EE395

A Cost-Utility Analysis of Ferric Derisomaltose versus Ferric Carboxymaltose in Patients with Inflammatory Bowel Disease in the United Kingdom

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Background

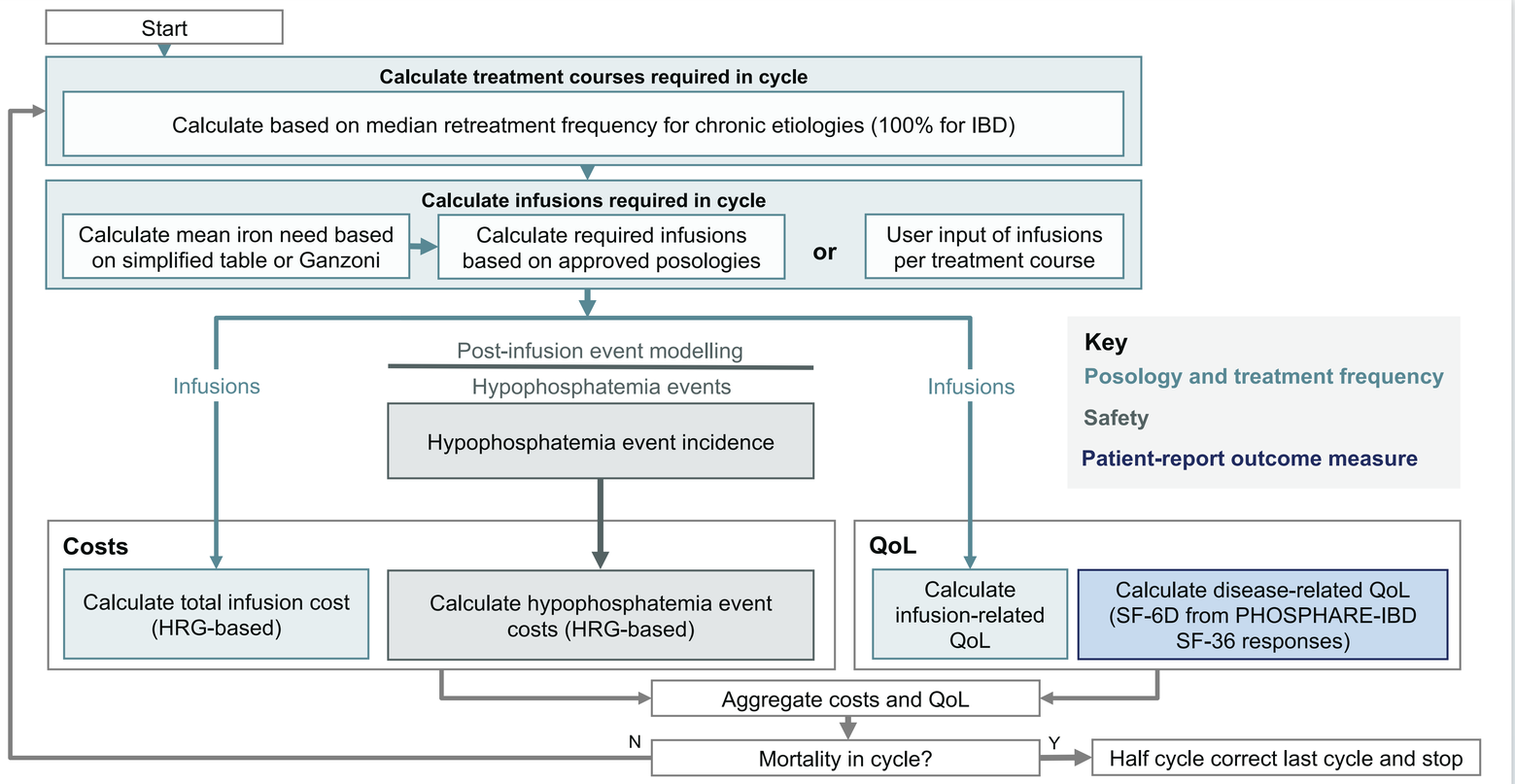
Intravenous iron is the preferred treatment for patients with iron deficiency anemia (IDA) who are intolerant of or unresponsive to oral iron, or who need rapid iron replenishment. Two high-dose, rapid-infusion iron formulations are currently available in the UK; ferric derisomaltose (FDI; Pharmacosmos A/S, Holbaek, Denmark) and ferric carboxymaltose (FCM; Vifor France, Paris, France).

The two iron formulations have been shown to be equivalent in terms of hematological response, but differ in the approved posology (FDI can be dosed up to 20 mg/kg, while FCM can be dosed up to 20 mg/kg with a limit of 1,000 mg per single dose) and recent trials have shown a significantly higher incidence of hypophosphatemia after the administration of FCM versus FDI.[1,2] In 2020, the UK Medicines and Healthcare products Regulatory Agency (MHRA) issued a Drug Safety Update on FCM regarding the risk of symptomatic hypophosphataemia leading to osteomalacia and fractures.[3]

Three randomized controlled trials (RCTs) have recently been conducted comparing the two formulations directly; two trials of identical design conducted in general IDA populations, and one trial conducted specifically in a population of patients with IDA associated with inflammatory bowel disease (IBD).[1,2]

The objective of the present study was to evaluate the cost-utility of FDI versus FCM in patients with IBD in the UK.

Figure 1. Cost-utility model schematic showing the patient-level model structure capturing differences in the posology of the iron formulations, differences in hypophosphatemia, and differences in patient-report outcomes

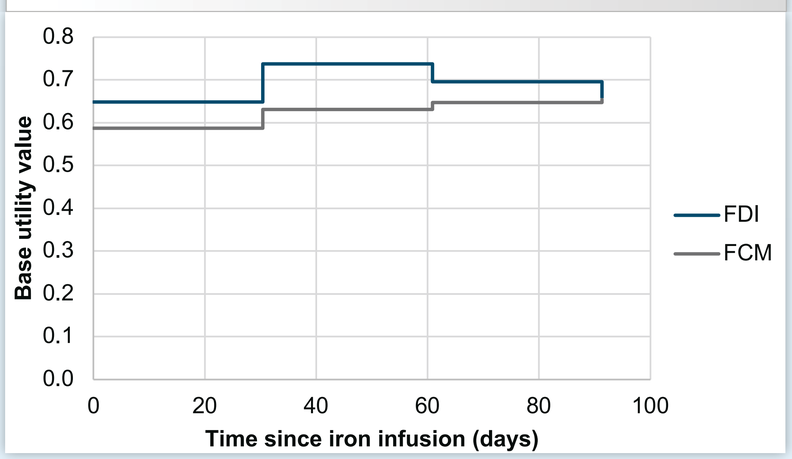


Methods

Cost-utility model and clinical data

A previously-published patient-level cost-utility model of iron deficiency was used to evaluate the cost-utility of FDI versus FCM in patients with IBD and IDA in the UK.[4] The model was configured to capture differences in the incidence of hypophosphatemia based on the PHOSPHARE-IBD trial, differences in the number of iron infusions required to correct the individually-calculated iron need, and differences in quality of life based on SF-6D utility values derived from the PHOSPHARE-IBD trial (Figure 1).[2,5]

Figure 1. Modeled SF-6D utility values up to 90 days after the first infusion of ferric derisomaltose (FDI) or ferric carboxymaltose (FCM)



No differences in hematological response were modeled in line with the finding that there was no significant difference in the change from baseline hemoglobin with FDI versus FCM in the PHOSPHARE-IBD trial.[2] Costs of hypophosphatemia treatment were modeled based on a published treatment algorithm and UK real world data.[6,7,8]

Perspective, currency and discounting

The UK cost-utility analysis was conducted from the perspective of the healthcare payer, NHS England, and ultimately the Department of Health and Social Care (DHSC). Costs were reported in 2022 pounds sterling and future cost and effectiveness outcomes were discounted at a rate of 3.5% *per annum*.

Table 1. Population characteristics and time-to-retreatment used in the base case analysis evaluating the cost-effectiveness of ferric derisomaltose versus ferric carboxymaltose in the UK

Characteristic[2]	**Mean**	**SD**
Age (years)	42.1	14.4
Hemoglobin (g/L)	105	14
Bodyweight (kg)	80.2	15.9
Characteristic[9]	**Median**	**95% CI**
Time to retreatment (months)	16	7–24

Patient characteristics (age, hemoglobin, and bodyweight) were obtained from the PHOSPHARE-IBD trial report (Table 1).[2,9] Lognormal distributions around hemoglobin and bodyweight were sampled independently to inform the iron need calculations, which were based on a simplfiied table-based approach in the base case analysis.

Costs

The cost of each iron infusion was calculated using the five healthcare resource group (HRG) codes for IDA, specifically SA05G-L ("Iron Deficiency Anaemia" with varying comorbidity and complication levels). The five codes were weighted by recent activity data from the National Cost Collection for the NHS, ultimately yielding a cost of GBP 314.71 per infusion. Costs of administering intravenous phosphate were captured based on the lowest HRG tariff costs for "Fluid or Electrolyte Disorders, without Interventions" (specifically KC05N and KC05M), corresponding to a cost per phosphate infusion of GBP 297.

One-way sensitivity analyses and probabilisitic sensitivity analyses (PSA) were conducted around the base case analysis. Specifically, one-way analyses were conducted around the mean baseline hemoglobin level and bodyweight. The PSA was based on running 1,000 model iterations with 50 patients per iteration.

Results

Iron infusions and costs

Patients in both arms received an average of 3.96 courses of iron treatment (consisting of one or more iron infusions) over the five year time horizon. Patients treated with FDI required 1.52 fewer iron infusions (5.68 versus 7.20 infusions) over the five-year time horizon versus FCM, corresponding to 0.39 fewer infusions per treatment course (1.43 with FDI versus 1.82 with FCM). The reduction in the number of infusions drove infusion-related cost savings of GBP 451 per patient (GBP 2,137 with FCM versus GBP 1,686 with FDI) over the five-year time horizon.

Costs of monitoring and treating hypophosphatemia after treatment with FCM were GBP 308 versus GBP 0 with FDI based on the incidence of hypophosphatemia in the PHOSPHARE-IBD trial and the assumption of no phosphate monitoring requirement with FDI.

Cost-utility of FDI versus FCM

Compared with FCM, FDI increased quality-adjusted life expectancy by 0.074 QALYs from 2.571 QALYs to 2.646 QALYs over the five-year time horizon. Overall costs were GBP 2,445 with FCM versus GBP 1,686 with FDI, resulting in FDI dominating FCM with increased quality-adjusted life expectancy and reduced costs.

Sensitivity analyses

Probabilistic sensitivity analysis results were used to generate cost-effectiveness scatterplots and acceptability curves (not presented), which showed that there would be a 100% likelihood of FDI being cost-effective versus FCM at willingness-to-pay thresholds from GBP 0–50,000 per QALY gained.

Conclusion

- The analysis showed that FDI would improve patient quality of life and reduce direct healthcare expenditure versus FCM in patients with IBD and IDA in the UK.
- The FDI cost savings were driven by reductions in the number of infusions required and no need for monitoring and treatment of hypophosphatemia.

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Acknowledgement

This study was sponsored by Pharmacosmos A/S.

Poster presented at the International Society for Pharmacoeconomics and Outcomes Research (ISPOR) Europe
Vienna, Austria • November 6-9, 2022