Intraoperative echocardiography during congenital heart operations: experience from 1,000 cases


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
Intraoperative echocardiography during congenital heart operations.

Type of intervention
Diagnosis and elective treatment.

Economic study type
Cost-effectiveness analysis.

Study population
Patients with congenital heart defects undergoing (in most cases) repair using cardiopulmonary bypass (CPB). A few patients did not require CPB (but these did not include those who underwent simple palliative procedures such as shunt or pulmonary artery band). Forty-five percent of patients were less than 1 year of age at the time of surgery and 71.3% were less than 3 years of age at that time.

Setting
The setting was an university hospital. The study was carried out in North Carolina, USA.

Dates to which data relate
Effectiveness data were collected between 1987 and 1994. Resource use data were collected from 1992 to 1995. 1995 prices were used.

Source of effectiveness data
Single study.

Link between effectiveness and cost data
Costing was undertaken retrospectively on a different patient sample from that used in the effectiveness analysis.

Study sample
One thousand (1,000) patients with congenital heart defects.

Study design
Case series.
Analysis of effectiveness
It seems that the analysis was based on treatment completers only. The main health outcomes used in the analysis were the number (proportion) of intraoperative revisions of repairs based on echocardiographic findings and successful revision repairs (the revised 'residual defect' was either eliminated or made 'acceptable'). The rate of complications was also reported. Echocardiography was performed intraoperatively, for most cases, both before and after surgical repair.

Effectiveness results
Overall, 44 patients (4.4%) underwent intraoperative revision of their repair based on echocardiographic findings. In the early years, 8.5% of repairs needed to be revised. With experience, the number of revisions fell to between 3% to 4%, but the need for revision continued to occur throughout the series. Thirty nine of those patients (88.6% or, equivalently, 3.9% of the original sample) had a successful revision. In 2.6% of patients thought by the surgeon to have a good repair, intraoperative echocardiography revealed the need for operative revisions. There were no significant complications attributable to intraoperative echocardiography.

Measure of benefits used in the economic analysis
The main health outcomes used in the analysis were the rate of intraoperative revisions of repairs based on echocardiographic findings, and successful intraoperative revision.

Direct costs
Resource quantities, apart from length of stay, were not reported. Direct health service costs were considered, such as hospital costs. The cost information was obtained using Transition I, a cost tracking system, implemented at the Duke University Medical Centre in 1992. The costing was undertaken on actual data generated by the cases arising since that date. The costs did not include professional fees, nor, more importantly, the costs associated with echocardiography. 1995 prices were used and costs were not discounted.

Currency
US dollars ($).

Sensitivity analysis
No sensitivity analysis was performed.

Estimated benefits used in the economic analysis
Forty four patients (4.4% of the total patient sample) underwent intraoperative revision of their repair based on echocardiographic findings. Consequently, 39 patients (88.6%) of these patients (3.9% of the total) had a successful revision.

Cost results
The average cost for patients who returned to the operating room during their hospitalisation for revision of a repair was significantly greater than for those whose repairs were revised before they left the operating room:

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\text{Average cost} = 94,180 (+/- 33,881) \text{ versus } 21,415 (+/- 8,215).
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Synthesis of costs and benefits
The authors did not combine cost and benefits as the intervention turned out to be the dominant strategy.

Authors' conclusions
In an era where complete repair of congenital heart defects is emphasised, intraoperative echocardiography provides
information that can guide successful operative revision so that babies leave the operating room with optimal results.

**CRD Commentary**

The internal validity of the study results is in doubt due to the absence of a proper control group and given the lengthy time frame covered, in addition to which, the technology, among other factors, was subject to wide variations. It is not clear whether the 'do-nothing' option is a good comparator since even 'physicians' subjective judgement' could have some diagnostic power. Apparently the cost analysis did not consider the additional costs of echocardiography, given the information provided. The cost comparison was based on data from three late-revision-of-repair patients only. Further studies are needed, with adequately chosen comparators, better designs controlling for potential sources of bias and parallel collection of resource use data, before firm conclusions can be reached regarding the most efficient use of resources in the assessment of outcomes of congenital heart operations.

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