Events Avoided and Cost Savings Associated with the Use of Intravenous Ferric Carboxymaltose for the Treatment of Iron Deficiency in Patients Stabilised after an Acute Heart Failure Episode with Reduced Ejection Fraction in the UK

Phil McEwan[1], Piotr Ponikowski[2], Jason A Davis[1], Giuseppe Rosano[3], Andrew J. Stewart Coats[4], Fabio Dorigotti[5], Donal O'Sullivan[5], Antonio Ramirez de Arellano[5], Ewa A. Jankowska[2]

[1]Health Economics and Outcomes Research Ltd, Cardiff, UK; [2]Department of Heart Diseases, Wrocław Medical University, Wrocław, Poland; [3]Cardiovascular and Cell Sciences Research Institute, St George's University, London, UK; [4]University of Warwick, Warwick, UK; [5]Vifor Pharma, Glattbrugg, Switzerland

POSC131

Introduction

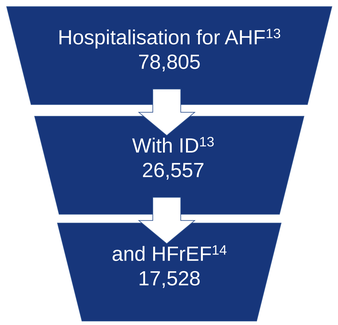
- Heart failure (HF) is a major global public health burden, affecting an estimated 64 million people worldwide.[1]
- Despite recent advances, prognosis remains poor[1] and patients with HF experience significantly impaired health-related quality of life (HRQoL).[2]
- The significant morbidity associated with HF places considerable strain on the NHS; HF is one of the biggest causes of hospitalisations in the UK.[3]
- Iron deficiency (ID) is prevalent in up to 50% of patients with chronic HF[4,5] and present in up to 80% of patients hospitalised for an episode of acute heart failure (AHF).[6,7]
- In patients with HF, ID is associated with reduced exercise capacity,[8] impaired HRQoL,[9] increased risk of hospitalisation and mortality.[10]
- High prevalence and adverse outcomes means that ID represents a substantial unmet medical need in patients with HF and presents a novel therapeutic target.
- The AFFIRM-AHF trial (NCT02937454) has shown ferric carboxymaltose (FCM) to be effective in patients with ID and heart failure with reduced ejection fraction (HFrEF), at reducing the risk of hospitalisation for heart failure (HHF) and improving quality of life.[11]

Objective

- The objective of this study was to estimate clinical events and cost consequences for UK healthcare payers after introducing FCM to treat ID in HFrEF patients previously hospitalised for AHF.

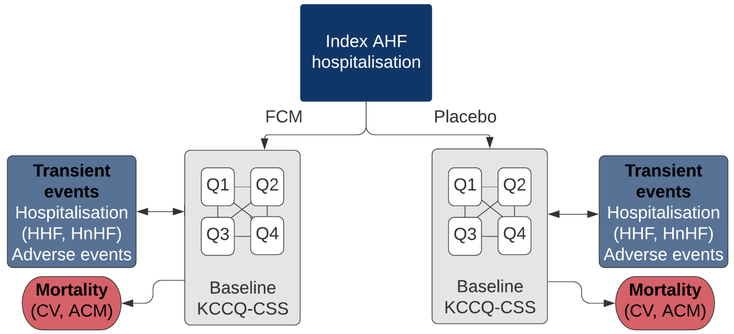
Methods

- A de novo cost-offset model was built to estimate the impact of introducing FCM for treatment of ID in HFrEF patients who were hospitalised for AHF over a five-year time horizon in the UK.[12]
- The base case eligible patient population was estimated as follows:



- The proportion of patients hospitalised for AHF with concomitant ID was taken to be 33.7%, based on a UK-specific retrospective cohort study.[13] An alternative source – a prospective study in the French setting – was identified,[6] where up to 79.4% patients hospitalised for AHF had ID. Therefore, a scenario analysis based on this eligible population (41,297) was included.
- Outcomes in patients hospitalised for AHF with ID and treated with either FCM or placebo were determined by a previously published economic model.[11] The model structure is outlined in **Figure 1.** These outcomes were used as inputs in the cost-offset model.
- The association between treatment uptake and events avoided and cost savings was deduced by linear regression.
- Costs were obtained from published literature. HHF costs used were £2,382 (standard error 283.20).[12,15,16] Costs of FCM applied over the first two months totalled £242.99. All costs were adjusted to 2020 units.

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 McEwan et al. 2020[12]

Results

- Without treatment, individuals were estimated to incur 20,051 HF-related bed-days with an associated cost of £56.8 million **(Figure 2a and 3a).** Treatment with FCM was associated with a reduction of 220 HF-related bed days per 1,000 patients over 5 years **(Table 1).**
- This reduction in HF-related bed days corresponded to cost savings of £621,983, which decreased to £378,993 after accounting for drug acquisition costs **(Table 1).**
- In a scenario where all eligible patients were treated with FCM, HF-related bed days would be reduced by 3,850 with an associated cost savings of £10.9 million and £6.6 million without and with drug acquisition costs, respectively **(Figure 2b, 3b and 4).**

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

Year	Reduction in HF hospital bed days/1,000 patients	Hospitalisation cost savings/1,000 patients	Total cost savings/1,000 patients
Year 1	-89	-£252,049	-£9,059
Year 2	-147	-£415,287	-£172,297
Year 3	-184	-£521,792	-£278,802
Year 4	-207	-£586,498	-£343,508
Year 5	-220	-£621,983	-£378,993

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

- The discrepancy in prevalence of ID in patients hospitalised for AHF derived from retrospective versus prospective studies indicates that ID may be underdiagnosed. In a scenario where 79.4% patients hospitalised for AHF had ID[6] and were treated with FCM, hospital bed days were reduced by 9,070 days, corresponding to a cost saving of £15.7 million after considering drug acquisition costs, over 5 years (£25.7 million unadjusted).

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

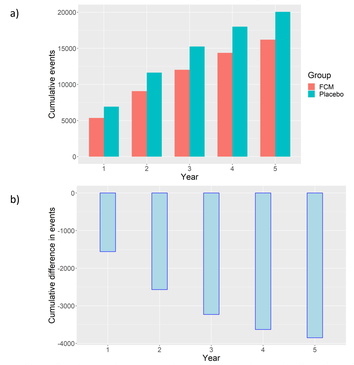
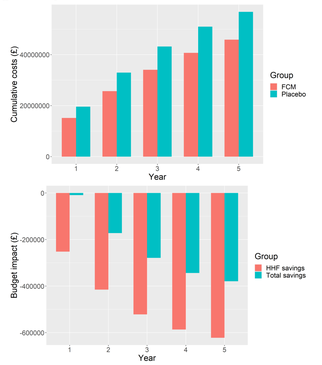
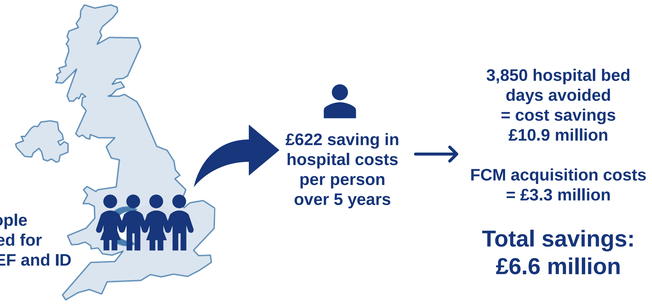


Figure 3: a) Cost of HF-related bed days associated with FCM versus placebo b) budget impact associated with FCM



FCM: ferric carboxymaltose; HHF: hospitalisation for heart failure

Figure 4: Estimated resource use and cost savings over 5 years associated with FCM use versus placebo if all eligible patients treated



Conclusion

The growing prevalence of HF and the increased risk of recurrent hospitalisation in patients hospitalised for AHF pose a significant burden on NHS resources. FCM has the potential to substantially reduce HHF burden and deliver costs savings to the UK healthcare system in patients with HFrEF and ID who have been hospitalised with acute HF.

References

1. Groenewegen A et al. Eur J Heart Fail 2020;22:1342-1356.
2. Juenger J et al. Heart 2002;87:235-241.
3. Ambrosy AP et al. J Am Coll Cardiol 2014;63:1123-1133.
4. Anand IS et al. Circulation 2018;138:80-98.17.
5. Jankowska EA et al. Eur Heart J 2013;34:816-829.
6. Cohen-Solal A et al. Eur J Heart Fail 2014;16:984-991.
7. Wexler D et al. Int J Cardiol 2004;96:79-87.
8. Jankowska EA, et al. J Cardiac Fail. 2011;17:899–906.
9. Comín-Colet J et al. Rev Esp Cardiol (Engl Ed) 2015;68:846-851.
10. Martens P, et al. Acta Cardiol. 2018;73(2):115–123
11. Ponikowski P et al. *Lancet* 2020;396:1895-1904.
12. McEwan P et al. Eur J Heart Fail. 2021 Jun 30. doi: 10.1002/ejhf.2270.
13. Beattie JM et al. Open Heart. 2020 Mar 11;7(1):e001153.
14. National Heart Failure Audit (England and Wales) 2019 (2017/2018 data). https://www.nicor.org.uk/wp-content/uploads/2019/09/Heart-Failure-2019-Report-final.pdf
15. Department of Health. NHS reference costs 2017 to 2018. Available from: https://improvement.nhs.uk/resources/reference-costs/.
16. McEwan P et al. European Journal of Heart Failure. 2020;22(11):2147-56.

Presented at Virtual ISPOR EU; 1st-3rd December, 2021
This study was supported by Vifor Pharma, Glattbrugg, Switzerland