A comparison of three techniques for acute postoperative pain control following major abdominal surgery

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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
Three treatments for postoperative pain in patients recovering from major abdominal surgery were examined. The treatments were nonsteroidal anti-inflammatory drugs (NSAIDs) alone, or in conjunction with intravenous patient-controlled analgesia (IV-PCA) or intermittent epidural morphine. NSAIDs alone was the basic pain treatment, and consisted of diclofenac in combination with a histamine-blocking drug. The treatment protocols were described in detail in the original paper.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients recovering from major abdominal surgery such as colectomy, cholecystectomy, colostomy, gastrectomy and splenectomy. Only patients in whom surgery was performed through a midline incision were considered. Patients who suffered from a specific drug intolerance were excluded.

Setting
The setting was a hospital. The economic study was conducted in Israel.

Dates to which data relate
The effectiveness and resource use data were gathered from September 1999 to September 2000. The price year was not reported.

Source of effectiveness data
The effectiveness evidence was derived from a single study.

Link between effectiveness and cost data
The costing was conducted prospectively on the same sample of patients as that used in the effectiveness analysis.

Study sample
After excluding both patients who refused to participate into the Acute Pain Service and those who were unsuitable for participation for cognitive reasons, all eligible patients considered at the study centre were included in the analysis. A sample of 358 patients was identified. Of these, 90 were in the basic pain treatment group, 101 in the IV-PCA group,
and 167 in the epidural morphine group. The patients in the basic treatment group had a mean age of 57 (+/- 19) years (age range: 23 - 105) and 17 were men. The patients in the IV-PCA group had a mean age of 57 (+/- 18) years (age range: 20 - 90) and 33 were men. The patients in the epidural group had a mean age of 68 (+/- 16) years (age range: 21 - 100) and 90 were men.

**Study design**
This was a prospective cohort study that was conducted at a single centre, the Meier Hospital in Kfar Saba. The treating anaesthesiologist determined the patient's allocation to the study groups in conjunction with the patient. The patients' assessment started in the post-anaesthesia care unit (PACU) and continued until a target pain score was reached and the analgesic treatment was stopped. No patient was lost to the follow-up assessment. Experienced nurses assessed the outcomes.

**Analysis of effectiveness**
All patients initially included in the study sample were accounted for in the effectiveness analysis. The outcome measures used were:

- pain, using a visual analogue scale (VAS) ranging from 0 (minimal) to 100 mm (maximal);
- patients with at least one episode of a pain VAS greater than 30 mm;
- rescue morphine administration;
- complications such as respiratory rate (<= 10 breaths/minute), nausea and/or vomiting and pruritus;
- patient satisfaction (excellent, good, satisfactory, or bad); and
- the time required to monitor and treat patients.

The baseline comparability of the study groups was not discussed. However, the patients in the epidural morphine group were quite older than the patients in the other groups. Similarly, substantial differences in the gender distribution were observed.

**Effectiveness results**
The median VAS score was 23.5 in the basic pain treatment group, 6 in the IV-PCA group, and 4 in the epidural morphine group, (p<0.04).

The proportion of patients with at least one episode of a pain VAS greater than 30 mm was 44% in the basic pain treatment group, 45% in the IV-PCA group, and 30% in the epidural morphine group, (p<0.0003 when comparing the basic pain treatment and IV-PCA groups with the epidural morphine group).

There were 47 doses of rescue morphine in 40 patients in the basic pain treatment group, and 48 in 45 patients in the IV-PCA group, (p<0.008).

In terms of complications, only one patient in the epidural morphine group had a respiratory rate of less than 10 breaths/minute, but he was easily stimulated.

The frequency of postoperative nausea and/or vomiting was comparable among the groups.

The proportion of patients with pruritus was 1% in the basic pain treatment group, 2% in the IV-PCA group, and 15% in the epidural morphine group, (p<0.001 when comparing the basic pain treatment and IV-PCA groups with the epidural morphine group).

Patient satisfaction was high and was comparable among the groups.
The time required to monitor and treat the patients was 19 minutes/24 hours in the basic pain treatment group, 40 minutes/24 hours in the IV-PCA group, and 44 minutes/24 hours in the epidural morphine group.

**Clinical conclusions**
The effectiveness analysis showed that basic pain treatment was associated with more postoperative pain than IV-PCA or epidural morphine. However, the proportion of patients who experienced very painful levels was comparable across the groups. Side effects were more frequent in the epidural morphine group.

**Measure of benefits used in the economic analysis**
The outcomes were left disaggregated and no summary benefit measure was used in the economic analysis. In effect, a cost-consequences analysis was carried out.

**Direct costs**
Discounting was not relevant since the costs were incurred during a short timeframe. The unit costs were presented separately from the quantities of resources used for most cost items. The health services included in the economic analysis were devices and equipment, drugs, disposable equipment (excluding syringes, needles and swabs) and nursing. The cost/resource boundary of the hospital appears to have been adopted. The costs were calculated on the basis of 3 days' treatment. The treatment of side effects was not considered. The cost of the device was calculated assuming that it was used for 5 years at 365 days per year. The source of the cost data was not reported. The price year was not given.

**Statistical analysis of costs**
The costs were treated deterministically.

**Indirect Costs**
The indirect costs were not considered.

**Currency**
US dollars ($).

**Sensitivity analysis**
Sensitivity analyses were not conducted.

**Estimated benefits used in the economic analysis**
See the 'Effectiveness Results' section.

**Cost results**
The total costs were $9.9 in the basic pain treatment group, $23.9 in the IV-PCA group, and $16.1 in the epidural morphine group.

**Synthesis of costs and benefits**
A synthesis of costs and benefits was not relevant since a cost-consequences analysis was carried out.

**Authors' conclusions**
Basic pain treatment could be considered a useful alternative to more labour-intensive and expensive analgesic
treatments, such as intravenous patient-controlled analgesia (IV-PCA) or epidural morphine, in patients recovering
from major abdominal surgery. However, levels of pain were higher for patients receiving basic pain treatment.

CRD COMMENTARY - Selection of comparators
The choice of the comparators appears to have been appropriate, as NSAIDs alone or in conjunction with two
traditional analgesic treatments were considered in the analysis. Detailed information on the treatment protocols was
provided. You should decide whether they are valid comparators in your own setting.

Validity of estimate of measure of effectiveness
The effectiveness evidence came from a prospective cohort study. The method used to allocate the patients to the
interventions was not randomised and was based on the preferences of anaesthesiologists and patients. The lack of
randomisation could have introduced selection bias and confounding factors. Further, the baseline comparability of the
study groups was not discussed and the three groups appear to have been quite unbalanced in terms of age and gender
distribution. This could have biased the results of the analysis. Moreover, power calculations were not performed and
there was no evidence that the sample size was appropriate. These issues tend to limit the internal validity of the
analysis. The length of follow-up was adequate and the method used to select the sample was reported. The analysis
considered all patients included in the initial study sample. The evidence came from a single centre, which could have
limited the transferability of the results to other groups of patients.

Validity of estimate of measure of benefit
No summary benefit measure was used in the analysis because a cost-consequences analysis was conducted.

Validity of estimate of costs
The perspective adopted in the study was not explicitly stated, although it could have been that of the hospital. The
unit costs and the quantities of resources used were reported separately. A detailed breakdown of the cost items was
provided. This permits the replication of the study in other settings. However, limited information on the source of the
data (which were presumably derived from the study centre) and the price year was given. This reduces the possibility
of performing reflation exercises in other settings. The cost estimates were specific to the study setting and no
sensitivity analyses were conducted. The costs were treated deterministically.

Other issues
The authors did not compare their findings with those from other studies. They also did not address the issue of the
generalisability of the study results to other settings. Sensitivity analyses were not carried out, which reduced the
external validity of the analysis. The study referred to patients recovering from major abdominal surgery and this was
reflected in the authors' conclusions. The authors noted that the use of a randomised, clinical trial would have been
more appropriate, but it was not carried out for feasibility reasons.

Implications of the study
The study results suggested that basic pain treatment could be considered a feasible option for pain control in patients
recovering from major abdominal surgery.

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