Economic evaluation of micafungin versus caspofungin for the treatment of candidaemia and invasive candidiasis

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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.

CRD summary
This study aimed to evaluate the economic impact of micafungin versus caspofungin for patients with candidaemia and invasive candidiasis. The authors concluded that micafungin and caspofungin were cost-equivalent, and the drug's acquisition cost was the critical factor. The methods and results were mostly reasonable and adequately reported, but the scope may have been limited. Overall, the authors' conclusions seem appropriate.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
This study aimed to evaluate the economic impact of micafungin versus caspofungin for patients with candidaemia and invasive candidiasis.

Interventions
Micafungin 100mg per day was compared with caspofungin 70mg on day one and 50mg thereafter. Second-line therapies, such as liposomal or conventional amphotericin B, were given if treatment failed.

Location/setting
Australia/secondary care.

Methods
Analytical approach:
An economic model was developed, based on a key clinical trial (See 'Other Publications of Related Interest') and other sources, but was not conducted alongside the trial. The authors stated that an Australian hospital perspective was used.

Effectiveness data:
The key effectiveness data were the probability of treatment success and, given treatment failure, the probabilities of death, mycological persistence, emergent infection, or clinical failure and microbiological success. For micafungin, treatment failure meant mycological persistence. For caspofungin, treatment failure meant either mycological persistence or emergent infection. These were obtained from a clinical trial (see 'Other Publications of Related Interest').

Monetary benefit and utility valuations:
Not relevant.

Measure of benefit:
The authors did not report a summary measure of benefit because the trial showed no statistically significant difference between the treatments. They did not consider any differences in clinical outcomes, and conducted a cost-minimisation analysis.

Cost data:
Only the direct medical costs of treating candidaemia and intensive care were included. These included antifungal therapy, diagnostic tests, adverse-event monitoring, and hospital and critical care. Wholesale medication costs for
Australian hospitals were from the Health Purchasing Victoria tender 2010 to 2012. The acquisition cost of micafungin was estimated from the proportional price of micafungin and caspofungin in the UK. The costs of hospitalisation were Australian Refined Diagnosis Related Group 2007 to 2008 data. The proportion of patients and duration of stay in the intensive care unit were from published studies. The daily care unit cost was from an Australian tertiary hospital. The costs of other resources were from the Medicare Benefits Schedule 2010. All costs were reported in Australian dollars (AUD), and the price year was 2010 to 2011. Values from previous years were inflated, using the Australian Consumer Price Index 2010.

Analysis of uncertainty:
One-way and two-way sensitivity analyses explored the impact of different values for various costs, time on treatment, time to discharge, and time to death or failure. Scenario analyses were conducted on the inclusion of diagnostic tests, alternative treatments and doses. Probabilistic sensitivity analysis was conducted using triangular distributions for each parameter. A cost-effectiveness acceptability curve was used to report the probability of micafungin saving costs.

Results
No statistically significant difference was found between micafungin 100mg and caspofungin, with 4.1% (95% CI -4.4 to 12.3) in favour of micafungin 100mg.

In the main analysis, micafungin was associated with a net cost saving of AUD 160 per patient. The probability of micafungin being cost-saving, compared with caspofungin, was over 58%.

The results were robust in most of the sensitivity analyses.

Authors’ conclusions
The authors concluded that micafungin and caspofungin were cost equivalent, and the drug’s acquisition cost was the critical factor.

CRD commentary
Interventions:
The interventions were adequately described. In the introduction of the paper, other relevant comparators were mentioned but were not included in the analysis.

Effectiveness/benefits:
The clinical evidence was from a head-to-head randomised controlled trial. This design can have a low risk of bias, but the details were not given; the authors referenced another publication. It was stated that this was the only head-to-head trial relevant to this study. There was no discussion of whether or not there were placebo-controlled trials and whether a multiple treatment meta-analysis was feasible. There was no evidence of a systematic search, so it was unclear if the best available evidence was selected. The effectiveness evidence was appropriate for the study population. Treatment success was a useful outcome, but it did not capture the magnitude of the health gain to the patient and allow comparison with other interventions in other disease areas. The time horizon of the analysis appears to have been the average time until patients were either dead or successfully treated. Given that the number of deaths was not inconsequential and there was a small difference between the two comparators, the clinical outcomes and time horizon may have been inadequate to capture the downstream benefits.

Costs:
The role of screening and diagnostic tests in the treatment pathway was not clearly described. It was not clear if some screening costs were redundant due to every patient receiving the test regardless of treatment alternative, or whether all the screening and diagnostic tests were for monitoring during or after treatment. Every effort was made to ensure the cost data were relevant to the study setting.

Analysis and results:
The authors undertook a cost-minimisation analysis justified by no statistically significant difference in the clinical effectiveness of the two treatments. A properly conducted cost-minimisation analysis should be based on data powered to show equivalence. This does not appear to have been the case for this economic evaluation. A full cost-effectiveness analysis would have been more appropriate. The model structure was described, but the clinical pathway, including
screening and diagnostic tests, could have been clearer. The time horizon may not have been adequate to capture the downstream costs and benefits. Uncertainty in the cost-effectiveness results was evaluated, but narrow triangular distributions were used. Triangular distributions should generally not be used as they have poor statistical properties and can underestimate uncertainty. It would have been more appropriate to use beta distributions for binomial proportion data, Dirichlet distributions for multinomial proportion data, and gamma or lognormal distributions for costs and/or resource use (i.e. duration of treatment). Some of the data were from an expert panel and the source study had broad data ranges instead of variability statistics, so broader uncertainty should have been assumed.

Concluding remarks:
The methods and results were mostly reasonable and adequately reported. Insufficient justification was provided to conduct a cost-minimisation analysis. The probabilistic analysis was methodologically poor; but the one-way sensitivity analyses adequately supported the authors' conclusions.

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Other publications of related interest

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