UNFAVOURABLE OUTCOMES OF BLOOD TRANSFUSIONS IN HOSPITALISED ANAEMIC PATIENTS

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INTRODUCTION / OBJECTIVES

Guidelines recommend the administration of intravenous (IV) iron to patients with anaemia due to iron deficiency [1,2]. Blood transfusions are the last resource, advised only in critical patients, as they allow for a quick raise in haemoglobin (Hb) levels. However, these are also associated with deleterious outcomes [3].

This study aimed to characterize the impact of blood transfusions in length of stay (LOS) and inpatient mortality, in a population of hospitalised anaemic patients treated with two different IV iron formulations.

METHODS

This was a retrospective cohort study. Patient records from a Portuguese general Hospital, with at least one inpatient administration of iron sucrose (IS) in 2014-2015 or ferric carboxymaltose (FC) in 2016 (when FC became available), were reviewed. Adult anaemic patients with at least one Hb evaluation before and after the administration of IV iron were included. Endpoints assessed comprised the association of blood transfusions with anaemia correction, LOS and inpatient mortality, adjusted for sex, age and baseline Hb level. Although other relevant iron-related parameters such as ferritin and transferrin were planned to be analysed, these were not available in the majority of clinical records, therefore these data were not reported.

Statistical analyses were conducted in R 3.5®. An adjusted odds ratio and its 95% confidence interval (95%CI) were calculated to estimate the effect of transfusion on anaemia correction and in-hospital mortality through a logistic regression model. The effect of transfusions on LOS was measured by a generalized linear mixed model (GLMM) with normal distribution and logarithm link.

RESULTS

Data was collected for 1,178 patients, of which 878 were treated with IS and 300 with FC. Mean age was 63.9 and 71.1 years for patients treated with IS and FC, respectively. The majority of patients were female in both groups: 61.4% for the patients treated with IS and 51.3% for the patients treated with FC. Average baseline Hb level was 8.4 g/dl for both groups. The three most frequent conditions leading to anaemia were digestive haemorrhage, post-surgery and oncologic diseases, also in both groups (Table 1).

Table 1 Patients and IV iron administration episodes characteristics, by IV iron formulation

	Iron sucrose (N=878)	Ferric carboxymaltose (N=300)
Female, n (%)	539 (61.4%)	154 (51.3%)
Age (years), mean (SD)	63.9 (20.6)	71.2 (17.0)
Episodes	**Iron sucrose (N=945)**	**Ferric carboxymaltose (N=307)**
Conditions leading to anaemia, n (%)		
Digestive haemorrhage	157 (16.6%)	62 (20.2%)
Post-surgery	142 (15.0%)	61 (19.9%)
Oncology	139 (14.7%)	44 (14.3%)
Other*	507 (53.7%)	140 (45.6%)
Baseline Hb (g/dL), mean (SD)	8.4 (1.3)	8.4 (1.3)
Baseline anaemia severity status, n (%)		
Severe	338 (35.8%)	109 (35.5%)
Moderate	580 (61.4%)	189 (61.6%)
Mild	27 (2.9%)	9 (2.9%)

Legend: *includes kidney disease, nutritional deficiency, urinary haemorrhage, multifactorial anaemia, trauma, postpartum, gynaecologic disease, cardiovascular disease, haemorrhage, iatrogenic anaemia, infection, autoimmune disease, pre-surgery, duodenal haemorrhage, hepatic disease and undetermined; Hb – haemoglobin; SD – standard deviation.

RESULTS (cont.)

The majority of patients required blood transfusions in both groups: 58.0% in the IS and 62.9% in the FC.

Having received a blood transfusion was not significantly associated with anaemia correction in any of the two study groups (Table 2).

Table 2 Model for anaemia correction, by IV iron formulation

Anaemia correction	Iron sucrose			Ferric carboxymaltose		
Covariates	OR	LL 95% CI	UL 95% CI	OR	LL 95% CI	UL 95% CI
Age (years)	0.99	0.97	1.00	0.97	0.95	0.98
Sex (male vs. female)	0.30	0.14	0.61	0.39	0.17	0.90
Baseline Hb (g/dL)	1.04	1.01	1.06	1.03	1.00	1.06
Transfusion status (present* vs. absent**)	1.09	0.60	1.98	1.03	0.28	1.75

Legend: Hb - haemoglobin; OR – Odds Ratio; CI – confidence interval; LL - Lower limit; UL – Upper limit; *During or after iron administration; **Absent or before first iron administration.

Nonetheless, blood transfusion administration was significantly associated with longer LOS and higher in-hospital mortality risk in both study cohorts (Table 3).

Receiving at least one blood transfusion increased the LOS by 21% (95% confidence interval [95%CI]: 8%-35%) in the IS group and 28% in the FC group (95%CI: 3%-60%), when adjusted for age, sex and baseline Hb (Table 3).

The in-hospital mortality risk increased 2.5-fold (95%CI: 1.4-4.3) in patients treated with IS and who received a blood transfusion. As for patients treated with FC, in-hospital mortality was 4.3 times (95%CI: 1.6-12.1) greater in patients who received a blood transfusion (Table 3).

Table 3 Models for LOS and inpatient mortality, by IV iron formulation

Length of stay	Iron sucrose			Ferric carboxymaltose		
Covariates	Exp (β)	LL 95% CI	UL 95% CI	Exp (β)	LL 95% CI	UL 95% CI
Age (years)	1.01	1.00	1.01	1.01	1.00	1.01
Sex (male vs. female)	1.11	0.98	1.24	1.13	0.92	1.39
Baseline Hb (g/dL)	1.00	1.00	1.01	1.00	0.99	1.01
Transfusion status (yes vs. no)	1.21	1.08	1.35	1.28	1.03	1.60
In-hospital mortality	**Iron sucrose**			**Ferric carboxymaltose**		
Covariates	OR	LL 95% CI	UL 95% CI	OR	LL 95% CI	UL 95% CI
Age (years)	1.02	1.01	1.04	1.00	0.98	1.02
Sex (male vs. female)	2.01	1.30	3.13	0.97	0.46	2.02
Baseline Hb (g/dL)	0.99	0.98	1.01	1.00	0.97	1.03
Transfusion status (yes vs. no)	2.48	1.43	4.30	4.35	1.57	12.06

Legend: Hb - haemoglobin; OR – Odds Ratio; CI – confidence interval; LL - Lower limit; UL – Upper limit.

CONCLUSION

The administration of blood transfusions was not associated with a higher anaemia correction, but rather impacted adversely on patients' LOS and in-hospital mortality across different IV iron groups. Therefore, blood transfusions should be carefully considered, in accordance to most recent patient blood management guidelines.

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