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Impella and IABP for high-risk PCI: a systematic review and meta-analysis

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Aims: A systematic literature review (SLR) and meta-analysis was undertaken to compare health outcomes associated with the use of Impella and intra-aortic balloon pump (IABP) in patients undergoing high-risk percutaneous coronary intervention (HR PCI).

Methods and results: A SLR of published randomised and non-randomised studies from Sep 1999-2019 (20 years) was undertaken through a search of MEDLINE®, Web of Science, Cochrane Library, and Scopus. Forward and backward citation searching was conducted using Google Scholar and supplemented with a search of the grey literature. For studies which met the inclusion criteria, data extracted included respondent characteristics, study design, and the reporting of mortality, myocardial infarction, complication rates, and other clinical outcomes. A comparison of clinical outcomes was synthesized using a meta-analysis and a random-effects model was fitted to account for heterogeneity between studies. Small study effect, including publication bias, was tested using funnel plots and Egger's test. Meta-analyses of patient subgroups were also conducted where data permitted. Of 638 titles and abstracts screened, 22 studies met the study inclusion criteria. Studies tended to report superior health outcomes for patients who received Impella compared to IABP in terms of lower mortality, major bleeding, vascular complications, revascularisation, stroke/transient ischaemic attack, renal complications, and major adverse cardiovascular events (MACE)/major adverse cardiovascular and cerebrovascular events (MACCE). Although funnel plots were not always found to be symmetrical, no evidence of publication bias (with the exception of the IABP pooled MACE/MACCE ($p=0.033$) outcome) was found with the Egger's test ($p>0.05$).

Conclusions: The results of our SLR and meta-analysis indicate that Impella is associated with superior health outcomes when compared to IABP in terms of mortality, major bleeding, vascular complications, revascularisation, stroke/ transient ischaemic attack, renal complications, and MACE/MACCE. Further research is needed to explore the conclusions regarding the presence of publication bias with the IABP pooled MACE/MACCE outcome. Moreover, further studies and/ or real-world data (RWD) are needed to confirm and identify the optimal approach for patients undergoing HR PCI in clinical practice. This will enable the aforementioned patients to gain maximal health status by using available resources.