PICO Search Assignment Worksheet **Name Melinda Chiu**

Ms. AB is a 34yo female, G1P000 at 18 weeks gestation, presents to OBGYN clinic complaining of dizziness and fatigue.

According to the World Health Organization, anemia is present in roughly 40% of pregnant women around the world (1). This is a common issue that if left untreated, can lead to devastating complications. Mothers may be a risk of fatigue, fainting, palpitations, breathing issues, perinatal infection, bleedings, and preeclampsia. The fetus may be a risk of prematurity, intrauterine growth restriction, low birthweight, and death (2). In treating iron deficiency anemia (IDA), I have learned about diets and the use of iron. I wanted to discover, in pregnant patients with iron deficiency anemia, is oral or intravenous administration of iron better at improving maternal and fetal outcomes?

Search Question: In pregnant patients with iron deficiency anemia, is the administration of iron via POor IV better at improving maternal and fetal clinical outcomes?

Question Type: What kind of question is this?

☐Prevalence ☐Screening ☐Diagnosis ☐Prognosis ☒Treatment ☐Harms

Preferred Study Type: Meta-analysis, Systematic review, RCT

PICO search terms:

P	I	C	O
pregnant women	oral iron	intravenous iron	better maternal and fetal clinical outcomes
gynecologic patients	iron supplementation	parenteral iron	
iron deficiency anemia	oral ferrous sulphate	IV iron polymaltose	
iron deficiency anaemia	oral iron polymaltose	IV iron sucrose	
		IV iron carboxymaltose	

Search tools and strategy used:

PubMed

- Pregnancy iron anemia systematic review, filters: none → 90 results
- Pregnancy iron anemia systematic review, filters: free full text, 10 years publication date → 90 results

Cochrane Database

- pregnancy iron deficiency anemia, filters: Cochrane Reviews → 15 results

Google Scholar

- gynecologic patients iron deficiency IV iron sucrose outcomes, filters: none → 3k results
- gynecologic patients iron deficiency IV iron sucrose outcomes, filters: since 2010→ 2k results

Trip Database

- gynecologic patients iron deficiency intravenous iron sucrose outcomes, filters: Systematic Reviews → 17 results
- pregnant iron deficiency anemia treatment, filters: none → 1713 results
- pregnant iron deficiency anemia treatment, filters: Systematic Reviews → 15 results
- pregnant iron deficiency anemia treatment, filters: Controlled Trials → 69 results

These studies were chosen since they included the comparison of oral versus parenteral iron to treat pregnant patients with iron deficiency anemia (IDA). After typing in the PICO search terms on PubMed, Cochrane database, Google Scholar, and Trip database; if the search result was too much, filters and sorting options were utilized. Titles of the search results would be skimmed, placing focus on those that mentioned the treatment of IDA. Then articles would be looked into, and selected for those that looked into both the PO and IV iron administration. Also the journals where the articles were published were checked for being Medline indexed, and published within the past 10 years. Some difficulties from the search were that there were many articles that studied treating post-partum women, and not those currently pregnant. Also, there are many dersired articles that did not have free access. 2 systematic reviews and 2 RCT were found.

Search results:

Citation
Med J Aust. 2019 Oct;211(8):367-373.
https://onlinelibrary.wiley.com/doi/full/10.5694/mja2.50308

Title and Authors
Intravenous or oral iron for treating iron deficiency anaemia during pregnancy: systematic review and meta-analysis
Alaa Qassim Rosalie M Grivell Amanda Henry Giselle Kidson-Gerber Antonia Shand Luke E Grzeskowiak

Abstract
Objectives: To compare the effects on perinatal maternal and neonatal outcomes of intravenous and oral iron therapy as first-line treatment of iron deficiency anaemia (IDA) in pregnant women.
Study design: A meta-analysis, applying fixed and random effects models, of randomised controlled trials (RCTs) that compared the effects of intravenous and oral iron therapy for pregnant women with IDA.
Data sources: MEDLINE, EMBASE, Scopus, Cochrane Register of Controlled Trials, Web of Science; bibliographies of identified articles.
Data synthesis: Fifteen eligible studies with a total of 1938 participants were identified. Each was at high risk of bias in at least one domain; ten were undertaken in low or middle income countries. Evidence (from nine RCTs) that intravenous iron was superior to oral iron in reducing the need for blood transfusion at delivery was low quality (Peto odds ratio, 0.19 [95% CI, 0.05-0.78]; number needed to treat, 95 [95% CI, 81-348]). Evidence that intravenous iron was superior to oral iron in increasing neonatal birthweight (eight RCTs: mean difference, 58 g; 95% CI, 4-112 g) or reducing the rate of breastfeeding cessation within 24 months of delivery (one RCT: hazard ratio, 0.70; 95% CI, 0.50-0.99) was of low or very low quality. While intravenous iron treatment was superior to oral iron for improving maternal haematological parameters at delivery, their effects on neonatal haematological parameters were similar.
Conclusions: There is no strong evidence that first-line therapy with intravenous iron is superior to oral administration for treating IDA in pregnant women. The few identified differences in outcomes were small in magnitude and from studies at high risk of bias.

Reason I chose it
- indexed for MEDLINE, published within the past 2 years
- Systematic reviews and meta-analysis offers the highest levels of evidence

- Used studies to compare IV versus PO iron for treating pregnant patients with IDA.
- this study included 2 other studies that I was going to use

Citation
Acta Obstet Gynecol Scand. 2016 Mar;95(3):270-9.
https://obgyn.onlinelibrary.wiley.com/doi/epdf/10.1111/aogs.12812

Title and Authors
Systematic Review of Randomized Trials of the Effect of Iron Supplementation on Iron Stores and Oxygen Carrying Capacity in Pregnancy
Jahnavi Daru, Natalie A M Cooper, Khalid S Khan

Abstract
Introduction: Anemia in pregnancy affects 25% of all pregnancies in Europe with iron deficiency affecting even more. Despite supplementation, iron deficiency persists. This review will assess the effect on serum ferritin (iron stores) and hemoglobin (oxygen-carrying capacity) following iron supplementation in pregnant women with anemic and non-anemic iron deficiency.
Material and methods: A systemic search of electronic databases and trial registers was conducted from inception to January 2014. Randomized controlled trials of iron supplementation that measured serum ferritin and hemoglobin levels before and after supplementation were selected. Two independent reviewers selected studies, extracted data and assessed quality. Descriptive analyses were carried out.
Results: The review included 23 randomized controlled trials (3525 women). In iron deficiency anemia, more studies described statistically significant increases in serum ferritin levels than in hemoglobin levels following intravenous iron supplementation. In non-anemic iron deficiency there were more statistically significant increases in serum ferritin levels than in hemoglobin levels following oral supplementation. There were no studies reporting maternal quality of life outcomes.
Conclusions: Serum ferritin appears to change more than hemoglobin following iron supplementation. The clinical effects of this need further investigation.

Reason I chose it
- indexed for MEDLINE, published within the past 4 years
- Systematic reviews offer the highest level of evidence
- Used studies to compare IV versus PO iron in a pregnant patient

Citation
Lancet Glob Health. 2019 Dec;7(12):e1706-e1716.
https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(19)30427-9/fulltext

Title and Authors
Safety and effectiveness of intravenous iron sucrose versus standard oral iron therapy in pregnant women with moderate-to-severe anaemia in India: a multicentre, open-label, phase 3, randomised, controlled trial
Neogi, SB. et al.

Abstract
Background: Intravenous iron sucrose is a promising therapy for increasing haemoglobin concentration; however, its effect on clinical outcomes in pregnancy is not yet established. We aimed to assess the safety and clinical effectiveness of intravenous iron sucrose (intervention) versus standard oral iron (control) therapy in the treatment of women with moderate-to-severe iron deficiency anaemia in pregnancy.

Methods: We did a multicentre, open-label, phase 3, randomised, controlled trial at four government medical colleges in India. Pregnant women, aged 18 years or older, at 20-28 weeks of gestation with a haemoglobin concentration of 5-8 g/dL, or at 29-32 weeks of gestation with a haemoglobin concentration of 5-9 g/dL, were randomly assigned (1:1) to receive intravenous iron sucrose (dose was calculated using a formula based on bodyweight and haemoglobin deficit) or standard oral iron therapy (100 mg elemental iron twice daily). Logistic regression was used to compare the primary maternal composite outcome consisting of potentially life-threatening conditions during peripartum and postpartum periods (postpartum haemorrhage, the need for blood transfusion during and after delivery, puerperal sepsis, shock, prolonged hospital stay [>3 days following vaginal delivery and >7 days after lower segment caesarean section], and intensive care unit admission or referral to higher centres) adjusted for site and severity of anaemia. The primary outcome was analysed in a modified intention-to-treat population, which excluded participants who refused to participate after randomisation, those who were lost to follow-up, and those whose outcome data were missing. Safety was assessed in both modified intention-to-treat and as-treated populations. The data safety monitoring board recommended stopping the trial after the first interim analysis because of futility (conditional power 1·14% under the null effects, 3·0% under the continued effects, and 44·83% under hypothesised effects). This trial is registered with the Clinical Trial Registry of India, CTRI/2012/05/002626.

Findings: Between Jan 31, 2014, and July 31, 2017, 2018 women were enrolled, and 999 were randomly assigned to the intravenous iron sucrose group and 1019 to the standard therapy group. The primary maternal composite outcome was reported in 89 (9%) of 958 patients in the intravenous iron sucrose group and in 95 (10%) of 976 patients in the standard therapy group (adjusted odds ratio 0·95, 95% CI 0·70-1·29). 16 (2%) of 958 women in the intravenous iron sucrose group and 13 (1%) of 976 women in the standard therapy group had serious maternal adverse events. Serious fetal and neonatal adverse events were reported by 39 (4%) of 961 women in the intravenous iron sucrose group and 45 (5%) of 982 women in the standard therapy group. At 6 weeks post-randomisation, minor side-effects were reported by 117 (16%) of 737 women in the intravenous iron sucrose group versus 155 (21%) of 721 women in the standard therapy group. None of the serious adverse events was found to be related to the trial procedures or the interventions as per the causality assessment made by the trial investigators, ethics committees, and regulatory body.

Interpretation: The study was stopped due to futility. There is insufficient evidence to show the effectiveness of intravenous iron sucrose in reducing clinical outcomes compared with standard oral iron therapy in pregnant women with moderate-to-severe anaemia.

Reason I chose it

- indexed for MEDLINE, published within the past 2 years
- initially I was not looking for a RCT based on the reasons listed previously, however, since this study was “open-label”, it does not seem as ethically questionable.
- Compares IV versus PO iron, with a large sample size of 2018 pregnant patients

Citation

BMC Pregnancy Childbirth. 2017; 17: 137. Published online 2017 May 8.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5422878/

Title and Authors

Intravenous iron sucrose v/s oral ferrous fumarate for treatment of anemia in pregnancy. A randomized controlled trial

Shruti B. Bhavi, Purushottam B. Jaju

Abstract

Background
The objective of this study was to compare the efficacy, safety and tolerability of intravenous iron sucrose with that of oral ferrous fumarate in iron deficiency anemia during 14 to 34 weeks of pregnancy.

Methods
A randomized controlled trial was performed involving 112 patients attending the antenatal clinic at Shri B.M.Patil Medical college Hospital, Bijapur from October 2011 to August 2012,with hemoglobin levels between 70-110 g/L and serum ferritin of < 15 ng/ml.
In the intravenous group,200 mg of iron sucrose was administered in 100 ml 0.9% sodium chloride per day. Participants in the oral group were given 200 mg of ferrous fumarate per day. The primary outcome measures for the trial, haemoglobin and serum ferritin levels were measured after 4 weeks. Statistical significance was assessed using Student's *t*-test.
Results
The change in haemoglobin in women receiving intravenous iron was higher than with oral ferrous fumarate 22 ± 11.5 g/L vs 12 ± 9 g/L ($p < 0.0001$).Similarly the change of serum ferritin was significantly higher in women receiving intravenous iron compared to oral iron.
55% participants in the intravenous group had an improvement in haemoglobin more than 20 g/L compared to only 11% of the oral therapy group.48% of patients in I.V group showed increase in ferritin level between 51 to 100 ng/ml in comparison to only 3.5% in oral group.
Intravenous iron sucrose is an effective in correction of anemia in pregnancy or iron store depletion.
Conclusion
Intravenous iron sucrose is more effective than 200 mg a day ferrous fumarate in increasing maternal iron stores.

Reason I chose it

- indexed for MEDLINE, published within the past 3 years
- this was a RCT, covering the variables I am looking for in my PICO search

Summary of Evidence:

Author (Date) Level of Evidence	Sample/Setting (# of subjects/ studies, cohort definition etc)	Outcome(s) studied	Key Findings	Limitations and Biases
Qassim et al. (2019) Systematic Review and Meta-analysis	**Searched MEDLINE, Scopus, EMBASE, Cochrane Register of Controlled Trials, and Web of Science **Inclusion criteria: 1) RCTs that compared effects in pregnant patients with IDA who used IV or PO iron 2) patients with low Hb levels or at high risk of IDA 3) Setting: unspecified, ranging from low to high income countries (India, Australia, Singapore, France, Thailand, Turkey) **Found 15 studies that fit their criteria, totaling 1938 subjects.	**primary: need of maternal blood transfusion **secondary: maternal (ie: breast feeding) and neonatal (ie: birth weight) clinical outcomes, maternal and fetal Hb and ferritin levels at delivery	**Objective is to determine the clinical outcomes of mother and neonate when either PO or IV iron was used to treat IDA during the pregnancy. **subjects with IV iron therapy were found to have less need for blood transfusion. **NNT with IV iron to avoid one blood transfusion = 95 **women with IV iron therapy vs PO delivered babies with greater birthweight **no difference was noted in PO vs IV therapy on gestation time, need for ceasarean delivery, maternal hypertensive issues , nor pre-term birth. **one study found that IV iron therapy vs PO did not have as much impact on blood loss during delivery, post-partum hemorrhage, birthlength, nor stillbirth; another found the rate of breastfeeding cessation within 24 months of delivery was less in IV iron mothers.	**authors noted: "All 15 studies were at high risk of bias because of the lack of blinding of participants and study personnel." **there was also noted that bias existed in 5 studies from incomplete data on outcomes, and 5 where PO iron **this study's assessment of included studies' quality according to GRADE approach was "low to very low for all outcomes". **the quality of the review depends on the quality of the data provided from the included studies.

Daru et al. (2016) Systematic Reivew	**Searched MEDLINE, EMBASE, Cochrane Library, CINAHL and AMED. **Inclusion criteria: RCTs studying pregnant women with IDA or non-anemic iron deficiency (NAID), iron in different administration methods were used, there was a comparison between methods and another method or placebo, and outcomes studied were serum ferritin, Hb, maternal quality of life, birthweight and gestation at delivery. **Exclusion criteria: studies that did not offer define anemia values prior to treatment, if ferritin was nont measured at baseline, if iron in conjunction with other vitamins were studied. **Setting: unspecified **resulted with 23 studies that fit researcher criteria	**serum ferritin and Hb after iron treatment, maternal quality of life, birthweight and gestation at delivery.	**objective was to assess iron supplementation's effects on pregnant patients with IDA and NAID. **six of the included studies compared IV versus PO iron supplementation. ****the IV group had a more significant increase in Hb, compared to PO group in 3 of the 6 studies. ****the IV group had a more significant increase in ferritin, compared to PO group in 5 of the 6 studies. ****therefore ferritin was found to be more affected by iron supplementation than Hb. **2/3 of the studies that compared weekly versus daily PO iron, found that serum ferritin levels was significantly increased in the daily administration; but there was no difference when studying Hb levels. **none of the studies included reported maternal quality of life. Also, there was no differences noted in gestational age nor birthweight in both administration groups.	**authors admitted that the included studies had such heterogeneity in study design that meta-analysis could not be performed. Previous heterogeneity mentioned was due to different lab definition of anemia, and varying times at which post-supplementation blood work was conducted. **11 out of the 23 studies was rated "low quality" according to the Jadad scoring system. **the quality of the review depends on the quality of the data provided from the included studies.
Neogi et al. (2019) RCT	**Inclusion criteria: women >18yo between 20-28wk gestation with 5-8g/dL Hb, or between 29-32wk gestation with 5-9g/dL and MCV:RBC count ratio of >14; AND if patient planned to deliver in the same hospital, lives within 20km radius from hospital, and willing to attend regular checkups. **Exclusion criteria: patients with medical issues of HTN, DM, asthma, recent hepatitis, acute infections, heart disease, heart failure, recent IV iron therapy in past 6 mo, hemoglobinopathies, possible pancytopenia, intolerability to IV iron, and history of needing repeated blood infusions. **patients were randomly put into IV iron sucrose group or PO iron group by using a sequence generator. 999 women received IV (22 lost in follow up), and 1019	**primary: possible life-threatening maternal complications (ie: post partum hemorrhage, sepsis, shock, prolonged hospital stay, need for blood transfusion, and ICU admission) **secondary: other maternal complications, fetal outcomes (ie: low birth weight, preterm labor, perinatal death, Hb concentration, ferritin concentration, and MCV), and adverse effects surrounding time of iron administration, and after.	**objective to find evidence of safety and clinical effectiveness of IV iron sucrose compared to PO iron in treatment of pregnant patients with moderate to severe anemia. **9% of the patients receiving IV, versus 10% receiving PO, showed the primary outcomes studied. **2% of the patients receiving IV, versus 1% receiving PO, showed dangerous maternal adverse events. **4% of the patients receiving IV, versus 5% receiving PO, showed serious fetal and neonate adverse events. **After 6 weeks into the study, 16% of the patients receiving IV, versus 21% receiving PO, had reported minor adverse events. **concluded that there was insufficient evidence to support the effectiveness of IV iron over PO used to treat pregnant women with moderate to severe anemia, in reducing the clinical outcomes being studied.	**study was conducted in India, so individual patient factors may differ (ie: diet, healthcare access, socioeconomic background) **the outcomes studied are a variety of events that vary in severity, which makes it harder to compare differences between them. **not all the subjects were able to be seen by the researchers, so hospital records had to be retrieved instead. This may lead being unable to collect the needed data to assess outcomes. **not all patient Hb-at-time-of-delivery was able to be obtained, due to Indian culture of home deliveries. Only readings from follow up visits were available. **there was loss of patients in follow-up

	women received PO (34 lost in follow up). **Setting: recruited patients from 4 government medical college hospitals in India who visited for routine checkups between Jan 31, 2014, and July 31, 2017.			(comparable in both groups).
Bhavi et al. (2017) RCT	**Inclusion criteria: Hb level 70-110gL, serum ferritin <15ng/mL, 18-45 years old, and this being a single pregnancy. **Exclusion criteria: history of bleeding issues, history of blood transfusion within past 4 mo, hemoglobinopathy, RBC issues, asthma, allergies, or in an acute inflammatory state. **112 subjects between 12-14 weeks gestation were included. After randomization, 56 subjects were on PO iron, and 56 were on IV iron. **Setting: study was conducted between October 2011-August 2012, in the OBGYN department of a medical college in Bijapur, India.	**% Hb, CBC, serum ferritin, UA, and peripheral blood smear to determine type of anemia	**objective to "the compare the efficacy, safety and tolerability of intravenous iron sucrose with that of oral ferrous fumarate in iron deficiency anemia during 14 to 34 weeks of pregnancy." **Both PO and IV iron treatment x 4 weeks resulted in a statistically significant increase in Hb. The change in Hb % and serum ferritin was greater in IV iron group. **After 4 weeks of treatment, both PO and IV iron treatment groups had no significant lasting increase on Hb levels. However, there was significant lasting increase on ferritin levels in the IV group, unlike the PO group. **According to other cited articles: Adverse effects of PO iron include GI issues of gastritis, constipation, diarrhea, abdominal pain, nausea and vomiting; seen in 10-40% of patients. There is also greater risk of non-compliance. Adverse effects of IV iron included life-threatening anaphylactic reactions, CV collapse and respiratory failure in 0.1-2.0% of patients. Milder effects included fever, urticaria and arthritis in 30% of patients. ****in the current study, life-threatening adverse effects were not observed in the IV iron group, as it was generally well-tolerated	**small sample size can lead to falsely elevated treatment effect. **short study duration may not give enough time to see treatment effect, and monitor adverse effects. **study was conducted in India, so individual patient factors may differ (ie: diet, healthcare access, socioeconomic background)

Conclusions:

Qassim et al. (2019)	Subjects with IV iron therapy were found to have less need for blood transfusion; where NNT with IV iron to avoid one blood transfusion = 95. Patients with IV iron therapy vs PO delivered babies with greater birthweight; but there was no difference noted in PO vs IV therapy on gestation time, need for ceasarean delivery, maternal hypertensive issues, nor pre-term birth.
Daru et al. (2016)	The IV group had a more significant increase in serum ferritin and Hb levels. In terms of weekly versus daily PO iron, serum ferritin levels was significantly increased in the daily administration; but there was no difference when studying Hb levels.
Neogi et al. (2019)	There results were comparable in both IV and PO iron groups in terms of primary outcomes studied, dangerous maternal adverse events, and serious fetal and neonate adverse events. Concluded that there was insufficient evidence to support the

	effectiveness of IV iron over PO used to treat pregnant women with moderate to severe anemia, in reducing the clinical outcomes being studied.
Bhavi et al. (2017)	Both PO and IV iron treatment resulted in a statistically significant increase in Hb. The change in Hb % and serum ferritin was greater in IV iron group. Neither group had significant lasting increase on Hb levels post-therapy. However, there was significant lasting increase on ferritin levels in the IV group, unlike the PO group. Life-threatening adverse effects were not observed in the IV iron group, as it was generally well-tolerated
These articles are listed in the order of how I weigh them in terms of strength of evidence. Qassim et al. (2019) since it was a Systematic Review and Meta-analysis, that was published recently. Although the study claimed that all the included articles had high risk of bias and low quality, their findings were conclusive. Daru et al. (2016) was given a lot of weight as well, since it was also a systematic review published recently. The two RCTs Neogi et al. (2019) and Bhavia et al. (2017) were both conducted in India, where individual patient factors may differ (ie: diet, healthcare access, socioeconomic background) and not be as applicable in treating our patients; therefore they are weighed much less. Neogi et al. (2019), however, was given more weight due to its large sample size. The conclusions formed from these articles provided weak evidence to show a difference in superiority between the administration of iron via IV or PO. Both methods appeared effective in treating these pregnant patients with IDA. However, it was noted that IV administration tended to lead to greater increase in ferritin, as well as Hb.	

Magnitude of any Effects

There was not enough evidence to show a significantly greater effect in treating IDA with PO versus IV iron supplementation. There was some evidence that the IV group had greater increase in serum ferritin levels than Hb. In regards to which administration method has more adverse effects, there is no mutual conclusion between the studies.

Clinical Significance

This subject is important to cover since IDA is a common issue that if left untreated, can lead to devastating complications involving maternal and fetal complications. As providers, we want to provide the most efficient and effect treatment. From this Mini-CAT, it appears as if PO and IV iron are equally as useful in treating IDA during pregnancy.

Clinical Bottom Line

The PICO question to answer was: In pregnant patients with iron deficiency anemia, is the administration of iron via PO or IV better at improving maternal and fetal clinical outcomes? From searching on PubMed, Cochrane database, Google Scholar, and Trip database, 3 articles that were relevant to the search terms and could be helpful to answer the PICO question were picked. There are 2 systematic reviews and 2 RCTs.

Based on the articles and information gathered, there is weak evidence to show a difference in superiority between the administration of iron via IV or PO. The articles used had conflicting conclusions. Greatest weight was given to the first article by Qassim et al. (2019) since it was a Systematic Review and Meta-analysis, that was published recently. It had also included two articles that I originally wanted to include in this PICO, since I deemed them useful to answering the question. Although the study claimed that all the included articles had high risk of bias and low quality, their overwhelming conclusion was that women with IV iron therapy were found to have less need for blood transfusion, and the babies had greater birthweight. Daru et al. (2016) was given a lot of weight as well, since it was also a systematic review published recently. They were able to come to a conclusion that IV iron supplementation had higher increase in serum ferritin levels, and the increase in Hb levels; as compared to the PO iron groups. Also, it found that the daily administration of PO iron greater affected the serum ferritin levels, unlike in Hb. Neogi et al. (2019) had weight due to its large sample size. It had found no statistically significant difference between primary outcomes, and maternal and fetal adverse effects between both IV versus PO

iron treatment groups. Bhavia et al. (2017) had the least weight due to its relatively smaller sample size. It had found that both PO and IV iron treatment groups resulted in statistically significant increase in Hb. There was, however, greater change in Hb % and serum ferritin in the IV treatment group.

Overall, both PO and IV appear to have effectiveness in treating mothers with IDA, with comparably positive maternal and fetal clinical outcomes. However, it seems as if IV administration may have greater effect on increasing ferritin levels, as compared to PO. Neither method had a glaring difference in adverse effects related to both administration methods.

Sources:

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2. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4375689/
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4. Article 2: Daru, J, Cooper, NAM, Khan, KS. Systematic review of randomized trials of the effect of iron supplementation on iron stores and oxygen carrying capacity in pregnancy. *Acta Obstet Gynecol Scand* 2016; 95: 270– 279.
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