EE254

# A Cost-Utility Analysis of Ferric Derisomaltose Versus Ferric Carboxymaltose in Patients with Inflammatory Bowel Disease in Italy

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## Background

Anemia is the most common extraintestinal complication of inflammatory bowel disease (IBD), with approximately half of cases caused by iron deficiency. Intravenous (IV) iron is the preferred iron deficiency anemia (IDA) treatment where oral iron is contraindicated, ineffective or not tolerated, or where correction of iron deficiency is urgent. The recent PHOSPHARE-IBD randomized controlled trial (RCT; ClinialTrials.gov ID NCT03466983) reported significantly higher incidence of hypophosphatemia after treatment with ferric carboxymaltose (FCM) than ferric derisomaltose (FDI), confirming the findings of the PHOSPHARE-IDA trials.[1,2]

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

## Methods

### Cost-utility model

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 inflammatory bowel disease in Italy (Figure 1).[3] 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 (QoL) based on SF-6D utility values derived from the PHOSPHARE-IBD trial. Hypophosphatemia treatment was modeled based on a published treatment algorithm and real world data.[4,5,6]

### Modeling of iron need and administration

Iron need was modeled based on simplified tables of iron need, with each simulated patient being assinged baseline hemoglobin and bodyweight values based on lognormal distributions parameterized using the characteristics of patients enrolled in the PHOSPHARE-IBD trial. The number of infusions of FDI and FCM required to address the modeled iron need was calculated based on the posological characteristics described in the product labels. Given the chronic nature of IBD, it was assumed that patients would experience IDA recurrence over time, with median time to recurrence of 16 months based on a 2009 pooled analysis of studies in patients with IBD.[7] In between iron treatment courses, disease-related QoL was brought linearly back to the PHOSPHARE-IBD baseline (Figure 2).

### Italian analysis

The analysis was conducted over a five-year time horizon from a national payer perspective. Costs in the analysis were based on diagnosis-related groups (DRGs), which covered both infusion and drug costs for IV iron infusions and phosphate replenishment in patients experiencing hypophosphatemia.

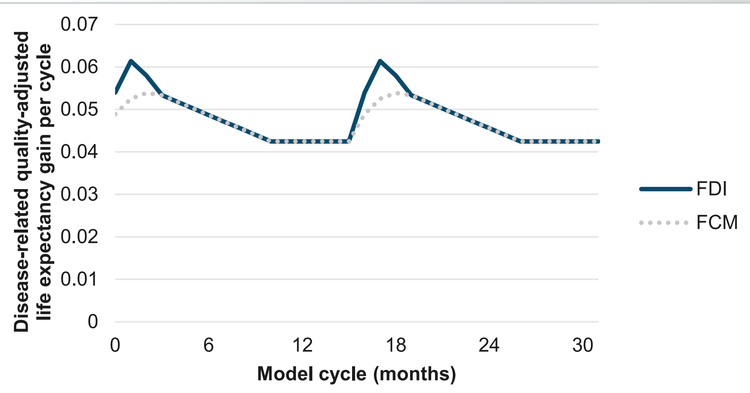
Future costs and effects were discounted at 3.5% *per annum*. The model reported outcomes expressed in terms of costs and quality-adjusted life years with FDI, FCM, and the difference, in addiiton to incremental cost-effectiveness ratios and net monetary benefits (NMBs) calculated based on a willingness-to-pay threshold of €30,000 per QALY gained. Sensitivity analyses were performed.

## Results

### Base case results

Patients treated with FCM or FDI received an average of 3.96 iron treatment courses over the five-year time horizon; however, patients treated with FDI required 1.43 infusions per treatment course, versus 1.82 with FCM, resulting in 1.52 fewer iron infusions over the full time horizon (7.20 infusions with FCM versus 5.68 infusions with FCI). This difference result in infusion-related cost savings of €310 per patient with FDI (€1,467 with FCM versus €1,157 with FDI).

**Figure 2. Per-cycle increases in quality-adjusted life expectancy in living patients treated with ferric derisomaltose versus ferric carboxymaltose**




Compared with FCM, FDI increased quality-adjusted life expectancy by 0.075 QALYs from 2.57 QALYs to 2.65 QALYs.

Costs of monitoring and treating hypophosphatemia after treatment with FCM were €169 per patient, resulting in total cost savings of €478 per patient treated with FDI (€1,635 with FCM versus €1,157 with FDI). FDI was therefore the dominant intervention, and the NMB with FDI versus FCM was €2,721 in the base case analysis.

### Sensitivity analyses

FDI remained dominant in all one-way sensitivity analyses conducted; however, the analyses showed that the base case was most sensitive to changes in baseline bodyweight (Figure 3), with a 10% reduction in mean baseline bodyweight reducing the NMB by €162, from €2,721 in the base case to €2,559 (Figure 3). Chages in mean baseline hemoglobin levels had an effect on a similar order of magnitude to changes in mean baseline bodyweight, with a 10% reduction in baseline hemoglobin reducing the NMB by €157 to €2,563. Other analyses, including changing the cost per infusion of FDI, cost of serum phosphate testing, cost of intravenous phosphate replenishment, and the incidence of all and severe hypophosphatemia after FCM had a negligible effect on the NMB, with changes falling below €50 over the full time horizon.

In probabilistic sensitivity analyses, all model iterations fell in the southeast quadrant of the scatterplot, showing FDI to be less costly and more effective than FCM. A cost-effectiveness acceptability curve generated from the model iterations showed a 100% likelihood of cost-effectiveness at willingness-to-pay thresholds between €0 and €100,000 per QALY gained.

## Conclusions

- The analysis showed that FDI would improve patient quality of life and reduce direct healthcare expenditure versus FCM in patients with IBD in Italy.
- Cost savings with FDI were driven by reductions in iron infusions and hypophosphatemia monitoring and treatment.

**Figure 3. One-way sensitivity analysis results showing change from the base case net monetary benefit based on a willingness-to-pay threshold of EUR 30,000 per quality-adjusted life year gained**

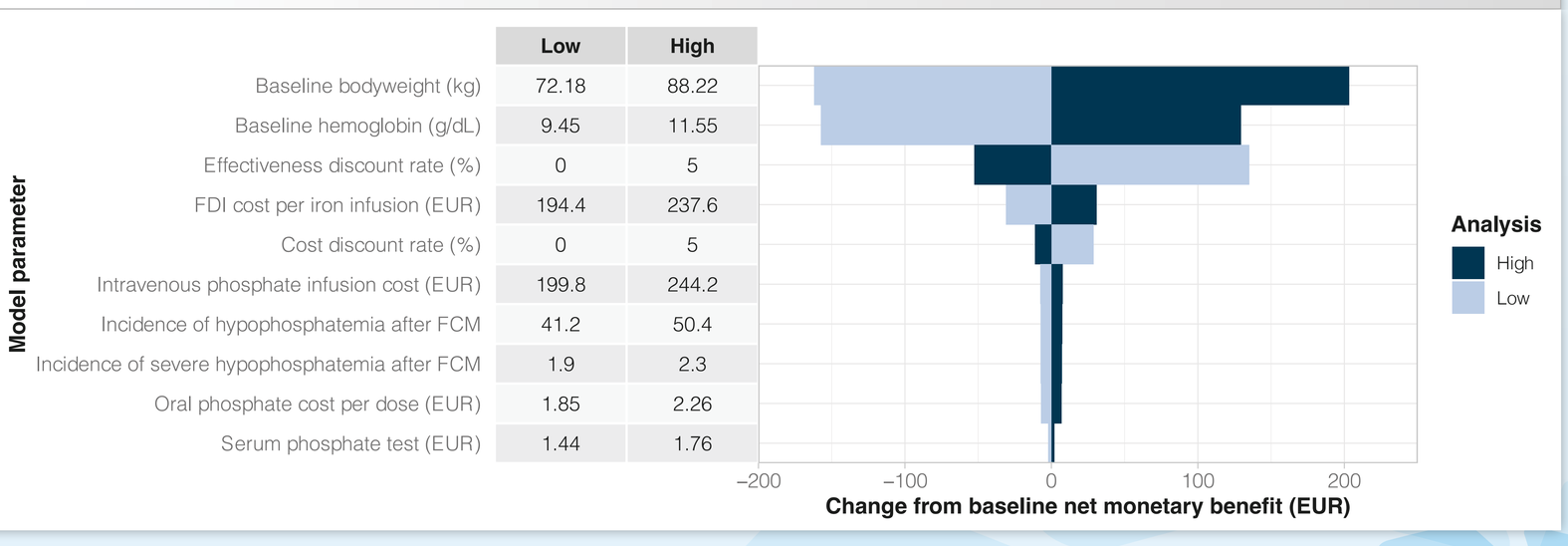
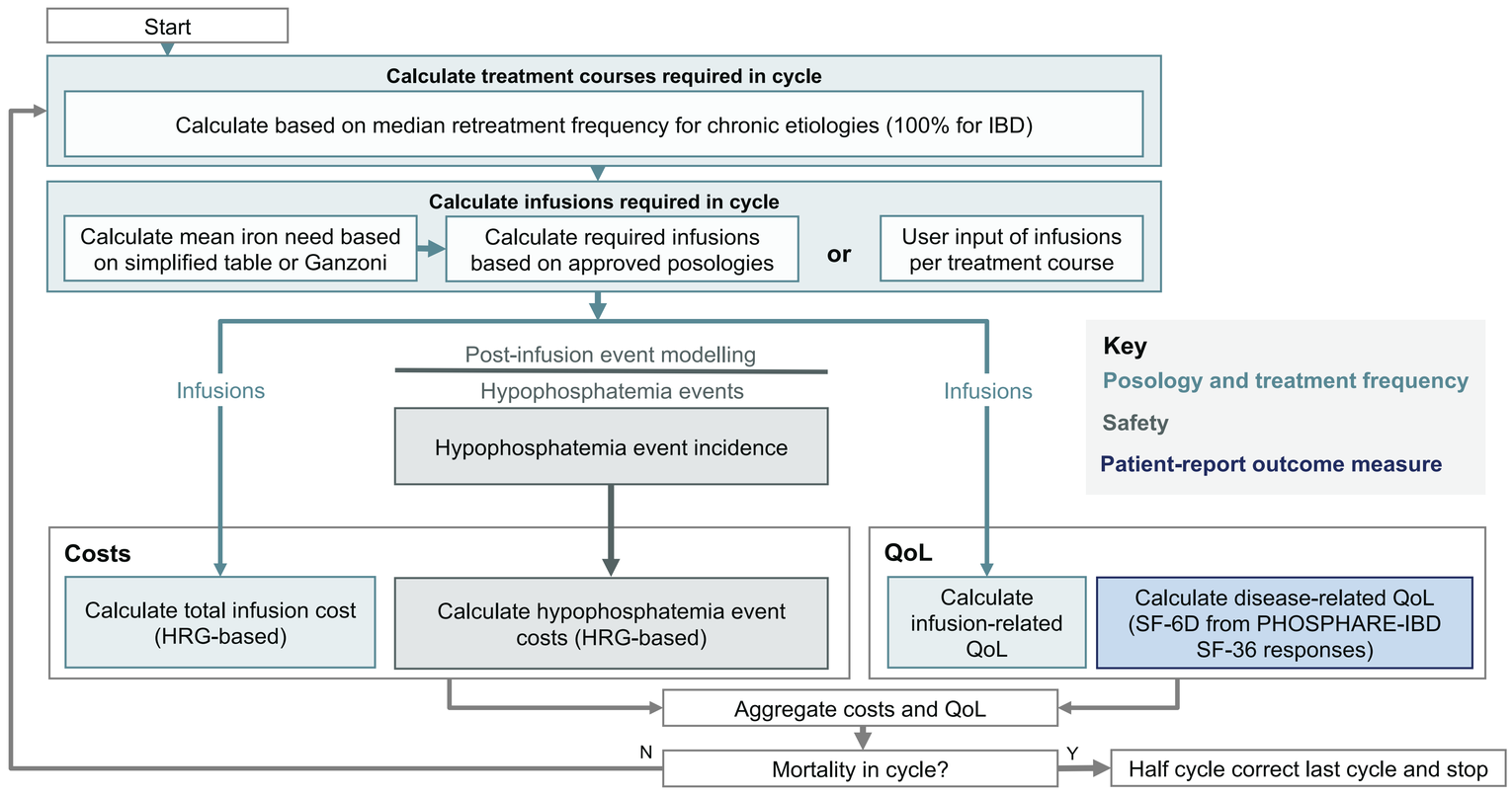



**Figure 1. Cost-utility model schematic showing the patient-level model structure capturing differences in the posology of the iron formulations, differences in hypophosphatemia, and differences in patient-report outcomes**

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