Evaluation of iron infusion dosing in gastroenterology ambulatory patients

Rachel Goodman, Patrick Hilley, Simone Taylor and Claire Keith

Pharmacy Department, Austin Health, Victoria

Background

Ferric carboxymaltose (FCM) and ferric derisomaltose (FDM) are the first-line intravenous iron products prescribed by our local Gastroenterology Unit. This is due to their short administration times and that iron stores can be repleted in one to two infusions (1). The Product Information for both products recommends dosing based on the patient's total iron deficit. This is calculated using the full Ganzoni formula or the simplified Ganzoni method (Table 1) (2-4).

Anecdotally, patients may receive inadequate replacement of their iron deficit when FCM is used because the maximum dose per infusion is 1,000mg. Inadequate iron replacement may occur less frequently with FDM because higher doses of 1,500mg can be given as a single infusion. Maximising the dose administered at each visit may improve anaemic symptoms more quickly and reduce the number of subsequent iron infusions required. This may minimise patient burden associated with multiple Ambulatory Care Centre (ACC) attendances and potentially free up valuable hospital resources.

Table 1: Simplified Ganzoni method (3)

Haemoglobin (g/L)	Patient bodyweight	
	35kg to <70kg	70kg and above
< 100	1,500 mg	2,000 mg
100 to < 140	1,000 mg	1,500 mg
≥ 140	500 mg	500 mg

Aims

To describe the dosing of iron infusions received by gastroenterology patients attending the Austin Health ACC; with a focus on FCM and FDM.

Method

Study design, setting and time-period
A retrospective, observational study was conducted at Austin Health between February to July 2022.

Inclusion Criteria
- Gastroenterology unit patients who received an iron infusion at Austin Health ACC between January 1st, 2021, and December 31st, 2021
- Patients who received either FCM or FDM

Exclusion Criteria
Infusions for which the patient did not have a documented:
- haemoglobin result within 90 days prior to the infusion.
- bodyweight measured within 12 months prior to receiving the iron infusion.

Primary endpoint
Proportion (%) of iron infusion doses that were considered therapeutic.

Secondary endpoints
Proportion (%) of patients who:
- received more than one iron infusion in the observed time-period
- were dosed therapeutically in the first infusion

Data collection procedure
Patients were identified through extraction of data from the hospital pharmacy dispensing system, Merlin. Cerner Powerchart and Scanned Medical Records electronic databases were then used to extract relevant patient data using an explicit data collection tool.

Definitions
Therapeutic: iron infusion dosed in concordance with the simplified Ganzoni method dose
Subtherapeutic: iron infusion dosed less than the simplified Ganzoni method dose
Supratherapeutic: iron infusion dosed greater than the simplified Ganzoni method dose

Results

Table 2: Demographics
The following demographics table includes the data from the first included iron infusion for each patient

Total number of patients included	**255**
Age at dispensing (years), mean (standard deviation, range)	52 (18.5, 17-94)
Sex (female), n (%)	153 (60)
Referring unit (%)	
Inflammatory bowel disease	118 (46.3)
General gastroenterology	89 (34.9)
Liver Transplant Unit	28 (11.0)
Hepatology	20 (7.8)
Haemoglobin concentration (g/L), median (IQR)	127 (109-134)
Ferritin concentration (microg/L), median (IQR)	17 (10-26)
Bodyweight (kg), n (%)	
≤49kg	13 (5.1)
50 - 69kg	92 (36.1)
70 - 89kg	82 (32.2)
≥ 90kg	68 (26.7)
FCM infusion, n (%)*	250 (92.6)
FDM infusion, n (%)*	20 (7.4)
PBS category, n (%)*	
General	143 (53.0)
Concession	120 (44.4)
Entitlement	5 (1.9)
Non-PBS	2 (0.7)

*Note: Total number of infusions included; n=270

Figure 1: Percentage (%) of iron infusions considered therapeutic (n=270)

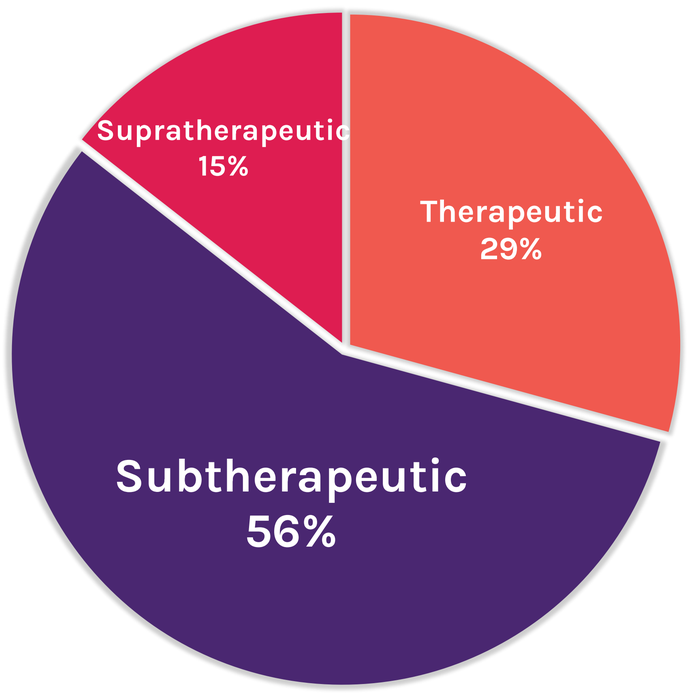

Figure 2: Comparison of the dosing of FCM and FDM infusions

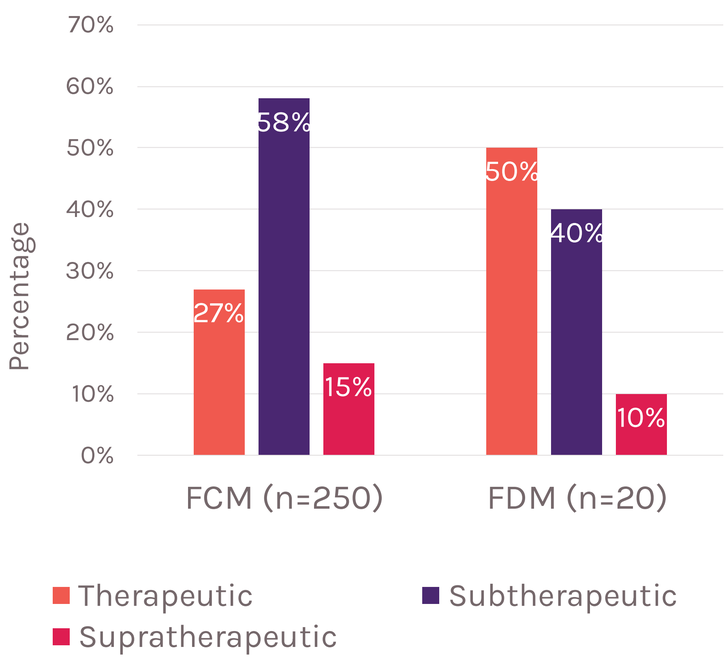

Table 3: Proportion of patients who received more than one iron infusion in the time period

Outcome	Count (%)
Patients who received more than one iron infusion	**17 (7)**
Patients who received more than one iron infusion and all infusions met inclusion criteria	12 (5)
Of these, dosing of the first infusion as per the simplified Ganzoni method	
Subtherapeutic	8
Therapeutic	2
Supratherapeutic	2

Discussion

Most of the infusions included in this study delivered iron doses that were lower than the patient's total iron deficit, calculated using the technique recommended in the Product Information. As hypothesised, the proportion of infusions that fully replaced the iron deficit was greater for FDM than for FCM. This may be because FDM maximal doses are higher than for FCM.

Even though most patients did not have their iron stores repleted with the initial infusion, the proportion of patients who received multiple iron infusions was lower than expected (7%). Most patients who received more than one iron infusion received initial infusion doses that did not adequately replace the iron deficit. This may have contributed to patients re-presenting for subsequent infusions.

Limitations of this study include that this was a single centre study, therefore results may not be broadly generalisable to the practice at other hospitals. The retrospective methodology meant some data was missing, such as haemoglobin and body weight (that required some infusions to be excluded). Patients were not followed beyond the 12-month study period; some subsequent infusions may have been administered that are not included in this study. In addition, previous or subsequent iron infusions may have been administered in the community or at another hospital that were not included in this study. Therefore, the proportion of patients receiving multiple infusions may have been underestimated.

Conclusion

Dosing of iron infusions in gastroenterology patients could be optimised to more fully correct the iron deficit with each infusion. This might be achieved with more frequent use of FDM over FCM. We are unable to conclude from these data whether such optimisation could reduce the number of re-presentations to the ACC for subsequent infusions. This issue should be explored in future studies.

References:
1. Snook J, Bhala N, Beales ILP, et al. British Society of Gastroenterology guidelines for the management of iron deficiency anaemia in adults. GUT 2021;0:1–22. doi:10.1136/gutjnl-2021-325210
2. National Blood Authority Australia. Iron product choice and dose calculation for adults: Guidance for Australian health providers. Canberra: NBA, 2016 [cited 2022 Apr 28]. Available from: https://www.blood.gov.au/system/files/documents/Iron%20product%20choice%20and%20dose%20calculation20052016.pdf
3. MIMS Online [Internet]. Sydney: MIMS Australia; Ferric Carboxymaltose Product Information [last updated 2021 Sep 13; cited 2022 Mar 26]; Available from: https://www.mimsonline.com.au
4. MIMS Online [Internet]. Sydney: MIMS Australia; Ferric Derisomaltose Product Information [last updated 2021 Oct 12, cited 2022 Mar 26]; Available from: https://www.mimsonline.com.au