Impact of a clinical pathway and implant standardization on total hip arthroplasty: a clinical and economic study of short-term patient outcome

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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
Use of a clinical pathway (CP) and of a hip implant standardisation programme (HISP) on total hip arthroplasty (THA), compared to a conventional approach with no CP or HISP. The CP prescribed a course of action from the time a decision was made to schedule THA until the patient was discharged from the acute-care hospital. The HISP used 5 objective criteria and 4 patient demand categories to determine the choice of the hip implant for the patient.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population consisted of patients receiving unilateral THA operations for osteoarthritis at the hospital where the study took place.

Setting
The setting was secondary care. The economic evaluation was carried out at the Lahey Hitchcock Medical Center, Burlington, Massachusetts, USA.

Dates to which data relate
Effectiveness and resource data were collected between 1991 and 1995 approximately. The exact end date was not specified. The price year was 1993.

Source of effectiveness data
The evidence for the final outcomes was derived from a single study.

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

Study sample
Sample size calculations were not performed. The sample was selected on the basis of the THA operation undergone at the hospital. 89 consecutive patients who were treated in 1991 received the former conventional intervention with no CP or HISP. 117 consecutive patients treated in 1993 received the operation using CP and HISP. In the conventional approach, 24 patients (21%) were excluded from the sample and in the new approach, 25 patients (17.6%) were
excluded from the sample. Reasons for the exclusion were not specified.

**Study design**

The study design was a non-randomised trial with historical controls carried out in a single centre. The median duration of follow-up was 4 years for the conventional group and 2 years for the CP and HISP group. Complete follow-up data were unavailable for 2 patients (2.2%) in the conventional group and 4 patients (3.4%) in the new intervention group.

**Analysis of effectiveness**

The analysis was based on intention to treat. The primary health outcomes used were a postoperative pain score, evaluated using a 10-point visual analog scale, a 100-point Harris hip score (HHS), functional outcome, outcome of the procedure and satisfaction of patients, as measured by level of activity, ability to climb stairs, amount of support needed for walking, distance walked and occupation of the patient at the time of the follow-up evaluation. Data on patients were obtained by questionnaires distributed to the patients by the nurses and filled out with the assistance of the medical team. Before hip arthroplasty surgery, the two patient populations were similar when compared by age, weight, activity, general health, occupation, and preoperative visual analog pain score. The two patient populations differed by preoperative Harris hip score and in activity and occupation.

**Effectiveness results**

The effectiveness results were as follows:

The pain scores were 0.86 for the conventional approach group and 0.91 for the new approach group. The difference was not statistically significant (p>0.5).

The postoperative Harris hip scores were 91.94 for the conventional approach group and 89.71 for the new approach group. The difference was not statistically significant (p<0.2).

The improvement in mean Harris hip scores was 52.56 points in the conventional group and 56.34 points in the new approach group, again the difference was not statistically significant (p<0.1).

Patient outcome after THA improved considerably and patient outcome was not different between the groups of patients in 1991 and 1993. Complications in the hospital were evaluated in both treatment groups in terms of operative complications, anaesthetic complications, medical complications, thromboembolic complications, infection problems with wound healing, and instability or dislocation. Two dislocations of the hip complicated the operations among the 89 patients who underwent surgery in 1991. One dislocation of the hip and one acetabular repositioning on the postoperative day 4 complicated the operations among the 117 patients who underwent surgery in 1993. No significant difference in complication rates was seen between these two groups.

**Clinical conclusions**

The quality of the short-term clinical results and the outcomes of the patients did not change after the implementation of the clinical pathway and hip standardisation programme.

**Measure of benefits used in the economic analysis**

As the effectiveness results showed no difference between the intervention and the comparator, the economic analysis was based on cost differences only (cost-minimisation).

**Direct costs**

Some resources (length of stay) were reported separately from costs. The perspective adopted was that of the hospital. The direct costs included in the analysis were the cost of the implant, cost of stay in the hospital and the cost of complications. Direct cost data were obtained from hospital records. The estimation of charges was based on hospital
data. Charges were converted to costs using a cost-to-charge ratio. Discounting was not conducted despite a timeframe greater than one year. The price year was not specified. Hospital costs, but not implant costs, were adjusted for inflation using a specific price index, the CPI-U, Northeast, to 1993 prices.

**Statistical analysis of costs**
Statistical tests were applied to test the difference in costs, however, it was not possible, from the information provided in the paper, to determine which tests were used.

**Indirect Costs**
Indirect costs were not reported.

**Currency**
US dollars ($).

**Sensitivity analysis**
Sensitivity analyses were not performed.

**Estimated benefits used in the economic analysis**
See effectiveness results above.

**Cost results**
Hospital costs were reported separately from the implant costs. The mean inflation-adjusted hospital cost were $10,210 (range: $5,174 - $14,904) for the conventional approach, and $9,446 (range: $6,137 - $16,721) for the new approach group. The difference between the two groups was statistically significant (p<0.01). The average cost of implants per case in actual dollars was $3,841 in the conventional group and $3,461 in the new group. The difference was statistically different (p<0.001). The timeframe appears to have been 4 years for the conventional group and 2 years for the new approach.

**Synthesis of costs and benefits**
Costs and benefits were not combined, since this was a cost-minimisation analysis.

**Authors’ conclusions**
No differences were seen between groups in terms of patient ratings of outcome and satisfaction, or in terms of complication rates in the hospital. Implementation of CP and HISP did not adversely affect the short-term outcome of THA, but did reduce hospital length of stay and hospital cost for THA.

**CRD COMMENTARY - Selection of comparators**
The choice of the comparator was explicitly justified, namely the conventional approach to the total hip arthroplasty operation before the clinical pathway and hip standardisation programme were implemented at the hospital. You, as a user of the database, should decide if this is a widely used health technology in your own setting.

**Validity of estimate of measure of effectiveness**
The analysis was based on a non-randomised trial with historical controls. Given that the new intervention had already been implemented, the study design was appropriate for the hypothesis. However, caution should be exercised due to the potential bias that can occur in retrospective studies. The study sample was representative of the study population,
namely patients undergoing THA at the hospital. The patients groups were shown to be comparable at analysis, except for the preoperative Harris hip score, activity and occupation. Analyses were not undertaken to account for these differences at baseline. Analysis was conducted on intention to treat, which was appropriate. More information could have been provided on the instruments used to measure effectiveness.

**Validity of estimate of measure of benefit**
No summary measure of benefit was used since the effectiveness results were shown to be comparable.

**Validity of estimate of costs**
The cost analysis in general was not very good and insufficient information was reported properly to evaluate its quality. From the perspective adopted, namely the hospital, it was not possible to determine whether all relevant categories of costs, such as labour, were included in the analysis. Similarly, for each category of cost, it was not possible to determine whether all relevant costs were included in the analysis. For example, the authors reported the average cost of the implant, but it was not specified whether this was simply the cost of the device or included other costs as well. As it was not possible to specify what exactly was measured in the costs, this is likely to affect the authors’ conclusions. Length of stay was reported separately from costs, but no other quantities were reported. It appears that the conventional group was followed up for four years and the new approach group for two years, the authors did not discuss how this was accounted for when measuring resource use for the two groups. No statistical analyses were conducted on resource use data or on prices. Inflation adjustment was made to the hospital costs but not to the cost of the implants. Discounting was not conducted despite this being required by the timeframe of the study. The price year was not clearly reported but appears to have been 1993. One good point of the analysis was the conversion of charges to costs.

**Other issues**
Comparisons were made with findings from other studies and the issue of generalisability to other settings was addressed. The authors did not appear to present their results selectively, but more information on how the differential follow-up periods were accounted for could have been provided, for this could affect the costs of the interventions. The study considered patients undergoing THA at the hospital and this was reflected in the conclusions. The authors acknowledged that the study could have been improved by using validated health status instruments. A further limitation reported by the authors was the short-term nature of the study: revision rates and the cost of revision procedures need to be included, ideally in a 10-year horizon.

**Implications of the study**
The authors concluded that the introduction of the clinical pathway guidelines and the hip implant standardisation programme had been justified in their hospital from a clinical outcome and an economic perspective.

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