Prophylactic bilateral salpingo-oophorectomy (PBSO) with or without prophylactic bilateral mastectomy (PBM) or no intervention in BRCA1 mutation carriers: a cost-effectiveness analysis

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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
The objective of the study was to examine the cost-effectiveness of prophylactic bilateral salpingo-oophorectomy (PBSO) with or without prophylactic bilateral mastectomy (PBM), compared with no intervention, for the prevention of breast cancer and/or ovarian cancer in women with germline BRCA1 mutation. The authors concluded that PBSO with or without PBM was a cost-effective strategy from the perspective of Norwegian society. The economic side of the analysis was robust and transparent, although the sources of clinical information were less clear.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The objective of the study was to examine the cost-effectiveness of prophylactic bilateral salpingo-oophorectomy (PBSO) with or without prophylactic bilateral mastectomy (PBM), compared with no intervention, for the prevention of breast cancer (BC) and/or ovarian cancer (OC) in women with germline BRCA1 mutation.

Interventions
The study examined PBSO with or without PBM versus no intervention in BRCA1 carriers (discovered by testing and subsequent genetic counselling). PBSO was performed at the age of 35 years and PBM at the age of 30 years.

Location/setting
Norway/hospital.

Methods
Analytical approach:
This economic evaluation was based on a Markov model, which simulated disease progression with or without the preventive approaches under examination. A 70-year time horizon was considered. The authors stated that a societal perspective was adopted.

Effectiveness data:
The clinical data appear to have been derived from studies that might have been identified selectively. The epidemiological data and effectiveness estimates were mainly based on Norwegian sources. The values used in the analysis and the calculations made to derive some model inputs were reported, but details of the sources used were not given. The key clinical input was the reduction in risk of OC and BC with PBSO alone or PBSO plus PBM.

Monetary benefit and utility valuations:
None.

Measure of benefit:
The summary benefit measure was the number of life-years (LYs) gained with the preventive measures in comparison with no intervention. LYs were estimated using the decision model and an annual discount rate of 3% was applied.

Cost data:
The cost items included in the analysis were grouped into three categories: health care costs (visits to health care professionals such as breast surgeons and gynaecologists, PBM, PBSO and hormonal therapy), patient- and family-related costs (patient’s co-payment for visits to health care professionals, transportation costs), and costs in other sectors (productivity losses). The analysis considered also the cost of testing all BC and OC patients (to access families that should be offered counselling and subsequent interventions). In some cases the authors estimated resource use but, in general, it was determined using national sources or other published studies. The costs were derived from national outpatient tariff and diagnosis-related group systems. The costs of indirect costs were based on Norwegian statistics. Future costs were discounted at an annual rate of 3%. The costs were presented in euros (EUR) and the price year was 2007.

Analysis of uncertainty:
All model inputs were varied by ± 25% of their baseline value in a univariate sensitivity analysis, in order to identify the most influential parameter.

Results
The discounted LYs gained per woman with PBM plus PBSO over no intervention were 6.4. With PBSO alone, the discounted LYs gained were 3.1 assuming full participation, and 2.2 with 70% participation.

The total undiscounted additional costs (excluding future savings) ranged from a minimum of EUR 4,949 for PBSO and 70% participation (including only health care costs) to EUR 19,855 for PBSO with PBM and including all costs. When future savings were included, the discounted additional cost of preventive interventions was substantially reduced, and in some circumstances they were less costly.

The incremental cost-effectiveness ratio for preventive interventions over no intervention ranged from EUR 3,409 to dominant (less costly and more effective), depending on the type of intervention, use of discounting and categories of costs included.

In the base-case, when all costs and savings were accounted for, the discounted incremental cost per LY gained in comparison with no intervention was EUR 1,834 with PBSO alone and 70% participation, EUR 1,284 with PBSO and 100% participation, and EUR 496 with PBSO and PBM.

The sensitivity analysis showed that the discount rate, lifetime risk of BC and/or OC, production gain and acceptance rate had the greatest impact on the cost-effectiveness ratios. However, even under unfavourable conditions, the cost per LY remained an economically attractive figure.

Authors’ conclusions
The authors concluded that PBSO with or without PBM in BRCA1 mutation carriers was a cost-effective strategy from the perspective of the Norwegian society in comparison with no preventive strategy. Thus, the authors stated that future studies should investigate the implementation of testing all incident BCs to identify mutation carrying families.

CRD commentary
Interventions:
The selection of the comparators was appropriate. The authors justified their choice of no intervention as the baseline strategy on the grounds that it represented the current pattern of care. As was pointed out, many women are not aware of being mutation carriers and, as a consequence, do not undergo any testing.

Effectiveness/benefits:
Little information on the sources used to derive the clinical estimates was provided. The authors reported extensively the values used in the model, but did not describe the features of the primary sources; this makes it difficult to judge the validity of the clinical data. Regarding the selection of the benefit measure, the authors were aware of the fact that the most appropriate measure would have been quality-adjusted life-years. However, given the lack of solid data on quality of life as required for the current model, unadjusted survival was considered. This appears to be the main limitation of the analysis since the preventive interventions described are likely to have a substantial impact on women’s quality of life.
Costs:
The analysis of the costs was carried out from the broadest possible perspective. The costs were presented in a
disaggregated form, thereby enhancing the transparency of the economic analysis. The approach used to calculate the
total costs (additional expenses minus savings) was described clearly, which strengthens the validity of the analysis. The
costing reflected the national setting and caution will be required if extrapolating the analysis to other contexts. The cost
estimates were treated deterministically but were varied in the univariate sensitivity analysis.

Analysis and results:
The synthesis of the costs and benefits was clear. The issue of uncertainty was partially addressed by means of a
sensitivity analysis. Nevertheless, the use of a probabilistic sensitivity analysis would have been more appropriate. The
authors discussed the implications of implementing a wide policy of prevention of OC and BC. In terms of the
generalisability of the study results, the authors stated that the current findings may not be applicable to other
populations with different epidemiological characteristics.

Concluding remarks:
Overall, the authors performed a transparent and accurate analysis of the costs, but the derivation of the clinical inputs
was not clear in terms of the types of sources. However, the authors' conclusions are likely to be robust, as shown in the
sensitivity analysis, even when unfavourable scenarios were considered.

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Other publications of related interest
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