removal of rugs and mats, introducing non-slip bathmats, installing rails to stairs, baths and toilets, repairing pathways, stairs, gates and flooring, and installing better lighting.

Type of intervention

Primary prevention.

Economic study type

Cost-effectiveness analysis.

Study population

The study population comprised people over the age of 65 years. Patients were excluded if they lived in a nursing home or hostel for the aged, or if a home visit by an OT was part of their discharge plan.

Setting

The study setting was the community. The economic evaluation was carried out in Sydney, Australia.

Dates to which data relate

The dates during which the effectiveness or cost data were collected were not specified. The price year was 1997.

Source of effectiveness data

The effectiveness data were derived from a single study.

Link between effectiveness and cost data

Due to budget constraints, the cost data were taken from a 40% subsample (212 patients) of the study sample (530 patients). The subsample was virtually identical to the total study sample in respect of age, gender, falls in the last year, and other clinical characteristics.

Study sample

The study sample comprised 530 patients, 264 in the HHRP group and 266 in the control group. No power calculations to determine the sample size were reported. The participants were mainly recruited while inpatients at a teaching hospital, although some were recruited while outpatients or from day care centres. Only those patients living in the

community were included. All of the patients had agreed to take part in the study, although it was not reported whether any refused to take part. The study sample was divided into two subgroups, those who had fallen at least once in the previous year and those who had not fallen.

Study design

This was a randomised controlled trial carried out a single centre. The patients were allocated to either the HHRP group (n=264) or the control group (n=266). The method of randomisation was reported in a separate paper (see Other Publications of Related Interest no.1). The time horizon of the study was one year, although the median length of follow-up was 378 days. No methods of blinding were reported for the outcome assessment.

Analysis of effectiveness

The analysis was performed on the basis of treatment completers only. The number of falls was reported for each group. The two groups appear to have been similar at baseline in all areas. The mean age was 76.4 years in the HHRP group and 77.2 years in the control group. The proportion of women in the HHRP group was 56%, compared with 58% in the control group. Thirty-nine per cent of both groups had had at least one fall in the previous year. The mean number of hospital admissions and bed days prior to the intervention were also comparable. Only the mean cost of other (non hospital) care and informal (home) care in the 12 months prior to the intervention differed. This was Aus$3,990 for the HHRP group and Aus$3,020 for the control group. For the patients in the costing subsample, SF-36 scores were also recorded before the intervention, and then 12 months after the intervention. In addition, the results were reported for the two subgroups of those who had and had not fallen in the previous year.

Effectiveness results

After the exclusion of three patients who reported more than 50 falls, there were 226 falls in the HHRP group and 324 falls in the control group, (p=0.07).

Of those patients who has experienced falls in the previous year (39% of each group), there were 99 falls in the HHRP group and 193 in the control group, (p=0.03).

For those who had not had a fall in the previous year (61% of each group), there were 127 falls in the HHRP group and 131 in the control group, (p=0.81).

There was no significant change in the SF-36 score, even when the subgroups were considered.

The relative risk of falling at least once if in the HHRP group was 0.81 (95% confidence interval, CI: 0.66 - 1.00).

The relative risk was 0.64 (95% CI: 0.50 - 0.83) for those with previous falls and 1.03 (95% CI: 0.75 - 1.41) for those with no previous falls.

The effectiveness data were also reported for those patients used in the costing subsample. The results were very similar to those for the total study sample.

Clinical conclusions

The HHRP only appears to reduce the number of falls among the elderly for those patients who have experienced falls in the previous year. It does not appear to have any significant effect upon those who have not fallen in the previous year.

Measure of benefits used in the economic analysis

The primary measure of benefit used in the study was the number of falls prevented.

Direct costs

No discounting was performed, as the time horizon of the study was 12 months. However, the cost for equipment intended to last more than 12 months was annuitised and discounted at a rate of 5%. The study included hospital costs, other health care costs provided in institutions, other health care costs provided in the home, and informal care costs. The resource quantities and the unit costs were not presented. The hospital costs were calculated using the length of stay, and the Australian Diagnostic-Related Group (AN-DRG) codes. Other health care costs were for the general practitioner, nurse and other health care professional consultations, and home visits. Informal care costs referred to the time spent by family and friends in looking after the patient. Home modification costs were also included. All the costs were inflated to the price year 1997.

Statistical analysis of costs

The authors stated that the cost data were not normally distributed, and showed considerable skewness. The median costs were reported in addition to the mean costs, in order to account for the effect of possible outlying data.

Indirect Costs

No indirect costs were included in the study.

Currency

Australian dollars (Aus$).

Sensitivity analysis

A sensitivity analysis was performed, removing all outliers from the analysis. Outliers were defined as those whose costs were more than three standard deviations away from the mean, or those with more than 50 falls in the past year. Sensitivity analyses to account for uncertainty in the data in other areas, were not conducted.

Estimated benefits used in the economic analysis

Three patients were excluded after reporting more than 50 falls. All three were in the control group. In the 12 months following the intervention, there were 226 falls in the HHRP group (n=264) and 324 falls in the control group (n=266).

When the analysis was performed on those patients who experienced at least one fall in the previous 12 months, there were 99 falls in the HHRP group (n=103), and 193 in the control group (n=103).

Cost results

Over 12 months, the mean cost per patient was Aus$10,084 (median: Aus$5,728) for the HHRP group and Aus$8,279 (median: Aus$4,695) for the control group.

For the median values, the Wilcoxon 2-sample test gives a z-value of 1.12, (p=0.26). These were made up of hospital costs (Aus$4,951 for the HHRP group and Aus$4,039 for the controls), nursing home costs (Aus$1,072 and Aus$708), hostel costs (Aus$135 and Aus$283), other health care costs (Aus$2,441 and Aus$1,995), informal care costs (Aus$1,362 and Aus$1,239), home modification costs (Aus$7 and Aus$15), and intervention costs (Aus$116 and zero).

For those patients who had at least one fall in the previous year, the mean cost per patient was Aus$11,457 (median: Aus$7,867) for the HHRP group and Aus$8,510 (median: Aus$7,824) for the control group.

For those patients who had not fallen in the previous year, the mean cost per patient was Aus$9,114 (median: Aus$4,585) for the HHRP group and Aus$8,118 (median: Aus$3,604) for the control group.

Synthesis of costs and benefits

The mean cost per fall prevented was Aus$4,986 (median: Aus$2,853).

For those patients who had at least one fall in the previous 12 months, the mean cost per fall prevented was Aus$3,980 (median: Aus$119).

No synthesis was performed for those who had not fallen in the previous 12 months, since there was no statistically significant benefit for the intervention in that group.

After the outliers had been removed, the mean cost per fall prevented was Aus$1,921 (median: Aus$1,586).

For those patients who had fallen in the previous 12 months, the cost per fall prevented was less than zero. This meant that the intervention was more effective and cost less than the comparator.

Authors' conclusions

A home hazard reduction programme (HHRP) is likely to increase the costs, but will also prevent a number of falls amongst the elderly. The authors concluded that a single factor HHRP is more likely to be cost-effective when employed on patients who have had at least one fall in the previous year.

CRD COMMENTARY - Selection of comparators

The option of providing a HHRP was compared against routine care after discharge (not providing a HHRP). This is a reasonable comparison, as there are no reasons to include any other options. The study considered only one aspect of fall prevention. Other possibilities include medication, care, walking equipment and protective clothing. It is possible that there will have been interaction effects.

Validity of estimate of measure of effectiveness

The number of falls prevented was an appropriate measure. The severity of the falls was not reported, although measures were reported for hospital days and costs. Three patients were excluded after reporting more than 50 falls. No details were provided as to which treatment group these patients were in, or whether the reported falls were serious or were even confirmed as genuine. These omissions may have introduced biases to the study.

Validity of estimate of measure of benefit

The summary measure of benefit was the number of falls prevented. It would have been useful to have measured quality of life, in order assist in comparisons with other technologies. It is also, perhaps, surprising that there was no mortality in this elderly sample, particularly in association with falls.

Validity of estimate of costs

The costs included in the study covered all reasonable areas and were taken from the same sample as the effectiveness data. The resource quantities and the unit costs were not presented separately, thus reducing transparency and generalisability. The costs of informal care (care from friends and/or families) were estimated using information from a survey of unpaid housework, and as such, no loss of earnings was considered in these scenarios. This might be questionable from a societal perspective. The authors acknowledged that nearly all hospital admissions (and therefore hospital costs) in the trial period were unrelated to falls. Thus, the costing results may have been affected by pure chance. In addition, it was also pointed out that the higher costs for health resource use (particularly for nursing homes) for patients with a history of falls may be an indirect result of the home visits. In other words, the home visit 'triggered' the patient's family into considering community support services.

Other issues

The cost-effectiveness results were in direct contradiction to another study (see Other Publications of Related Interest no.2). Due to the specific nature of the study, in particular the costs, it would be unwise to assume that the results can be generalised to other settings or communities. The costing was reported selectively, although other results were reported in full. The authors' conclusions were in keeping with the scope of the study.

Implications of the study
The authors recommend that a HHRP is more likely to be effective when used for older people who have a history of falls at home. However, the authors add that further trials are needed to examine more closely the cost-effectiveness of fall prevention strategies.

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Bibliographic details
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Other publications of related interest
1. Cumming RG, Thomas M, Szonyi G, Salkeld G, et al. Home visits by an occupational therapist for assessment and modification of environmental hazards: a randomised trial of falls prevention. Journal of the American Geriatrics Society 1999;47:1397-402.

2. Rizzo JA, Baker DI, McAvay G, Tinetti ME. The cost-effectiveness of a multifactorial targeted prevention program for falls among community elderly persons. Medical Care 1996;34:954-69.

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