A cost-effectiveness analysis of using azacitidine vs. decitabine in treating patients with myelodysplastic syndromes

Gidwani R, Khan ZM, Fenaux P, Beach CL, Pashos CL

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
The study assessed the cost-effectiveness of azacitidine versus decitabine for the treatment of patients with myelodysplastic syndromes (bone marrow stem cell disorders). The authors concluded that azacitidine led to greater health benefits at lower costs than decitabine. The analysis was based on transparent methods that should ensure the validity of the authors' conclusions within the assumptions of the model.

Type of economic evaluation
Cost-effectiveness analysis, cost-utility analysis

Study objective
The study assessed the cost-effectiveness of azacitidine versus decitabine for the treatment of patients with myelodysplastic syndromes.

Interventions
Decitabine was compared with azacitidine. Decitabine was given at a dose of 15mg/m$^2$ per day every eight hours for six-weeks. Azacitidine was given at a dose of 75mg/m$^2$ for seven days for four-weeks.

Location/setting
USA/hospital.

Methods
Analytical approach:
The analysis was based on a Markov model with a two-year time horizon. The authors stated that the perspective adopted in the study was that of the third-party payer.

Effectiveness data:
A selective approach was used to identify relevant sources of evidence. Key data on the efficacy of treatment were from two published randomised clinical trials; each compared drug treatment with best supportive care (although there were some differences in supportive care between the two trials). Patient characteristics were taken from these two trials. Some differences in the severity of disease at baseline in the two trials were acknowledged. No methodological details of the other sources of evidence were reported. Additional data were based on authors' assumptions, for example, no differences in adverse events between the two drugs.

Monetary benefit and utility valuations:
Utility values came from published sources, including a study of face-to-face interviews with myelodysplastic syndrome patients using the time trade-off method and another study of chronic myeloid leukaemia patients completing the EQ-5D questionnaire.

Measure of benefit:
The summary benefit measures were life-years gained, quality-adjusted life-years (QALYs) gained, patient-months of transfusion independence, and cases of acute myelogenous leukaemia progression avoided. Life years and QALYs were discounted at an annual rate of 3%.
Cost data:
The costs included the direct medical costs of treatment: drug acquisition, administration and monitoring; red blood cell transfusions; iron chelation treatment; and treatment of patients who progressed to acute myelogenous leukaemia.
Average wholesale prices were used to estimate drug costs combined with dosing schedules obtained from product labels. Other data on resource quantities were based on clinical trials and official guidelines. Costs of medical items were taken from Medicare reimbursement rates and published studies. Costs were in US $. The price year was 2009. A 3% annual discount rate was applied.

Analysis of uncertainty:
All model inputs were subjected to analysis of uncertainty in a deterministic one-way sensitivity analysis. An alternative dosing schedule for decitabine was also considered.

Results
With azacitidine, the expected costs of treatment was $150,322, life years were 1.512, QALYs were 1.041, patient-months with transfusion independence were 8.328, and the proportion of patients avoiding progression to acute myelogenous leukaemia was 50.9%.

With decitabine, the expected costs of treatment was $166,212, life years were 1.292, QALYs were 0.870, patient-months with transfusion independence were 6.224, and the proportion of patients avoiding progression to acute myelogenous leukaemia was 28.5%.

Thus, azacitidine was the dominant treatment as it was more effective and less expensive than decitabine regardless the outcome considered.

The sensitivity analyses confirmed the robustness of base-case findings and azacitidine remained dominant or cost-effective in all simulations, except when an alternative schedule of five-day decitabine was assumed. In this case, the incremental cost per QALY gained for azacitidine rose to $121,152.

Authors' conclusions
The authors concluded that azacitidine led to greater health benefits at lower costs than decitabine.

CRD commentary
Interventions:
The rationale for the selection of the compactors was clear as the two approved hypomethylating agents were considered.

Effectiveness/benefits:
As no head-to-head clinical trials were found for the two treatments under study, an indirect comparison was used. It was shown that differences existed between the two trials used for treatment effect in patients’ populations and in the placebo arms of the trials. The possibility that differences in the clinical findings may have partially depended on the differences between trials could not be excluded. The authors did not use a statistical tool to deal with this issue, which represented a limitation of the analysis. Some assumptions were also made because of the lack of valid published sources. Sensitivity analyses were conducted to estimate the impact of changing some model parameters. Various benefit measures were used in this analysis to capture the impact of the treatments on patients’ health. QALYs were a valid measure because the disease strongly affected quality of life in this specific patient population. Some key details of the derivation of utility valuations were given and the instruments used and populations considered appeared appropriate.

Costs:
The economic analysis was consistent with the perspective of the health care payer. Most data on unit costs and resource quantities of resources used were presented. Most unit costs were based on conventional US sources. Other data came from published studies which were not fully described but should be relevant to the authors’ context. The price year was clearly stated, which would allow reflation exercises in other time periods. The impact of variations of economic inputs was tested in the deterministic sensitivity analyses.
Analysis and results:
Clear information on the simulation model was provided. An incremental approach was used to identify the optimal treatment strategy. Uncertainty was only partially investigated, as the analysis considered variations of individual inputs. The study results were presented in detail. The authors acknowledged some limitations of their analysis. They stated that there was a need for future head-to-head trials to corroborate these findings. Transferability of study results was not addressed; these findings might be specific to the authors’ setting.

Concluding remarks:
The analysis was based on transparent methods that should ensure the validity of the authors’ conclusions within the assumptions of the model.

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