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Management of Iron-Deficiency Anemia on Inpatients and Appropriate Discharge and Follow-Up

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Abstract

Background: The aims of the study were to identify appropriate supplementation of iron for inpatients and to identify factors involved in appropriate discharge documentation and follow-up.

Methods: This was a retrospective analysis of 103 patients at a community hospital in New York City.

Results: A total of 57 (57/103, 55.3%) patients were admitted due to symptomatic anemia. Twenty (20/103, 19.4%) of those with iron-deficiency anemia had either esophagogastroduodenoscopy or colonoscopy. Gastroenterologist or hematologist was consulted for 45/103 (43.7%). Inpatient iron supplementation was given for 62/103 (60.2%) of patients; and 43/103 (41.7%) had blood transfusion. Upon discharge, 50/103 (48.5%) had appropriate documentation of iron-deficiency anemia on discharge paperwork. Appropriate follow-up was done for 54/103 (52.4%). Iron supplementation was provided for 53/103 (51.5%) of patients. Having inpatient esophagogastroduodenoscopy or colonoscopy, blood transfusion, or symptomatic anemia had a statistical significance for likelihood of appropriate discharge documentation.

Conclusions: Iron-deficiency anemia can have high rates of mortality and morbidity in the population. Appropriate discharge of patients with iron-deficiency anemia and factors related to this are paramount for clinicians in order to have the best patient outcomes.

Keywords: Iron-deficiency anemia; Congestive heart failure; Chronic kidney disease; Iron supplementation; Inpatient

Introduction

Anemia is defined by hemoglobin levels under 13 g/dL in men, and under 12 g/dL in women [1]. Anemia affects roughly 25% of the world population [2, 3], of which half is caused by iron deficiency, with 2% of American men and 5% of American women affected [2, 3]. Low iron store causes decreased levels of hemoglobin production by the bone marrow [2]. Iron is required for erythrocytes to produce heme for hemoglobin and for vital proteins in oxygen transportation [2-5]. Metabolically active cells, including myocytes, are highly dependent on this.

Previous literature has shown that in patients with untreated iron-deficiency anemia if severe enough, mortality is possible due to either poor tissue oxygenation, or cardiac arrhythmias from left ventricular hypertrophy. There is also high morbidity due to decreased exercise tolerance, increased fatigue, and worsened quality of life index [2, 6, 7].

Iron-deficiency anemia has been poorly diagnosed and treated in inpatients in the past with only 40-66% receiving adequate iron supplementation in tertiary care hospitals [8]. We hypothesized that patients whose admission to our institution revealed a new diagnosis of iron-deficiency anemia would not be reliably discharged on iron supplementation or have the diagnosis appropriately transmitted to their primary care physicians for further evaluation and treatment.

Materials and Methods

We performed a chart review of patients admitted to our academic community hospital in New York City who were discharged from the internal medicine service from January to June 2018, whose test results met criteria for iron-deficiency anemia during that hospital stay. Iron deficiency criterion for men was defined as hemoglobin under 13 g/dL, and women under 12 g/dL, with ferritin less than 30 ng/dL [1-3, 9] for any patient. Diagnostic criteria in patients with congestive heart failure were ferritin below 300 ng/dL and transferrin saturation (TSAT) under 20% [10-18]. Diagnostic criteria for those with chronic kidney disease were ferritin under 100 ng/dL, and TSAT under 20% [19-22]. Those with end stage renal disease had iron-deficiency anemia criteria of ferritin under 200 and TSAT under 20% [22]. The study excluded those with an allergy to iron.

Patients' charts were reviewed for inpatient supplementation of iron, discharge supplementation on paperwork, and documentation of iron-deficiency anemia. Patients' charts were also assessed to see rates of hematology and gastroenterology consults. Rates of blood transfusions, esophagogastroduodenoscopy (EGD), or colonoscopies performed were analyzed. This also reviewed if need for EGD or colonoscopy,

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Table 1. Demographics (N = 103)

Variables	N (%) or result
Gender, N (%)	
Male	28 (27%)
Female	75 (72.8%)
Race, N (%)	
Caucasian	41 (39.8%)
African American	39 (37.9%)
Latino	9 (8.7%)
Asian	6 (5.8%)
Other	8 (7.8%)
Age (average, years)	
Male	68.0
Female	60.6

blood transfusions, or reason for admission was symptomatic anemia if there was a statistical relationship with discharge documentation. We used Chi-squared, relative risk (RR), and odds ratio (OR) to analyze this.

All personal information for patients was de-identified. This paper conforms to the Declaration of Helsinki. Institutional Review Board approval was obtained by Feinstein Institute for Medical Research.

Results

A total of 103 patients were examined, with females 75 (72.8%) and males 28 (27.2%) (Table 1). Demographic breakdown showed that Caucasians 41 (39.8%), African American 39 (37.8%); six patients (5.8%) were Asian, nine (8.7%) Latino, and eight (7.8%) were other (Table 1). The average age was 62.6 years for all patients, with females 60.6 years old and males 68.0 years old.

Of 103 patients discharged, 57/103 (55.3%) were admitted due to symptomatic anemia including: gastrointestinal or genitourinary bleeding, syncope, lightheadedness, or weakness. Colonoscopy or EGD during hospitalization was done on 20/103 (19.4%) of the patients. Either gastroenterologist or hematologist was consulted for 45/103 (43.7%) of the patients. Inpatient iron supplementation was done with 62/103 (60.2%) of the patients. Oral ferrous sulfate supplementations were given in 21/103 (20.4%) of these patients (Table 2). Intravenous iron sucrose was given to 33/103 (32%) of the patients (Table 2). Intravenous sodium ferric gluconate was given to 8/103 (7.8%) of the patients (Table 2). Forty-three (43/103, 41.7%) had blood transfusion inpatient, and 34/43 (79%) of those with blood transfusion had inpatient iron supplementation.

Upon discharge, 50/103 (48.5%) had the term iron-deficiency anemia documented (Table 2). Appropriate follow-up with primary care, gastroenterology, obstetrician and gynecologist, or hematologist was done for 54/103 (52.4%) of the patients (Table 2). Oral iron was supplemented to 53/103 (51.5%) of the patients (Table 2).

Of those with EGD or colonoscopy, 18/20 (90%) had appropriate discharge documentation of iron-deficiency anemia. Of those without the procedure, 32/83 (38.6%) had appropriate discharge documentation. P value was < 0.001 (RR was 2.3 and OR was 14.3, Table 3). These findings showed that having an EGD or colonoscopy had a positive relationship with likelihood of appropriate mention of iron-deficiency anemia on discharge paperwork.

Of those with symptomatic anemia, 38/57 (66.7%) had appropriate discharge documentation. Of those without symptomatic anemia, 12/46 (26.1%) had appropriate discharge documentation. P value was < 0.001 (RR 2.56 and OR 5.67, Table 3).

Of those patients with blood transfusions during their hospital course, 29/43 (67.4%) had appropriate discharge documentation (Table 3). Of those without blood transfusion, 21/60 (35%) had appropriate discharge documentation. P value was 0.0012 (RR 1.93 and OR was 2.07, Table 3).

Discussion

Our study found that only 52.4% of those discharge had appropriate follow-up with care providers or oral iron supplementation, and only 48% had appropriate documentation of iron-deficiency anemia on discharge paperwork. Having a blood transfusion, EGD or colonoscopy, or symptomatic anemia had a higher likelihood of better discharge documentation.

Table 2. Inpatient Iron Supplementation and Discharge

Inpatient iron supplementation and discharge	N (%)
Any form of iron supplementation inpatient	62 (60.2%)
Oral ferrous sulfate inpatient	21 (20.4%)
Intravenous iron sucrose inpatient	33 (32%)
Intravenous sodium ferric gluconate inpatient	8 (7.8%)
Oral iron supplementation on discharge	53/103 (51.5%)
Appropriate follow-up with primary care physician, hematologist, gastroenterologist, or obstetric gynecologist on discharge paperwork or discharged on oral iron supplementation	54 (52.4%)
Proper documentation of iron-deficiency anemia on discharge paperwork	50 (48%)

Table 3. Appropriate Documentation of Iron-Deficiency Anemia and Having EGD/Colonoscopy, Blood transfusion, and Symptomatic Anemia

Variables	N (%)	P value (Chi-square)	Relative risk (95% CI)	Odds ratio
Procedure and appropriate discharge documentation		< 0.001 (17.1)	2.3 (1.7 - 3.2)	14.3
Yes	18/20 (90%)			
No	32/83 (38.6%)			
Blood transfusion and appropriate discharge documentation		0.0012 (10.6)	1.93 (1.3 - 2.9)	2.07
Yes	29/43 (67.4%)			
No	21/60 (35%)			
Diagnostic criteria and appropriate discharge documentation		< 0.001 (16.8)	2.56 (1.5 - 4.3)	5.67
Yes	38/57 (66.7%)			
No	12/46 (26.1%)			

EGD: esophagogastroduodenoscopy; 95% CI: 95% confidence interval.

Iron-deficiency anemia is a highly prevalent condition in the USA. It can put patients at increased risk of death due to decreased oxygen transportation, cause cardiac arrhythmias, and decrease quality of life [1, 2, 6]. Iron-deficiency anemia has been poorly diagnosed and treated in inpatients in the past, with only 60-66% receiving adequate iron supplementation [8]. Only 60.2% of those who were admitted to the hospital with diagnostic criteria of iron-deficiency anemia were supplemented, consistent with prior studies. Our study shows that outpatient management of iron-deficiency anemia after discharge is inadequate, and this can place patients at increased risk for morbidity and mortality.

The limitations of this study include being a retrospective chart review of documentation. Iron-deficiency anemia is also tricky in patients with chronic diseases. Iron supplementation has been shown to help reduce mortality in those with blood loss [2-7]. Iron deficiency due to congestive heart failure and chronic kidney disease confers increased fatigue and decreased exercise capacity [10-22]. Oral or intravenous supplementation depending on inflammatory markers helps patients have a better quality of life. Future studies are needed in interventions to help increase iron supplementation from clinicians.

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Financial Disclosure

None to declare.

Conflict of Interest

None to declare.

Informed Consent

Our research was retrospective in nature. Waiver for informed consent was obtained from the Institutional Review Board at the Feinstein Institute for Medical Research.

Author Contributions

Kishan Patel helped in creating the first draft of the paper and appropriate chart review. Zain Memon helped in literature search, chart review, and data analysis. Rebecca Mazurkiewicz helped with final edits of the paper.

Data Availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

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