Spinal, epidural or propofol anaesthesia for out-patient knee arthroscopy
Dahl V, Gierloff C, Omland E, Raeder J C

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
Regional versus general anaesthesia for outpatient knee arthroscopy.

Type of intervention
Treatment; Anaesthesia.

Economic study type
Cost-effectiveness analysis.

Study population
ASA I-II patients scheduled for elective knee arthroscopy.

Setting
An outpatient surgery centre. The study took place in Oslo, Norway.

Dates to which data relate
The time period to which the effectiveness and cost data relate was not stated. Price dates were not given.

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

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

Study sample
15% of the patients who were invited to participate in the study refused to do so, mainly because they wanted regional anaesthesia in order to stay awake and follow the procedure on the monitor during the operation. 93 patients were recruited for the study. Two patients were excluded, one because the epidural block proved unsatisfactory and one because the post-operative registrations were not completed according to the protocol. 91 ASA I-II patients scheduled for elective knee arthroscopy were randomly assigned to the spinal anaesthesia group (group S: n=32), to the epidural anaesthesia group (group E: n=29), and to the propofol anaesthesia group (group P: n=30). No power calculations were provided.

Study design
The study was a prospective randomised controlled trial, carried out at a single centre. The follow-up period extended to 4 days after discharge. No loss to follow-up was stated.

**Analysis of effectiveness**

The analysis of the clinical study was based on intention to treat. The primary health outcomes used included pre-operative pain duration, intensity of pre-operative pain, preparation time, perioperative conditions, time between the end of the operation and entry into the recovery room, post-operative block duration, operation time, time between the end of the operation and discharge, post-operative pain, the need for rescue analgesia post-operatively, time to regain full strength of lower extremities, incidence of post-operative nausea, level of activity, and quality and amount of sleep after discharge. Visual analogue scales (VAS) and verbal scores were used to estimate the degree of pain. The activity level was estimated by means of a verbal score. There were no significant differences between the 3 groups in terms of demographic characteristics: mean age was 39 years (range: 18 - 68 years), and 65% were men. Previous and concomitant diseases, smoking habits, use of alcohol, incidence of headache and travel disease were comparable in the 3 groups.

**Effectiveness results**

The type of surgery performed was either a diagnostic arthroscopy or a partial meniscectomy, with no difference between the groups in distribution. Group E scored lower on the pre-operative pain duration score than the other two groups. Mean and maximum intensity of pre-operative pain as estimated by the VAS scores were identical. Preparation time was significantly lower in group P compared to the two other groups (P: 7.4 +/- 5.4 minutes; S: 23.0 +/- 4.8 minutes; E: 31.0 +/- 9.1 minutes). The perioperative data of vital signs were comparable between the groups. Time between end of operation and entry into the recovery room in group P was significantly higher than in group S (P: 15.0 +/- 6.3 minutes; S: 10.0 +/- 4.1 minutes).

Post-operative block duration was significantly higher in group E compared to group S (E: 125 +/- 45 minutes; S: 75 +/- 28 minutes). No significant differences between the three groups were observed in terms of operation time and time between the end of the operation and discharge. Group P had significantly higher post-operative pain scores on arrival at the recovery unit and at 60, 120, and 180 minutes after arrival. The need for rescue analgesia post-operatively was significantly higher in group P at 60 and 120 minutes (E: 25% of patients; S: 45% of patients; P: 61% of patients). In group S, patients had full strength of their lower extremities 75 (+/- 28) minutes after the end of surgery as compared with 125 (+/- 45) minutes in group E (P<0.02). No differences in the incidence of post-operative nausea were observed. After discharge, there were no differences between the groups regarding level of activity, quality and amount of sleep.

**Clinical conclusions**

Propofol anaesthesia results in the shortest pre-operative time, but also in a more painful and opioid-demanding post-operative period. Epidural anaesthesia gives the longest stay in the theatre and the most prolonged post-operative regional block. Spinal anaesthesia is associated with a risk of post-spinal headache.

**Modelling**

No modelling was undertaken.

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

The main outcome measure was the level of post-operative pain, measured at different time intervals after operation. VAS and verbal scores were used to estimate the degree of pain. All patients provided degree of pain data. Pain levels after discharge were elicited through telephone interviews.

**Direct costs**

The direct costs included the perioperative costs of drugs and disposables. The costs were calculated by listing all drugs and disposable equipment needed for anaesthesia in an average patient from each group. A qualitative estimation of the
cost-increasing potential of all aspects of peri-operative differences between the groups was made. Costs were not discounted. Quantities and costs were not reported separately. The quantity/cost boundary adopted was that of the hospital. The estimation of quantities and costs was based on actual data. The source of quantity/cost data was not reported. The price year was not stated.

Statistical analysis of costs
The Kruskal-Wallis test was used for the non-parametric variables and the ANOVA-variance test for the parametric variables. When significant results were found (i.e. \( p<0.05 \)), groups were compared pairwise by the Mann-Whitney test for non-parametric results and the Student's t-test for the parametric results, both with Bonferroni modification.

Indirect Costs
No indirect costs were included in the study.

Currency
US dollars ($).

Sensitivity analysis
No sensitivity analysis was carried out.

Estimated benefits used in the economic analysis
Group P had significantly higher post-operative pain scores (both VAS scores and verbal scores) on arrival at the recovery unit and at 60, 120, and 180 minutes after arrival. Group P had a non-significant tendency towards higher verbal pain scores at the 240 and 300 minutes registration.

Cost results
The perioperative costs of drugs and disposables were estimated to be $6.5 in group S, $22 in group E, and $30 in group P. Pre-operative time dramatically increased costs in group E. Time spent between end of surgery and admission into the recovery room substantially increased costs in group P. Post-operative pain costs were substantially higher in group P. Prolonged post-operative block costs were dramatically higher in group E. In group S, post-spinal headache costs were substantially higher.

Synthesis of costs and benefits
The cost and benefit measures were not combined into a cost-effectiveness ratio.

Authors' conclusions
Propofol anaesthesia results in the shortest stay in the operation theatre but a higher degree of post-operative pain and a higher cost of drugs and disposables.

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

Validity of estimate of measure of benefit
The measure of benefit seems to be valid. The authors should be applauded for using various techniques to elicit pain values, since the ideal choice of technique is still unclear. Post-operative levels of pain were jointly determined by type of anaesthesia and the severity of the condition. It was not immediately clear from the study that condition severity was
similar for the three groups. A more detailed and exact reporting of the results would have been appreciated.

**Validity of estimate of costs**
The cost analysis and reporting of results could have been more extensive. The results of the cost analysis may be unreliable since potential cost savings resulting from decreased time in the operation theatre or earlier discharge were not taken into account. In addition, it is difficult to assess the significance of the qualitative cost analysis.

**Other issues**
The authors did not undertake a comparison of their results with the findings of other cost-effectiveness studies. The robustness of the results cannot be assessed since no sensitivity analysis was carried out. The lack of detail in reporting makes it difficult to assess the generalisability of the results to other patients, settings or countries. The sample size may have been too small to detect significant differences.

**Implications of the study**
The cost results of this study should be validated before a choice between the different anaesthetic techniques is made.

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**Other publications of related interest**


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