Outcomes and cost analysis of pyeloplasty for antenatally diagnosed ureteropelvic junction obstruction using Markov models

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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 potential costs and clinical outcomes of treatment protocols involving paediatric pyeloplasty for children diagnosed with ureteropelvic junction obstruction. Pyeloplasty was more effective, but more costly than medical management. Practice-specific features should be considered by paediatric urologists when determining the best treatment. The methodology and the reporting were satisfactory and the authors’ conclusions appear to be appropriate.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
This study examined the potential costs and clinical outcomes of three treatment protocols, with different times for paediatric pyeloplasty, in children diagnosed with ureteropelvic junction obstruction (UPJO).

Interventions
Three treatment protocols were compared. In medical management, patients underwent annual imaging and prophylactic antibiotics without pyeloplasty. In immediate pyeloplasty, patients underwent pyeloplasty during their first year of age. In pyeloplasty after no improvement on imaging, patients were given prophylactic antibiotics and observed for one year to allow spontaneous resolution of the UPJO before proceeding to pyeloplasty if not resolved.

Location/setting
USA/secondary care.

Methods
Analytical approach:
A Markov model was constructed to estimate the costs and health outcomes associated with the progression of disease over time. The time horizon was five years and the authors stated that the perspective was that of a medical institution.

Effectiveness data:
The clinical data came from the published literature, including a randomised controlled trial (Dhillon. 1998, see 'Other Publications of Related Interest' below for bibliographic details) and retrospective studies (Capolicchio, et al. 1997, Faerber, et al. 1995, see 'Other Publications of Related Interest' below for bibliographic details). The key clinical parameters were the age at resolution of the UPJO, the proportion of patients with worsened hydronephrosis, the number of pyeloplasties, and the number of pyelonephritis episodes.

Monetary benefit and utility valuations:
Not relevant.

Measure of benefit:
There was no single measure of benefit. Health outcomes were evaluated using the clinical outcomes of age at resolution of the UPJO, the proportion of patients with worsened hydronephrosis, the number of pyeloplasties, and the number of pyelonephritis episodes.
Cost data:
The cost categories included initial management after diagnosis, pyelonephritis treatment, annual management after diagnosis, and open pyeloplasty with three-day stay. The costs were determined from actual institution costs in 2003 and the price year was 2003. A 3% annual inflation rate was used.

Analysis of uncertainty:
One-, two- and three-way sensitivity analyses were performed by calculating the threshold level at which a given combination of values for one, two or three variables would change the treatment protocol that was most cost-effective.

Results
The mean age at resolution of the UPJO was older in medical management (6.3 years) than in pyeloplasty after no improvement (1.8 years) and immediate pyeloplasty (1.0 year).
The worsening of hydronephrosis was greater in medically treated patients (21%) than in pyeloplasty after no improvement (8%) and immediate pyeloplasty (4%).
The mean number of pyeloplasties per patient was 0.9 for pyeloplasty after no improvement on imaging and 1.0 for immediate pyeloplasty.
The mean number of pyelonephritis episodes was greater for the medically treated patients (0.11) than for pyeloplasty after no improvement (0.02) and immediate pyeloplasty (0.001).

The least costly protocol for UPJO was medical management ($10,024) compared with pyeloplasty after no improvement ($40,206) and immediate pyeloplasty ($44,492).

The three-way sensitivity analysis showed that medical management was more cost-effective at lower pyelonephritis rates and lower costs for annual imaging and antibiotics. Pyeloplasty protocols were more cost-effective at greater pyelonephritis rates and greater costs for annual medical management.

Authors' conclusions
Pyeloplasty was more effective, but more costly. Practice-specific features should be considered by paediatric urologists when determining the best treatment for UPJO.

CRD commentary
Interventions:
The interventions were clearly described. The intervention was relevant to other settings for the treatment of patients with UPJO.

Effectiveness/benefits:
The effectiveness data were based on a randomised controlled trial and retrospective studies. No systematic review of the literature was reported, so it is unclear whether the best available evidence was used. The authors stated that they used the best available data for their model, and that they could incorporate better data into their model when available.

Costs:
The costs appear to have reflected the perspective adopted. A breakdown of the costs associated with each stage of treatment was clearly provided. Actual institution costs were used and this was an appropriate source for the cost data. These were appropriately adjusted for annual inflation and the cost methods were generally well reported.

Analysis and results:
Overall, the analytical approach was satisfactorily reported and the model structure was reported in full, with a diagram. No incremental cost-effectiveness analysis was done and the authors did not specify a summary measure of benefit. The issue of uncertainty was addressed through one-, two- and three-way sensitivity analyses. A probabilistic sensitivity analysis would have better analysed the overall uncertainty around the cost-effectiveness results. The results of both the base case and the sensitivity analyses were extensively reported and the authors pointed out the limitations of their model.

Concluding remarks:
The methodology and the reporting were satisfactory and the authors’ conclusions appear to be appropriate.

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