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Evaluation of Intravenous Iron in the Inpatient Setting at a Large Health System.

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OBJECTIVE

- To determine whether the inpatient use of intravenous (IV) iron replacement was justified and followed evidence-based guidelines.

BACKGROUND

- The American Society of Hematology found that anemia was the most common hematological disorder in the United States.^{1,2} Anemia/iron deficiency criteria used in this study are as follows^{3,4}:

	Pregnant	Age 12-14 years	Age 15+ years	
			Female	Male
Hemoglobin (g/dL)	<11	<12	<12	<13
Iron (mcmol/L)		Less than 10		
Ferritin (mcmol/L)		Less than 10		

- Risk factors for iron deficiency anemia include pregnancy, patients with heavy menstruation, diets low in red meat, acute or chronic blood loss, intake of medications that reduce the absorption of iron, and malnutrition.⁵
- Some patients require IV iron delivery due to factors including failure of oral iron supplements, chronic blood loss, inflammatory bowel disease that impairs absorption, chronic kidney disease, or need for rapid iron repletion.⁵ Maternal iron deficiency anemia in pregnancy has been associated with decreased birth weight and decreased motor and cognitive development in childhood.^{6,7}
- Inpatient use of IV iron is thought to lower the chance of unnecessary complications for the patient, reduce the blood product usage, and reduce costs for the hospital system.

METHODS

- This study included inpatients who received one or more doses of IV iron replacement therapy, from April 1, 2022 through March 31, 2023, single large health system across 9 hospital locations. Any duplicate encounters with new order numbers were excluded.
- A random sample of 300 patients were identified and all pediatric patient data was included. All IV iron products used during the timeframe were included (iron dextran, iron sucrose, ferrous gluconate). A portion (10%) of data points were manually validated.
- Electronic health record data was collected to identify provider specialty, primary diagnosis from encounter, ICD-10 codes for co-morbidities, encounter numbers, oral medication tolerability, lab values such as hemoglobin, iron, ferritin, and transferrin saturation (TSAT), and past medical history. Study use appropriateness criteria were as follows:

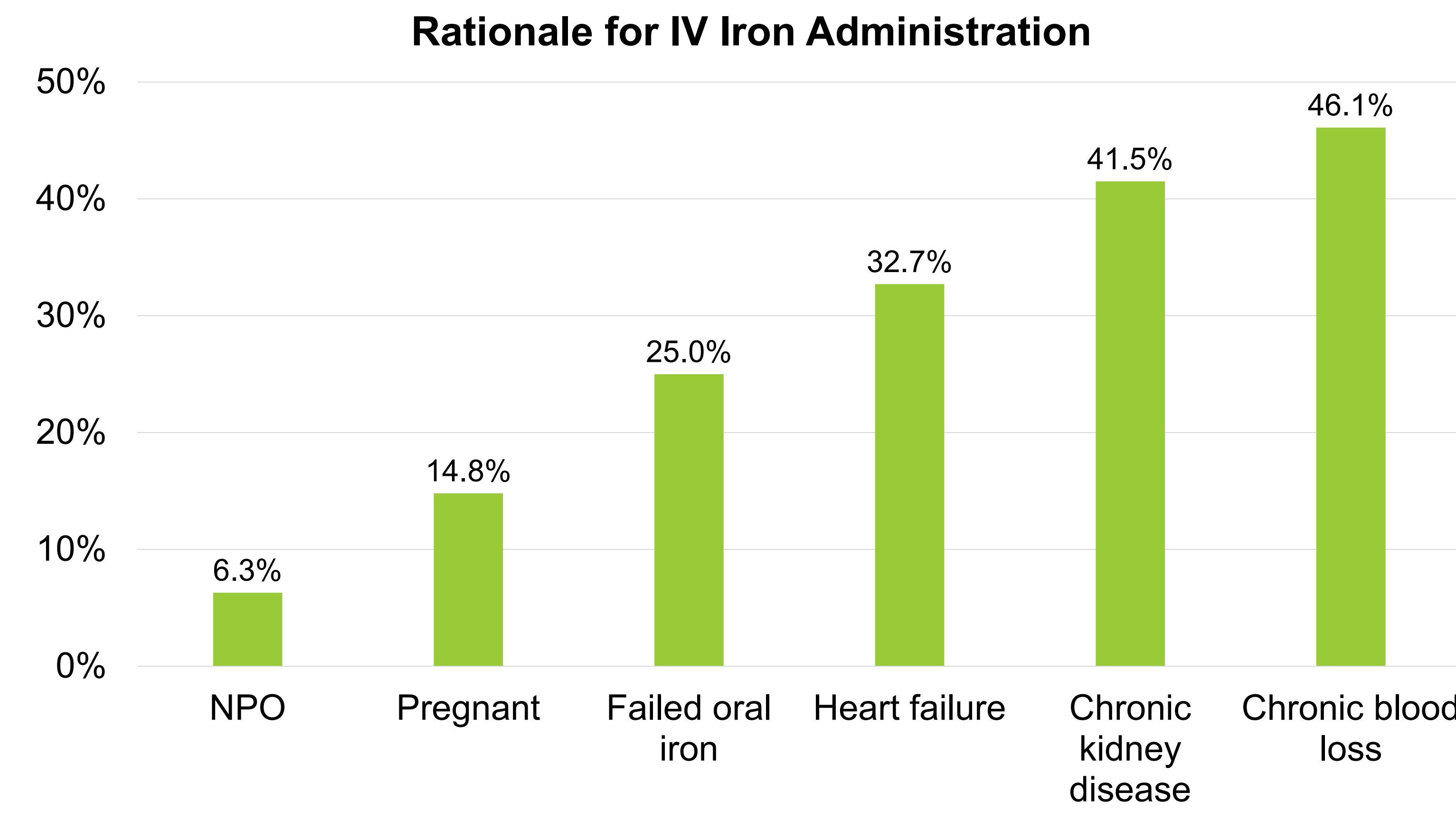
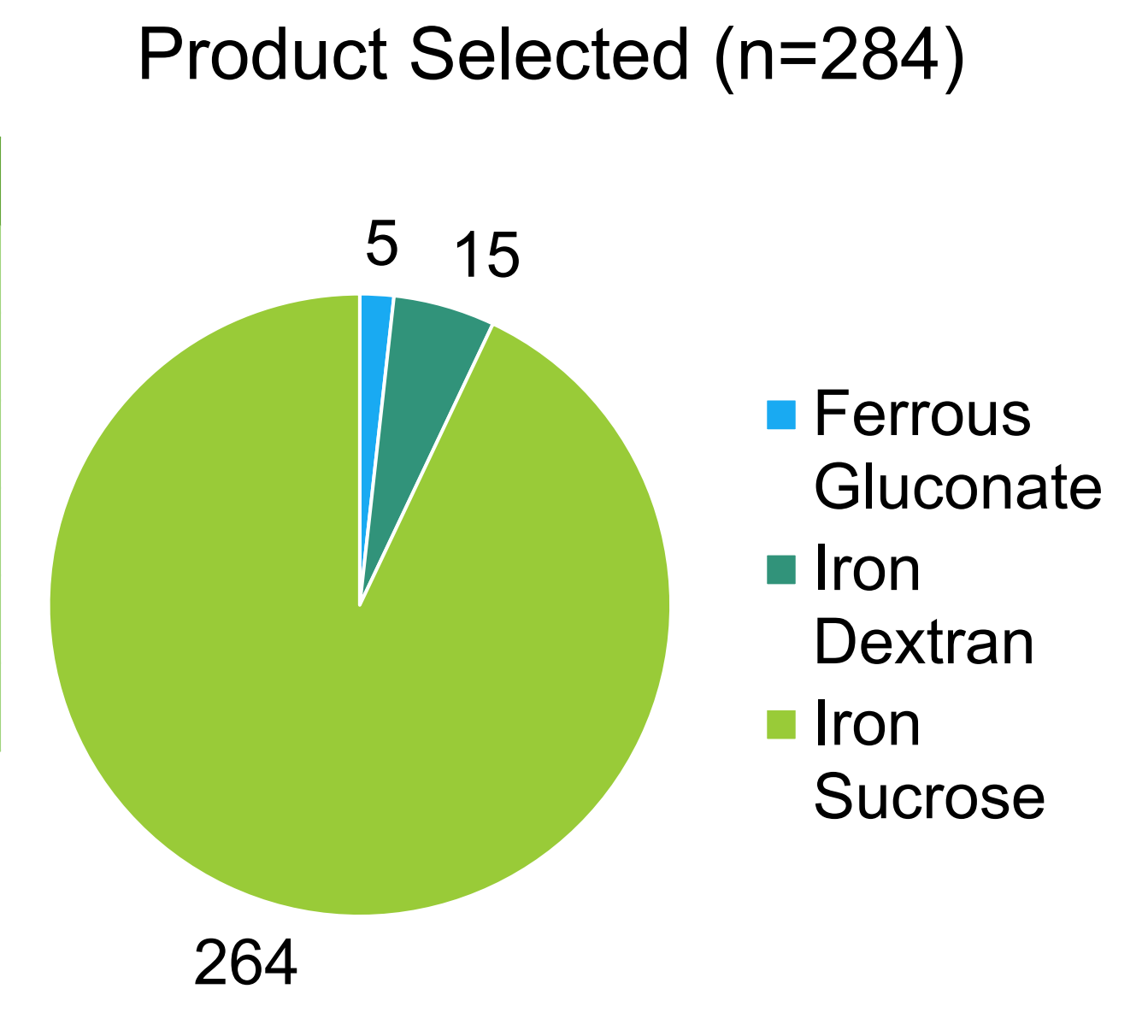
Criteria for IV administration		Criteria for inpatient use
Active blood loss	Near giving birth	Active blood loss
Heart failure exacerbation	PO iron failure	Heart failure exacerbation
Inflammatory bowel disease	NPO diet	Near giving birth
CKD on dialysis		

RESULTS

- 7140 patients were identified. 3952 patients met inclusion criteria (1398 excluded). 280 adults and 20 pediatric patients sampled, and duplicate encounters were excluded. A total of 269 adult patients and 15 pediatric patients were included.

Baseline Characteristic* (n=284)	
Age (years)	59.0 +/- 22.1
Female	175 (61.6%)
Iron (mcmol/L)	27.4 +/- 25.0
Ferritin (mcg/L)	212.0 +/- 323.8
Hemoglobin (g/dL)	8.4 +/- 2.1
Doses administered	1.9 +/- 1.3

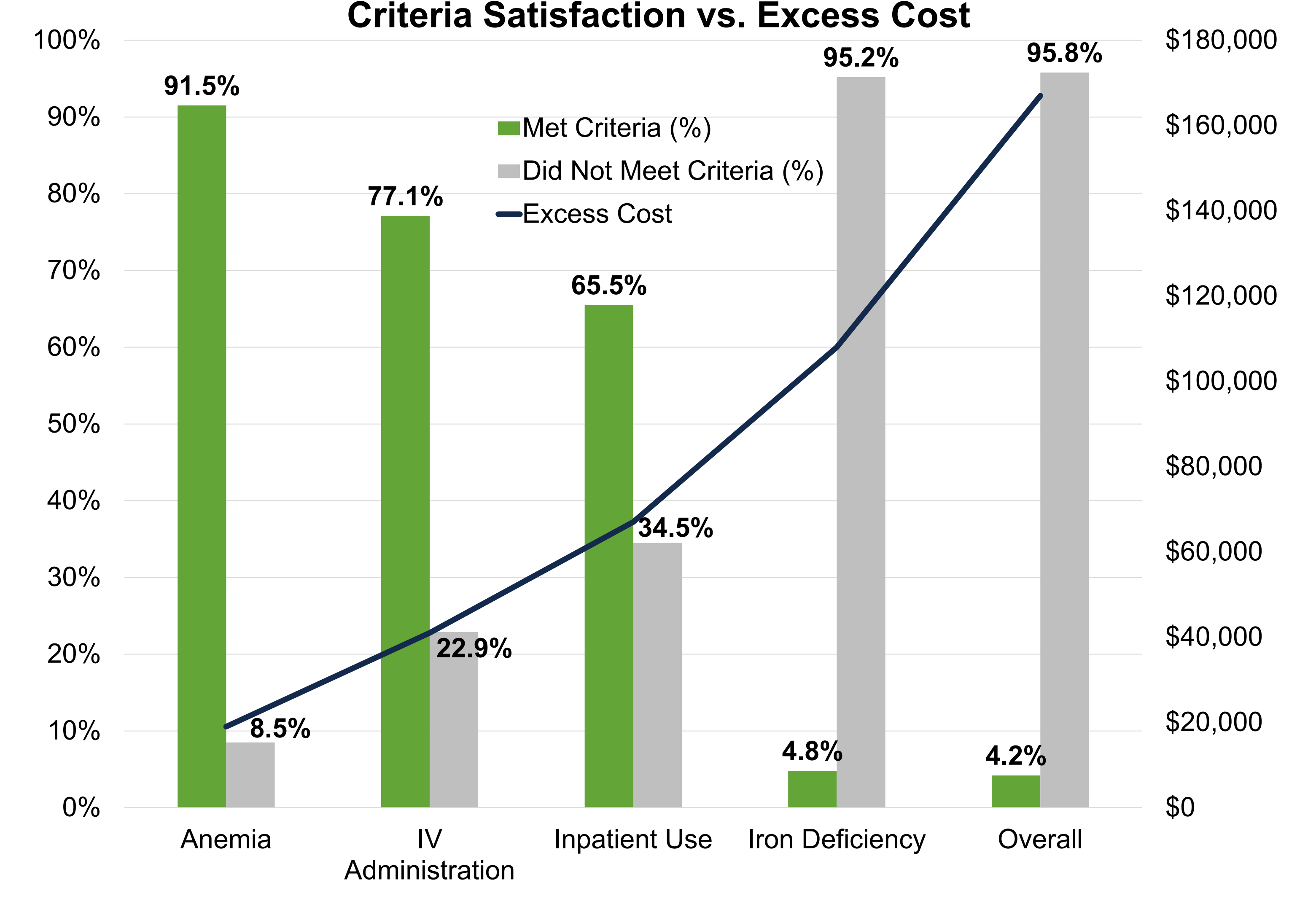
*Mean +/- SD or n (%)



Indication (n=284)	
Acute bleeding	103 (36.3%)
Chronic anemia	52 (18.3%)
Pregnancy	36 (12.7%)
CKD or AKI	29 (10.2%)
Trauma	11 (3.9%)
Bariatric surgery	10 (3.5%)
Heart Failure	9 (3.2%)
Post-operation complications	8 (2.8%)
Unknown	6 (2.1%)
Intake issues	6 (2.1%)
Low lab markers	5 (1.8%)
Cancer	4 (1.4%)
Colitis	2 (0.7%)
Inflammation	1 (0.4%)
Fistula	1 (0.4%)
Stenosis	1 (0.4%)

Ordering Specialty (n=284)	
Internal Medicine	135 (47.5%)
OB/GYN	41 (14.4%)
Nephrology	34 (12.0%)
Gastroenterology	22 (7.8%)
Cardiology	15 (5.3%)
General Surgery	10 (3.5%)
Hematology/Oncology	8 (2.8%)
Pediatrics	4 (1.4%)
Family Medicine	4 (1.4%)
Critical Care	4 (1.4%)
Pulmonology	3 (1.1%)
Pharmacy	2 (0.7%)
Orthopedic Trauma	1 (0.4%)
Neurocritical Care	1 (0.4%)

RESULTS



DISCUSSION & CONCLUSIONS

- Intravenous iron in hospitalized patients is a growing expense for organizations and warranting guideline-directed medical therapy.
- Analysis of lab values for iron deficiency anemia compared to NIH criteria found that many patients did not have iron deficiency. Patients who were not anemic or iron deficient, did not meet criteria for IV administration, nor meet criteria for inpatient administration of iron cost the health system \$167,000.
- Iron sucrose was the most administered iron product, but patients' iron stores were rarely fully repleted which is defined as 1000 mg of IV iron.
- Limitations of this study were lack of follow-up laboratory data to assess efficacy and 72 patients did not have initial iron panel laboratory values.
- 75% of patients who did not use oral iron or fail oral iron treatment (defined as two months of consecutive use) prior to IV iron usage may have reduced excess money spent and such high utilization.
- The creation of an order panel may reduce unnecessary spending of IV iron in patients without a previous iron panel.

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Disclosure
The authors of this presentation have the following to disclose concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation:
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