Treatment of malignant pleural effusion: PleuRx catheter or talc pleurodesis? A cost-effectiveness analysis

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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 cost-effectiveness of out-patient Pleurx® catheter versus in-patient chest tube placement with talc slurry, for the treatment of malignant pleural effusions in cancer patients aged 50 years or older. The treatment for patients with a prognosis of six months should be chosen based on clinical factors and patient preference as, despite in-patient treatment being cheaper and more effective, the two strategies were similar. The study was satisfactorily carried out and the authors’ conclusions appear to be robust.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to examine the cost-effectiveness of two strategies for the management of malignant pleural effusions in patients, aged 50 years or older, with any type of cancer.

Interventions
The two strategies were out-patient placement of the Pleurx® catheter for home-based drainage of effusions and hospital-based chest tube placement with talc slurry.

Location/setting
USA/in-patient and out-patient.

Methods
Analytical approach:
A decision tree model was developed to determine the costs and benefits of the two strategies over a six-month horizon. The authors stated that the perspective of the third-party payer was adopted.

Effectiveness data:
The clinical data came from a literature review, but its methods and conduct were not reported. Some features of the data sources were reported, such as the type of study (prospective or retrospective), sample size, and key results. For example, for in-patient treatment, the treatment efficacy, which was defined as effusion resolution and was the key clinical endpoint, was derived from a recent meta-analysis of 1,499 patients that reported a success rate of 80%. For out-patient treatment, the treatment efficacy was an average of six retrospective studies and one prospective study, weighted on the basis of sample size and quality. The same sources were used for treatment complications and some assumptions were also made.

Monetary benefit and utility valuations:
The utility values were from various sources, including a recent study of patients with lung cancer, another study of patients on peritoneal dialysis, and authors’ opinions when published data were not available.

Measure of benefit:
Quality-adjusted life-years (QALYs) were the summary benefit measure.

Cost data:
The economic analysis included the cost of hospital admission for in-patient treatment and treatment of infection, home visits, physician office visits, and Pleurx (placement and supplies). The resource use was based on both published sources and authors’ assumptions. The costs were from Medicare reimbursement rates, a published cost-effectiveness study, and charges at the authors’ institution. All costs were in US dollars ($) and the price year was 2008.

**Analysis of uncertainty:**
A deterministic one-way sensitivity analysis was undertaken to investigate whether the base-case results were robust to variations in the inputs that were most uncertain in the literature review.

**Results**
The expected costs per patient were $8,170.80 with in-patient treatment and $9,011.60 with out-patient treatment. The expected QALYs were 0.281 for in-patients and 0.276 for out-patients. In the base case, in-patient treatment was the dominant strategy as it was more effective and less expensive than out-patient treatment.

A similar conclusion was reached in a scenario that included in-patient treatment for those patients who received out-patient treatment and did not have a complication, but did not have resolution of effusion. The relatively small differences in costs and QALYs suggested that the choice of treatment should be based on patient preference and the clinical situation.

The sensitivity analysis showed that in patients with a prognosis of less than six weeks, out-patient treatment had an incremental cost per QALY gained of less than $100,000 due to the lower costs of Pleurx supplies.

**Authors’ conclusions**
The authors concluded that the choice of treatment for patients with malignant pleural effusions and a prognosis of six months should be based on the clinical situation and patient preference, as in-patient talc treatment was cheaper and more effective, but the two strategies had similar economic and clinical profiles.

**CRD commentary**
**Interventions:**
The rationale for the selection of the comparators was appropriate as the authors considered the available treatments in palliative care for this patient population. Thoracentesis was excluded as it had a very high recurrence rate, as shown in clinical studies.

**Effectiveness/benefits:**
The clinical evidence came from a literature review, which is the best way to identify the most relevant sources of data, but it was unclear whether this review was systematic, as no details were reported on the inclusion and exclusion criteria and the databases searched. Little information on the design of the primary sources was provided, which makes it impossible to extensively judge the quality of the evidence. A meta-analysis was the key source of data on the in-patient treatment efficacy and meta-analyses are considered to be valid sources, given the large number of patients involved. The benefit measure was appropriate as QALYs capture the impact of the interventions on both survival and quality of life, which are relevant dimensions of health for these patients. The instruments used to derive the utility values were not reported.

**Costs:**
The categories of costs were consistent with the stated perspective. Some items were presented as unit costs, while others were reported as total categories, due to the use of reimbursement rates, which are typical of the US health care system. The price year was appropriately reported, which will allow reflation exercises for other time periods. The cost estimates were treated deterministically and only the cost of Pleurx was varied in the sensitivity analysis. Variations in the other costs were not considered as they were fixed in the authors’ setting. The costs associated with medications or oxygen therapy were excluded as there was no available data and their inclusion should have favoured the in-patient option.

**Analysis and results:**
The mean and incremental outcomes of the model were reported for the two strategies. The costs and benefits were synthesised in an incremental analysis, which was valid as it identified the most cost-effective strategy. The sensitivity analysis was deterministic and did not comprehensively assess the uncertainty. The authors acknowledged some limitations of their study and these mainly related to the heterogeneity in the quality of the clinical studies, the exclusion of some parameters (e.g. minor complications), and the need for some assumptions.

Concluding remarks:
The study was satisfactorily carried out and, despite some potential methodological limitations, the authors’ conclusions appear to be robust.

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