Cost and effectiveness of different treatment alternatives in urinary stone practice

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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
Using extracorporeal shock wave lithotriptor (ESWL), percutaneous nephrolithotomy (PNL), and open pyelolithotomy (PL) in the treatment of patients with renal stones; and using ESWL, ureterorenoscopy (URS), and stone basket procedure (SB) in the treatment of patients with lower ureteric stones.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
Patients with renal and ureteric stones.

Setting
Hospital. The economic study was carried out in Helsinki, Finland.

Dates to which data relate

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

Link between effectiveness and cost data
The costing was undertaken retrospectively on the same patient sample as that used in the effectiveness study.

Study sample
Power calculations were not performed to determine the sample size. In the comparison of ESWL, PNL, and PL, the number of patients and procedures were as follows: PL group 44 patients, 45 procedures; PNL group 58 patients, 76 procedures; ESWL group 425 patients, 675 procedures. In the comparison of ESWL, SB, and URS, the number of patients and procedures were as follows: ESWL group 54 patients, 79 procedures; SB group 42 patients, 48 procedures; and the URS group 42 patients, 50 procedures.
Study design
This was a retrospective cohort study, carried out in a single centre. The duration of the follow-up was one month and 6 months for PL. No loss to follow-up was reported.

Analysis of effectiveness
The analysis of the clinical study was based on treatment completers only. The primary health outcomes used in the analysis were success rate, duration of procedure, hospital stay, complications and sick-leave. Between the sub-groups of PNL and ESWL, the comparison was performed also in uniform categories where treatments on both sides, staghorn calculi, ureteric stones and one ESWL-treated bladder stone were excluded (these sub-groups are indicated by * in the following paragraphs).

Effectiveness results
In the comparison of ESWL, PNL, and PL, the success rates were 99%, 97%, and 96%, respectively. The mean duration of procedures were 106, 129, 117, 90, 88, 34, 63 and 91 minutes in PL, PNL, PNL*, ESWL and ESWL*, respectively. In the comparison of SB, URS and ESWL, the corresponding figures were 34, 63 and 91 minutes, respectively. The hospital stay for the first comparison was estimated to be 14.8 (PL), 9.8 (PNL), 10.9 (PNL*), 2.9 (ESWL) and 2.7 days (ESWL*). The corresponding figures for the second comparison were 8.2, 7.7, and 3 days for SB, URS, and ESWL, respectively (p<0.05). The total amount of complications related to PNL was 36% versus 18% for PL and 7% for ESWL (p<0.0001). The corresponding figures for SB, URS, and ESWL were 4, 8, and 0%, respectively. The sick-leave for the first comparison was estimated to be 40.7 (PL), 15.8 (PNL), 9.9 (PNL*), 5.6 (ESWL) and 6.4 days (ESWL*), (p<0.05). The corresponding figures for the second comparison were 8.9, 12.6 and 3.7 days for SB, URS, and ESWL, respectively (p<0.05). The stone-free status after 1 month after SB, URS, and ESWL were 71, 66, and 60%, respectively (NS).

Clinical conclusions
The cumulative mean hospital stay after ESWL per patient was significantly shorter than that of the patients treated by PNL or PL or by SB or URS but there was no difference between the hospital stay after PNL and PL or after SB and URS. The cumulative sick-leave per patient in the sub-group of ESWL was shorter than that in the sub-groups of PNL or PL or SB and URS.

Measure of benefits used in the economic analysis
No summary benefit measure was identified in the economic analysis, and only separate clinical outcomes were measured.

Direct costs
Discounting of costs was not required due to the short time frame of follow up. Quantities were analysed separately from costs. The cost analysis covered the costs of laboratory analyses, radiographic examinations, inpatients care, auxiliary services and administration, wages of the anaesthetist, nursing staff and the urologist. The perspective adopted in the cost analysis was not explicitly specified. Charge data were used to evaluate the costs of different treatment modalities. The price year was 1993. The follow-up costs were not included in the cost analysis.

Statistical analysis of costs
95% confidence intervals were reported.

Indirect Costs
Not considered.
**Currency**  
Finish marks (FIM). A conversion rate of $1 = \text{FIM}8,060$ was used.

**Sensitivity analysis**  
Not undertaken.

**Estimated benefits used in the economic analysis**  
Not applicable.

**Cost results**  
The cumulative mean hospital costs per patient in comparison 1 were FIM33,860 (PL), FIM63,360 (PNL), FIM59,410 (PNL*), FIM17,430 (ESWL) and FIM14,830 (ESWL*). The corresponding figures for the second comparison were FIM19,520, FIM17,750 and FIM17,810 in SB, URS and ESWL, respectively.

**Synthesis of costs and benefits**  
Costs and benefits were not combined.

**Authors' conclusions**  
In the treatment of renal stones, particularly with a diameter of less than 20mm, ESWL is the most cost-effective method evaluated by the hospital costs, when repeated and additional procedures are included. In the treatment of lower ureteric stones the decisive factor is often the rapid removal of the stone. Therefore these stones are commonly removed by ureteroscopy in local centres. However, based on the hospital costs per patient, ESWL is a highly competitive alternative also for distal ureteric stones with a stone-free status equal to ureteroscopy at one month but with fewer complications and disability days with accompanying social cost savings.

**CRD COMMENTARY - Selection of comparators**  
The reason for the choice of the comparators is clear.

**Validity of estimate of measure of effectiveness**  
The internal validity of the effectiveness results can not be guaranteed due to the lack of a prospective study design.

**Validity of estimate of measure of benefit**  
With respect to lack of a summary benefit measure, the study may be regarded as a cost-consequences analysis.

**Validity of estimate of costs**  
Quantities were reported separately from the costs and adequate details of methods of cost estimation were given. However, the study lacked a prospective cost analysis. In view of the lack of a prospective study design and sensitivity analysis, the study results may need to be treated with some caution.

**Other issues**  
The issue of generalisability to other settings or countries was not addressed, although, appropriate comparisons were made with other studies.

**Source of funding**  
None stated.

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