Cost-effectiveness of peritoneal dialysis catheter implantation by laparoscopy versus by open dissection
Crabtree J H, Kaiser K E, Huen I T, Fishman A

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 a laparoscopic procedure (LP) for the implantation of peritoneal dialysis catheters

Type of intervention
Secondary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
The population studied was patients attending Kaiser Permanente Bellflower Medical Centre between August 1992 and September 2000 for the implantation of dialysis catheters. No details of the characteristics of these patients were provided.

Setting
The setting was secondary care. The economic study was carried out in the USA.

Dates to which data relate
The effectiveness and resource use data were obtained between August 1992 and September 2000. The prices were based on costs in the year 2000.

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

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

Study sample
The sample for the study comprised 232 consecutive catheter implant procedures and 23 procedures to rescue catheters from flow dysfunction. The sample was based on all procedures conducted at one centre between two dates, August 1992 and September 2000. No rationale was provided for the choice of the time period. No power calculations to determine the sample size were reported. The intervention group (LP) comprised 169 procedures, while the control group comprised 63 procedures.
**Study design**
This was a cohort study that was carried out in a single centre. The duration of follow-up was not stated. There was no loss to follow-up. There was no blinding for the assessment of the outcomes.

**Analysis of effectiveness**
The effectiveness analysis was conducted on an intention to treat basis. The primary health outcome was the incidence of catheter obstruction following an implantation procedure. No information was reported on the differences between the intervention and control groups. No adjustments were made for potential confounding factors.

**Effectiveness results**
The incidence of catheter obstruction was:

- over all procedures, 6.7% for LP and 17.5% for OD; and
- 1.1% over the last 91 LP procedures.

No statistical analysis was reported.

**Clinical conclusions**
It was concluded that LP results in a lower incidence of catheter obstruction.

**Measure of benefits used in the economic analysis**
The outcome was the incidence of catheter obstruction, which involved additional costs to rescue.

**Direct costs**
The costs included were institutional. Discounting was not carried out. It is unclear whether this was relevant, as no information on the periods of follow-up from initial catheter implantation to rescue procedures was reported. The quantities and the costs were not analysed separately. The costs were estimated using actual data from the study. The quantities of resources used were measured between August 1992 and September 2000. The costs were based on the application of year 2000 prices. The costs reported were average costs.

The cost data used in the cost-effectiveness analysis were based on Medicare reimbursements for professional services. Outpatient service costs were estimated from the Hospital Outpatient Prospective Payment System. Inpatient service costs were based on Medicare payments for DRGs. Additional separately paid costs, such as diagnostic services, were the averages of actual payments from the payer over the sample.

**Statistical analysis of costs**
No statistical analysis of the costs was conducted.

**Indirect Costs**
No indirect costs were included in the analysis.

**Currency**
US dollars ($).

**Sensitivity analysis**
A threshold analysis was conducted for the costs of laparoscopic implantation and OD procedures.

**Estimated benefits used in the economic analysis**
The incidence reduction over all procedures was 10.8% (17.5 minus 6.7).

The incidence reduction over the last 91 LP procedures was 16.4% (17.5 minus 1.1).

No statistical testing of these results was reported.

**Cost results**
Catheter implantation cost:

- $2,821 by LP and $1,781 by OD on an outpatient basis, and
- $10,219 by LP and $10,028 by OD on an inpatient basis

The rescue of catheter obstruction cost $3,349 on an outpatient setting and $12,200 on an inpatient basis.

**Synthesis of costs and benefits**
A breakeven catheter obstruction incidence reduction was calculated as the reciprocal of the cost of rescue divided by the difference in catheter implantation costs. The weightings were applied to reflect the proportion of outpatient and inpatient procedures conducted in the centre.

The weightings applied were:

- for rescue costs, 0.33 for outpatient and 0.67 for inpatient; and
- for initial implantation costs, 0.8 for outpatient and 0.2 for inpatient;

The breakeven catheter obstruction incidence reduction was 9.4%.

**Authors' conclusions**
The laparoscopic procedure (LP) was a cost-effective means of establishing peritoneal dialysis catheter access in comparison with the open dissection (OD) technique.

**CRD COMMENTARY - Selection of comparators**
The comparator used was justified on the grounds that it is the traditional method of catheter implantation. You should decide if this is appropriate for your setting.

**Validity of estimate of measure of effectiveness**
The estimate of measure of effectiveness came from a cohort study. Comparability of the patient groups was not demonstrated. No statistical analysis was reported on the estimates of incidence of rescue procedure following catheter implantation.

**Validity of estimate of measure of benefit**
The summary measure of health benefit was the incidence of catheter obstruction. You should decide if this is an appropriate measure of benefit with which to compare the two interventions.
Validity of estimate of costs
The cost perspective used was that of the health service. All the categories of cost relevant to this perspective were included in the analysis. The costs were not reported separately from quantities. Resource use was estimated on the basis of the study sample. No statistical analysis of the quantities was performed. The prices used were based on Medicare reimbursement schedules. The actual costs from the perspective of the institution were also calculated. These were not used in the cost-effectiveness analysis.

Other issues
The conclusion that LP is cost-effective in comparison with OD needs to be interpreted with caution for several reasons. First, no confidence intervals were reported for the effectiveness or cost results, so it is not possible to judge the level of statistical significance of the findings. Second, the alternative sites of service (inpatient and outpatient) made a big difference to the effectiveness results needed to cover the cost threshold (1.5 to 26% difference in the incidence of catheter obstruction). The final threshold estimate was based on weightings between inpatient and outpatient site of service. This was specific to the centre, which may limit its generalisability. Third, the results were also influenced by the success rates of alternative catheter implantation procedures. Varying levels of experience in laparoscopic procedures will influence the generalisability of the results. Finally, the results were only reported from a health service perspective.

The authors recognise that they have examined only one rescue modality (laparoscopic rescue). They stated that other rescue modalities are more expensive and imply that these would, therefore, make LP even more cost-effective.

Implications of the study
The authors recommend that each institution performs its own cost study, on the lines of that outlined in the paper.

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