A cost-effectiveness analysis of postoperative goal-directed therapy for high-risk surgical patients

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OBJECTIVES: Patients undergoing major surgery are at high risk of increased postoperative morbidity and mortality. Goal-directed therapy has been shown to improve outcomes when commenced in the early postoperative period, yet the economic impact remains unclear. The aim of our study was to assess the cost effectiveness of goal-directed therapy as part of postoperative management.

DESIGN: Cost-effectiveness analysis to determine short and long term clinical and financial benefits. A decision tree was constructed to determine short-term "in-hospital" costs, based on outcome data derived from a previous study. For a long-term cost-effectiveness analysis, we created a simulation model to estimate life expectancy (quality-adjusted) and lifetime costs for a hypothetical cohort of major noncardiac surgical patients. Cost and outcome comparisons were made between postoperative goal-directed therapy and best standard therapy and described as cost/hospital survivor and cost/patient for the short-term analysis and as incremental cost/quality-adjusted life year for the long-term model. One-way, multiway, and probabilistic analyses were performed to address uncertainties in the model input values, and results were presented graphically in a cost-effectiveness acceptability curve.

SETTING: Simulation of a tertiary care department in the United Kingdom.

PATIENTS: A hypothetical cohort of high risk surgical patients.

INTERVENTIONS: Patients undergoing high-risk surgery were stratified to receive goal-directed therapy or standard best practice to improve tissue oxygenation in the postoperative setting.

MEASUREMENTS AND MAIN RESULTS: In our short-term model, goal-directed therapy decreased costs by £2,631.77/patient and by £2,134.86/hospital survivor. The most sensitive variables were relative risk of complication and length of stay. When assuming the worst-case scenario (prolonged ICU and in-hospital stay, highest complication costs, and maximum cost for monitoring), goal-directed therapy still achieved cost savings (£471.70). Our findings also predict that goal-directed therapy not only prolongs quality-adjusted life expectancy (0.83 yr or 9.8 mo) but also leads to incremental cost savings over a lifetime projection of £1,285.77, resulting in a negative incremental cost-effectiveness ratio of - £1,542.16/quality-adjusted life year.

CONCLUSION: The implementation of goal-directed therapy is both clinical and cost-effective. Additional implementation expenditures can be offset by savings due to reduced costs accrued from a reduction in complication rates and hospital length of stay. We conclude that goal-directed therapy provides significant benefits with respect to clinical and financial outcomes.