A meta-analysis of perioperative beta blockade: what is the actual risk reduction?
McGory M L, Maggard M A, Ko C Y

CRD summary
This review assessed the effect of beta-blockers given around the time of operation, in noncardiac surgery. The authors concluded that beta-blockers had a protective effect on short-term complications and mortality. They also made recommendations for more research into treatment for particular groups of people. The conclusions should be treated with some caution as other relevant studies might have been missed.

Authors' objectives
To evaluate the effects of peri-operative beta-blockers in people undergoing noncardiac surgery.

Searching
MEDLINE (1966 to 2004) was searched; the search terms were given. The reference lists of identified studies were checked. It was not stated whether any language restrictions were applied.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs) were eligible for inclusion.

Specific interventions included in the review
The intervention of interest was beta-blockers, given peri-operatively. No explicit inclusion criteria were stated with regards to the comparator. The beta-blockers used in the included studies were labetalol, atenolol, oxyprenolol, esmolol and bisoprolol; these were compared with placebo. The drugs were initiated up to 1 week pre-operatively to immediately prior to surgery. One study started treatment within 1 hour after surgery. Full details of the dosing regimens were given.

Participants included in the review
Studies on people undergoing noncardiac surgery were eligible for inclusion. The types of surgery undertaken in the included studies were abdominal, peripheral, orthopaedic, neurosurgery, aortic aneurysm repair, infrainguinal arterial bypass, carotid endarterectomy, knee arthroplasty and hip replacement. The participants had mild to moderate hypertension, known coronary artery disease (CAD) or risk factors for CAD, pre-operative ischaemia on Holter monitor, positive results on dobutamine echo, or were aged 65 years or older. The mean ages of the participants ranged from 63 to 76 years.

Outcomes assessed in the review
Studies evaluating mortality, myocardial infarction or myocardial ischaemia were eligible for inclusion. Results were given for peri-operative overall and cardiac mortality, long-term cardiac and all-cause mortality, myocardial infarction and myocardial ischaemia. Peri-operative mortality was defined as death during the initial hospitalisation and long-term mortality was assessed at 1 month to 2 years after the operation. Adverse events were also reported.

How were decisions on the relevance of primary studies made?
Two reviewers independently selected the papers.

Assessment of study quality
Quality was assessed using the Jadad scoring system, based on randomisation, double-blinding, and description of withdrawals or drop-outs. The scores ranged from 0 to 5 with 5 being the highest. Two reviewers independently assessed quality.
Data extraction
Two reviewers independently extracted the data.

Methods of synthesis
How were the studies combined?
The data were combined using a fixed-effect model. Relative risks (RRs) and risk differences (RDs), together with 95% confidence intervals (CIs), and numbers-needed-to-treat (NNT), were estimated for each outcome.

How were differences between studies investigated?
Heterogeneity was assessed using a chi-squared test. Sensitivity analyses were also carried out; these were based on studies of lower risk surgery (general or orthopaedic surgery) versus higher risk surgery.

Results of the review
Six RCTs (632 participants) were included.

In the quality assessment, one study scored 5, one scored 3, two scored 2 and two scored 1.

There was no difference in the incidence of peri-operative overall mortality with beta-blockers compared with placebo (RR 0.52, 95% CI: 0.20, 1.35; 2 RCTs).

All other outcomes showed a significant benefit with beta-blockers compared with placebo: RR 0.25 (95% CI: 0.07, 0.87; 2 RCTs) for peri-operative cardiac mortality, RR 0.33 (95% CI: 0.14, 0.74; 2 RCTs) for long-term overall mortality, RR 0.16 (95% CI: 0.05, 0.53; 2 RCTs) for long-term cardiac mortality, RR 0.14 (95% CI: 0.04, 0.47; 4 RCTs) for myocardial infarction, and RR 0.47 (95% CI: 0.34, 0.65; 5 RCTs) for myocardial ischaemia. The corresponding estimated RDs for these significant outcomes ranged from -0.05 to -0.18 and the NNT ranged from 6 to 20.

In sensitivity analyses of the 2 studies on lower risk operations, the RD was -0.08 (95% CI: -0.15, 0.00; NNT=13) for myocardial infarction and -0.12 (95% CI: -0.24, -0.01; NNT=8) for myocardial ischaemia.

Authors’ conclusions
The analysis showed the protective effect of beta-blockers used in noncardiac surgery on both short-term complications and mortality.

CRD commentary
The aims of this review were stated clearly. The search was limited to one database and there was no mention of whether language restrictions had been applied. It was possible that studies were missed and this could have affected the results of the review. The methods of the review were reported and appeared adequate to reduce reviewer error and bias. The quality of the included studies was assessed using a recognised scoring system, although the results were not fully discussed in light of the findings. The authors’ decision to combine the results in a formal meta-analysis might not have been appropriate because of heterogeneity between the studies. In view of these comments, in particular the possibility of missed studies, the authors’ conclusions should be treated with some caution.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.

Research: The authors stated that further research is needed to assess how to treat specific populations i.e. people with low to moderate risk of cardiac events, those undergoing general surgical procedures, the elderly, and those already being treated with beta-blockers. In addition, more information is needed on the optimal timing and duration of treatment.
Bibliographic details

PubMedID
16153424

DOI
10.1016/j.surg.2005.03.022

Indexing Status
Subject indexing assigned by NLM

MeSH
Adrenergic beta-Antagonists /therapeutic use; Humans; Myocardial Infarction /drug therapy /mortality; Myocardial Ischemia /drug therapy /mortality; Randomized Controlled Trials as Topic; Risk Reduction Behavior; Surgical Procedures, Operative /mortality

AccessionNumber
12005004388

Date bibliographic record published
30/06/2007

Date abstract record published
30/06/2007

Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.