
Recent Studies Inform Cost-Effective Heart Bypass Surgery

Searching major databases between 2003 and 2007, selected studies were assessed, subjected to data extraction using a standard template and quality assessment using published criteria.

A simple short-term economic model was developed, informed by a systematic review of economic evaluations and populated with data from a review of costing/resource-use studies and other published studies.

The cost-effectiveness of magnesium sulphate as prophylaxis was estimated for a set of base-case assumptions and the robustness of these results was assessed using deterministic and probabilistic sensitivity analysis.

Twenty-two papers met the inclusion criteria reporting 15 trials which all compared magnesium sulphate with placebo or control. They ranged in size from 15 to 176 patients randomised, and were conducted in Europe, the US and Canada. The standard of reporting was generally poor, with details of key methodological attributes difficult to elucidate. No trials were identified that specifically aimed to compare magnesium sulphate with sotalol. Of 1070 patients in the pooled magnesium group, 230 (21%) developed postoperative AF, compared with 307 of 1031 (30%) patients in the placebo or (control) group.

Two randomised controlled trials (RCTs) were notable as they had relatively lower ORs in favour of magnesium sulphate. When these were removed from the analyses the pooled OR remained statistically significant, but heterogeneity no longer remained significant. These two studies tended to impart a highly significant reduction in the odds of AF to whichever subgroup they were analysed in. When studies were ordered by total duration of prophylaxis, an apparent relationship between duration and odds of AF was evident, with decreasing odds of AF as duration of prophylaxis increased. This was confirmed by linear regression analysis ($R^2 = 0.743$, $p < 0.001$).

Sixty-three potentially relevant references about cost-effectiveness were identified, but no economic evaluations of intravenous magnesium alone as prophylaxis against AF following CABG, compared with sotalol as prophylaxis or no prophylaxis, were identified. Studies reporting resource use by patients with AF following CABG suggest that while AF significantly increased inpatient stays, by up to 2.3 days in the intensive care unit (ICU) and 3.4 days on the ward, differences in length of stay and costs between patients receiving prophylaxis and those not receiving prophylaxis were not statistically significant. In the base-case analysis, magnesium sulphate prophylaxis resulted in 0.081 fewer cases of AF at an incremental cost of 2.55 pounds sterling.

The incremental cost-effectiveness ratio (ICER) was 32 pounds sterling per AF case avoided. The estimated difference in average length of stay between the prophylaxis and no-prophylaxis strategies was only 0.24 days, despite a large assumed difference of 3 days for patients experiencing AF in each group (1 extra day in the ICU and 2 extra days on the ward). In a deterministic sensitivity analysis the greatest variation in ICERs was observed for input parameters relating to the baseline risk of AF following CABG and the effectiveness of prophylaxis, cost of prophylaxis and the resource consequences of postoperative AF.

No clear relationship between dose and AF was observed, although a lower constant dose rate was associated with the lowest odds of AF. Further research should investigate the relationship between dose, dose rate, duration of prophylaxis, timing of initiation of therapy and patient characteristics, such as degree of risk for AF. This will provide stronger evidence for the optimum delivery of intravenous magnesium in patients undergoing CABG.

Published on : Tue, 29 Jul 2008