Anemia in Pregnancy: A Case Study

Medical Nutrition Therapy I Fall 2013

Group 2- “The Best of Times Hokies”

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I. Understanding the Diagnosis and Pathophysiology

1.) Evaluation of the pt's admitting history and physical reveal several signs and symptoms supporting the diagnosis of anemia. The pt reported being more tired than usua, her skin appeared pale, and she reported shortness of breath. Pt has not gained enough weight during 23rd week gestation. Her 24-hour recall revealed an iron intake of 19 mg as compared to the recommendation of 27 mg/day.[1] Pt does not take prenatal vitamins due to stomach irritation, which would provide key vitamins and minerals, in addition to iron, that play a role in nutrition and pregnancy outcomes.

2.) The following laboratory values and tests support the diagnosis of anemia. A.M. presents with several abnormal hematology values:

- RBC (X $10^6/mm^3$) result of 3.8 (ref. range 4.2-5.4 X $10^6/mm^3$). RBC can be used to assess for nutritional deficiency, but it may also be decreased due hemorrage, hemolysis, genetic aberrations, marrow disease, and kidney failure. RBC is not an absolute measure for iron, B12, or folate deficiencies. The pt's results indicated, which indicated a possible iron deficiency because RBC and CBC are only affected when iron stores have been depleted.[2,3]
- Hgb and Hct results of 9.1 g/dL (ref. range 12 – 15 F) and 33% (ref. range 37 – 47 F) respectively. Hgb and Hct values are part of a routine CBC, and when used together can be a part of the evaluation for iron status. Hgb is a superior measure compared to Hct because it measures RBC total hemoglobin, versus the Hct, which measures the percentage of total blood volume. When Hgb and Hct levels are below normal, as in the pt's case, there is indication of one of four nutritional anemias.[2,3]
- MCV result of 72 μm^3 (ref. range 80 – 96 μm^3). When MCV is less than 80 it is indicative that a pt's RBC volume is less than the average and termed microcytic. This may indicate iron deficiency, thalassemia trait and chronic renal failure, or anemia of chronic disease.[3]
- TIBC result of 465 μg/dL (ref. range 240-450 μg/dL). TIBC is the "direct measure of all proteins available to bind mobile iron and depends on the number of free binding sites on the plasma iron-transport protein transferrin." [4] The concentration of iron within the cell regulates when the body needs to synthesize and release transferrin. When iron content is low transferrin levels increase, therefore as a general rule increased transferrin levels indicate an iron deficiency. However, certain health and disease states should be considered when evaluating transferrin levels to determine possible deficiency. Pts with hepatitis, hypoxia, pregnancy, or oral contraceptive/estrogen use will present with higher than normal transferrin values because of their health status.[2,3,4]
- Ferritin result of 10 μg/dL (ref. range of 20-120 μg/dL F). Ferritin is the protein responsible for iron storage in the liver, spleen, and marrow.[5] Small amounts of ferritin will pass through the cell membrane and enter circulation, which can then be measured in clinical laboratories. 1 ng/mL of serum ferritin indicates 8 mg of stored iron. Ferritin values are a good marker of the volume of iron stores in a pt, and are considered one of the best indicators of iron deficiency not related to chronic or inflammatory diseases.[2,3,5]
- Folate result of 2 ng/dL (ref. range 5 – 25 ng/dL). Serum folate can be an indicator of body stores, and a decreased value may indicate a folate deficiency.[2]

3.) “Hgb concentration is a measure of the total amount of Hgb in the peripheral blood.”[3] Iron is incorporated in the Hgb complex and is responsible for the exchange of oxygen and carbon dioxide between the lungs and systemic tissues. The determination of low Hgb status in the initial CBC is a preliminary indication of low body iron stores because the values of a CBC are generally only affected during iron depletion. However, a pt’s hydration state has the potential to affect Hgb values, therefore further testing should be ordered.[3,5]

A pregnant woman’s blood volume increases throughout pregnancy. By the final period of gestation it is estimated that blood volume will have increased by about one-half of pre-pregnancy blood volume. The increase of blood volume results in a natural and expected decrease in Hgb.[6] Other values that tend to be affected by pregnancy status are serum albumin and other serum proteins and water-soluble vitamins. Retention of fluid may lead to a decreased serum albumin content. Certain blood factors will increase due to pregnancy, including fat-soluble vitamin concentrations, triglycerols, cholesterol and free fatty acids.[6]

4.) There are several classifications of anemia:

Megaloblastic Anemia relates to the synthesis of DNA. In megaloblastic anemia the synthesis of DNA is disturbed, which causes physical and functional changes in cells and their precursors produced in the blood and bone marrow. This is exhibited by large, abnormal and immature red blood cell precursors. Megaloblastic anemia is typically caused by folic acid or vitamin B12 deficiency. It is characterized by a Hct or CBC value of 100 femtoliters or more.[7]

Pernicious anemia, also known as megaloblastic microcytic anemia, is a type of megaloblastic anemia that forms large cells. Pernicious anemia is typically caused by vitamin B12 deficiency, due to a lack of intrinsic factor.[7]

Normocytic (or hypochromic) anemia is a non-harmful form of anemia that will mimic iron deficiency anemia. Normocytic anemia results from a low amount of circulating average red blood cells due to fewer red blood cells required for tissue oxygenation. Normocytic anemia is related to the anemia of chronic and inflammatory diseases (ACD), and lab values present at 80-99 fl.[7]

Microcytic anemia, a generic form of anemia, is classified by small red blood cells.[7] It is the form of anemia commonly related to iron deficiency and involves diminished levels of circulating hemoglobin. The average size of RBCs in microcytic anemia is less than 80 fl.[7]

Sickle cell anemia (“hemoglobin S disease”) is a genetic and chronic form of hemolytic anemia resulting from the inheritance of the gene encoding for hemoglobin S. Hemoglobin S disrupts hemoglobin synthesis, and causes sickle-shaped red blood cells that carry oxygen less efficiently.[7]

Hemolytic anemia is a result of defects in red blood cell membranes that cause oxidative damage, leading to the breakdown of the cell or cell lysis due to the shortened life span of RBCs. A vitamin E deficiency may be a sign of hemolytic anemia.[7]

5.) There are two classifications of iron in the body:

1.) Functional iron is located in hemoglobin, myoglobin and Fe containing enzymes.
2.) Storage iron is located in ferritin, hemosiderin and transferrin.

The majority of iron content in the body is located as part of red blood cell hemoglobin. Iron hemoglobin allows for the exchange of oxygen and carbon dioxide between the systemic tissues and the lungs. Due to iron’s ability to bind tightly to proteins, it is found in redox reactions of metabolic processes in the body. For example, ferrous iron (Fe^{2+}) is reduced to the ferric form (Fe^{3+}) as electrons pass through the electron transport chain in the process of producing ATP within the mitochondria of a cell. Iron plays a role in drug metabolism because it is incorporated in the rate-limiting enzyme, Cytochrome P450, located in the liver. Iron is important for immune function, and both iron overload and deficiency can lead to alterations in the body’s immune response. A patient may be at increased risk for infection if he or she presents with iron overload because bacteria requires iron to survive. Lower concentrations of T-lymphocytes are observed in patients with iron deficiency, and the cell’s ability to carry out mitosis, referred to as the mitogenic response, is impaired in most cases. In people of all ages, iron is required for brain cell function, and iron deficiency early in life has been correlated with decreased scholastic achievement compared to peers.[5]

Women require more iron during pregnancy because of an increase in maternal blood volume, an increased need for iron in order to supply an adequate amount of oxygen to the fetus, uterus, and placenta, and to increase the RBC count and expand the plasma volume of the mother. Iron also supports the growth of the fetal-placental unit.[6] Pregnant women require about 700-800 mg of iron throughout pregnancy. 250-300 mg is specifically for the needs of the developing fetal and placental tissues. Iron is a key nutrient for the fetal and neonatal brain development – part of myelin, monoamine synthesis, neuronal and glial energy metabolism.[6] If iron intake is not adequate, there is a risk for low hemoglobin production and compromised delivery of oxygen to the developing fetus. Iron-deficiency anemia is associated with preterm delivery, fetal growth retardation, low birth weight and inferior neonatal health.[6]

6.) There are four stages of iron deficiency:

Stage 1 iron deficiency occurs when stores of iron are moderately depleted, and before there is evidence of body dysfunction. During stage 1 iron deficiency, RE marrow iron, transferrin IBC and plasma ferritin levels are the main laboratory values that would be affected.[7]

Stage 2 iron deficiency occurs when iron stores are severely depleted, but with no evidence of body dysfunction. During stage 2 iron deficiency, RE marrow iron, plasma ferritin, transferrin IBC, and iron absorption percentages are the primary affected laboratory values.[7]

Stage 3 iron deficiency occurs when a pt has reached full iron deficiency and begins to display bodily dysfunction, specifically damaged metabolism. During stage 3 iron deficiency, plasma iron, transferrin saturation, sideroblasts and red blood cell protoporphyrin are the main laboratory values affected.[7]

Stage 4 iron deficiency is associated with continued body dysfunction, and the pt is dx with iron deficiency anemia. Symptoms of stage 4 iron deficiency could include defects in epithelial tissues, gastritis, and cardiac failure. During stage 4 iron deficiency, type of erythrocytes is the main laboratory value that would be affected.[7]

The following table displays several lab values during the different stages of anemia.[4]

Lab Value	Normal	Reduced Iron Stores	Iron Depletion	Iron deficient erythropoiesis	iron deficiency anemia
Marrow iron stores	2-3+	1+	trace	0	0
Transferrin iron binding capacity (umol/L)	50-65	60-65	65	>70	>75
Plasma ferritin (ug/L)	100+/-60	<25	<20	10	<10
Plasma iron (umol/L)	20+/-10	<20	<20	<11	<7
Transferrin saturation(%)	35+/-15	30	<30	<15	<10
RBC protoporphyrin (umol/L)	0.28-0.9	0.28-0.9	0.28-0.9	>1.5	>3.0
Type of erythrocytes	normal	normal	normal	normal	microcytic hypochromic

7.) The pt’s history reveals several mentionable risk factors for the development of iron-deficiency anemia. First, pt’s pregnancy status presents as a risk factor due to the increase in blood volume needed to sustain a fetus. She has a history of below-normal weight gain in previous two pregnancies as well as her current pregnancy. An18-month previous cesarean

section could have possibly caused blood loss and lowered body iron stores, putting pt at risk for developing anemia. The pt also reports smoking 1-2 cigarettes daily. The carbon monoxide and nicotine of tobacco smoking has been shown to increase carboxylated hemoglobin of the fetus and result in a reduction of blood flow to the placenta.[1]

8.) If anemia continues during pregnancy, it runs the risk of inadequate oxygen delivery to the developing fetus. Iron-deficiency anemia increases the risk for inadequate weight gain, low birth weight and preterm delivery. Iron deficiency in the 1st and 2nd trimesters is associated with the greatest risk of preterm delivery.[1,6] The Academy of Nutrition and Dietetics position statement on healthy outcomes in pregnancy states that iron-deficiency in pregnancy increases the risk for perinatal mortality and may have a negative impact on maternal-infant interaction.[1]

II. Understanding the Nutrition Therapy

9.) Nutritional requirements for energy, protein, iron, calcium, zinc, folate, vitamin B12, and vitamin C are modified due to the physiological demands of pregnancy.

1.) Metabolism increases by 15% in a single pregnancy in order to support the demands on the mother and the growing fetus.[6] An increase in calories is not required until the mother reaches the 2nd trimester. At the start of the 2nd trimester, the 2005 DRIs recommend an increase of 340kcal/day. In the 3rd trimester, energy requirements increase another 112kcal/day. Total recommended energy increase is approximately 452kcal/day.[1] A malnourished mother is less affected than the fetus. Energy restriction results in the production of ketones, which the fetus has limited ability to use for energy. Energy deficiency has a large effect on the fetus’ cortex, hippocampus and the white matter of the brain.[6]
2.) Calcium intake should be sufficient to sustain the 30g that collect in the 3rd trimester to build the fetal skeleton.[6] The recommendation for A.M. specifically is 1000 mg/day.[1]
3.) Zinc deficiency can adversely affect vitamin A status as well as lead to congenital malformations. Plasma zinc levels are hard to detect, but supplementation is not normally required when a mother consumes a balanced diet.[6]
4.) Increased folate is required for maternal erythropoiesis, DNA synthesis and fetal and placental growth. Folate requirements increase to 520 μg/day of dietary folate equivalent during pregnancy.[1] The average amount of folic acid received through food fortification is 128 mcg/day and an additional 400 mcg is required through food or supplements. NTDs are the greatest risk of folate deficiency. Most women do not recognize they are pregnant before the neural tube closes at day 28 of gestation, therefore all women who is able to become pregnant should be aware of folate consumption. Any woman trying to become pregnant should increase her folate consumption for optimal body folate stores for pregnancy.[1,6]
5.) Vitamin B12 plays a role in enzyme reactions and methionine and tetrahydrofolate pathways.[4] Meeting nutrition requirements would be a concern for vegetarians and vegans, because vitamin B12 is found solely in animal products. If the mother is a vegetarian or vegan, a supplement should be considered because enough vitamin B12 must be transferred to the fetus in order to prevent developmental delays.[1,6]

6.) Daily consumption of food sources high in Vitamin C is encouraged, but no recommendations suggest supplemental Vitamin C.[6] Vitamin C may be particularly important for A.M. because of its role in aiding in the absorption of iron.[8]

10.) Liver is the best dietary source of iron because it has the greatest bioavailability compared to other dietary iron sources.[5] Other excellent sources of iron include seafood, kidney, and lean meat, beef and poultry. These animal sources of iron are a source of heme iron, and are preferred by the body for absorption across the brush border membrane of the small intestine.[2] Animal sources of iron make up about 5-10% of a person’s dietary iron, however absorption from these sources can be up to 25%. This may be attributed to the meat-fish-poultry factor (MFP) of these sources.[5] Nonheme iron can be obtained from plant sources such as dried beans, dark leafy greens (spinach, kale, collards, ect.), whole grains, and nuts.[2] Nonheme iron sources are less bioavailable, and absorption rates have been reported at about 5%.[5]

11.) Sources of heme iron are absorbed directly by the formation of a vesicle across the brush border membrane of the small intestine. Once heme iron has crossed the brush border, heme oxygenase is responsible for the removal of iron from ferroporphyrin, the heme-iron complex. The free iron ion then combines with apoferritin to form ferritin. Ferritin is the iron storage protein, and stores iron when it is in the ferrous form.[4,5]

Nonheme iron sources must first be digested to separate the iron from its plant source into a soluble and ionized form. The low pH of the gastric juices of the stomach facilitate this separation and reduction of iron into the ferrous form. If ferric iron is not reduced to the ferrous form before it passes into the duodenum of the small intestine, its absorption is low due to chelation and precipitation in the high pH of the small intestine. Ferrous iron becomes more soluble at the pH of 7, and is the preferred ionized form for absorption. Unlike heme iron, the soluble and ionized iron from nonheme sources requires the divalent metal transport protein I (DMT1) for transport across the brush border membrane of the small intestine. Following entrance into the enterocyte, the absorbed ferrous form of iron will combine with apoferritin to form ferritin for storage; the storage and release into the plasma is now the same for both heme and nonheme iron.[4,5]

Ferroportin (FP1) is the transport protein responsible for the transfer of iron across the basolateral membrane of the enterocyte and into the plasma. FP1 requires energy in the form of ATP in order to carry out this transport. Following the relocation of iron into the plasma, it will combine with apotransferrin to form transferrin, the protein responsible for the transport of iron in the bloodstream. Because transferrin only has the capacity to transport iron in the oxidized ferric form, hephaestin is required in order to oxidize ferrous iron to ferric iron. Transferrin has the capacity to bind a maximum of two ferric ions at each of two separate binding sites.[5]

There is a large variation of 200-1500 mg of stored iron in the body.[5] Iron is stored as either ferritin or hemosiderin in the liver (30%), bone marrow (30%), the spleen and the muscles (40% total). A maximum of 50 mg/day can be released from storage to be used for the synthesis of hemoglobin.[5]

III. Nutrition Assessment

12.) Height, weight, BMI, %UBW Assessment
Height: 5'5" (65")
Weight:

- Pre-pregnancy: 135#
- 23 wks gestation: 142#

BMI: (Weight in # / Height in in^2) * 703

- Usual BMI: (135 / 4225) * 703 = **22.5**
- Current BMI: (142 / 4225) * 703 = **23.6**
- BMI Classification of Weight: Normal Weight Status

%UBW: (Current weight # / usual weight #) * 100

- 142/135 * 100 = **105% UBW**

13.) A.M. has gained 7# at 23 wks gestation. According to the maternal weight gain curve, A.M. has not gained an adequate amount for the 23 wk gestational period. At 23 wks gestation pregnant women who were normal weight pre-pregnancy should have gained 11-16#.[6] If A.M. was at the same pre-pregnancy weight for her previous two pregnancies, she did not meet recommended weight gain of 25# in either of the two pregnancies.

14.) The range of acceptable energy intake varies based on total energy output combined with the mother's basal metabolic rate. EER was used to evaluate energy requirements because it takes into account variable factors such as age, gender, and physical activity level.

- EER (women 19+, BMI 18.5-25, assumed active due to caring for two young children)
  - 354-6.91 * 31yo + 1.27 PA * (9.36 * 64.41kg) + (726 * 65in/39.370m) = **1,994.52 kcal/day**
- A.M. is 23 wks pregnant and requires increased energy needs of about 364 kcal/day
  - 1994.52 + 364 = **2,359 kcal/day**

Beginning in 2^{nd} half of pregnancy, women require an addition 1.1g/kg/day of pre-pregnancy weight.[6]

- 1.1g/kg = **67.5g/day**

Questions 15 and 16 were evaluated using Nutrition Software Program, Nutritionist Pro, located in Litton Reeves on Virginia Tech's campus.

15.) A.M. meets 65% of recommended energy intake and about 80% recommended protein requirements for 23 wks gestation.

16.) A.M. iron intake based on the 24-hour dietary recall was 19.665 mg. Pregnant women require 27 mg/day of iron, therefore, the pt meets 72.8% of the daily pregnancy iron requirement.

IV. Nutrition Diagnosis

17.) The following pertinent nutrition problems and their diagnoses are as follows:

- Increased iron needs (NI 5.1)
- Inadequate energy intake (NI 1.2)
- Inadequate protein intake (NI 5.7.1)
- Limited adherence to nutrition-related recommendations (prenatal vitamin intake patterns) (NB 1.6)

18.) The following PES statements would be pertainable:

Increased iron needs R/T pregnancy status of 23 wks gestation AEB medical dx hypochromic microcytic anemia and abnormal hematology lab values (RBC 3.8 x 10^6/mm^3; Hgb 9.1 g/dL; Hct 33%; TIBC 465 ug/dL; Ferritin 10 μg/dL). (NI 5.1)

Inadequate energy intake R/T reported picky eating habits and complaints of GI distress AEB 24-hour food recall assessment confirming 65% of recommended energy intake. (NI 1.2)

Inadequate protein intake R/T increased protein needs at 23 wks gestation AEB 24-hour recall assessment confirming 80% of recommended protein intake. (NI 5.7.1)

Limited adherence to nutritional-related recommendations (prenatal vitamin intake) R/T complaints of abdominal pains AEB pt’s self-report during assessment of nutrition history. (NB 1.6)

V. Nutrition Intervention

19.) There have been studies that find a dosage of 40mg of ferrous iron prevents IDA in about 95% of pregnant women.[8] Daily iron supplements have been found to contribute to increased oxidative stress and may cause damage to the intestinal epithelium due to iron generated free radicals. Oral ferrous iron is associated with an increase in plasma concentration of nontransferrin bound iron, which is highly reactive and more of a concern at higher doses, but should still be considered. Some women have reported gastrointestinal side effects, but these side effects tend to be dose dependent at above 100 mg/day.[7,8] Ferrous sulfate may cause darkening of the stool, stained teeth, constipation or upset stomach.[9] However, Maltofer, the oral ferric iron polymaltose complex, has been found to be safer when compared to ferrous sulfate during pregnancy.[8]

Absorption of iron is inhibited by calcium, polyphenols (coffee, tea, wine), and phytates, whereas vitamin C has been shown to increase absorption of iron.[8] Iron also has the potential to interfere with the absorption of other essential divalent metal ions such as zinc.[8] Because of this A.M should be instructed to take her supplement of ferrous iron between meals, with a fruit juice that contains vitamin C, and at a different time than her prenatal vitamin.[7,8]

20.) The average prenatal vitamin provides Vitamins A, D, E, K, Thiamin (B1), Riboflavin (B2), Niacin (B3), Vitamin B6, Vitamin B12, Vitamin C, panothenic acid, choline, biotin, calcium, copper, iron, chromium, iodine, magnesium, zinc, selenium, manganese, and phosphorus.[6] However, prenatal supplements vary in degree of complete nutrition profiles, and pregnant women should seek advice to determine the superior choice available to them locally.[6]

Research indicates the majority of women recognize the importance of a prenatal vitamin, but do not understand specific reasons why the supplement is important for pregnancy and health of the growing fetus.[10] It is important to educate women who are or could become pregnant on why taking a prenatal vitamin is essential to a good pregnancy outcome. Use of emotion-based messaging during a consultation may aid in motivating women to make taking their prenatal a priority during the pregnancy.[10] Women who incorporate taking a prenatal vitamin as part of a daily routine report that it becomes automatic and were more likely to follow prenatal vitamin recommendations versus women who lacked a set plan for when they would take their multivitamin.[10] Other strategies women have reported to have helped them remember their prenatal vitamin are to store the vitamin in a visible and easily assessable location such as on the kitchen counter or table, the enlistment of a family member or friend’s support and the medical professional’s role in explaining the benefits of the multivitamin.[10]

A.M. should first be educated about why the prenatal vitamin is important and how it will improve the health of her child. She should then work with the doctor or registered dietitian and collaboratively discuss and set goals and objectives for her to reasonably make taking the prenatal vitamin a priority. It is important A.M. is knowledgeable about the best time to take her prenatal vitamin for the highest possible absorption of nutrients.

VI. Nutrition Monitoring and Evaluation

21.) In order to assess the patient’s pregnancy, nutritional, and iron status, an outpatient RD referral should be made in order to monitor a variety of factors such as weight gain throughout the rest of the pregnancy, energy intake, serum folate levels, iron status, protein consumption and vitamin and mineral (calcium, zinc, vitamin B12, and vitamin C) intake. Tracking of prenatal vitamin and ferrous iron supplement should be conducted, with continued education if recommendations continue to not be met.

If pt is re-admitted to the hospital, laboratory values should be reassessed. RBC (X $10^6/mm^3$) count, MCV values, and ferritin levels should be evaluated and compared to previous laboratory values to assess iron stores. Hgb and Hct levels should be taken into account but with caution because they can be affected by the increase in blood volume during pregnancy. TIBC levels should be evaluated, but with caution as TIBC levels can be increased due to pregnancy.

ASSESSMENT:

A.M. is a 31-year-old female at 23 weeks gestation. Gravida: 3 para: 2. Pt underwent a cesarean section 18 months previously. Admitted to hospital to monitor possible premature labor due to a fall and experiencing vaginal bleeding and abdominal pain. Presents pallor, tiredness and shortness of breath in comparison to other pregnancies, CVC ordered. NPO. Medical diagnosis of hypochromic microcytic anemia. 40mg ferrous sulfate prescribed TID.

- Supplements: non-routine use of prenatal vitamins due to stomach pain
- Tobacco use: 1-2 cigarettes/day
- Pt mentions being a picky eater and no appetite changes

Labs WNL except:
- RBC 3.8 x 10^6 / mm^3
- HGB 9.1 G/Dl
- Hct 33%
- TIBC 465 μg/dL
- Ferritin 10 μg/dL

Weight Status and Est. Needs:
- Ht: 65”
- Wt: 142#
- UBW (pre-pregnancy): 135#
- %UBW: 105%
- Meeting 65% EER of 2,359 kcals/day
- Meeting 80% RDA of 67.5g protein
- Meeting 72.8% of 27mg/day iron
- Pregnancy wt gain: 7# (recommended range 11-16#)

DIAGNOSIS:

- Increased iron needs R/T pregnancy status of 23 wks gestation AEB medical dx hypochromic microcytic anemia and abnormal hematology lab values (RBC 3.8 x 10^6/mm^3; Hgb 9.1 g/dL; Hct 33%; TIBC 465 ug/dL; Ferritin 10 μg/dL). (NI 5.1)
- Inadequate energy intake R/T reported picky eating habits and complaints of GI distress AEB 24-hour food recall assessment confirming 65% of recommended energy intake. (NI 1.2)
- Inadequate protein intake R/T increased protein needs at 23 wks gestation AEB 24-hour recall assessment confirming 80% of recommended protein intake. (NI 5.7.1)
- Limited adherence to nutritional-related recommendations (prenatal vitamin intake) R/T complaints of abdominal pains AEB pt’s self-report during assessment of nutrition history. (NB 1.6)

INTERVENTION:

Mineral-modified diet- iron (ND 1.10)

- Goal: To raise RBC values above 4.2 x 10^6/mm^3, Hgb levels above 12 g/dL, Hct values to 37%, TIBC levels below 450 μg/dL, and ferritin above 20 μg/dL
- Prescribed 40 mg ferrous sulfate to be taken daily.
- Provide pt with suggested alterations and additions to her diet in order to increase consumption and absorption of iron from food.

Discharge and transfer to consultation with outpatient RD (RC 2.3)

- Goal: increase energy, protein and iron intake to 100% requirement.
- Pt will be provided with tools and education in order to ensure all nutrient requirements are being met.
- Outpatient RD will monitor nutrient consumption for optimal pregnancy outcome for both mother and child.
- Track weight gain in pregnancy against curve and work to move patient into the healthy range of weight gain for pregnancy.

Strategies for supplement compliance- combination of several strategies to reach goal (C 2.11)

- Goal: Increase adherence of prenatal vitamin and supplement intake.
- Motivational interviewing during nutritional consult to instill importance of regular supplement adherence.
- Investigate whether pt has the social support needed to keep her accountable.
- Inform pt of strategies other women use to remember to take supplements.

MONITORING AND EVALUATION:

- Re-assess RBC, Hct, TIBC, Ferritin lab values if pt is re-admitted in the future.
    - Determine if values have remained the same, deviated more from ref. range, or are now within ref range.
- Outpatient RD:
    - Track weight gain in pregnancy (25-35# by end of gestation period), recording any change in weight gain status and further deviation from recommended weight gain.
    - Track nutrient consumption, specifically energy, protein, and iron consumption.
        - Meet energy needs as they continue to increase throughout gestation (approximate increase 452kcal/day by the end of gestational period)
        - Protein consumption of 67.5 g/day
        - Iron intake of 27 mg/day
- Evaluate implementation and compliance of ferrous iron supplement and prenatal vitamin
    - Pt reports of supplement compliance of 100%.
    - Re-evaluate goals if daily supplement compliance is still not met.

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