Quality vascular surgical care: the importance of innovation and change in an era of dwindling reimbursement
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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.

Health technology
The use of four instruments to analyse, revise, and streamline resource use in care processes for carotid, aortic, and dialysis access surgery. The instruments were:

- specific algorithms, i.e. explicit protocols with well-defined rules to be followed to solve specific health care problems;
- clinical pathways, i.e. detailed interdisciplinary plans for managing specific surgical interventions or medical conditions;
- case management, i.e. collaborative, patient-based systems designed to achieve effective and efficient health services through the planning, organising, coordinating, and monitoring of health resources and quality levels; and
- case manager, i.e. a skilled clinician committed to the patient and the institution for the daily implementation of the case management process for a specific clinical problem.

Type of intervention
Management and organisational instruments.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients undergoing carotid, aortic, or dialysis access surgery.

Setting
The setting was an academic teaching institution. The economic study was carried out at the Texas A and M University Health Science Center (Department of Surgery, Division of Vascular Surgery) and the Scott and White Clinic and Hospital, Temple (Texas, USA).

Dates to which data relate
The data on the effectiveness and resources used were gathered from 1986 to 1998. The price year was not reported.

Source of effectiveness data
The effectiveness evidence was derived from a single study.

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

**Study sample**
No power calculations were performed to determine the sample size. There was no evidence that the initial sample size was appropriate for the clinical study question. For carotid surgery, 15 consecutive patients undergoing carotid endarterectomy in February 1997 were selected and monitored. For abdominal aortic aneurysm surgery, a sample of 120 patients was selected from December 1995 to April 1998. Of these, 60 patients underwent a retroperitoneal approach and 60 patients underwent a transperitoneal approach; the latter represented the routine procedure before the introduction of management instruments. Patients with ruptured aneurysms were excluded from the analysis. For the haemoaccess intervention, 208 patients with end-stage renal disease, treated at the largest single dialysis centre at the authors' institution, were included in the sample.

**Study design**
For carotid surgery, a single cohort of patients was used for the effectiveness analysis, with an implicit comparison group represented by previously treated patients. For abdominal aortic aneurysm surgery, a randomised controlled trial was conducted. For haemoaccess, a single cohort of patients was used and the hospital charts were retrospectively reviewed. The length of follow-up was not reported for any of the study groups.

**Analysis of effectiveness**
The primary health outcomes for carotid surgery were utilisation of the intensive care unit (ICU), the length of stay, stroke and death rates, the overall morbidity, readmission rates, and quality assessment by the patient through a modified standard form (SF-16). The health outcomes for abdominal aortic aneurysm surgery were ICU stay, the duration of postoperative ileus, the total length of stay, and patient satisfaction. The primary outcomes for haemoaccess were primary patency of a bridge graft and revision patency, in months. The comparability of the study groups was unclear.

**Effectiveness results**
Carotid surgery:

ICU utilisation was reduced by 90%;

the length of stay was reduced to less than 24 hours in 84% of the patients, compared with approximately 3 days with the previous management;

the stroke and death rates at 30 days were both 0%;

the overall morbidity was 2% in 100 consecutive cases;

the readmission rate was 3%; and

the ratings of patient satisfaction were stated to have improved.

For aortic surgery, in comparison with the routine strategy the intervention group showed statistically significant reductions, (p=0.0001), in the following:

ICU stay, which was reduced by 24(+/-6) hours;

the duration of postoperative ileus, which was decreased by "approximately" 2.5 days; and

the total length of stay, which was "approximately" 5 days in the retroperitoneal approach and 7 to 9 days in the transperitoneal approach.
The levels of patient satisfaction were stated to have been similar in both groups.

Haemoaccess:
the primary patency of a bridge graft was 19.7 months; and
surgical revision patency was 9 months in non-diabetics and 7.2 months in diabetics, which compared favourably with
that recommended by the National Kidney Foundation-Dialysis Outcome Quality Initiative.

The following procedures had poor outcomes:

thrombectomy without revision;

balloon angioplasty of anastomotic stenosis leaving more than 15% residual stenosis;

balloon angioplasty with or without stenting of lesions in the outflow venous system beyond the outflow anastomosis;

and

surgical treatment of similar venous outflow tract lesions by patch angioplasty.

The study also indicated that endovascular interventions were performed better when the interval between the interventions was less than 6 months. Surgical revision appeared to have more durable outcomes when performed 6 months after the last intervention.

Clinical conclusions
The effectiveness analysis appears to have shown that the implementation of changes in patient management generally achieved satisfactory levels of morbidity, mortality, and patient satisfaction.

Measure of benefits used in the economic analysis
No summary benefit measure was used, and a cost-consequence analysis was therefore conducted.

Direct costs
Discounting was not conducted since the costs were incurred over a time period shorter than 2 years. The unit costs and the quantities of resources were not reported. The cost boundary adopted was that of the teaching hospital. The health service costs included in the costing were not reported since only the total costs were specified. The quantities and the costs were estimated from actual data, but the source of the data was not reported. The price year was not reported.

Statistical analysis of costs
No statistical analyses of the costs were reported, although a range (source unknown, but possibly 95% confidence Interval) was provided.

Indirect Costs
The indirect costs were not included.

Currency
US dollars ($).

Sensitivity analysis
No sensitivity analyses were carried out.
Estimated benefits used in the economic analysis
See the 'Effectiveness Results' section.

Cost results
For carotid surgery, the cost per patient decreased from $11,000 (+/-5,000) to $4,400 (+/-500). For aortic surgery, the reduction in the overall costs was $4,000. Finally, for the haemoaccess intervention, the costs were kept below the reimbursement levels for both primary graft placement and surgical revision ($500 to $1,000 positive margin).

Synthesis of costs and benefits
Not relevant.

Authors' conclusions
The new methods of patient management, aimed at streamlining the overall treatment-related costs, were successful in reducing resource consumption while maintaining satisfactory outcome levels and improving patient satisfaction. It should be noted that the study was carried out in an academic teaching centre, where cost-containment programmes are usually difficult to implement.

CRD COMMENTARY - Selection of comparators
The rationale for the selection of the comparators in each stage of the study was clear. Each surgical procedure was compared with the previous standard treatment or patient management programme implemented at the authors’ institution. You should assess which patient management programme is currently implemented in your own setting.

Validity of estimate of measure of effectiveness
The effectiveness analysis used different study designs for the three different surgical procedures examined. The internal validity of the analysis could have been limited by the lack of randomisation, the small sample size (in the absence of power calculations), and the lack of an explicit comparison group. In general, the reporting of the methodology and the results was scant. In addition, there was little information on the study population or the actual characteristics of the sample.

Validity of estimate of measure of benefit
No summary benefit measure was used and a cost-consequence analysis was therefore conducted. It would have been interesting to adopt a summary benefit measure, in order to assess the impact of the management programmes on the patients' health.

Validity of estimate of costs
There were very few details of the cost analysis. The source of the cost data, the price year, and the cost items were not reported. In some circumstances, only the differential costs between the previous and the recent programmes were reported, without stating the total costs. No statistical analyses were conducted. The cost estimations appear to have been somewhat specific to the study setting, and no sensitivity analysis was conducted to assess the generalisability of the results.

Other issues
The issue of the generalisability of the study to other settings was not addressed, and sensitivity analyses were not conducted. As a result, the external validity of the study was low. The authors did not compare their findings with those from other studies, and limited results were reported. The authors’ conclusions were entirely related to their own institution and, unfortunately, little patient information was provided with which to assess the generalisability.
Implications of the study
The authors highlight the active role that vascular surgeons should play for a more efficient use of resources. In addition, to reduce the overall costs, they suggest that no cost-shifting towards other areas should occur. Finally, the patients' satisfaction was improved by a greater involvement of patients and their families in the treatment steps. However, whilst, intuitively, these conclusions and recommendations seem reasonable, too little information was provided in this paper with which to assess their validity.

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