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Commentary

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Intravenous iron sucrose (venofer®): an obstetric tool to facilitate blood stewardship

Abstract

To prevent iron deficiency anemia (IDA) with its associated adverse obstetric outcomes, women are routinely counseled to consume iron fortified nutrients, macronutrients and oral iron supplements. The widely reported side effects of this therapy, nausea, vomiting and constipation, often prompts non-adherence. At our institution, recalcitrant inadequate iron stores during the prenatal period escalate transfusion rates of packed red blood cells (PRBCs). Blood transfusion has been and remains the therapeutic fallback management of IDA during pregnancy. Beginning in January of 2013, to mitigate the need for avoidable blood transfusions during pregnancy, women receiving prenatal care at our institution were offered iron sucrose infusion to treat persistent IDA.

We conducted a performance review of PRBC transfused on our obstetric service between the years of 2013 to 2017. During this time period, as the rate of pregnant women receiving parenteral iron increased by 7 fold, the number of pregnant women transfused PRBCs decreased by 28%. Although numerous investigators have described the use of parenteral iron during pregnancy, it has not become a standard tool in the management of IDA during pregnancy. If oral iron supplementation is to remain a component of routine prenatal care, as recommended by public health and national professional medical organizations, our review supports the need for randomized clinical trials to evaluate parenteral iron sucrose administration during pregnancy as an important public health tool to decrease rates of allogeneic blood transfusion.

Keywords: anemia, IDA, intravenous iron Infusion, iron Deficiency Anemia, iron Sucrose, obstetric, venofer

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Cassandra E Henderson,[1] Eduardo Valdes,[1] Elfy Payero,[1] Manisha Jain,[1] Shadi Rezai[2]

[1]Department of Obstetrics and Gynecology, Lincoln Medical and Mental Health Center, USA

[2]Department of Obstetrics and Gynecology, Baylor College of Medicine, USA

Correspondence: Cassandra E Henderson MD, CDE, Department of Obstetrics and Gynecology, Lincoln Medical and Mental Health Center, 234 East 149th Street, Bronx, New York, 10451, USA, Email cehendersonmd@gmail.com

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Commentary

Use of parenteral and oral iron supplements during pregnancy has been associated with increased maternal iron stores and decreased risk of allogeneic blood transfusion. Oversight of the nation's blood supply is the responsibility of two government health agencies. The Centers for Disease Control and Prevention (CDC) monitors the supply by investigating potential associated infectious diseases, while the U.S. Food and Drug Administration (FDA) enforces standards for blood collection and distribution. However, it is the health care providers who are charged with the stewardship of this critical, life sustaining, invaluable scarce medical resource by having the responsibility to adopt principles of blood management based on the known and unknown risks, need to maintain an adequate blood supply and direct and indirect costs of allogeneic blood transfusions.[1,2]

The prevalence of iron-deficiency anemia (IDA) varies throughout the world ranging from 12 to 43 %. In the US approximately 5% of pregnancies are complicated by IDA as determined not only by hemoglobin (Hgb) levels, but by quantitative assessment of iron saturation and iron stored as measured by ferritin and transported on transferrin.[3,4] Iron stores gradually become depleted with the diagnosis of IDA being the preverbal tip of the iceberg. Clinical support for the diagnosis is provided by the identification of hematologic descriptors of hypochromic and microcytic red blood cell indices with increased reticulocyte counts.[5]

Plasma volume fluctuates during normal pregnancy. As a result of this varied hemodilution, the definition of anemia changes throughout the trimesters of pregnancy. According to CDC guidelines, during pregnancy hgb value of less than 11g/dL defines anemia during the first and third trimesters, while the diagnosis is made during the second trimester by Hgb value that is less than 10.5g/dL.

Anemia during pregnancy is associated with adverse perinatal outcome related primarily to higher rates of preterm births and low birth weight infants born to women affected by IDA. Multiple investigators have demonstrated a direct correlation between maternal IDA and adverse neonatal outcome.[6,7]

Although, pregnant women affected by IDA may present with symptoms such as, dyspnea, palpitations, weakness, low work productivity and fatigue, most report no symptoms. Nevertheless, even when asymptomatic, this medical condition is associated with reduced red blood cell oxygen delivery capacity.[8]

To avert or lessen the impact of IDA during pregnancy, women are routinely counseled to consume iron-fortified nutrients, macronutrients and oral iron supplements daily.[9] Frequently reported side effects of these oral iron supplements include nausea, vomiting and constipation that often prompts non-adherence. As a consequence clinical attempts to prevent or correct low iron stores may be hampered. At our institution, recalcitrant inadequate iron stores increase the risk for allogeneic blood transfusion. This valuable medical commodity becomes the definitive intervention for management of acute and chronic IDA during pregnancy.

Blood is an expensive and scarce medical resource. The economics of the blood banking system are related to the collecting, screening for potential viral and bacteria infection and storage of the sample. The scarcity or recurrent announced blood "shortages" that have often

been attributed to inadequate donor pool has been worsened by the increased demand resulting from successful treatment of hematologic and oncologic disorders.

Blood stewardship, as defined by the society for Advancement of Blood Management defines blood management, as "the timely application of evidence-based medical and surgical concepts designed to maintain hemoglobin concentration, optimize hemostasis and minimize blood loss in an effort to improve patient outcome".[10] Parenteral iron treatment of men and women affected by IDA has been shown to decrease rates of blood transfusion.[11] Although, a number of investigators have described the use of parenteral iron during pregnancy, it has not become a standard tool in the management of IDA during pregnancy.[12]

In the absence of a medical contraindication, at the initial and every subsequent prenatal encounter at our center, the physician gives each woman two bottles of tablets, one containing prenatal multivitamins with 325 mg of FeSO4 in the other. The parturients are encouraged to consume the oral supplements daily and are given counseling by a nutritionist that includes recommended iron-rich food sources.

Women found to have IDA during subsequent prenatal visits receive additional guidance to consume vitamin C rich food sources to augment iron absorption and avoid iron blocking calcium rich substances. In 2013, we began offering parenteral iron as a treatment option for pregnancies complicated by recalcitrant anemia with documented low iron stores as supported by iron saturation of less than 10% and low ferritin levels.

We found that while a large portion of our obstetric population did not adhere to recommended use of oral iron supplement, parenteral iron preparation was well tolerated by our patients. As a result in 2015, although oral iron supplements continued to be provided routinely to avoid low iron stores, parenteral iron became our recommended treatment for IDA during for pregnancy.

After obtaining IRB approval, we performed a performance improvement project to review our experience with intravenous iron sucrose and evaluate the relationship between antenatal parenteral iron sucrose administration and transfusion of packed red blood cells (PRBCs). Information was abstracted from the clinical laboratory and blood bank electronic data sources to determine the number of units of PRBCs transfused and number of gravidas that received parenteral iron. Our annual number of deliveries remained stable at approximately 2000 per year. During the period we reviewed, the number of pregnant women that received parenteral iron infusion each year increased from 9 to 68. Concurrently, each year the number of women who received PRBC's decreased from 43 to 25 and the number of units of PRBCs transfused decreased from 102 to 78. No adverse events occurred during the administration of parenteral iron sucrose on our obstetric service.

Clearly our performance improvement review has the inherent limitations of a retrospective review. In addition, it was only a review of laboratory and pathology data, not a chart review. Therefore, we were not able to assess the existence of medical, obstetric or surgical co-morbidities. We also did not evaluate the severity of IDA or presence of other micronutrient deficiencies.

Nevertheless, our limited review supports the finding of a 2011 Cochrane review of 23 trials involving 3,198 pregnancy women. The author of this systematic review concluded that although, anemia complicating pregnancy presents a burden for women and their offspring, there is a paucity of good quality trials assessing clinical maternal and neonatal effects of iron administration in women with anemia.[13] If oral iron supplementation is to remain a component of routine prenatal care, as recommended by public health and national professional medical organizations, our review supports the need a for randomized clinical trial to evaluate parenteral iron sucrose administration during pregnancy as an additional tool to decrease allogeneic blood transfusion rates.[14]

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Conflicts of interest

Authors did not report any potential conflicts of interests.

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