Drug-eluting stents in acute myocardial infarction: updated meta-analysis of randomized trials


CRD summary
This review concluded that during medium-term follow-up, drug-eluting stents used in people with acute myocardial infarction were safe and resulted in a marked reduction in reintervention. Doubts about the quality of included studies mean that the conclusions should be treated with caution.

Authors' objectives
To compare the effects of drug-eluting stents with bare-metal stents in people undergoing primary percutaneous coronary intervention (PCI) for acute myocardial infarction. An update of a previous review (see Other Publications of Related Interest).

Searching
MEDLINE, Cochrane Central Register of Controlled Trials (CENTRAL) and six relevant websites were searched to January 2010. Search terms were reported. Bibliographies of relevant reviews and editorials published within a year of the review were checked. There were no restrictions on form of publication.

Study selection
Randomised controlled trials (RCTs) with a mean follow-up of at least six months and that compared drug-eluting stents to bare metal stents in people with acute myocardial infarction who underwent primary PCI were eligible for inclusion. Primary outcomes of interest were a composite of death or myocardial infarction and reintervention. Other outcomes were all-cause death, recurrent myocardial infarction and stent thrombosis (defined according to the Academic Research Consortium classification).

In the included studies, mean age ranged from 59 to 64 years. Sirolimus-, paclitaxel- and zotarolimus-eluting stents were used. Recommended length of thienopyridine therapy ranged from more than one month to 12 months. Mean follow-up was from seven to 24 months.

Two reviewers independently assessed studies for inclusion.

Assessment of study quality
Quality was assessed on adequacy of allocation concealment, intention to treat analysis (ITT) and blinding of outcome assessors.

The authors did not state how many reviewers performed the validity assessment.

Data extraction
Individual patient data (IPD) were sought from trial investigators in order to calculate summary hazard ratios (HR) and 95% confidence intervals (CI) using the Mantel-Cox test. When unavailable, data were extracted from published reports.

Methods of synthesis
Pooled hazard ratios and 95% CIs were calculated using DerSimonian and Laird random-effects method and a fixed-effect methods Heterogeneity was assessed using the Cochran test and $I^2$. Sensitivity analyses were undertaken by removal of each trial individually. Subgroup analysis investigated the drug used (paclitaxel or sirolimus). Meta-regression was used to explore any influence of recommended duration of thienopyridine (clopidogrel) use and length of follow-up on the main safety outcome and of clopidogrel use on stent thrombosis. Publication bias was investigated using a funnel plot and the adjusted rank correlation test.
Results of the review
Fourteen RCTs (7,781 participants) were included. One study had 3,006 participants; others ranged from 80 to 744 participants. IPD were used for nine trials and summary data were used for five trials. Three trials were analysed according to a modified ITT principle. Tests showed no evidence of publication bias.

There was no difference between drug-eluting and bare-metal stents for the combined outcome of all-cause death and myocardial infarction ($I^2=0\%$), all-cause death ($I^2=0\%$), myocardial infarction ($I^2=0\%$) and stent thrombosis ($I^2=0\%$).

Drug-eluting stents were associated with a reduction in reintervention (HR 0.41, 95% CI 0.32 to 0.52, $I^2=29.9\%$).

When analyses were undertaken according to type of drug, use of sirolimus-eluting stents was associated with a reduction in death or myocardial infarction (HR 0.71, 95% CI 0.54 to 0.93). There was no effect on this outcome with paclitaxel-eluting stents. Both drugs resulted in a reduction in reintervention, but there was a statistically significant difference between results ($p=0.001$). There were no significant differences between the two drugs for other outcomes.

In sensitivity analyses, sequential removal of each trial yielded similar results to the main analysis. Meta-regression showed no effect of length of follow-up or recommended duration of clopidogrel.

Authors' conclusions
During medium-term follow-up, use of drug-eluting stents in people with acute myocardial infarction was safe and resulted in a marked reduction in the need for reintervention.

CRD commentary
The aims of the review were clearly stated in terms of inclusion criteria. The search covered several relevant sources and was not limited by language and publication type; this reduced the possibility of publication and language biases. The methods of study selection aimed at reducing reviewer error of bias; methods for quality assessment and data extraction were not described. The authors stated that study quality was assessed, but no results were presented so it was not possible to comment on the validity of included data. No details on whether or how IPD were verified were reported (such as checking the integrity of randomisation, internal consistency and plausibility of data). The methods of synthesis appeared appropriate. Heterogeneity was assessed. The authors commented that people with high-risk characteristics were excluded from the trials, so the results may not be generalisable to all people with acute myocardial infarction.

Doubts about the quality of the included studies mean that the conclusions should be treated with caution.

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

Research: The authors stated that longer follow-up was needed to assess the effect of drug-eluting stents in people with acute myocardial infarction on late thrombotic events.

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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.