Outcomes of hospital-based managed care: a multivariate analysis of cost and quality
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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
Hospital-Based Managed Care using locally derived guidelines in the form of CareMaps.

Type of intervention
Recovery.

Economic study type
Cost-effectiveness analysis.

Study population
Women undergoing caesarean delivery.

Setting
Hospital. The economic study was carried out in Iowa, USA.

Dates to which data relate
The main effectiveness and resource use data were collected during January to September 1992, for the control group, and from November 1992 through June 1993, for the intervention. Resource use was valued using prices for the 1992-93 fiscal year.

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

Link between effectiveness and cost data
The costing was undertaken retrospectively on an enlarged patient sample from that used in the effectiveness study.

Study sample
A total of 381* women who experienced a caesarean delivery during the 18 months of the study and who were cared for in the maternity unit at a tertiary-level university hospital were included in the study. Of these, 181 were included in the control (before-intervention) group, whilst the experimental (after intervention) group included 154 caesarean patients. Only 100 (55.3%) in the before group and 107 (69.5%) in the after group completed the baseline questionnaire one day before discharge (61.8%, overall*). These women averaged 27 years of age and had an average of 2.5 children. Also, 29% were unmarried, 83% had at least a high school education, 87% were white and 51% had private insurance. Of these, 34% were delivering their first child and 29% had had a previous caesarean delivery. The authors stated that power calculations (not reported in the paper) had shown that "there was an adequate number of subjects to detect clinically meaningful effects".
Study design
The authors referred to the study as a before and after study. However, whilst that would be appropriate when using the institution as the unit of observation, if mothers are the unit of observation (as they appear to be in this case, given the statements regarding power calculations and the study design adopted) the study can be thought of as a non-randomised study with historical controls. The duration of follow up was 1 month after hospital discharge. Overall, the loss to follow-up at one month after discharge was 16.4%, with the figures for the control and experimental group being 15% and 18%, respectively.

Analysis of effectiveness
The analysis was based on treatment completers only. The main outcome was the physical recovery and quality of care (satisfaction) as stated by patients in a questionnaire using a 1-5 scale (with higher values representing better outcomes), and length of hospital stay. Only length of stay was assessed on the complete sample. The groups were shown to be comparable in terms of demographic characteristics. The proportion of births with complications and patients with comorbid conditions were also comparable between groups. According to the authors, the proportion of caesarean births at the institution during the period covered by the study was stable (17%). The authors carried out the analysis with and without outliers (cases with a length of stay longer than 10 days after surgery) being included, obtaining similar results. The only difference observed was that arising in terms of morbidity from infections, which was observed to be lower in the experimental group than in the control (the intervention itself being a possible explanatory factor for this).

Effectiveness results
The length of hospital stay was 5.35 days (SD 1.78) for the control group and 4.62 (SD 1.27) days for the intervention group, (p<0.05). The mean score for physical recovery at discharge was 3.57 (SD 0.68) and 3.64 (SD 0.74), respectively (p<0.05). In turn, the mean total score for quality of care was 4.26 (SD 0.60) and 4.41 (SD 0.48), respectively (p<0.05). The only subscale score in the questionnaire with a p value less than 0.05 was that for 'outcome of care', which had a value of 4.40 (SD 0.74) for the control group and 4.60 for the intervention group (SD 0.54). The comparison of mean follow-up scores for physical recovery, 4.02 (SD 0.70) and 3.82 (SD 0.76) for the control and intervention groups, and quality of care, 4.50 (SD 0.60) and 4.57 (SD 0.66), respectively, yielded a p value greater than 0.05 in both instances. As for the analysis of effect after controlling for differences in complications and comorbidities between groups, the hierarchical regressions showed the intervention to have a net effect of 0.104 (mean) and 0.023 on quality and recovery at discharge, respectively (p>0.05 for both cases). This multivariate analysis also showed a reduction in the follow-up score of the intervention group for the recovery outcome measure (-0.152, p<0.05). However, the authors argued, that that result did not correspond with the patients' reports of frequency of problems at the follow-up interview.

Modelling
'Hierarchical' regression analysis was used to analyse the estimates of outcome measures used in the clinical study and costs after controlling for differences in comorbidities and complications between groups.

Measure of benefits used in the economic analysis
The measure of benefits was the reduction in number of days in hospital, and improvement in quality of life at hospital discharge.

Direct costs
The length of hospital stay was analysed separately from the costs. Charges were converted to costs using cost-to-charge ratios determined for each service centre in the hospital. Since data collection took place across 2 fiscal years, costs and...
charges from 1991-92 were normalised to the fiscal year 1992-93 rates by using a common charge table. The quantity/cost boundary adopted was the hospital. The cost data were obtained from the total original study population in the clinical study (n=335) as derived from the institution's records. Only the costs associated with postoperative care were included in the analysis. Apparently no costs incurred after discharge were included in the analysis.

Statistical analysis of costs
Analysis of variance was used to test between-group cost differences.

Currency
US dollars ($).

Sensitivity analysis
No sensitivity analysis was carried out.

Estimated benefits used in the economic analysis
The mean length of hospital stay was 5.35 days for the control and 4.62 days for the intervention group. In turn, the mean total score for quality of care was 4.26 and 4.41, respectively (p<0.05); the subscale score in the questionnaire for 'outcome of care', had a value of 4.40 and 4.60, respectively, for the control and intervention groups.

Cost results
Mean total costs were $3,950 (SD $1,541) for the control group and $3,432 (SD $1,737) for the intervention group (p<0.05). Total patient charges for post-surgery care were reduced from $4,017 to $3,548. Given the proportion of the prospective payment mechanism in the total reimbursement received by the institution during the study period, the actual cost savings for the institution amounted to $401 per patient ($518 reduction in cost minus the $117 reduction in reimbursement). The multivariate analysis showed that the intervention was associated with a decrease in mean costs of $403 (p<0.05), after controlling for differences in complications and comorbidities between groups.

Synthesis of costs and benefits
Since the intervention was considered to be the dominant strategy, costs and benefits were not combined.

Authors' conclusions
Hospital-based managed care can reduce resource use, length of stay and cost associated with hospital care while maintaining or improving the quality of care.

CRD COMMENTARY - Selection of comparators
The reason for the choice of comparator was clear.

Validity of estimate of measure of benefit
Although the effectiveness analysis controlled for known differences in prognostic factors and demographic characteristics between groups, the estimate of measure of benefit may be open to question due to the nature of the study design used, a specific concern being that associated with the historical nature of the control group. As noted by the authors, the length of follow-up in the study was insufficient to give firm evidence about the stability of the effects. The authors did not explain the negative result associated with the intervention in terms of recovery at one month follow-up. The subsequent exclusion of this result from the estimates of benefit used in the economic study may therefore bias these results.
Validity of estimate of costs
Adequate details about costs were given.

Other issues
Appropriate comparisons were not made with other studies. The issue of generalisability to other countries was not addressed.

Implications of the study
Further studies are needed in order to ascertain whether locally-developed CareMaps (based on expert opinion) are a cost-effective option for the management of mothers after caesarean delivery. Also, as suggested by the authors, the lower recovery score observed in the intervention group at 1 month follow-up warrants further investigation as does the issue of the generalisability of results to other clinical conditions.

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