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
The study examined two different perioperative therapies in patients undergoing major elective non-cardiac surgery and vascular surgery. One was the use of beta-blockers (specifically, 200 mg of metoprolol for 30 days) and the other the use of statins (specifically, 20 mg/day atorvastatin for 45 days). Both therapies were compared with placebo.

Type of intervention
Secondary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised a hypothetical cohort of high-risk non-cardiac surgical patients aged 61 to 75 years.

Setting
The setting was secondary care. The economic study was carried out in South Africa.

Dates to which data relate
The clinical and economic data were derived from studies published between 1996 and 2005. The price year was 2004.

Source of effectiveness data
For the analysis of beta-blockers, the clinical data obtained from the literature were estimates on major peri- and postoperative cardiovascular complications in patients undergoing major elective non-cardiac surgery. For example, the incidence of all-cause mortality, nonfatal myocardial infarction, nonfatal cardiac arrest within 30 days of surgery, and several adverse cardiovascular outcomes potentially attributable to beta-blocker administration (hypotension and bradycardia needing treatment, congestive heart failure, bronchospasm, and cerebrovascular accident).

For the analysis of statins, the clinical data referred to incidences of cardiac and all-cause mortality, myocardial infarction, unstable angina and stroke, as well as incidences of rhabdomyolysis and elevated hepatic enzymes.

Sources searched to identify primary studies
The clinical data were derived from American and European prospective studies, including clinical trials. No information on these studies was given as they were the same as those used in the previous analyses. Only the overall results of these studies were reported.

Methods used to judge relevance and validity, and for extracting data
The approach used to derive the clinical data was not reported in the current publication. The authors stated that South African data would have been preferred, but none of these estimates were found in the published literature, thus American and European analyses had to be used. No details were given of the methods used to combine these estimates.

**Measure of benefits used in the economic analysis**
No summary benefit measure was used in the economic analysis as a cost-consequences analysis was presumably carried out. However, the authors reported the clinical outcomes estimated from the literature in order to demonstrate the clinical benefits of either therapy versus no therapy in terms of the reduction in deaths and cardiovascular complications. Adverse events were also reported. These clinical benefits were not combined with the costs. The number needed to treat (NNT) to prevent one major perioperative cardiovascular event or perioperative death with beta-blocker therapy was finally provided.

**Direct costs**
The analysis of the costs appears to have been performed from the perspective of the third-party payer. It included the costs of drugs, the treatment of drug-related adverse events, and perioperative complications. The unit costs and the quantities of resources used were not presented separately. The resource use data were derived from the previous analyses. The costs referred to the South African setting and were derived from the Discovery Health claims for patients in the age band 61 to 75 years. Discounting was not relevant as the costs were incurred during a short time. The price year was 2004.

**Statistical analysis of costs**
Statistical analyses of the costs were not performed.

**Indirect Costs**
Productivity costs were not considered.

**Currency**
South African rand (ZAR).

**Sensitivity analysis**
The issue of uncertainty was not addressed and no sensitivity analyses were carried out.

**Estimated benefits used in the economic analysis**
The review of the literature showed that beta-blocker therapy led to a statistically significant reduction in cardiovascular complications, although there was an increase in the rate of adverse events in comparison with no therapy (49.2% versus 33.8%, p<0.0001).

Overall, the rate of all deaths up to two years was 4.2% with beta-blocker therapy and 8.2% with placebo, (p=0.003).

The NNT to prevent one major perioperative cardiovascular event with beta-blocker therapy was 20, while the NNT to prevent one perioperative death was 72.

Overall, a similar conclusion was achieved for patients treated with statins. The proportion of perioperative cardiovascular events (nonfatal myocardial infarction, unstable angina, cardiovascular accident) or deaths decreased from 15.4% with no treatment to 8.7% with statins, (p=0.004).

**Cost results**
The total costs per patient were ZAR 11,895.52 with beta-blocker therapy and ZAR 12,764.71 with placebo (difference -ZAR 869.19).

The total costs per patient were ZAR 7,413.34 with statin therapy and ZAR 9,236.24 with placebo (difference -ZAR 1,822.90).

The reduction in costs was due to the reduction in cardiovascular complication for both therapies.

**Synthesis of costs and benefits**
The costs and benefits were not combined as a cost-consequences analysis appears to have been carried out. However, the authors stated that beta-blockers are potentially cost-effective for patients with an expected major cardiovascular complication rate exceeding 10%, while statins are potentially cost-effective in patients with an expected major cardiovascular complication rate exceeding 15.4%.

**Authors’ conclusions**
Compared with no therapy, perioperative beta-blockers and statins led to a reduction in adverse outcomes in high-risk patients undergoing major elective non-cardiac surgery and vascular surgery. This resulted in lower costs from the perspective of the third-party payer.

**CRD COMMENTARY - Selection of comparators**
The choice of the comparators was appropriate in that each therapy was compared with placebo (no therapy). Details of the dosages were given. You should decide whether these are valid comparators in your own setting.

**Validity of estimate of measure of effectiveness**
The clinical data were derived from a review of the literature, the methods and conduct of which were not reported as such details had been presented in the earlier publications. The use of clinical trials as the main source of treatment effectiveness enhances the validity of the clinical information. The authors acknowledged that the epidemiological data were not based on South African data, but this was inevitable as only American and European sources were available in the literature. However, the authors pointed out that there is growing evidence that the incidence of coronary artery disease is rapidly increasing in South Africa, which makes the use of American and European data appropriate.

**Validity of estimate of measure of benefit**
No summary benefit measure was used in the economic analysis as a cost-consequences analysis was carried out.

**Validity of estimate of costs**
The authors did not explicitly report the perspective of the study, but the source used to derive costs suggests that the viewpoint of the third-party payer might have been used. There was little information on the unit costs and quantities of resources used, most items being reported as macro-categories. This could limit the possibility of replicating the analysis in other settings. The resource use data were derived from the published economic analyses. The price year was reported, which has positive implications for the generalisability of the study results. A drawback of the economic analysis was that the costs were treated deterministically and the use of alternative cost estimates was not investigated.

**Other issues**
The authors did not make extensive comparisons of their findings with those from other studies. The issue of the generalisability of the study results to other settings was not addressed. The external validity of the analysis was limited as sensitivity analyses were not carried out. The authors noted that the correct identification of high-risk patients represents a key element of the cost-effectiveness of beta-blockers and statins.

**Implications of the study**
The study results support the use of perioperative statins and beta-blockers in high-risk patients undergoing major elective vascular surgery and non-cardiac surgery.
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None stated.

Bibliographic details

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Other publications of related interest
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Indexing Status
Subject indexing assigned by NLM

MeSH
Adrenergic beta-Antagonists /adverse effects /economics /therapeutic use; Aged; Cardiovascular Diseases /prevention & control; Costs and Cost Analysis; Economics, Pharmaceutical; Humans; Hydroxymethylglutaryl-CoA Reductase Inhibitors /adverse effects /economics /therapeutic use; Intraoperative Complications /prevention & control; Middle Aged; Perioperative Care /economics; South Africa

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