Cost-effectiveness analysis of a low-fat diet in the prevention of breast and ovarian cancer

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 examined the cost-effectiveness of a low-fat dietary intervention compared with the usual diet to prevent breast cancer and ovarian cancer in women aged 50 years or older, with a high fat intake. The authors concluded that the low-fat dietary intervention was cost-effective from the perspectives of both society and the public health care payer, but not the private health care payer. The cost-effectiveness methodology was conventional, which should ensure the validity of the authors’ conclusions.

Type of economic evaluation
Cost-utility analysis

Study objective
This study examined the cost-effectiveness of a low-fat dietary intervention compared with the usual diet to prevent breast cancer and ovarian cancer in women aged 50 years or older, with a high fat intake.

Interventions
The low-fat dietary intervention was compared with the usual diet. The main content of the dietary programme was a series of support and orientation meetings, based on the principles of behaviour change. Two groups of women were considered: those with a high fat intake at baseline (more than 36.8% of energy from fat) and those at a high risk of breast cancer and with 32% or more of energy from fat.

Location/setting
USA/primary care.

Methods
Analytical approach:
The analysis was based on a Markov cohort model, with a lifetime horizon, for five age cohorts (50, 55, 60, 65, and 70 years). The authors stated that the study was carried out from the perspectives of society and of the health care payers (private insurers for women younger than 65 years and Medicare for women aged 65 years or older).

Effectiveness data:
The clinical data were from a selection of relevant studies. The hazard ratios for the intervention versus control for the risk of invasive breast cancer in the two groups of women were the key data for the model. These and most of the clinical inputs were from the Women’s Health Initiative Dietary Modification (WHI-DM) randomised controlled trial, which was carried out at 40 centres in the USA (Prentice, et al. 2007, see ‘Other Publications of Related Interest’ below for bibliographic details). This trial included a large sample of women and had a median follow-up of eight years. The disease progression was estimated from the National Cancer Institute’s Surveillance Epidemiology and End Results programme, with adjustments where necessary. Other inputs came from published sources.

Monetary benefit and utility valuations:
The utility values were from published sources.

Measure of benefit:
Quality-adjusted life-years (QALYs) were the summary benefit measure and were discounted at an annual rate of 3%.

Cost data:
The economic analysis included the costs of the programme implementation (opportunity costs for participants and direct expenditure for staff, equipment, supplies, materials, and facilities) and cancer care. Participants’ time was estimated using median hourly earnings of women paid hourly rate wages or salaries. The resources for the programme were based on its implementation in the WHI-DM trial. Hourly wages for staff were based on nationally representative rates. Official sources were used for other items. The costs of cancer care were from published studies. The societal perspective included all costs, while the health care payer perspectives excluded opportunity and diet costs. All costs were in US dollars ($) and were discounted at an annual rate of 3%. The price year was 2008.

Analysis of uncertainty:
A Monte Carlo simulation was carried out using predetermined probability distributions for the model inputs to generate confidence intervals around the projected outcomes. One-way sensitivity analyses were carried out on selected model inputs, using authors’ assumptions or published ranges of values.

Results
From the societal perspective, the incremental cost-utility ratio (ICUR) of the intervention over usual care was $12,944 in 50-year-old women, and increased consistently with age to $42,842 in 70-year-old women, with a high fat intake. The ICURs in women at a high risk of breast cancer ranged from $10,544 (50 years) to $34,450 (70 years).

From the perspective of the private health care payer, the ICURs were $71,416 for 50-year-olds and $259,286 for 55-year-olds, with a high fat intake, and $47,112 for 50-year-olds and $267,985 for 55-year-olds, at a high risk of breast cancer. From the perspective of Medicare, the ICURs were $14,959 for 65-year-olds and $22,900 for 70-year-olds, with high fat intake, and $11,687 for 65-year-olds and $17,730 for 70-year-olds, at a high risk of breast cancer.

Substantial reductions in the intervention costs (almost 50%) were required for the intervention to be cost saving. The ICURs were considerably lower without discounting. The programme remained cost-effective even if implemented in small groups of participants. The inclusion of participants from randomisation date rather than the intervention start did not change the conclusions.

Authors’ conclusions
The authors concluded that the low-fat dietary intervention was cost-effective, for both groups of women, from the perspectives of both society and the public health care payer, but not the private health care payer.

CRD commentary
Interventions:
The selection of the comparators was appropriate and was based on the interventions in the WHI-DM trial. More information on the features of the programme was available in the WHI-DM trial publication.

Effectiveness/benefits:
Most of the clinical inputs were from a large clinical trial that was conducted at several US sites. The details were not reported, but the design should ensure a high internal validity for the data. The clinical trial design was appropriate for assessing a public health intervention, since the sample of participants represented the population that was most likely to benefit from a low-fat diet. The trial was very large and the follow-up was relatively long (eight years). The sources of epidemiological data were representative of the US context and were adjusted where necessary. No information on the derivation of the utility values was provided and the impact of variations in these inputs was not considered in the sensitivity analysis. QALYs were a valid benefit measure because these cancers have a substantial impact on both survival and quality of life.

Costs:
The economic analysis was carried out from three perspectives, which were appropriate for different payers. The authors justified the exclusion of some costs, such as those common to both strategies and those associated with research activities. The costs were presented as category totals and were not broken down into individual items. The programme costs were directly from the trial and are likely to have been collected in detail. The cost of cancer care was from published sources, but their methods were not reported. Other characteristics of the study, such as the price year and discounting, were clearly reported.
Analysis and results:
The projected costs and benefits of the interventions were reported and an appropriate incremental approach was used to synthesise them. The uncertainty was appropriately investigated and the confidence intervals highlighted the results that were less robust. The key details of the decision model were explicitly reported. The use of various age cohorts and two risk groups was a good feature of the analysis. The authors stated that their findings might have underestimated the benefits of the intervention, since the risks of cardiovascular disease and other types of cancer were not included. The results should be considered to be specific to the US context.

Concluding remarks:
The cost-effectiveness methodology was conventional, which should ensure the validity of the authors’ conclusions.

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