Translating findings from AFFIRM-AHF: Events avoided and cost savings associated with the use of ferric carboxymaltose for the treatment of iron deficiency in patients with acute heart failure with reduced ejection fraction in Italy

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Introduction

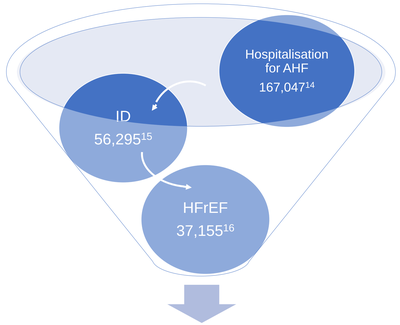
- Heart failure (HF) is a leading cause of hospitalisation in Europe, and affects approximately 64 million people worldwide.[1,2]
- Despite the advances in HF management, high HF hospitalisation (HHF) rates cause considerable economic burden to the Italian healthcare system.[3]
- Reports state that Iron deficiency (ID) affects 50% of chronic HF patients,[4,5] and is present in up to 80% of patients hospitalised for an episode of acute HF (AHF).[6,7] In HF patients, ID is associated with poor quality of life,[8] reduced exercise capacity,[9] and increased risk of hospitalisation and mortality.[10]
- Consequently, ID adds further burden to both HF patients and healthcare systems, representing an unmet medical need in patients with HF and a potential therapeutic target.
- Intravenous ferric carboxymaltose (FCM) is an approved ID therapy which rapidly replenishes iron stores and is often used to correct anaemia.[11] The current European Society of Cardiology HF guidelines suggest FCM should be considered in symptomatic patients with left ventricular ejection fraction (LVEF) < 45% and ID, and in patients recently hospitalised for HF and with LVEF ≤ 50% and ID.[12]
- FCM has recently demonstrated improvements in HF hospitalisation (HHF) and quality of life in stabilized patients after an acute heart failure episode with HF with reduced ejection fraction (HFrEF) and ID in a recent trial (AFFIRM-AHF, NCT02937454).[13]

Objective

- The objective of this study was to assess the cost consequence of introducing FCM for the treatment of ID in HFrEF patients previously hospitalised for AHF from the perspective of healthcare payers in Italy.

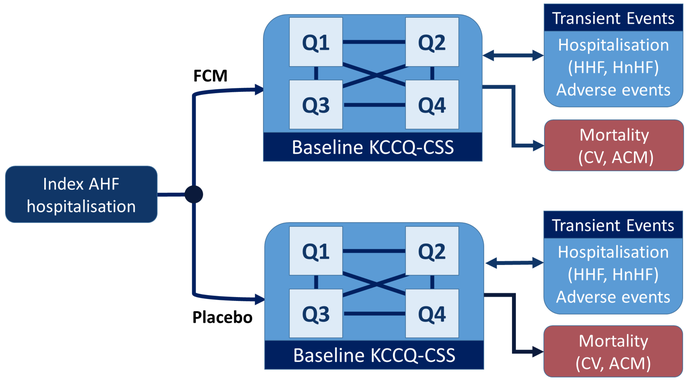
Methods

- The financial impact of introducing FCM therapy for the treatment of ID in HFrEF patients who were hospitalised for AHF was estimated using a de novo cost-offset model over a five-year time horizon from the perspective of healthcare payers in Italy.
- Estimated number of eligible patient population was derived as shown below:



- The base case assumed 33.7% patients hospitalised for AHF had concomitant ID, based on a UK-specific retrospective cohort study.[15] A prospective French study indicates that ID may be underdiagnosed, estimating up to 79.4% patients hospitalised for AHF had ID,[6] therefore a scenario analysis using this eligible population (87,539) was evaluated.
- The rates of HHF were incorporated from the AFFIRM-AHF trial,[13] and confirmed using a Cohort state-transition Markov model.[17] The model outline is shown in **Figure 1**.
- To evaluate the association between treatment uptake and events avoided and cost-savings, a linear regression was employed.
- The model input costs were sourced from published literature, with the mean cost of hospitalisation for HF reported in the Italian NHS as €6,983.91.[18] Costs of FCM applied over the first two months totalled €270.77. Costs were adjusted to 2020 prices.

Figure 1: Cohort state-transition Markov model used to estimate outcomes for patients with HFrEF and ID following an index hospitalisation for acute HF



ACM: all-cause mortality; AHF: acute heart failure; CV: cardiovascular; FCM: ferric carboxymaltose; HHF: hospitalisation for heart failure; HnHF: non-heart failure hospitalisation; KCCQ-CSS: Kansas City Cardiomyopathy Questionnaire – Clinical Summary Score; Q1/2/3/4: quartile 1/2/3/4. Figure derived from [17]

Results

- Across the five-year time horizon, an estimated 37,155 patients were admitted with acute HFrEF and ID.
- Without FCM intervention, 42,503 HF-related bed days were predicted within this patient population, with an associated expenditure of €120.4 million over the five-year time horizon (**Figure 2a and 3a**).
- Treatment with FCM resulted in a cost savings of €1.5 million per 1,000 patients over a five-year time horizon, as a result of a reduction in HF-related bed days of 220 days per 1,000 patients. Cost savings decreased to €1.26 million per 1,000 patients after accounting for drug acquisition costs (**Table 1**).
- Treating all 37,155 patients with FCM resulted in an estimated reduction in total HF-related bed days of 8,137 days, amounting to an overall cost saving of €56 million and €46.8 million without and with drug acquisition costs, respectively, over the five-year time horizon (**Figure 2b and 3b**).
- In a scenario analysis where 79.4% patients hospitalised for AHF had ID and were treated with FCM, hospital bed days were reduced by 19,170 days, corresponding to a cost saving of €110.1 million (€133.8 million without adjustment) over 5 years.

Figure 2: a) HF-related bed days associated with FCM versus placebo b) Difference in cumulative HF-related bed days

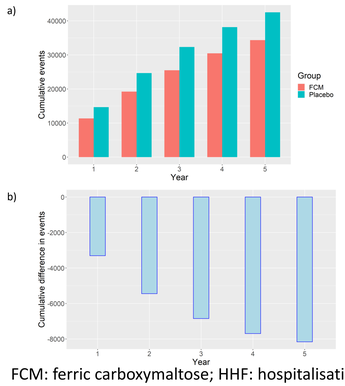
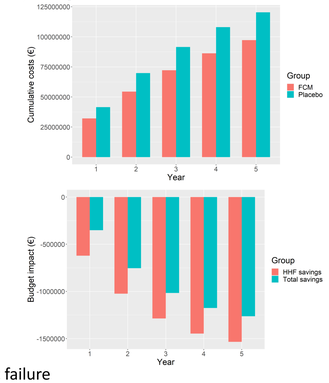


Figure 3: a) Cost of HF-related bed days associated with FCM versus placebo, b) budget impact associated with FCM, per 1,000 patients



FCM: ferric carboxymaltose; HHF: hospitalisation for heart failure

Table 1: Reduction in HF-related bed days associated with FCM versus placebo

Year	Reduction in HF-related bed days/1,000 patients	Hospitalisation cost savings/1,000 patients	Total cost savings/1,000 patients
Year 1	–89	–€621,365	–€350,595.26
Year 2	–147	–€1,024,127	–€753,357.02
Year 3	–184	–€1,286,776	–€1,016,005.53
Year 4	–207	–€1,446,346	–€1,175,576.21
Year 5	–220	–€1,533,855	–€1,263,084.73

FCM: ferric carboxymaltose; HF: heart failure; HHF: hospitalisation for heart failure

Conclusion

This analysis of AFFIRM-AHF showed that in iron-deficient patients stabilised after an episode of AHF, FCM reduced the number of HF hospitalisations and resulted in a reduction of HF-related bed days. Considering the prevalence of ID in HF, FCM treatment has the potential to provide cost savings to the Italian healthcare system via reducing the burden of HHF.

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