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## Systematic review and meta-analysis of enhanced recovery programmes in surgical patients

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### CRD summary

This review concluded that enhanced recovery programmes were effective in reducing the length of hospital stay and overall complication rates, across surgical specialities. It was not possible to identify any individual components that improved outcome. The authors' conclusions reflect the evidence presented, but the poor quality of this evidence may affect their reliability.

### Authors' objectives

To evaluate whether the effects of enhanced recovery programmes on patient outcomes vary across surgical specialities or with the design of individual programmes.

### Searching

MEDLINE, EMBASE, CINAHL and Cochrane Central Register of Controlled Trials (CENTRAL) were searched up to January 2013, without language restrictions. Search strategies were reported in an appendix. ClinicalTrials.gov was searched in July 2012. References of some relevant reviews and articles were searched.

### Study selection

Eligible were randomised controlled trials (RCTs) or quasi-randomised trials, comparing enhanced recovery programmes with standard care, for adults (16 years or older) undergoing elective surgery. Patients could receive either regional or general anaesthetic. An enhanced recovery programme had to include at least four elements from a checklist of 21 recognised elements (details in the review). Comparison programmes had to contain at least three fewer elements than the intervention.

Most of the included trials investigated gastrointestinal surgery; the others evaluated genitourinary, joint or lung surgery, or aortic aneurysm repair. Most trials excluded vulnerable or frail patients. The median number of elements in the enhanced recovery programme was eight (range six to 11), and in the control it was one (range zero to two). The intervention elements were included in all three phases of care (preoperative, intraoperative and postoperative) in most trials. The outcomes included deaths within 30 days of surgery, non-fatal complications within 30 days of surgery, and length of primary hospital stay (defined in review).

Two reviewers independently selected trials for inclusion.

### Assessment of study quality

Trial quality was assessed using the Cochrane risk of bias tool. The number of reviewers assessing quality was not reported.

### Data extraction

For mortality, complications and readmissions, risk ratios and their corresponding 95% confidence intervals were extracted or calculated. For primary length of stay, the time in days was calculated or extracted, and mean differences, with standard deviations or median and ranges, were presented. Complications were classified into all non-fatal (grades I to IV), minor (I to II), or major (III-IV), using the Clavien-Dindo system. Trial authors were contacted if necessary.

Two reviewers independently extracted the data. Disagreements were resolved through discussion or with a third reviewer.

### Methods of synthesis

Pooled risk ratios and standardised mean differences, with 95% confidence intervals, were calculated using both a fixed-effect model and a DerSimonian and Laird random-effects model. Statistical heterogeneity was assessed using  $I^2$ .

Publication bias was assessed using funnel plots, where 10 or more trials reported an outcome. Egger's test and the Harbord test were also used to assess publication bias. Heterogeneity between trials, due to the type of operation or

components, was investigated in subgroup analyses and meta-regression. Sensitivity analyses were used to assess the impact on the outcomes of trial design and risk of bias.

### Results of the review

Thirty-eight trials were included (5,099 participants; range 21 to 1,570). Thirty-six were RCTs, and two were quasi-randomised trials. Two reports were abstracts only. Trial quality was assessed as poor; six trials were at a low risk of bias for randomisation and allocation concealment.

Compared with controls, enhanced recovery programmes reduced the primary length of stay (SMD -1.15 days, 95% CI -1.45 to -0.85; 23 trials) and reduced the risk of all complications within 30 days (RR 0.71, 95% CI 0.60 to 0.86; 21 trials).

There were no significant differences between groups for deaths within 30 days of surgery (19 trials), major complications (10 trials), and readmission rates (19 trials).

There was evidence of significant statistical heterogeneity for the analysis of length of stay ( $I^2=89.9%$ ). There was significant publication bias for the outcomes of all complications, readmission rates, and length of stay.

The impact of enhanced recovery programmes was similar across specialties, and there was no consistent evidence that the elements included within the programmes affected patient outcomes. Further sensitivity analyses and subgroup analyses did not significantly alter the main results (details reported).

### Authors' conclusions

Enhanced recovery programmes were effective in reducing length of hospital stay and overall complication rates, across surgical specialities. It was not possible to identify any individual components that improved outcome.

### CRD commentary

The review question was clear, with reported inclusion criteria. Several relevant sources were searched, without language restriction. Publication bias was assessed and observed for one outcome. Appropriate methods were used to avoid error and bias in the selection of trials and data extraction, but it was unclear whether these were used in assessing quality.

Trial quality was assessed, but the full results for individual trials were not reported; quality was reported to be poor. The methods of synthesis appear to have been appropriate. The authors noted that few trials were designed or powered for complication rates, and the reporting of complications was generally poor. They also noted that dependent patients, or those not able to live independently, were excluded from the trials, so the results may only be relevant to those living independently before surgery.

The authors' conclusions reflect the evidence presented, but the poor quality of this evidence may affect their reliability.

### Implications of the review for practice and research

**Practice:** The authors did not state any implications for practice.

**Research:** The authors stated that a qualitative synthesis could investigate the determinants of the success of enhanced recovery programmes.

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