Local anesthesia in outpatient knee arthroscopy: a comparison of efficacy and cost
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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
General, regional and local anesthesia in outpatient knee arthroscopy.

Type of intervention
Diagnosis and treatment.

Economic study type
Cost-effectiveness analysis.

Study population
All patients who underwent arthroscopy within a 12 month period at Duke University Medical Centre (age range 10-77 years, males and females) except those who underwent a planned concomitant open procedure such as hardware removal, ligament repair or reconstruction, or arthrotomy.

Setting
Orthopaedic outpatients of Duke University Medical Center, North Carolina, USA.

Dates to which data relate
Retrospective data were collected between 1 July 1993 and 1 July 1994. The prospective study began on 1 July 1994; no final date was specified.

Source of effectiveness data
Retrospective study.

Link between effectiveness and cost data
In the case of the retrospective study, the costing was undertaken on the same patient sample as that used in the effectiveness study.

Study sample
In the case of the retrospective study, although 339 patients underwent arthroscopic knee procedures during the period of data collection, 83 were excluded from the analysis since they underwent a planned concomitant open procedure, leaving a total sample size of 256 patients. Of these, 47 males and 27 females of average age 33 years (range 10 to 76 years) received general endotrachial anaesthesia, 31 men and 31 women of average age of 42 years (range 18-77 years) received regional anaesthesia. 82 males and 43 females (average age 39 years, range 17 -74 years) received local anaesthesia. The number of surgeons involved in treating patients was not stated. The prospective study involved 100 patients, all of whom received local anaesthesia and were treated by the same surgeon. There was no mention of the
number of patients who refused to complete the analogue scale questionnaire or the number who did not complete all four survey questions.

**Study design**
Retrospective and prospective chart review.

**Analysis of effectiveness**
Patients were compared with respect to surgical procedure, operating time, anaesthesia time, pharmaceuticals administered and complications. Comparisons were made using the Kruskal Wallis nonparametric ANOVA test. In the retrospective study, groups were shown to be comparable in terms of age and gender.

**Effectiveness results**
The operative time and total anaesthetic time was 35 minutes less for the local group than for the regional group, and 23 minutes less for the local group than for the general group. The difference between the local and regional/general groups was statistically significant at the five per cent level. There were 19 complications with general anaesthesia, 16 with regional anaesthesia and 2 with local anaesthesia. Two regional and 2 local cases required subsequent general anaesthesia. The prospective study showed the same results as patients receiving local anaesthesia in the retrospective study. The authors reported that the use of local anaesthesia was well accepted among the patients surveyed.

**Clinical conclusions**
The use of local anaesthesia for outpatient knee arthroscopy is safe, effective and well accepted.

**Modelling**
Not applicable.

**Measure of benefits used in the economic analysis**
Successful anaesthesia and complications.

**Direct costs**
The costs included in the analysis were total pharmaceutical costs and recovery room costs. Quantities and costs were reported separately in the case of recovery room costs but not in the case of pharmaceuticals. Quantities were taken directly from medical records. Prices were based on the half-hourly recovery room rate and billings for pharmaceuticals in that hospital. There was no discounting of costs and benefits since the benefits did not span a period longer than a single year.

**Statistical analysis of costs**
Tests for differences in costs were carried out using the Kruskal-Wallis nonparametric ANOVA test.

**Indirect Costs**
None included.

**Currency**
US dollars ($).
Sensitivity analysis
No sensitivity analysis was performed.

Estimated benefits used in the economic analysis
In most cases, successful anaesthesia for arthroscopy was achieved using either local, regional or general anaesthesia. Complications with general anaesthesia included nausea and vomiting (15 patients), inability to void urine (3 patients) and chest pain (1 patient). Complications with regional anaesthesia included inability to void urine (9 patients), nausea and vomiting (3 patients), prolonged paralysis (2 patients) and the need for subsequent general anaesthesia (2 patients). Two local cases required subsequent general anaesthesia.

Cost results
In the case of the retrospective study, both total pharmaceutical and recovery room costs were significantly lower for the local group as compared with the regional and general groups. Local anaesthesia was $500 per procedure less than general anaesthesia and $400 per procedure less than regional anaesthesia. The analysis did not include the cost of operating room time, subsequent general anaesthesia when local or regional anaesthesia was unsuccessful or the cost of treating complications. Since complications were less common in the local group this might be an underestimate.

Synthesis of costs and benefits
The net benefits and costs were not combined in an overall index measure. There was no true incremental analysis performed although costs were reported as a difference between procedures with the assumption of the same clinical effect so that the study became a cost-minimisation analysis.

Authors' conclusions
The use of local anaesthesia for outpatient knee arthroscopy is safe, effective and well accepted and produces overall cost savings compared with regional or general anaesthesia.

CRD COMMENTARY - Selection of comparators
The choice of comparators is justified and sensible.

Validity of estimate of measure of effectiveness
Ideally this study would have compared the costs and effectiveness of the three types of anaesthesia in a sample of patients who were randomly assigned to treatment group. A prospective study, collecting data on outcomes (including assessments of patient satisfaction) and costs from the same group of patients would also be more reliable. A retrospective comparison may be biased since those receiving local anaesthesia may be less seriously ill and at lower risk. In the case of the retrospective study, there was no mention of the number of surgeons involved in treating patients in either of the three groups. Surgeons may have had a preference for a particular type of anaesthesia so introducing a potential source of bias into the study. Satisfaction should have been assessed for each of the three forms of anaesthesia, ideally using more sophisticated methods. There was no indication that the satisfaction rating scales and measures had been appropriately validated.

Validity of estimate of costs
There was no mention in the methods section on how costing was actually performed. In the discussion the authors refer to billing and charges and pharmaceutical costs being determined from the direct patient costs per item. Whether these were the actual costs paid by the patients enrolled in the study (most likely) or the costs the hospital would have charged for the procedure and pharmaceuticals consumed in the treatment process at some given time period, say at the conclusion of the study, is not clearly defined.

Other issues
In the summary section the authors claim that the prospective study showed nearly identical time and cost data to the
A retrospective study among patients who received local anaesthesia, although no information was given as to how the groups actually differed. There was no mention in the discussion of which patient populations might be likely to benefit most from local anaesthesia and whether there were any subgroups which might more appropriately be treated with regional or general anaesthesia.

**Implications of the study**
The use of local anaesthesia was shown to save a minimum of $400 per case compared with the alternatives. Since arthroscopy is a widely performed orthopaedic procedure, substantial cost savings could be made if more arthroscopies were performed under local rather than regional or general anaesthesia as long as this does not increase the rate of arthroscopy.

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