Cost-effectiveness of populationwide educational approaches to reduce serum cholesterol levels


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
Populationwide educational approaches for the reduction of serum cholesterol levels

Type of intervention
Primary prevention; secondary prevention.

Economic study type
Cost-effectiveness analysis, cost-utility analysis.

Study population
Patients aged 35-84 years, without coronary heart disease.

Setting
The economic study was performed in the USA.

Dates to which data relate
Costs and effectiveness data were extracted from literature published in the period 1981-1990. Prices were updated to 1993 using the general medical component of the Consumer Price Index.

Source of effectiveness data
Effectiveness data were derived from a review of previously completed published studies on populationwide risk factor reduction programmes, pertaining to the Stanford Three-Community Study, the Stanford Five-City Project and the North Karelia Study.

Modelling
A decision-analysis model (Coronary Heart Disease Policy Model) was used to combine the costs and effectiveness of population-based strategies for cholesterol reduction in the US from 1995 to 2020. The Coronary Heart Disease Policy Model is a three part-model consisting of the Demographic-Epidemiologic Submodel (used to assess each individual's risk of developing CHD and death on the basis of risk factors); the Bridge Submodel (used to assess the coronary events during the first 30 days after the patient develops CHD) and the Disease History Submodel (used to track subsequent development of recurrent CHD events, case-fatality rates and resource costs).

Outcomes assessed in the review
The outcomes assessed were serum cholesterol level reduction (%), diastolic blood pressure reduction, and smoking rate reduction.
Number of primary studies included
Three studies were included in the review.

Methods of combining primary studies
Primary studies were not combined.

Results of the review
The North Karelia Study showed a serum cholesterol reduction of 3% in men and 1% in women, diastolic blood pressure reduction of 1% in men and 2% in women, and a smoking rate reduction of 28% in men and 14% in women. The Stanford Three-Community Study showed a serum cholesterol reduction of 3% and the Stanford Five-City Project showed a serum cholesterol reduction of 2%, diastolic blood pressure reduction of 4% and a smoking rate reduction of 13%.

Measure of benefits used in the economic analysis
The measure of benefits were life-years saved and Quality-Adjusted Life Years (QALYs).

Direct costs
Costs were estimated from data found in 2 of the studies reviewed, the North Karelia programme and the Stanford Five-City Project, and included the costs of media-related interventions including television, radio, newspapers, and other printed material and direct education through community activities and face-to-face instruction. Costs were discounted at 5%.

Currency
US dollars (€).

Sensitivity analysis
Sensitivity analysis was performed by varying LDL and HDL cholesterol levels, cholesterol levels in persons with prevalent CHD, multiple risk factors, and the discount rate. Quality adjustments for patients with a history of CHD were also investigated, as well as the effect of induced costs.

Estimated benefits used in the economic analysis
The benefits were calculated to be 624,000 life-years saved (1.2 million based on undiscounted figures), when based on the results of the Stanford Five City programme. The undiscounted life-years saved when based on the North Karelia programme were 1.8 million. QALYs were not reported separately to costs.

Cost results
The cost of a communitywide intervention programme was $4.95 per person in the Stanford Five-City Project and in the North Karelia study, $16.55 per person for year 1 and an additional $8.28 per person per year thereafter.

Synthesis of costs and benefits
For the differing assumptions, a total of 30 separate cost-effectiveness ratios were calculated based on the change in projected costs divided by the change in projected life years for intervention versus no intervention. In general, the cost-effectiveness ratios were favourable. If there were a serum cholesterol reduction of 1% at a $4.95 programme cost per person, the cost-effectiveness ratio was $18,100 per year of life saved and at a $16.55 programme cost per person, the cost-effectiveness ratio was $88,000. If there were a 3% to 4% decrease in cholesterol and if the programme cost $4.95
per person, there would be savings in costs and life years. If there were to be a reduction in serum cholesterol level regardless of CHD history, all programmes had much more favourable cost-effectiveness ratios. When multiple risk factors were considered, the cost-effectiveness ratios were also favourable. For reductions of 1% to 4% in both HDL and LDL cholesterol, cost-effectiveness ratios varied from $5,200 to $5,400 ($4.95 programme per person cost) and from $6,300 to $6,500 ($16.55 programme per person cost) per year of life saved. Using QALYs, when a 2% reduction in serum cholesterol was modelled, the cost-effectiveness ratios decreased from $3,200 to $2,900 (based on a programme costing $4.95 per person per year) and from $38,500 to $34,800 (based on a programme costing $16.55 per person per year). The cost per life year saved for all interventions decreased modestly when the discount rate was lowered to 3%.

**Authors’ conclusions**
Populationwide educational interventions are likely to be cost-effective and cost saving over a broad range of assumptions, especially if serum cholesterol is reduced by more than 2%.

**CRD COMMENTARY - Selection of comparators**
While the choice of comparator of no intervention has not been explicitly justified, it appears to be usual practice on a populationwide scale, and so is sensible. Pharmaceutical intervention is unlikely to be available and applied on a populationwide scale, and therefore cannot be considered as a suitable comparator.

**Validity of estimate of measure of benefit**
The benefits were based on estimates from a limited number of published studies. The methodology employed to derive the estimates was not reported.

**Validity of estimate of costs**
Costs were only from the perspective of the health service and excluded costs experienced by others in society such as patients. Also, costs are likely to vary significantly from setting to setting, hence the findings may not be generalisable to other countries or settings. The cost increases in the use of drug therapy, physician visits, and adverse effects were not considered.

**Other issues**
The underlying epidemiology for different populations is likely to be vary hence limiting the generalisability to other countries or settings.

**Implications of the study**
Populationwide educational intervention programmes to lower serum cholesterol would be a cost-effective part of any national health strategy.

**Source of funding**
Supported in part by grants from the Agency for Health Care Policy and Research (R01-HS-06258) and the National Heart, Lung and Blood Institute (1-R01-HL-46315).

**Bibliographic details**

**PubMedID**