Cost-effectiveness analysis of rizatriptan and sumatriptan versus Cafergot in the acute treatment of migraine

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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.

Health technology

Three technologies for the treatment of migraine were studied. These were rizatriptan 10 mg, sumatriptan 50 mg, and a fixed-dose combination of ergotamine tartrate plus caffeine (Cafergot) 2 mg/200 mg. Cafergot was used as the comparator.

Type of intervention

Treatment.

Economic study type

Cost-utility analysis.

Study population

The hypothetical study population comprised a US migraine patient cohort.

Setting

The setting was the community. The economic study was carried out in California, USA.

Dates to which data relate

The effectiveness data were taken from studies published between 1991 and 2004. Resource use was determined in the decision model and would seem to relate to 2003. The prices were measured in 2003 dollars.

Source of effectiveness data

The effectiveness data were derived from a review and synthesis of studies.

Modelling

The authors used three separate decision models to compare rizatriptan versus Cafergot, sumatriptan versus Cafergot, and rizatriptan versus sumatriptan. A time horizon of 1 year was used. The model captured potential outcomes faced by a patient suffering an acute migraine attack (i.e. relief/no relief, recurrence/no recurrence, emergency room (ER) visit, hospitalisation).

Outcomes assessed in the review

The following outcomes were assessed:

the probabilities of acute relief and of headache recurrence for each technology of interest;

the probabilities of going to the ER and hospitalisation; and

the probability of switching therapy.

The authors also assessed the probability of dizziness, nausea, somnolence and chest pain occurring with each technology of interest.

Study designs and other criteria for inclusion in the review
Not reported. As the study was based on a decision analytic model, the authors appear to have selected studies that reported data relevant to their model.

Sources searched to identify primary studies
Not reported.

Criteria used to ensure the validity of primary studies
Not reported.

Methods used to judge relevance and validity, and for extracting data
Not reported.

Number of primary studies included
Seven studies were incorporated in to the review. However, one of the studies included was a meta-analysis of 53 trials of triptans.

Methods of combining primary studies
The authors used some data obtained from a meta-analysis, so in this case the data were already combined. No details of how data from other studies were combined were given.

Investigation of differences between primary studies
Not reported.

Results of the review
The probability of headache relief after first administration was 68.6% for rizatriptan, 62.7% for sumatriptan and 37.9% for Cafergot.

The probability of headache recurrence was 36.9% for rizatriptan, 27.8% for sumatriptan and 15.3% for Cafergot.

The probability of enduring a headache if headache was not relieved by first administration was 90%.

The probability of dizziness was 6.7% for rizatriptan, 5.8% for sumatriptan and 5.3% for Cafergot.

The probability of nausea was 4.2% for rizatriptan, 6.9% for sumatriptan and 8.5% for Cafergot.

The probability of somnolence was 5.5% for rizatriptan, 6.7% for sumatriptan and 2.3% for Cafergot.

The probability of chest pain was 0.7% for rizatriptan, 2.4% for sumatriptan and 0.8% for Cafergot.

The probability of headache relief in the ER was 94%.

The probability of switching to Cafergot from rizatriptan was 30.1%.

The probability of switching to rizatriptan from Cafergot was 69.9%.

The probability of switching to sumatriptan from rizatriptan was 35.7%.

The probability of switching to rizatriptan from sumatriptan was 64.3%.

Methods used to derive estimates of effectiveness
The authors supplemented their review with some assumptions.

Estimates of effectiveness and key assumptions
The authors assumed that the probability of switching between Cafergot and sumatriptan was the same as switching between Cafergot and rizatriptan, as there was no relevant comparison available in the literature.

The probability of switching to Cafergot from sumatriptan was 30.1%.

The probability of switching to sumatriptan from Cafergot was 69.9%

Measure of benefits used in the economic analysis
The summary measure of benefits was the quality-adjusted life-years (QALYs) gained. The utility values were taken from a published source (Evans et al. 1997, see 'Other Publications of Related Interest- below for bibliographic details), which provided full details of the valuations.

Direct costs
The authors estimated costs from a societal perspective. They focused on physician costs, drug acquisition costs, and the costs of hospital drugs and medical supplies. The unit costs were reported separately and the quantities were determined through the decision model. The unit costs, which were taken from published sources including primary studies and official cost reports such as the Red Book, were estimated in 2003 prices. The authors made an adjustment to average wholesale prices (AWP), to reflect the fact that many people belong to health plans and receive substantial discounts from the AWP. The costs were not reflated, yet one of the unit costs was taken from a study published in 1998 and so reflation might have been relevant. Given the short time horizon (1 year), discounting was appropriately not carried out.

Statistical analysis of costs
The costs were treated deterministically.

Indirect Costs
The authors estimated indirect costs including patient travel time and waiting time. The unit cost was based on the average hourly compensation rates for all occupations from the US Bureau of Labor Statistics. It was unclear how the quantities of time spent travelling or waiting were estimated. The indirect costs were estimated in 2003 prices over a 1-year period.

Currency
US dollars ($).

Sensitivity analysis

A univariate sensitivity analysis was carried out to explore uncertainty in the parameters. The analysis explored the impact of drug cost, cost of hospitalisation, utility values, efficacy, probability of switching medications, and the probability of relief in the ER. The authors did not report how they selected the ranges between which variables were altered.

Estimated benefits used in the economic analysis

The incremental QALYs for rizatriptan versus Cafergot were 0.0010.

The incremental QALYs for sumatriptan versus Cafergot were 0.0007.

The incremental QALYs for rizatriptan versus sumatriptan were 0.0001.

Cost results

The incremental cost of rizatriptan versus Cafergot was -$622.98.

The incremental cost of sumatriptan versus Cafergot was -$620.90.

The incremental cost of rizatriptan versus sumatriptan was -$433.45.

Synthesis of costs and benefits

Triptans were strictly dominant (lower cost and greater efficacy) in the treatment of acute migraine compared with Cafergot. Rizatriptan dominated sumatriptan.

The sensitivity analysis showed that the cost-effectiveness ratios were not sensitive to changes in key variables. The results of the rizatriptan versus sumatriptan model were sensitive to moderate changes in efficacy.

Authors' conclusions

Rizatriptan and sumatriptan were more cost-effective than Cafergot in the treatment of an acute migraine attack. Rizatriptan was .somewhat more cost-effective than sumatriptan/.

CRD COMMENTARY - Selection of comparators

The choice of the comparators was explicitly justified, with the authors providing a detailed background of the development of treatments for migraine and the relative advantages of each treatment. You should decide if these represent valid comparisons in your setting.

Validity of estimate of measure of effectiveness

The authors did not carry out a systematic review of the literature. As the analysis was based on a decision analytic model, the authors appear to have selected studies that provided data relevant to their study. Very few details of the review process were reported, which makes it difficult to assess the quality of the review and its findings. In several cases the authors combined data from primary studies, but did not provide details of how these data were combined.

Validity of estimate of measure of benefit

The estimation of benefits was modelled using a published source for utility values. The utility values assigned a value of 0 to both of the states .Headache not relieved by first administration of first medication, patient chooses to endure attack/ and .Headache not relieved at ER, patient needs hospitalisation/'. Often in cost-utility analyses, a utility value of zero is assigned to death and a value of 1 is assigned to the best imaginable health state. Therefore, it may not be appropriate to compare the results of this study with other cost-utility analyses. Moreover, in estimating the QALYs, the authors made an adjustment for the number of days in 1 year; this suggests that they were, in fact, estimating quality-

adjusted life-days rather than years. Any comparisons made with other findings should be made with caution.

Validity of estimate of costs

The economic analysis was carried out from a societal perspective. This was appropriate and relevant given the substantial productivity losses associated with migraine. However, the authors reported discounting the AWP to reflect the fact that many people belong to health plans and receive substantial discounts from the AWP. Therefore, any unit costs based on this discounting adjustment reflect the perspective of the patient and not that of society. The results would have benefited from a more detailed reporting of the total costs of each treatment alternative rather than just the incremental costs. This would have enabled the reader to gain a more thorough understanding of the results.

Other issues

The authors indicated that the results were consisted with work that had been carried out on a Canadian population, whilst also pointing out differences in the study designs that might have led to potential differences. The authors correctly suggested that the data might be generalised to other countries by re-estimating the model and accounting for differences in treatment costs and drug prices. However, as noted already, comparisons and generalisation of the results should be made with care. The conclusions drawn accurately reflected the study population and scope of the study. Several limitations, which focused on utility estimates and the measurement of quality of life in migraine patients, were discussed.

Implications of the study

The authors did not make any recommendations for policy or practice further to their study. However, they did propose further work involving head-to-head triptan clinical trials and quality of life studies.

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Bibliographic details

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Other publications of related interest

Evans KW, Boan JA, Evans JL, et al. Economic evaluation of oral sumatriptan compared with oral caffeine/ergotamine for migraine. Pharmacoeconomics 1997;12:566-77.

Kaplan R, Anderson JP, A general health policy model: update and applications. Health Serv Res 1988;29 Suppl 2:S16-22.

Indexing Status

Subject indexing assigned by NLM

MeSH

Caffeine /economics /therapeutic use; Cost-Benefit Analysis; Drug Combinations; Drug Therapy, Combination; Economics, Pharmaceutical /statistics & numerical data; Ergotamine /economics /therapeutic use; Humans; Migraine Disorders /drug therapy /economics; Serotonin Receptor Agonists /economics /therapeutic use; Sumatriptan /economics /therapeutic use; Triazoles /economics /therapeutic use; Tryptamines

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