Economic benefit of tonsillectomy in adults with chronic tonsillitis

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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.

Health technology
The use of tonsillectomy in adults with chronic tonsillitis.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised adult patients with a diagnosis of chronic tonsillitis, who met the American Academy of Otolaryngology clinical practice guidelines for consideration for adult tonsillectomy. Patients with obstructive sleep apnoea syndrome or potential malignancy were excluded, as were patients who simultaneously underwent adenoidectomy.

Setting
The setting was secondary and primary care. The study was carried out in Boston (MA), USA.

Dates to which data relate
The effectiveness and resource use data were collected between 1994 and 1999. The price year was 1999.

Source of effectiveness data
The effectiveness data were derived from a single study.

Link between effectiveness and cost data
The costing was performed retrospectively on the same sample population as that used in the effectiveness analysis.

Study sample
No power calculations appear to have been performed in the planning phase of the study to assure a certain power. A total of 293 adult patients with chronic tonsillitis, who underwent tonsillectomy in the academic otolaryngology practice where the study was carried out, were identified. In addition to the clinical exclusion criteria reported already, patients were also excluded if they had less than 1 year of follow-up. In the end, only 83 patients completed and returned the surveys used to collect the effectiveness data (response rate 30.3%; mean age 27.3 years, standard deviation, SD=8.5). The authors did not provide evidence that the study sample was representative of the study population.
Study design
This was a retrospective within-group comparison study that was performed at a single centre. The patients were followed up for a total of 24 months, 12 months before and 12 months after undergoing tonsillectomy. No blinding method for the outcome assessment was used.

Analysis of effectiveness
The primary health outcome assessed was the quality of life impact of adult tonsillectomy 12 months after the intervention, compared with the 12 months before. This was measured by the total score and the general, social and physical health sub-scores of the Glasgow Benefit Inventory (GBI). The GBI scale ranged from -100 to 100, with positive scores implying improvements in quality of life due to tonsillectomy. Disease severity parameters were also reported. The parameters considered were the number of weeks on antibiotics, the number of days of missed work, and the number of physician visits for the 12-month period before and after tonsillectomy. These health outcomes were collected through a patient-reported questionnaire.

Effectiveness results
There was a significant improvement in the quality of life of patients after tonsillectomy. This was shown by positive results in:

- the average total score (mean +/- 95% confidence interval, CI: +27.54 +/- 4.63; p<0.001) of the GBI,
- the general sub-score (mean +/- 95% CI: +35.74 +/- 5.33; p<0.001) of the GBI,
- the social sub-score (mean +/- 95% CI: +15.46 +/- 5.55; p<0.001) of the GBI, and
- the physical health sub-score (mean +/- 95% CI: +6.83 +/- 4.83; p=0.003) of the GBI.

There was a statistically significant reduction between the 12-month period before and after tonsillectomy in the number of weeks on antibiotics (-5.9 weeks; p<0.001), the number of days of work missed (-8.7 days; p<0.001), and the number of physician visits (-5.3 visits; p<0.001).

Clinical conclusions
After tonsillectomy, patients with chronic tonsillitis showed a statistically significant improvement in their quality of life. They also showed a significant reduction in each of the disease severity outcomes considered in the clinical study.

Modelling
A break-even time analysis was carried out to model the economic impact of tonsillectomy on the treatment of chronic tonsillitis in adults, and to identify the point in time at which the cost of the intervention for tonsillectomy was recovered by the savings of managing the disease condition in the subsequent years after the intervention.

Measure of benefits used in the economic analysis
No summary measure of benefit was used in the economic analysis. The study was therefore categorised as a cost-consequences analysis.

Direct costs
The direct costs considered in the economic analysis appear to have been those of the health service. They physician visits and antibiotics (i.e. penicillin, amoxicillin and erythromycin). The costs exclusively related to tonsillectomy were for the surgeon, anaesthesiologist, hospital facilities and postoperative therapy. The resource quantities were estimated from a patient self-reported questionnaire and a chart review. The costs were estimated from the Medicare reimbursement for evaluation and management, average wholesale prices, and data from three third-party payers in the
authors' geographic area. Therefore, the estimation of costs was based on current data. Most of the resource quantities were reported separately from the unit costs. The medical costs were adjusted for inflation using the medical sub-set of the Consumer Price Index, assumed to be steady at 1999 levels. The costs were discounted at a rate of 5%. The price year was 1999. The estimated costs were the average cost per patient. A further analysis was conducted to identify the break-even point at which the medical costs of tonsillectomy were recovered by its net cost-savings. Modelling was used for this analysis.

Statistical analysis of costs
Means and SDs of some of the resource quantities used were reported. However, the estimated costs per patient were not treated stochastically.

Indirect Costs
The indirect costs were estimated. These included the lost productivity due to workdays missed because of tonsillitis. The human capital approach was used for the estimation of these costs. The sources of the indirect costs were the national gross domestic product per capita, and the same patient survey used for the effectiveness analysis and the estimation of direct costs. These costs were adjusted for inflation with the medical sub-set of the Consumer Price Index. The resource quantities were reported separately from the costs. The price year was 1999. The costs were discounted at a rate of 5%.

Currency
US dollars ($).

Sensitivity analysis
One-way sensitivity analyses were performed to assess the robustness of the results obtained by means of the break-even time analysis. Some of the parameters modified in the sensitivity analyses were:

- the discount rate (7.5%),
- the Consumer Price Index for medical products,
- the reimbursement of physician visits,
- the number of workdays missed because of tonsillitis,
- the price of antibiotics.

The areas of uncertainty investigated were, therefore, variability in the data and analytical methods. The authors did not specify the method used to determine the range of variation for each parameter.

Estimated benefits used in the economic analysis
See the 'Effectiveness Results' section.

Cost results
During the 12 months before tonsillectomy, the mean direct cost per patient with chronic tonsillitis was $242.89, while the mean indirect cost per patient was $1,128.88.

After tonsillectomy, the mean direct cost of medical treatment specifically for chronic tonsillitis was $14.17 per patient, while the indirect cost per patient was reduced to $81.78.

The medical cost of adult tonsillectomy was $2,444.91, while the indirect cost was $649.43 per patient.
The results of the break-even time analysis showed that the direct costs of adult tonsillectomy would be recovered by net cost-savings of tonsillectomy at 12.7 years after the intervention. The overall societal costs would be recovered 2.3 years after the intervention.

Synthesis of costs and benefits
The estimated benefits and costs were not combined because of the cost-consequences approach undertaken. The sensitivity analyses showed that the results of the break-even time analysis were sensitive to the discount rate and the number of workdays missed because of tonsillitis. The results were moderately sensitive to changes in the price of antibiotics.

Authors' conclusions
Tonsillectomy results in significant improvement in quality of life and leads to substantial decreases in health-care utilisation and work-related absences, thus generating cost-savings in acceptable break-even time points.

CRD COMMENTARY - Selection of comparators
There was an implicit justification for the comparator chosen. No tonsillectomy for adult patients with chronic tonsillitis may be a valid alternative since its clinical effectiveness was not well known in the authors' setting.

Validity of estimate of measure of effectiveness
The study was based on a retrospective within-group comparison study. This might have been appropriate given the available information, although it was subject to relevant biases. For example, there might have been confounding factors affecting the results obtained because of changes associated with time. In addition, the clinical assessment of outcomes relied on the patients’ assessments of their tonsillitis over the last 2 years. These factors may affect the internal validity of the study results. Moreover, the authors did not provide evidence that the study sample was representative of the study population, which may limit the external validity of the study.

Validity of estimate of measure of benefit
No summary measure of benefit was used in the economic analysis. The study was, therefore, categorised as a cost-consequences analysis.

Validity of estimate of costs
Two perspectives, a health service perspective and a societal perspective, appear to have been adopted for the economic analysis. Most of the relevant costs relating to these perspectives were included in the study, although some costs were not considered, such as those associated with complications, or hidden medical costs (i.e. throat cultures or oral pain medication for acute exacerbations of tonsillitis). Most of the resource quantities were reported separately from the costs and the price year was identified, which would enhance reflation exercises to other settings.

Even though the resource quantities were reported stochastically, the average costs per patient were treated as point estimates and no statistical comparisons of the costs before and after tonsillectomy were performed. However, sensitivity analyses were performed. These related only to the break-even time analysis, to account for uncertainty that could affect the break-even point at which tonsillectomy would start generating cost-savings, but the values of the parameters used were not justified. Discounting was carried out for the break-even analysis, and an appropriate discount rate for the US setting was applied. This was appropriate since the costs were modelled over more than 2 years.

Other issues
The authors made some comparisons of their study findings with those from other studies that also applied break-even point analysis in the assessment of different interventions. These showed that the more serious the medical condition
was, the shorter the break-even point which was required for the intervention to start generating cost-savings. The issue of the generalisability of the results was not addressed. The authors do not appear to have presented their results selectively and their conclusions reflected the scope of the analysis. The authors did not report any additional limitations other than those reported already.

**Implications of the study**
As the authors reported, the reduction in costs associated with tonsillectomy in adults with chronic tonsillitis should be considered in the clinical decision-making process for tonsillectomy. However, the study presented some caveats that should be taken into consideration in this process.

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**Other publications of related interest**


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