Transurethral prostate resection, noncontact laser therapy or conservative management in men with symptoms of benign prostatic enlargement: an economic evaluation
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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
Three alternative strategies for the treatment of men with symptoms of benign prostatic hyperplasia were examined. The strategies were noncontact laser therapy (NLT), transurethral prostate resection (TPR) and conservative management (CM).

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis; cost-utility analysis.

Study population
The study population comprised men with uncomplicated lower urinary tract symptoms (no acute or chronic urinary retention).

Setting
The setting was a hospital. The economic study was carried out in the UK.

Dates to which data relate
The effectiveness and resource use data were derived from a study published in 2000. The costs were presented in 1998 and 1999 values.

Source of effectiveness data
The effectiveness evidence was derived from a single study.

Link between effectiveness and cost data
The costing was carried out prospectively on the same sample of patients as that used in the effectiveness study.

Study sample
Limited information on the study sample and design was provided. An overall sample of 340 patients was considered. There were 117 patients in the NLT group, 117 patients in the TPR group, and 106 patients in the CM group.

Study design
This was a prospective, randomised clinical trial. Details on the centres where the study was carried out, and the
methods used to randomise and then follow the patients included in the study, were not provided. The length of follow-up was 7.5 months.

**Analysis of effectiveness**
The basis of the analysis of the clinical study (intention to treat or treatment completers only) was not reported. The outcomes used in the analysis were:

the International Prostate Symptom Score (I-PSS),

maximum urine flow,

post-void residual urine,

the number of successful treatments,

I-PSS quality of life, and

Euroqol.

A composite measure of success, based on I-PSS and maximum urinary flow, was also used. This ranged from 'very successful' (postoperative I-PSS less than 8 to 50% of baseline and at least 33% improvement in maximum urinary flow) to 'very unsuccessful' (follow-up I-PSS score and maximum urinary flow no better than baseline). The baseline comparability of the study groups was not reported.

**Effectiveness results**
The difference in mean outcome from baseline to last follow-up assessment was:

-12.26 with TPR, -10.75 with NLT, and -1.31 with CM for I-PSS;

9.68 mL/s with TPR, 5.85 mL/s with NLT, and 0.16 mL/s with CM for maximum urine flow;

-74 mL with TPR, -73.38 mL with NLT, and 2.19 mL with CM for post-void residual urine; and

-2.2 with TPR, -1.9 with NLT, and -0.4 with CM for I-PSS quality of life.

The number of successful treatments per 100 patients was 81 with TPR, 67 with NLT, and 15 with CM.

The Euroqol changed from 0.774 to 0.790 with TPR, from 0.772 to 0.816 with NLT, and from 0.773 to 0.772 with CM.

**Clinical conclusions**
The effectiveness analysis showed that both NLT and TPR led to better outcomes in comparison with CM. TPR resulted in better clinical outcomes than NLT, but worse Euroqol results.

**Measure of benefits used in the economic analysis**
The summary benefit measures used were I-PSS, maximum urine flow, post-void residual urine, the number of successful treatments, I-PSS quality of life, and quality-adjusted life-years (QALYs). All these measures were derived directly from the effectiveness analysis. To calculate QALYs, it was assumed that a linear change in Euroqol scores occurred between baseline and 7.5-month follow-up, that Euroqol scores remained constant between 7.5 and 12 months, and that Euroqol scores would have remained at baseline if there had been no intervention.
Direct costs
Discounting was not relevant since the costs were not incurred for more than two years. The unit costs were presented separately from the quantities of resources used, and a very detailed breakdown of the cost items was provided. The health services included in the economic evaluation were operative time and staff, equipment, hospital stay (including overhead and consumables), diagnostic tests and drugs, inpatient and outpatient visits, home and office general practitioner and nurse visits, emergency visits, prescriptions, transportation, home help, and incontinence pads.

The cost/resource boundaries of the NHS and the patient were adopted in the cost analysis. The estimation of resource use was based on prospectively collected data that were derived from the sample of patients included in the effectiveness trial. The costs were, in general, obtained from NHS sources such as NHS trusts and Unit Costs of Health and Social Services. Travel costs were derived from the Automobile Association schedule. Other costs were values as reported by the patient, or market values. A 5-year life span was assumed for equipment and a 6% discount rate was used to determine the yearly equivalent costs. The costs were expressed in 1998 and 1999 values.

Statistical analysis of costs
The costs were presented as mean values with standard deviations.

Indirect Costs
The indirect costs were not considered.

Currency
UK pounds sterling (€).

Sensitivity analysis
Univariate sensitivity analyses were carried out to determine the impact of variations in some estimated costs on the total per patient costs from the perspective of the NHS. In particular, variations in costs and resources associated with the laser fibre, equipment life span, procedural costs, initial hospital stay costs, and resection costs were considered. Different methods of calculations and different sources were used to determine the alternative values used in the sensitivity analysis.

Estimated benefits used in the economic analysis
The outcome difference relative to CM (higher differences represent better results) was:

- 10.94 with TPR and 9.44 with NLT for I-PSS;
- 76 mL with TPR and 75.4 mL with NLT for post-void residual urine;
- 9.52 mL/s with TPR and 5.69 mL/s with NLT for maximum urine flow;
- 66 with TPR and 52 with NLT for successful outcomes;
- 1.75 with TPR and 1.54 with NLT for I-PSS quality of life; and
- 0.01 with TPR and 0.03 with NLT for QALYs.

Cost results
From the NHS perspective, the mean total costs per patient were 1,222.64 with NLT, 928.14 with TPR, and 45.18 with CM.

From the patient perspective, the mean total costs per patient were 16.06 with NLT, 11.50 with TPR, and 1.46 with
Synthesis of costs and benefits
Incremental cost-effectiveness and cost-utility ratios were calculated to combine the costs and benefits of NLT and TPR relative to CM.

The incremental cost per unit decrease in I-PSS relative to CM was 81 with TPR and 125 with NLT.

The incremental cost per mL decrease in post-void residual urine relative to CM was 12 with TPR and 16 with NLT.

The incremental cost per mL/s increase in maximum urine flow relative to CM was 93 with TPR and 207 with NLT.

The incremental cost to increase the number of successful outcomes relative to CM was 1,338 with TPR and 2,264 with NLT.

The incremental cost per unit decrease in I-PSS quality of life relative to CM was 504 with TPR and 767 with NLT.

When compared with NLT, TPR was dominant for all clinical outcomes, being less costly and more effective. However, when the QALYs were considered, NLT, although more costly than TPR, resulted in being more effective.

The incremental cost per additional QALY relative to CM was 76,779 with TPR and 38,291 with NLT.

The incremental cost per QALY for NLT relative to TPR was not calculated. In this case, the choice of the optimal strategy depended on the maximum acceptable threshold for the incremental cost per QALY.

The results of the sensitivity analysis showed that base-case results were quite robust to variations in the cost estimates.

Authors’ conclusions
Transurethral prostate resection (TPR) was more cost-effective than noncontact laser therapy (NLT) in men with lower urinary tract symptoms, for all clinical outcomes. However, when quality-adjusted life-years (QALYs) were considered, NLT was more effective. Conservative management (CM) could represent a feasible alternative for those who wish to delay surgery or wait to see whether intervention is required.

CRD COMMENTARY - Selection of comparators
The rationale for the selection of the comparators was clear. CM was selected as the basic comparator because it represented the most conservative approach for the treatment of patients with uncomplicated lower urinary tract symptoms. TPR was the preferred method until the 1990s, but concerns about morbidity led to the development of less invasive approaches, namely NLT. However, the authors noted that alternative laser strategies were available but were not considered in the study. You should decide whether they are valid comparators in your own setting.

Validity of estimate of measure of effectiveness
The effectiveness evidence came from a well-conducted clinical trial, which was appropriate for the study question. However, limited information on the design and methods of the trial were provided as the study had been published elsewhere. Therefore, it was not possible to assess the internal validity of the analysis. Some assumptions were made to simplify the calculation of QALYs. None of these assumptions was tested in the sensitivity analysis.

Validity of estimate of measure of benefit
Several summary benefit measures were used in the economic analysis. Some of them were specific to the disease considered in the study, whereas QALYs represent a measure more comparable with the benefits of other health care interventions. Euroqol was used to estimate utility and the authors made standard assumptions. As the cost-utility ratio provided results that were in contrast to those associated with other clinical outcomes, the authors noted that the use of
quality of life measures in lower urinary tract symptoms could not have been appropriate.

**Validity of estimate of costs**
The authors reported explicitly the perspectives adopted in the study. All the relevant categories of costs were considered in the analysis and a detailed breakdown of the cost items was provided. Further, the unit costs and the quantities of resources used were presented separately. This enhances the possibility of replicating the cost analysis. The source of the cost data was reported for almost all items. The cost estimates were specific to the study setting, but alternative values of the costs were used in the sensitivity analysis. The price year was reported, which aids reflation exercises in other settings.

**Other issues**
The authors compared some of their findings with those from other studies, especially in terms of clinical outcomes associated with CM and TPR. The issue of the generalisability of the study results to other settings was not addressed, although some issues of uncertainty were implicitly considered in the sensitivity analysis. The authors noted that the main limitations to the validity of their study were the short follow-up and missing data. The study referred to patients with lower urinary tract symptoms and this was reflected in the authors' conclusions.

**Implications of the study**
The study results suggested that TPR was the most cost-effective strategy for the treatment of men with lower urinary tract symptoms. CM could be considered an alternative strategy, but only for those patients delaying treatment in the short term.

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