Percutaneous coronary intervention at centers with and without on-site surgery: a meta-analysis

Singh M, Holmes DR, Dehmer GJ, Lennon RJ, Wharton TP, Katcher MA, Aversano T, Rihal CS

CRD summary
This review concluded that percutaneous coronary interventions performed at centers without on-site surgery were not associated with a higher incidence of in-hospital mortality and emergency bypass surgery compared to centers with on-site surgery. Given the limitations of the review and uncertain quality of the evidence-base, the conclusions should be treated with some caution.

Authors' objectives
To compare rates of in-hospital mortality and emergency coronary artery bypass grafting surgery after a percutaneous coronary intervention (PCI) between centers with and without on-site surgery.

Searching
MEDLINE, EMBASE and The Cochrane Library were searched for studies published in English between 1990 and December 2009; search terms were reported. Bibliographies of reviews were searched. Unpublished studies and conference abstracts were excluded.

Study selection
Matched case-control studies that compared outcomes of elective PCI or primary PCI for ST-segment elevation myocardial infarction (STEMI) from centers with and without on-site surgery were eligible for inclusion. Studies needed to report an analysis adjusted for differences in patient characteristics between centers. A clear definition of STEMI had to be provided where these patients were included.

Study periods ranged from 1992 to 2007. Most studies were multicentre. Sixty per cent of the studies were conducted in USA; others were conducted in Italy, Norway, Sweden, The Netherlands and Germany.

Two independent reviewers selected studies for the review; disagreements were resolved by consensus.

Assessment of study quality
Study quality was assessed using STROBE criteria.

The authors did not report how many reviewers performed the quality assessment.

Data extraction
Adjusted odds ratios (OR) with 95% confidence intervals (CI) for in-hospital mortality and need for emergency CABG (coronary artery bypass graft) surgery were extracted by one reviewer. Where adjusted odds ratios were not available, unadjusted odds ratios with 95% CI were extracted or calculated. Cells with zero were corrected by adding 0.5.

Methods of synthesis
Pooled odds ratios with 95% CI were calculated using a random-effects model. A fixed-effect model was used as a sensitivity analysis. Heterogeneity was investigated using the I² statistic (≤25% indicated low heterogeneity and ≥75% indicated high heterogeneity). Publication bias was evaluated using a funnel plot and the trim-and-fill method.

Sensitivity analyses were conducted to investigate the impact of outliers (studies where the 95% CI did not overlap with the 95% CI of the pooled estimate).

Results of the review
Fifteen studies met the inclusion criteria. The total of 1,038,362 participants (range 363 to 625,854) comprised 991,450 participants from centers with on-site surgery and 46,912 participants from centers without on-site surgery. All studies
met at least 15 of the variables in the STROBE checklist. Potential sources of bias identified related to participant selection, determination of study size, handling of quantitative variables and the source of funding.

**In-hospital mortality**: There was no significant difference between centres with and without on-site surgery for primary PCI (OR 0.96, 95% CI 0.88 to 1.05, I²=6%; 11 studies, 124,074 patients) and elective PCI (OR 1.15, 95% CI 0.93 to 1.41, I²=46%; nine studies, 914,288 patients). When the analysis was adjusted for publication bias there was a significantly greater incidence at centres without on-site surgery (OR 1.25, 95% CI 1.01 to 1.53). Further results were reported.

**Emergency CABG**: There was no significant reduction in need for emergency CABG at centres with on-site surgery for primary PCI (OR 0.53, 95% CI 0.35 to 0.79, I²=20%; seven studies, 77,638 patients) and no significant difference between centres for elective PCI (OR 1.21, 95% CI 0.52 to 2.85, I²=5%; six studies, 293,291 patients). Further results were reported.

**Authors' conclusions**

PCIs performed at centres without on-site surgery were not associated with a higher incidence of in-hospital mortality and emergency bypass surgery compared to centres with on-site surgery.

**CRD commentary**

The authors addressed a clear review question supported by appropriate inclusion criteria. Three relevant sources were searched. Only published studies in English were included, so publication and language biases may have been introduced. The authors investigated publication bias and this was said to be non-significant, but adjustment for missing studies altered the conclusions that could have been drawn for one analysis. Study selection was conducted in duplicate; no such methods to reduce error and bias were employed during data extraction. Study quality was assessed, but the results were reported incompletely and this made it difficult to determine which studies were prone to which bias. The number of patients treated at centres with on-site surgery far outweighed the numbers treated at centres without on-site surgery. Event rates were very low for the incidence of emergency CABG leading to imprecise estimates. Few study details were presented. There was no information on the proportion of patients who received stents and types of stent implanted, which made it difficult to gauge the degree of clinical heterogeneity across the studies and thus the reliability and generalisability of the pooled estimates.

Given the limitations of the review and uncertain quality of the evidence-base, the conclusions should be treated with some caution.

**Implications of the review for practice and research**

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

**Research**: The authors stated a need for studies to investigate the relationship between outcomes and PCI volume of centres and to identify processes that improved the safety and outcomes of non-primary PCI performed at centres without on-site surgery. More data were required for non-primary PCI, especially data stratified on the basis of clinical and angiographic risk and operator or institutional PCI volumes.

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**Bibliographic details**


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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.