The cost-effectiveness of falls prevention interventions for older community-dwelling Australians

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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.

CRD summary
This study evaluated the cost-effectiveness of strategies to prevent falls among older people. The authors concluded that Tai Chi, for the general population, and group exercise, for high-risk patients, were the most cost-effective strategies. Specific interventions for specific populations were all cost-effective. In general, the analysis was well reported and conducted, but the full incremental analysis was unclear, making it difficult to evaluate the results.

Type of economic evaluation
Cost-effectiveness analysis, cost-utility analysis

Study objective
This study evaluated the cost-effectiveness of strategies to prevent falls among older people.

Interventions
Six interventions for the general older population were evaluated: Tai Chi, group exercise, multiple interventions, interventions with many factors by referral, home exercise, and multifactorial interventions with active components.

For high-risk older people, who had suffered injury from a fall, interventions included group-based exercise, multifactorial interventions, and home hazard modification. Other interventions were considered for specific risk groups, including cataract surgery, withdrawal of psychotropic medicine, and cardiac pacing.

All interventions were compared with no intervention.

Location/setting
Australia/public health.

Methods
Analytical approach:
A five-state Markov model was developed to capture the movement between fall risk categories (low, medium, or high), residential care, and death. Cycle lengths were one year. People could not return from residential care or death. Each Markov state had an imbedded decision tree to simulate the movement between states. Patients entered the model at age 65 years and moved through cycles until death or 100 years old. The perspective was not explicitly stated.

Effectiveness data:
The primary effectiveness data were the rate ratios for falling, which were from a Cochrane review and meta-analysis (see Other Publications of Related Interest). The probabilities of falling by risk category were from expert opinion. The probabilities of medical attendance were from a published Australian study. The probabilities of death were from life tables from the Australian Bureau of Statistics.

Monetary benefit and utility valuations:
The main utility values were from a UK systematic review of EQ-5D utility values for osteoporosis. Utility decrements were applied for attending the emergency department, being admitted to hospital, suffering a fracture, entering residential care, and fear of falling. These decrements were from various published sources.

Measure of benefit:
Two measures of benefit were considered: falls avoided, and quality-adjusted life-years (QALYs) gained. These benefits were discounted at 5% annually.

Cost data:
The intervention costs were primarily from a published Australian cost-modelling study of fall prevention, with some costs from an unpublished study. Health care costs were from a published Australian source. The costs were reported per fall and per cycle, with the exception of residential care, where patients were assumed to only incur fall costs once and these were the total lifetime costs of fall-related residential care. All costs were presented in Australian dollars (AUD). They were discounted at an annual rate of 5%.

Analysis of uncertainty:
Univariate and probabilistic sensitivity analyses were undertaken. For the univariate analyses, parameters were varied to their confidence interval, the best estimate of their possible range, or to 25% more and 25% less. The results were displayed in a tornado diagram for one of the interventions. The probabilistic sensitivity analysis was run for 10,000 simulations, with all variables assigned a probability distribution. Rate ratios and utility values were given beta distributions. Intervention costs were given uniform distributions. Probabilities were given triangle distributions. Health care costs and utility decrements were given gamma distributions.

Results
In the general older population, Tai Chi was more effective and less costly than multiple interventions, home exercise, and the multifactorial interventions. Tai Chi had an incremental cost-effectiveness ratio (ICER) of AUD 44,205 per QALY gained, compared with no intervention. All other interventions had ratios over AUD 70,000 per QALY gained. The incremental cost per fall avoided results had a similar pattern.

Compared with no intervention, in high-risk older people, group-based exercise had an ICER of AUD 50,937 per QALY gained; home hazard modification had an ICER of AUD 57,856 per QALY gained; and the multifactorial intervention had an ICER of AUD 90,227 per QALY gained.

In the univariate sensitivity analyses, the most influential parameters were the intervention costs, effectiveness estimates, patient age, and structural assumption as to whether patients experienced a utility decrement due to the risk of falling.

The probabilistic sensitivity analysis found that at a willingness-to-pay of AUD 60,000 per QALY gained, Tai Chi was the most cost-effective option for the general older population.

Authors’ conclusions
The authors concluded that Tai Chi, for the general population, and group exercise, for high-risk patients, were the most cost-effective strategies. Specific interventions for specific populations were all cost-effective.

CRD commentary
Interventions:
The authors selected a wide range of interventions that appear to have been generally appropriate. The interventions were poorly described, and it was not clear what each intervention entailed.

Effectiveness/benefits:
The methods of selecting the evidence were not detailed, but the evidence chosen for effectiveness appears to have been appropriate. All the transition probabilities were from Australian sources, which enhances the validity of the results for the setting. The risk of falling was the opinion of experts, and this was only varied a little in the probabilistic sensitivity analysis. It is possible that the parameter uncertainty was underestimated.

Costs:
The perspective appears to have been that of the payer. It was not clear how cost sources were selected, but they were appropriate to the Australian setting. The costs were reported as totals, with no details of what was included in the broad categories. This may limit the generalisability and transferability of the results. The cost of the intervention was one of the key drivers of the cost-effectiveness results, in the univariate sensitivity analysis.
Analysis and results:
The total costs and benefits for each intervention were not reported. The incremental costs and outcomes were presented, it seems that these were compared with no intervention, rather than the next best intervention, but this was unclear. An incremental analysis should rank the interventions, remove interventions that are more costly and less effective than other interventions (dominated), and then calculate the incremental costs and benefits, relative to the previous intervention in the rank. Without the total costs and benefits it is not possible to validate the results presented. Sensitivity analysis was clearly reported and demonstrated the importance of the uncertainty in some of the key parameters.

Concluding remarks:
In general, the analysis was well reported and conducted, but the full incremental analysis was unclear, making it difficult to evaluate the results.

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