Incremental cost-effectiveness of drug-eluting stents compared with a third-generation bare-metal stent in a real-world setting: randomised Basel Stent Kosten Effektivitats Trial (BASKET)


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.

CRD summary
This study examined the cost-effectiveness of drug-eluting stents (DES) in comparison with bare-metal stents (BMS) in patients undergoing percutaneous coronary intervention and stenting. The authors concluded that DES were more effective than BMS, but, due to the higher overall costs, DES should be restricted to high-risk patient subgroups. The study was satisfactorily carried out and was well presented. The authors’ conclusions appear to be valid.

Type of economic evaluation
Cost-effectiveness analysis, cost-utility analysis

Study objective
The objective was to examine the cost-effectiveness of drug-eluting stents (DES) in comparison with bare-metal stents (BMS) in unselected patients undergoing percutaneous coronary intervention and stenting.

Interventions
Cobalt-chromium-based BMS were compared with two types of DES: a sirolimus-coated stent (Cypher) and a paclitaxel-coated stent (Taxus).

Location/setting
Switzerland/hospital.

Methods
Analytical approach:
This economic evaluation was based on data derived from a single study. The time horizon of the analysis was six months. The authors stated that the analysis was carried out from the perspective of the third-party payer.

Effectiveness data:
The clinical data came from a randomised controlled trial (RCT) carried out at a single institution (the University Hospital of Basel). The RCT enrolled 826 consecutive eligible patients with a mean age of 64 years and 79% were male. There were 545 patients in the DES group (264 in the Cypher and 281 in the Taxus group) and 281 in the BMS group. The exclusion criteria were reported and the length of follow-up was six months. The primary clinical endpoint was the reduction in major adverse cardiac events (MACE), which included cardiac death, non-fatal myocardial infarction, and target vessel revascularisation. Regression analysis was undertaken to identify the predictors of MACE.

Monetary benefit and utility valuations:
The utility valuations were obtained from a sample of 515 patients, who were enrolled in the RCT and had complete data on the self-administered European Quality of life (EQ-5D) questionnaire, including the Visual Analogue Scale, at baseline and after six months.

Measure of benefit:
The summary benefit measures were the reduction in the rate of MACE and quality-adjusted life-years (QALYs), which were derived directly from the RCT.
Cost data:
The economic analysis included the costs of procedures, stents, and hospital stay (including stay in intensive care). The unit costs of these items were reported. The details of resource use were not presented. The costs were derived from the Swiss medical tariff (TARMED) and list prices for stents used in Switzerland. They were in Euros (EUR) and the price year was not reported.

Analysis of uncertainty:
Bootstrapping analysis was performed to determine the confidence intervals (CIs) around the costs and benefits.

Results
In comparison with BMS, DES reduced the rate of MACE by 44%, with an odds ratio of 0.56 (95% CI 0.35 to 0.91). This was mainly due to a lower rate of target vessel revascularisations, while both cardiac death and non-fatal myocardial infarction were similar between the two groups. The two DES were not statistically different, although the absolute difference between Cypher and BMS was always slightly greater than that between Taxus and BMS.

Six-month costs were EUR 905 higher in the DES group than in the BMS group. The initial higher costs of DES were not totally offset by a reduction in follow-up costs. In general Cypher costs were slightly higher than those for Taxus.

The incremental cost per MACE avoided with DES over BMS was EUR 18,311 (EUR 19,264 for Cypher and EUR 16,694 for Taxus). Subgroup analysis suggested that DES might be more cost-effective in high-risk patients (those with three-vessel disease, older than 65 years, more than one segment treated, small stent size, or stent length greater than 20mm).

The incremental cost per QALY gained with DES over BMS was EUR 73,283, when QALYs were calculated using the EQ-5D index, and EUR 54,546 when using the Visual Analogue Scale.

Authors' conclusions
The authors concluded that DES were more effective than BMS, but due to the higher overall costs, DES should be restricted to high-risk patient subgroups.

CRD commentary
Interventions:
The authors justified their selection of the comparators. The two types of DES were appropriately compared against the most recently available BMS, which were cobalt-chromium stents.

Effectiveness/benefits:
The clinical evidence came from a well conducted and well presented RCT, which is generally considered to be a valid source of evidence due to the strengths of its design, which should minimise selection and assessment biases. The validity of the comparison was further enhanced by the use of the intention-to-treat principle, the performance of power calculations, the baseline comparability of study groups, and the extensive and appropriate use of statistical tests. The two benefit measures were appropriately selected. The rate of MACE is a commonly used outcome of studies on stenting, while QALYs are a more generalisable benefit measure and capture the overall impact of the interventions on a patient's health. Two instruments were used to elicit patient preferences and both are valid.

Costs:
The economic analysis reflected the point of view stated in terms of both the categories of costs and their sources. The authors justified the exclusion of drug costs, which were identical for all stent types. Similarly, other costs such as private physician visit costs, other medications, and rehabilitation costs were excluded because these items followed the usual care patterns and were presumably equally distributed in all patient groups. The unit costs were reported for some macro-categories, but no detailed information on resource quantities was presented. The price year was not reported, which limits the possibility of making reflation exercises for other time periods. Statistical analyses of costs were appropriately carried out. The authors acknowledged that the list prices for stents might be higher than actual market prices.
Analysis and results:
The costs and benefits were appropriately reported and synthesised using incremental analysis. The issue of uncertainty was investigated using a comprehensive approach, which provided CIs around the mean estimates. This approach is generally considered to be valid. The subgroup analysis was useful for estimating which patients might benefit most from DES. The authors compared their findings with those reported in the literature and discussed potential explanations for conflicting results, which were mainly related to different patient populations. Some potential limitations of the analysis, especially the difficulties of considering all the relevant costs (i.e. non-medical items) and the short time horizon were discussed. The implications of a more intensive treatment for high-risk patients were not taken into account.

Concluding remarks:
The study was satisfactorily carried out and was well presented. The authors’ conclusions appear to be valid.

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