

Does perioperative lipid-lowering therapy reduce in-hospital mortality after major noncardiac surgery?

Lindenauer PK, Pekow P, Wang K, Gutierrez B, Benjamin EM. Lipid-lowering therapy and in-hospital mortality following major noncardiac surgery. *JAMA* 2004;291(17):2092-9.

Background: Cardiovascular complications are an important source of morbidity and mortality among patients undergoing noncardiac surgery, despite preventive interventions such as β -blockade. It is unknown whether lipid-lowering therapy (LLT) prevents perioperative cardiovascular events in patients undergoing noncardiac surgery.

Design: A retrospective cohort of patients over 18 years of age who underwent major noncardiac surgery (defined as all intrathoracic, intra-abdominal and supra-inguinal vascular surgery, excluding obstetric procedures) was identified. Patients given LLT (primarily statins) in the first 2 days after admission (LLT2) were compared with those who were not given LLT or who received it after day 2. The primary outcome measure was in-hospital mortality.

Results: The cohort included 780 591 subjects, 77 082 (9.9%) of whom received LLT in the first 2 hospital days. Crude mortality rates showed a benefit for the LLT2 group (2.13% v.

3.05%, $p < 0.001$). However, the patients in the LLT2 group differed significantly from the control subjects in having a higher incidence of comorbidities and higher preoperative cardiac risk (as measured by the revised cardiac index). They were also more likely to receive β -blockers and thromboembolism prophylaxis.

To adjust for confounders, a propensity scoring system was created using a logistic regression model. Mortality rates remained lower in the LLT2 group than in the propensity-matched control group (2.18% v. 3.15%, $p < 0.001$). After adjustment for further clinical and demographic covariates, LLT2 was still associated with decreased postoperative mortality (odds ratio 0.62, 95% confidence interval 0.58–0.67). Numbers needed to treat with LLT2 to prevent 1 death, stratified by revised cardiac index score, are found in Table 1.

Commentary: This large, multi-centre observational study showed that LLT use in the first 2 hospital days was associated with decreased mortality among patients undergoing noncardiac surgery. This finding is consis-

tent with that of a previous retrospective study.¹

However, as with most observational studies based on administrative data, potential sources of bias remain. Perioperative LLT may have served as a marker for higher quality perioperative care in general, as evidenced by the higher use of β -blockade and venous thromboembolism prophylaxis in the LLT2 group. It is also possible that cardiovascular medications may have been discontinued during admission among control patients, which may have led to an increase in cardiovascular events and mortality rather than a protective effect from LLT in the first 2 hospital days. In addition, important confounders such as smoking and left ventricular function were not accounted for. Finally, the lack of postoperative cardiovascular event data prevents the presumed mechanism for decrease in mortality from being clearly documented.

Practice implications: This study provides a strong impetus for performing RCTs to examine the use of LLT in the immediate perioperative period. Further trials are needed to evaluate the relation, if any, between the duration of preoperative LLT and postoperative cardiovascular events. While awaiting results of such trials, clinicians should consider instituting LLT preoperatively in all eligible patients.

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Reference

1. Poldermans D, Bax JJ, Kertai MD, Krenning B, Westerhout CM, Schinkel AF, et al. Statins are associated with a reduced incidence of perioperative mortality in patients undergoing major noncardiac vascular surgery. *Circulation* 2003;107(14):1848-51.

Table 1: Number needed to treat (NNT) in propensity-matched cohort by revised cardiac risk index score

Variable	Revised cardiac risk index score					Overall
	0	1	2	3	≥ 4	
Patients, no. (%)	45 371 (34)	43 756 (33)	27 853 (21)	11 706 (9)	3 149 (2)	131 835 (100)
In-hospital mortality, no. (%)*	647 (1.43)	1 136 (2.60)	1 253 (4.50)	828 (7.07)	294 (9.34)	4 158 (3.15)
NNT (95% CI)†	186 (168–214)	103 (93–119)	60 (54–69)	39 (35–45)	30 (27–35)	85 (77–98)

Note: CI = confidence interval.

*Among patients who were not treated or who had treatment in the propensity-matched cohort.

†Based on adjusted odds ratios (ORs) from propensity-matched cohort. $NNT = 1 - [PEER \times (1 - OR)] / [(1 - PEER) \times PEER \times (1 - OR)]$, in which PEER is the patient expected event rate (e.g., the event rate in the control or untreated group).

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