Cost-benefit analysis of a simulated institution-based preoperative smoking cessation intervention in patients undergoing total hip and knee arthroplasties in France

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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 clinical and economic impact of a preoperative intervention for smoking cessation in comparison with no intervention in patients scheduled for hip or knee replacement surgery. The authors concluded that the intervention was effective, as it led to a reduction in hospital costs of more than its cost, from the perspective of the health care payer. The study was well presented, but had some methodological limitations and further studies are needed to confirm the authors’ conclusions.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The objective was to examine the clinical and economic impact of a preoperative intervention for smoking cessation (PISC) in comparison with no intervention in patients scheduled for hip or knee replacement surgery. The focus was on the economic impact.

Interventions
The PISC was delivered at the institution where the surgery was due to take place, six to eight weeks before surgery was scheduled. The PICS consisted of an initial interview and brief weekly contacts with a specialised nurse plus nicotine replacement therapy for six weeks.

Location/setting
France/hospital.

Methods
Analytical approach:
The analysis used a Markov model with a short time horizon. The authors stated that it was carried out from the perspective of the payer.

Effectiveness data:
The clinical evidence for the model came from a randomised controlled trial (RCT), which was identified through a search of original articles on preoperative smoking cessation listed in three published systematic reviews, two of which were from the Cochrane Database of Systematic Reviews. The RCT included 120 smokers and the primary endpoint was the rate of smoking cessation in the PISC and control groups. The main outcome for this study was the rate of complications after surgery.

Monetary benefit and utility valuations:
Not included.

Measure of benefit:
No summary benefit measure was used. The key clinical inputs were the smoking cessation rate and the rate of complications after surgery, which were derived from the RCT.

Cost data:
The economic analysis considered two key categories of costs, which were the delivery of the PISC and the length of hospital stay. The intervention delivery included management by a specialised nurse, a smoking status test, and the nicotine replacement therapy. The length of hospital stay included the stay on the orthopaedic ward, in intensive care, and on other medical or surgical wards, as reported in the RCT. The cost of the hospital stay was calculated using official rates in French hospitals and diagnosis-related group data. Extra days of stay were rated according to the ward. The cost of nicotine replacement therapy was estimated through a survey of 30 pharmacies in Paris. All costs were in Euros (EUR) and the price year was 2008.

Analysis of uncertainty:
A series of one-way sensitivity analyses was carried out by varying the length of stay in various wards, cost of stay in intensive care or orthopaedic ward, and rate of complications. The alternative assumptions appear to have been based on authors’ opinions.

Results
The probability of complications was 1/56 with the intervention and 6/52 without. The smoking cessation rate was 64% with the intervention and 7.7% without.

The hospital costs per patient were EUR 6,246 with the intervention and EUR 6,559 without. The cost of the PISC was EUR 196 per patient, the reduction in hospital costs was EUR 313, and the savings associated with the intervention were EUR 117.

The sensitivity analysis indicated that the length of stay in intensive care and the rate of complications were the most influential inputs. The cost of the PISC was higher than the savings in hospital costs only when the rate of complications with the intervention was increased from 1/56 to 4/56.

Authors’ conclusions
The authors concluded that the PISC was effective as it led to a reduction in hospital costs of more than its cost, from the perspective of the health care payer.

CRD commentary
Interventions:
The comparator, which was no intervention, was appropriately selected as it was the typical pattern of care in several institutions. The key details of the PISC were presented.

Effectiveness/benefits:
The clinical analysis was based on a published RCT, the rigorous design of which should have ensured the validity of the clinical estimates. The authors noted that the RCT might not have reflected real-world patterns of care. This source of evidence was appropriately identified through a search of the relevant literature reviews. The use of a single RCT might limit the ability of this study to represent the patient population, especially because the RCT had a small sample, and this was acknowledged by the authors. Further methods of the trial were presented in its publication. No benefit measure was reported, but the clinical results were used to estimate the reduction in hospital costs with the PISC.

Costs:
The analysis of costs was extensively presented. The cost categories were consistent with the economic viewpoint. The authors stated that further savings might be possible with a policy of full reimbursement, for the nicotine replacement therapy, by the French social security. The unit costs, resource quantities, the price year, and the sources of data were generally clearly presented, making the economic analysis transparent. The economic estimates were treated deterministically and were not statistically tested, but extensive sensitivity analyses were carried out by varying the cost estimates.

Analysis and results:
The costs and benefits of the programme were not combined and a cost-consequences analysis was carried out. The results were clearly presented, especially for the economic analysis, and were consistent with the objective. The issue of uncertainty was investigated using a deterministic approach rather than a more comprehensive methodology, which
would have provided more robust results. The scenarios investigated allowed the identification of the model drivers. The authors acknowledged that the benefits of the intervention might be restricted to the short time horizon, as other studies have shown that long-term benefits may fade gradually. They noted that their findings might not be generalisable to other countries due to potential variation in hospital practice. Their findings were also restricted to the population of patients scheduled for hip and knee surgery.

Concluding remarks:
The study was well presented, but had some methodological limitations and further studies are needed to confirm the authors’ conclusions.

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