Caspofungin versus amphotericin B for candidemia: a pharmacoeconomic analysis

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
The use of caspofungin for the treatment of candidemia. Patients were given 70 mg on the first day of treatment and 50 mg on subsequent days.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised adult patients with one or more positive Candida cultures from blood or another sterile site.

Setting
The setting was secondary care. The economic study was carried out in the USA.

Dates to which data relate
The dates to which the clinical effectiveness and resource use data referred were not reported in the paper. The price year was 2003.

Source of effectiveness data
The effectiveness data were derived from a single study.

Link between effectiveness and cost data
The costing was carried out retrospectively on a different patient sample from that used in the effectiveness analysis.

Study sample
The paper stated that a total of 239 patients were included in the effectiveness study, but did not report the split between the two treatment groups, or how the patients were allocated to the groups. The authors did not compare their patient sample with the wider patient population. Full details of the clinical study were published elsewhere (Mora-Duarte et al. 2002, see 'Other Publications of Related Interest' below for bibliographic details).

Study design
The study was a randomised controlled trial. There were no details of the duration of follow-up, loss to follow-up or
Analyses of effectiveness

The primary health outcomes used were:

- Favourable response rates;
- The duration of treatment (defined as resolution of all symptoms and signs of infection and culture confirmed eradication);
- Adverse event rates (including nephrotoxicity, defined as a rise in creatinine to double baseline or more than 1 mg/dL in those with elevated baseline values); and
- Withdrawal from the study due to adverse events.

The authors stated that the baseline characteristics of the two patient groups were similar and that data were analysed on an intention to treat basis.

Effectiveness results

The favourable response rate was 71.7% in the caspofungin group compared with 62.8% in the amphotericin B group. There was no significant difference in the duration of treatment between the two groups. The mean duration was 12.1 days in the caspofungin group and 11.7 days in the amphotericin B group.

There were fewer adverse events in the caspofungin group, (p=0.002) and laboratory-related events, (p=0.002) including elevated blood urea nitrogen, (p=0.02), creatinine, (p=0.05), decreased potassium, (p=0.04) and nephrotoxicity (8% in the caspofungin group versus 25% in amphotericin B group, p=0.02).

Clinical conclusions

The authors concluded that caspofungin was as effective as amphotericin B and had a lower rate of impaired renal function.

Modelling

A model was used to estimate the resource use and costs associated with a hypothetical cohort of patients, with candidemia, who were treated with caspofungin or amphotericin B. The time horizon was reported as being short (1 week to a few months). Only limited details of the model were reported.

Measure of benefits used in the economic analysis

The health benefit data were not combined with the cost information. In effect, a cost-consequences analysis was performed.

Direct costs

The direct costs to the hospital were estimated in this study. Resource use was modelled for a hypothetical cohort of patients. Model input data were based on the clinical trial that provided the effectiveness data (drug use) and three published studies (treatment of impaired renal function). The unit costs of drugs were taken as mean acquisition costs, based on transaction data for non-federal hospitals taken from the IMS Health Survey, and were specified in the paper. The total costs of treating impaired renal function were taken from published studies and summary details were given. The price year was 2003.
Statistical analysis of costs
The cost data were treated deterministically.

Indirect Costs
In line with the perspective adopted, no indirect costs were included.

Currency
US dollars ($).

Sensitivity analysis
One-way sensitivity analyses were undertaken to assess the impact of variability in the data. The ranges used were either based on the authors' assumptions or on changing the source of the unit costs.

Estimated benefits used in the economic analysis
See the 'Effectiveness Results' section.

Cost results
The total cost of treatment was $559,077 per 100 patients in the caspofungin group compared with $634,937 in the amphotericin B group.

Synthesis of costs and benefits
Sensitivity analyses showed that the cost data were not sensitive to changes in the drug costs. However, they were sensitive to variation in the costs of treating impaired renal function.

Authors' conclusions
The treatment of candidemia with caspofungin is as effective as amphotericin B, but with less nephrotoxicity, and is cost-saving.

CRD COMMENTARY - Selection of comparators
This study compared the use of caspofungin and amphotericin B for the treatment of candidemia. Although a rationale for the comparator was reported, it was unclear if it represented current practice in the authors' setting. You should consider how these two treatment options compare with usual practice in your own setting prior to applying the results of this study.

Validity of estimate of measure of effectiveness
The clinical effectiveness data used in this study were taken from a randomised controlled trial. No details of patient recruitment, randomisation methods, blinding, power calculations, etc. were given in this paper. Consequently, it is not possible to comment on the internal validity of the trial. The analysis appears to have been performed on an intention to treat basis and the two patient groups were reported to have similar baseline characteristics. To fully assess the internal validity, the reader is referred to the parent clinical trial paper (Mora-Duarte et al. 2002).

Validity of estimate of measure of benefit
No summary measure of health benefit was produced. In effect, a cost-consequences analysis was performed.
Validity of estimate of costs
The study was carried out from the perspective of a hospital. It included the costs of acquiring the two study drugs and the cost of treating impaired renal function arising from their use. The authors acknowledged that their cost estimates were conservative as they did not take long-term renal toxicity, non renal adverse events or potential differences in drug administration costs into consideration. Without further information on these factors it is not clear how this may impact on the results of this study. A breakdown of the unit costs and some resource use data were given in the paper. Sensitivity analyses were performed to assess the impact of variability in the cost data. These factors add to the generalisability of the study findings. A clear price year was reported, which will aid future reflation exercises.

Other issues
The authors do not appear to have presented their data selectively and their conclusions reflected the scope of their analysis. However, they did not compare their findings with those from similar studies. The study aimed to assess the costs of the two treatments in the USA. The authors did not consider how their findings could be generalised to other countries.

Implications of the study
The authors did not make any recommendations for further research or changes to practice.

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Other publications of related interest

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MeSH
Amphotericin B/adverse effects/economics/therapeutic use; Antifungal Agents/administration & dosage/economics/therapeutic use; Candidiasis/drug therapy/economics; Cost-Benefit Analysis; Echinocandins; Economics, Pharmaceutical; Female; Humans; Male; Middle Aged; Models, Economic; Peptides, Cyclic/economics/therapeutic use; Randomized Controlled Trials as Topic/economics/methods; Renal Insufficiency/chemically induced/economics

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