Coil occlusion versus conventional surgical closure of patent ductus arteriosus

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
Coil occlusion of patent ductus arteriosus (PDA).

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
Children with isolated restrictive PDA, undergoing PDA closure.

Setting
Hospital. The economic study was performed in Detroit, Michigan, US.

Dates to which data relate
Effectiveness data were collected between January 1993 and September 1995. All costs were corrected to 1995 dollars using the Consumer Price Index for Medical Care.

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

Link between effectiveness and cost data
Costing was undertaken retrospectively on the same patient sample as that used in the effectiveness analysis.

Study sample
The coil group consisted of the first 25 consecutive paediatric children (aged over 6 months) who underwent cardiac catheterisation with the intent to coil occlude a restrictive PDA between March 1994 and September 1995. The surgery group consisted of 21 patients (aged over 6 months) who underwent surgery for a restrictive PDA between January 1993 and September 1995.

Study design
Retrospective cohort study. Duration of follow-up was 6 months.
Analysis of effectiveness
The analysis of effectiveness was based on treatment completers only. The main health outcomes used in the analysis were the success rates in closing PDA in terms of clinical closure and complete closure. Clinical closure was defined as the disappearance of the PDA murmur and complete closure was defined as absence of clinical and colour Doppler evidence of a residual shunt.

Effectiveness results
Clinical closure was 92% in the coil group and 100% in the surgery group. Complete closure was 80% in the coil group.

Clinical conclusions
For closure of hemodynamically restrictive PDAs, transcatheter coil occlusion is marginally less effective than conventional surgery.

Measure of benefits used in the economic analysis
The measure of benefits was the success rate in closing PDA (clinical and complete closure).

Direct costs
Direct health service costs were considered. The estimated hospital costs for each patient constituted costs for: operating room or cardiac catheterisation laboratory, patient-care related costs during hospitalisation, medical supplies, and laboratory investigations. These estimates included both direct (e.g. disposable medical equipment, medications, other supplies) and other overhead costs (maintenance, personnel) as reported in the Health Care Finance Administration (HCFA) form 2552 for the Children's Hospital of Michigan, Wayne State University School of Medicine, Detroit, Michigan, US. The costs reported were based on a known ratio of the total costs and the total charges from individual hospital departments. The maximum allowable physician charges for each procedure, as designated by Blue Cross and Blue Shield of Michigan, were used in the analysis due to the intrinsic difficulty of estimating the professional costs. All costs were converted to 1995 dollars using the Consumer Price Index for Medical Care. Discounting was not necessary.

Statistical analysis of costs
A Mann Whitney U-Wilcoxon rank W rank sum W Test was used to compare the costs for the two groups and the length of hospital stay. Statistical significance was defined as a 2-tailed p value <0.05.

Indirect Costs
Not included.

Currency
US dollars ($).

Sensitivity analysis
No sensitivity analysis was performed.

Estimated benefits used in the economic analysis
Clinical closure was 92% in the coil group and 100% in the surgery group. Complete closure was 80% in the coil group.

Cost results
The estimated total costs were $9,104 ($7,492 - $11,839) for the surgical group versus $4,897 ($3,470 - $16,563) for the coil group.

Synthesis of costs and benefits
Although clinical benefits were marginally lower for the coil procedure compared with surgery, costs were significantly lower.

Authors' conclusions
The authors concluded that for the two strategies for closure of hemodynamically restrictive PDAs, transcatheter coil occlusion was marginally less effective but significantly more cost-effective than conventional surgery. With improvement in the technique and device design and with appropriate case selection, there should be further reduction in costs and residual shunts with this strategy.

CRD COMMENTARY - Selection of comparators
The reason for the choice of the comparator (conventional surgery for PDA) is clear, as it is widely used in the authors' setting. You, as a database user, should consider if this applies to your own setting.

Validity of estimate of measure of benefit
Data do not appear to have been used selectively to prove a particular point and the choice of health outcomes was justified. However, the study might benefit from a longer follow-up than 6 months.

Validity of estimate of costs
Excellent and clear details of the methods of quantity/cost estimation were given and no relevant cost items were omitted. Good and extensive comparisons were made with recent relevant studies.

Other issues
Given that they are derived from a single US hospital, the cost data may not be generalisable to other settings or countries.

Implications of the study
As the benefits and costs for coil occlusion are lower than for conventional surgery (albeit marginally), this is a prime candidate for further cost-effectiveness studies.

Source of funding
None stated.

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