Utility of clinical pathway and prospective case management to achieve cost and hospital stay reduction for aortic aneurysm at a tertiary care hospital

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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
Clinical pathway and prospective case management for aortic aneurysm surgery.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness study.

Study population
The patients in this study have an average age greater than 70 years, and are mostly male (>70%). Patients included any patient scheduled to undergo a non-urgent (elective) AAA surgery, except those with another planned major surgical procedure to be performed simultaneously or AAA surgery above a previous repair. Patients had a history of one or more of the following: coronary heart disease, coronary bypass, pulmonary dysfunction, liver dysfunction, smoking history, renal dysfunction, diabetes or hypertension.

Setting
Hospital. The setting is the Division of Vascular Surgery, at the University of Pittsburgh Medical Center in the USA.

Dates to which data relate
The data (both effectiveness and cost) were from the period February 1993 to October 1995.

Source of effectiveness data
Data come from a single study.

Link between effectiveness and cost data
The same patients were used to collect effectiveness data and costs. Cost information seems to have been collected retrospectively.

Study sample
There were 127 patient in three groups. Group I consisted of 49 consecutively treated patients who underwent AAA surgery immediately before pathway implementation who were suitable after applying the exclusion criteria; this was the referent group. Group II consisted of 44 patients enrolled during the first year of the pathway, and Group III consisted of a series of 34 consecutive patients enrolled after some modifications were made to the pathway. No sample size calculations were reported. Patients included all who were eligible during the months of the study. It was stated that
98% of patients who underwent AAA surgery were included in the study.

**Study design**
This was a non-randomized trial with historical controls. The follow-up period appears to have been the time until discharge from the hospital; no patients were reported as having been lost to follow-up.

**Analysis of effectiveness**
Analysis was based on intention to treat. The main outcomes were length of stay, mortality and readmission rate. Groups I and II were also examined for a relationship between several other characteristics (myocardial infarction, arrhythmia, fluid overload, gastrointestinal bleeding and acute renal failure) and length of stay. It was found that fluid overload was the only significant predictor of length of stay. For Group III the pathway then included a more aggressive plan to reduce perioperative fluid administration; this was done in an attempt to improve the pathway outcomes in Group III. The 3 groups were tested for differences in age, sex and history of coronary artery disease, coronary bypass, pulmonary dysfunction, liver dysfunction, smoking history, renal dysfunction, diabetes, and hypertension. No statistically significant differences were found. No adjustment for covariates was made.

**Effectiveness results**
Comparing Group I and Group II, there was a small, but non-significant, reduction in length of stay (13.8 days vs. 13.1 days; NS) and mortality (4.1% vs. 2.3%; NS) associated with those in Group II. The differences between Group I and Group III were 13.8 days and 10.2 days, respectively (p<0.05); and 4.1% and 0%, respectively (NS). Readmission rates were not different among the three groups.

**Clinical conclusions**
The institution of the pathway did not lead to demonstrable differences in terms of mortality or readmission rates, but did decrease length of stay. This would support the conclusion that following the pathway yields outcomes that are not dissimilar to those patients who do not follow the pathway.

**Measure of benefits used in the economic analysis**
The main outcomes were length of stay, readmission rate and mortality.

**Direct costs**
No costs were actually reported in this article; the relative charge comparisons were given in percentage terms. A computerized fiscal data base was referred to as the source of the resource utilization data.

**Statistical analysis of costs**
Relative charges were assessed in a stochastic fashion, but the actual test used was not stated. Group III charges were 40% less than those in Group I (p<0.05).

**Indirect Costs**
No indirect costs were included.

**Currency**
None stated.

**Sensitivity analysis**
Estimated benefits used in the economic analysis
The study did not show a statistically significant difference between the groups in terms of mortality or readmission rates. There was significant difference between Group I and Group III regarding length of stay, with Group III having 3.6 days less in hospital on average.

Cost results
Group III showed a significant decrease (40.6%) in relative charges versus Group I.

Synthesis of costs and benefits
Costs and benefits were not combined. However, the pathway group was the dominant strategy with respect to cost and length of stay. Incremental analysis was not performed.

Authors' conclusions
The authors concluded that instituting this clinical pathway could lead to significant lowering of resource consumption and costs without significant changes in mortality and readmission rates.

CRD COMMENTARY - Selection of comparators
The comparison of the improved pathway to both the 'old' pathway and usual care is a realistic comparison, as this is how patients would be treated in actual practice.

Validity of estimate of measure of benefit
The measure of benefit was probably adequate from the viewpoint of the hospital, but may have been improved by looking at other issues of quality of care and quality of life.

Validity of estimate of costs
Costs were not, unfortunately, reported in actual dollar terms. This makes it impossible to assess the face validity of the cost figure behind the relative charge data. Further, the use of charges instead of costs, or even the use of a cost/charge ratio, would have improved the study. The use of the relative charge as the measure of cost also makes it impossible to calculate a cost-effectiveness ratio. This may not be too strong a concern, however, as the pathway (Group III) appears to be dominant with regard to the length of stay outcome (i.e. it costs less and lowers length of stay). With the other outcomes of mortality and readmission rates, there appears to be no difference in outcome, but there is an improvement in relative charges. Again, one would choose the pathway followed by Group III. Probably the are of most concern in this study is the lack of information regarding the resources included in the costing. The decision not to include the salary of the case manager may have been ill-advised, but the authors state that the impact would have been small. It is rather difficult to assess the generalizability and reliability of the study without more information regarding the costs and resources used. A related concern is that p-values are reported for the relative charges from the 3 groups, but it is not clear what test was used or whether the charges themselves were tested or their relative rankings. This is an important limitation because testing for differences between relative charges is different than testing for differences between the actual charges and may yield different p-values, leading to different conclusions. It should be noted that hospital policy was followed in publishing the charge data in relative terms.

Other issues
This study most closely resembles a cost-minimization analysis, but there are some demonstrated differences in outcomes in the study groups. It should be noted that the data is never expressed in terms of a ratio, and further, costs are always expressed in percentage terms, making a cost-effectiveness ratio impossible to calculate.
This study does lend support to the notion that a clinical pathway may not cause harm to patients and may also lead to a decrease in costs. The method of reassessment of the clinical pathway proved to be a successful way to go about improving the pathway after implementation and illustrates that pathways ought to be looked upon as works in progress that are to improved upon over time.

**Implications of the study**
The main implication is that, at least on outcomes that can be measured simply, a clinical pathway is good value for money. This type of rather preliminary research should be followed by more in-depth study.

**Source of funding**
None stated.

**Bibliographic details**

**PubMedID**
9013911

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Aortic Aneurysm, Abdominal /economics /surgery; Case Management; Cost-Benefit Analysis; Critical Pathways; Hospital Charges /statistics & numerical data; Hospital Costs /statistics & numerical data; Hospitals, University /economics /utilization; Humans; Length of Stay /statistics & numerical data; Pennsylvania

**AccessionNumber**
21997000281

**Date bibliographic record published**
30/09/1998

**Date abstract record published**
30/09/1998