Comparison of rate control versus rhythm control for management of atrial fibrillation in patients with coexisting heart failure: a cost-effectiveness analysis

Perez A, Touchette DR, DiDomenico RJ, Stamos TD, Walton SM

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 rate control versus rhythm control for the management of atrial fibrillation in patients, aged 65 years or older, with heart failure, from the perspective of the third-party payer. The authors concluded that rate control was more effective and cheaper than rhythm control and it should be the first treatment for these patients. The methods were valid and the authors’ conclusions appear to be robust, despite limited reporting of the data sources.

Type of economic evaluation
Cost-utility analysis

Study objective
This study examined the cost-effectiveness of rate control versus rhythm control for the management of atrial fibrillation in patients, aged 65 years or older, with heart failure.

Interventions
The two interventions were rate control versus rhythm control as the first treatment for patients with both atrial fibrillation and heart failure. Both strategies were used for all patients and the sequence of treatment was varied. Beta-blockers, digoxin, or calcium-channel blockers were given for rate control, while amiodarone and cardioversion were used for rhythm control.

Location/setting
USA/in-patient.

Methods
Analytical approach:
The analysis was based on a Markov model, with a lifetime horizon. The authors stated that the perspective of the third-party payer was adopted.

Effectiveness data:
A literature search was carried out in MEDLINE and EMBASE to identify the relevant sources for the model inputs. Priority was given to randomised trials, conducted in the USA, with at least one year of follow-up. The key evidence came from two randomised controlled trials (RCTs) and a post hoc analysis of a published study. Mortality was from standard US life tables. It was assumed that the stroke rates and rates of adverse events were the same for the two control procedures. The primary input was the treatment response.

Monetary benefit and utility valuations:
The utility values were from two studies, one of which was the Preference-based EQ-5D Index Scores for Chronic Conditions in the United States study, which used the European Quality of life (EQ-5D) questionnaire.

Measure of benefit:
Quality-adjusted life-years (QALYs) were used as the summary benefit measure.

Cost data:
The economic analysis included the in-patient costs for atrial fibrillation and heart failure, the short-term management of amiodarone-induced hyperthyroidism, electrical cardioversion and ablation procedures, pulmonary fibrosis treatment, rate-slowing drugs, warfarin, and warfarin monitoring. The costs and quantities were from published sources, including the Healthcare Cost and Utilization Project database, a published cost-effectiveness analysis, average wholesale prices, a pharmacy chain drug discount programme, and a local pharmacist-run anticoagulation clinic. All costs were in US dollars ($) and the price year was 2009.

Analysis of uncertainty:
Deterministic sensitivity analyses were carried out by varying the inputs by 50% and 150% of their initial estimates. The utilities were varied by two standard deviations from their initial values. Alternative assumptions for patient age (55 and 65 years) and the discount rate (zero and 5%) were considered. A second-order Monte Carlo simulation was carried out, with 10,000 iterations, using predetermined probability distributions for each group of inputs. Uncertainty intervals and cost-effectiveness acceptability curves were calculated. A micro-simulation was performed, assessing the frequency of hospitalisations and severe adverse effects.

Results
The projected costs were $16,291 (95% UI 11,033 to 21,434) with rhythm control first and $7,231 (95% UI 5,517 to 9,016) with rate control first. The QALYs were 2.197 (95% UI 2.155 to 2.237) with rhythm control and 2.395 (95% UI 2.366 to 2.424) with rate control. Rate control first was the dominant strategy as it was more effective and less expensive than rhythm control.

This result held in all the sensitivity analyses. The cost-effectiveness acceptability curve showed that rhythm control first was cost-effective in none of the simulations, across a range of willingness-to-pay thresholds (zero to $200,000 per QALY).

Authors' conclusions
The authors concluded that rate control was more effective and cheaper than rhythm control and it should be the first treatment for these patients.

CRD commentary
Interventions:
The comparators were appropriately selected and they were based on the national atrial fibrillation clinical practice guidelines and protocols for clinical trials.

Effectiveness/benefits:
The clinical data were identified by a systematic review of the literature and the inclusion and exclusion criteria were reported. Priority was given to randomised controlled trials, conducted in the USA, with adequate follow-up. These sources were not described, but are likely to have had high internal validity. Most of the clinical data were extensively tested in the sensitivity analyses. QALYs were a valid benefit measure for heart failure and atrial fibrillation, and they allow comparisons with other disease areas, but little information on the methods used to obtain the utility weights was provided.

Costs:
The cost categories and data sources were consistent with the perspective. Limited unit costs and resource quantities were reported, but more information was available in online appendices. Some costs (emergency care and out-patient costs) were assumed to be identical for the two options. Standard US sources were generally used, as well as a published US economic evaluation. The price year was clearly reported, allowing reflation exercises for other time periods. Alternative cost estimates were tested in the sensitivity analyses.

Analysis and results:
The results were clearly presented, with the total and incremental findings for each strategy. Incremental cost-utility ratios were not calculated because rate control was dominant. The uncertainty was investigated, but only some of the results were reported. The model pathways and health states were fully described, with diagrams, but the data sources were mainly presented the appendices. The discount rate for the base case was not clearly stated. The results were
specific to the US context. The authors acknowledged some limitations of their analysis, which mainly related to the need for assumptions, but these were tested in the sensitivity analysis.

Concluding remarks:
The methods were valid and the authors’ conclusions appear to be robust, despite limited reporting of the data sources.

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