Consensus guidelines in the management of branch duct intraductal papillary mucinous neoplasm: 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
This study examined the cost-effectiveness of various management strategies for patients with branch-duct intraductal papillary mucinous neoplasms in the head of the pancreas, focusing on the consensus guidelines for surgical removal. The authors concluded that surveillance based on the guidelines was cost-effective in a typical cohort of 60-year-old patients. The methods appear to have been valid, but the limited reporting of the clinical data sources and the crucial impact of some assumptions should be considered when assessing the authors’ conclusions.

Type of economic evaluation
Cost-utility analysis

Study objective
This study examined the cost-effectiveness of various management strategies for patients with branch-duct intraductal papillary mucinous neoplasm (IPMN). It focused on the consensus guidelines for surgical removal, in a typical population aged 60 years and with branch-duct IPMN in the head of the pancreas.

Interventions
Three strategies were examined: surgery based on symptom development, without surveillance (no surveillance strategy); surveillance, with surgery according to the consensus guidelines (surveillance strategy); and immediate surgery (surgery strategy). The consensus guidelines recommended resection for branch-duct IPMN in patients with symptoms, a cyst of 30mm or larger, intramural nodules, or a main pancreatic duct dilated by over 6mm.

Location/setting
USA/hospital.

Methods
Analytical approach:
The economic evaluation was based on a decision-analytic Markov model, with a lifetime horizon. The authors stated that a societal perspective was adopted.

Effectiveness data:
The clinical data were from a selection of relevant studies and meta-analyses or systematic reviews were used where possible. The transition probabilities for the natural history of IPMN were based on a long-term observational study. The key inputs were the sensitivity and specificity of the consensus guidelines in diagnosing malignancy.

Monetary benefit and utility valuations:
The utility values were derived from the available literature.

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

Cost data:
The economic analysis included the costs of magnetic resonance imaging, physician visits, health care for diabetes...
mellitus and non-diabetic mellitus, pancreaticoduodenectomy, surgical complications, preoperative care, and end-of-life care. Both the direct medical and indirect non-medical costs were considered. The health care costs were based on Medicare reimbursement rates, the Nationwide Inpatient Sample, and published literature. Productivity losses were based on the average household income from the US Census Bureau. The costs were in US dollars ($) and the price year was 2008. Future costs were discounted at an annual rate of 3%.

Analysis of uncertainty:
A tornado analysis was used to identify the most influential inputs, and these values were varied in a threshold analysis. A probabilistic analysis was also undertaken, by assigning pre-defined distributions to the model inputs.

Results
The expected costs were $222,593 with no surveillance, $226,474 with surveillance, and $246,493 with surgery. The QALYs were 10.930 with no surveillance, 11.123 with surveillance, and 11.274 with surgery. The incremental cost per QALY gained with surveillance over no surveillance was $20,096, while the incremental cost per QALY gained with surgery over surveillance was $132,436.

When no quality-of-life adjustment was applied to survival, the incremental cost per life-year gained with surveillance over no surveillance was $16,042.

The most influential inputs to the model were the patient's age, the cost of non-diabetic care, the cost of postoperative care, the discount rate, and the quality of life values following the Whipple procedure. The inputs that altered the cost-effectiveness of the strategies at a $50,000 per QALY threshold were the patient's age, the sensitivity and specificity of the consensus guidelines, and the annual progression from adenoma to dysplasia. The surveillance strategy was cost-effective, compared with no surveillance, below the age of 78 years, when the sensitivity of the consensus guidelines was above 69.7%, and when the specificity was above 13.6%.

The probability of surveillance being cost-effective at the threshold of $25,000 was 56.0%, while at $50,000 it was 88.1%, and at $100,000 it was 99.4%.

Authors' conclusions
The authors concluded that surveillance, based on consensus guidelines, was cost-effective compared with no surveillance, in a typical cohort of 60-year-old patients with branch-duct IPMN in the head of the pancreas.

CRD commentary
Interventions:
The rationale for the selection of the comparators was clear as the proposed guidelines for resection were compared against the two other available strategies, which were no surveillance or immediate surgery.

Effectiveness/benefits:
The methods used to identify the relevant sources of clinical inputs and then choose the estimates from them were not provided. The authors noted that meta-analyses were used, if available, but it is not possible to judge the validity of these estimates, nor the utility values. QALYs were a valid benefit measure, because the disease has a strong impact on both quality of life and life expectancy.

Costs:
The economic analysis was carried out from a broad viewpoint and various costs were considered. These were presented as total categories and single items were not reported. Limited information on the sources of resource consumption was provided, reducing the transparency of the analysis. The sources for the costs were given and they appear to have been appropriate.

Analysis and results:
The authors used valid methodology to derive and synthesise the costs and benefits of the three approaches. The results were clearly presented and discussed. The methods used to examine the uncertainty underlying some estimates were appropriate and this analysis pointed out the impact of the assumptions for some epidemiological and economic
inputs. The results were validated using external data on five-year survival from published literature. The authors stated that the analysis was based on patients with branch-duct IPMN in the head of the pancreas and it was not clear whether the findings could be transferred to patients with branch-duct IPMN involving the body and tail of the pancreas, with small cysts, or with multifocal branch-duct IPMN. It was noted that the consensus guidelines had very low specificity and many patients incorrectly received surgery. This was due to the inclusion in the guidelines of the criterion of the presence of symptoms as an indication for surgery, but the exclusion of this criterion could dramatically reduce the sensitivity of the consensus guidelines.

Concluding remarks:
The methods appear to have been valid, but the limited reporting of the clinical data sources and the crucial impact of some assumptions should be considered when assessing the authors’ conclusions.

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