INTERVENTIONAL PACKAGE REGARDING ANEMIA PREVENTION DURING PREGNANCY

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ABSTRACT

Anemia results from a shortage of red blood cells or dysfunctional red blood cells in the body. This leads to reduced oxygen flow to the organs of human being. Reduction in either the percentage of red blood cells (hematocrit), or a reduction in the concentration of hemoglobin in a sample of venous blood when compared with reference values. Iron inadequacy is the most common anemia in the general population. Normal ranges for HGB and HCT vary substantially with age, race, and sex. The threshold for defining anemia is a HCT or HGB at or below the 2.5th percentile for age, race, and sex. The history, physical examination, and initial laboratory tests are used to narrow the diagnostic possibilities and guide further testing. Anemias are classified based upon red blood cell (RBC) size and the physiologic response of the bone marrow (i.e., the reticulocyte response). Approaching the evaluation of an anemic patient using these classification schemes helps to further narrow the diagnostic possibilities. Iron-deficiency anemia and other nutritional anemias can be prevented by ensuring that your child eats a well-balanced diet. Talk with your doctor about any specific dietary restrictions in your household as your child may *require a nutritional supplementation to ward off anemia.*

Key words*: anaemia, antenatal women, pregnancy, interventional package, prevention.*

Introduction

It is the general name for a range of disorders affecting RBC. Red blood cells contain hemoglobin, which is responsible for carrying O_2 in the blood. To produce red blood cells, the body needs Fe, vitamin B12 and folic acid. A disease in which the blood doesn't have enough healthy red blood cells.

Anemia results from a shortage of red blood cells or dysfunctional red blood cells in the body. This leads to reduced oxygen flow to the organs of human being.

Anemia during Pregnancy: -

Reduction in either the percentage of red blood cells (hematocrit), or a reduction in the concentration of hemoglobin in a sample of venous blood when compared with reference values. Iron inadequacy is the most common anemia in the general population.

It is a reduction in red blood cell (RBC) mass or blood hemoglobin concentration. In practice, anemia most commonly is defined by reductions in one or both of the following:

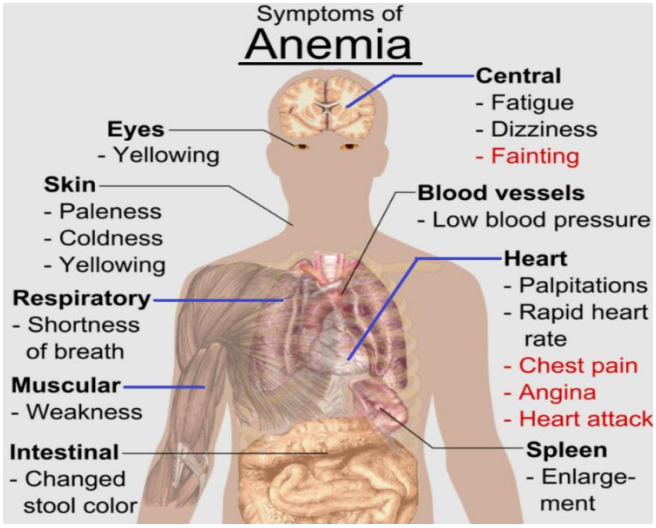
- ●Hematocrit (HCT) − The hematocrit is the fractional volume of a whole blood sample occupied by RBCs, expressed as a percentage. As an example, the normal HCT in a child age 6 to 12 years is approximately 40 %.
- ●Hemoglobin (HGB) − This is a measure of the concentration of the RBC pigment hemoglobin in whole blood, expressed as grams per 100 mL (dL) of whole blood. The normal value for HGB in a child age 6 to 12 years is approximately 13.5 g/dL (135 g/L).

Normal ranges for HGB and HCT vary substantially with age, race, and sex. The threshold for defining anemia is a HCT or HGB at or below the 2.5th percentile for age, race, and sex.

Signs and manifestation

- Pale or yellow skin
- Pale cheeks and lips
- Lining of the eyelids and the nail beds may look less pink than normal
- Shortness of breath
- Rapid heart rate
- Swollen hands and feet
- Headaches
- Irritability
- Mild weakness
- Tiring easily, napping more frequently
- Children experiencing red blood cell destruction may become jaundiced (yellowing of the skin or eyes) and have dark tea or cola-colored urine
- Dizziness and fainting
- Restless leg syndrome

History — The evaluation of a child with anemia begins with a thorough history. The degree of manifestation, past medical history, family history, dietary history, and developmental history may provide important clues to the cause of anemia:



●**Manifestation** — Characterizing the manifestation helps elucidate the severity and chronicity of anemia and may identify patients with blood loss or hemolytic etiologies:

•**Onset and severity of manifestation** − Common manifestation of anemia include lethargy, tachycardia, and pallor. New born may present with irritability and poor oral intake. Because of the body's compensatory abilities, patients with chronic anemia may have few or no manifestation compared with those with acute anemia at comparable hemoglobin (HGB) levels.

•**Manifestation of hemolysis** − Changes in urine color, scleral icterus, or jaundice may indicate the presence of a hemolytic disorder. Hemolytic episodes that occur only in male family members may indicate the presence of a sex-linked disorder, such as glucose-6-phosphate dehydrogenase (G6PD) deficiency.

•**Bleeding manifestation** − Specific questions related to bleeding from the gastrointestinal tract, including changes in stool color, the identification of blood in stools, and history of bowel manifestation, should be reviewed. Severe or chronic epistaxis also may result in anemia from blood loss and iron inadequacy. In pubescent girls, menstrual history should be obtained, including duration and amount of bleeding. Severe epistaxis and/or menorrhagia should raise suspicion for an underlying bleeding disorder. In patients who have manifestation of gastrointestinal bleeding, it is important to determine whether there is a family history of inflammatory bowel disease, intestinal polyps, colorectal cancer, hereditary hemorrhagic telangiectasia, von Willebrand disease, platelet disorders, or hemophilia.

●**Past medical history** — The past medical history should focus on characterizing past episodes of anemia and identifying underlying medical conditions:

•Birth history − The birth and neonatal history should include gestational age, duration of birth hospitalization, and history of jaundice and/or anemia in the newborn period. Results of newborn screening (which typically includes screening for sickle cell disease) should be reviewed.

•**History of anemia** − Previous complete blood counts (CBCs) should be reviewed, and if prior anemic episodes occurred, they should be characterized (including duration, etiology, therapy, and resolution). Prior episodes of anemia suggest an inherited disorder, whereas anemia in a patient with previously documented normal CBC suggests an acquired etiology. Patients with certain hemoglobinopathies (such as hemoglobin E or the various thalassemia's) may have a history of cure on multiple occasions for an erroneous diagnosis of iron inadequacy anemia.

•Underlying medical conditions − Past medical history and review of manifestation should be obtained to elucidate chronic underlying infectious or inflammatory conditions that may result in anemia. Travel to/from areas of endemic infection (eg, malaria, hepatitis, tuberculosis) should be noted (the Centers for Disease Control and Prevention website provides updated information on malaria and tuberculosis). Recent illnesses should be reviewed to investigate for possible infectious etiologies of anemia.

●**Drug and toxin exposure** — Current and past medications (including homeopathic or herbal supplements) should be reviewed with particular attention to oxidant drugs that can cause hemolysis, particularly in patients with underlying G6PD deficiency. Possible environmental toxin exposure should be explored, including lead exposure and nitrates in well water.

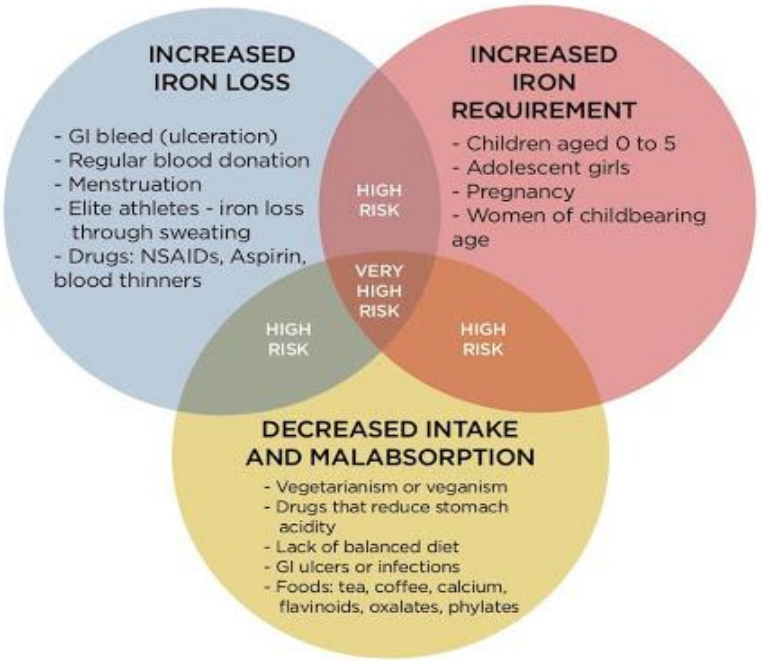
●**Family history** — Family history of anemia should be reviewed in depth. Family members with jaundice, gallstones, or splenomegaly should be identified. Asking if family members have undergone cholecystectomy or splenectomy may aid in the identification of additional individuals with inherited hemolytic anemias.

●**Dietary history**— The dietary history is focused on assessing iron intake and, to a lesser degree, folate and B12 content. The type of diet, type of formula (if iron fortified), and age of infant at the time of discontinuation of formula or breast milk should be documented. In addition, the amount and type of milk the patient is drinking should be determined. New born and children who are exclusively fed goat's milk can develop anemia due to folate deficiency. Pica (particularly pagophagia, the eating of ice) may suggest lead poisoning and/or iron inadequacy.

●**Developmental history** — Parents should be asked questions to determine if the child has reached age-appropriate developmental milestones. Developmental delay can be associated with iron inadequacy, vitamin B12/folic acid deficiency, and Fanconi anemia

•**Bleeding manifestation** − Specific questions related to bleeding from the gastrointestinal tract, including changes in stool color, the identification of blood in stools, and history of bowel manifestation, should be reviewed. Severe or chronic epistaxis also may result in anemia from blood loss and iron inadequacy. In pubescent girls, menstrual history should be obtained, including duration and amount of bleeding. Severe epistaxis and/or menorrhagia should raise suspicion for an underlying bleeding disorder. In patients who have manifestation of gastrointestinal bleeding, it is important to determine whether there is a family history of inflammatory bowel disease, intestinal polyps, colorectal cancer, hereditary hemorrhagic telangiectasia, von Willebrand disease, platelet disorders, or hemophilia.

RISK FACTORS



DIAGNOSTIC APPROACH: The history, physical examination, and initial laboratory tests are used to narrow the diagnostic possibilities and guide further testing.

Abnormalities in other cell lines — The first step in narrowing the diagnostic possibilities is determining whether the patient has an isolated anemia or if other cell lines (ie, white blood cells [WBCs] and platelets [PLT]) are also abnormal

●**Pancytopenia** − Causes of pancytopenia in children include leukemia, infection, myelosuppressive medications, aplastic anemia, and hypersplenism. ●**Anemia with thrombocytopenia** − Causes of anemia associated with low PLT count include hemolytic uremic syndrome (HUS), thrombotic thrombocytopenic purpura (TTP), and Evans syndrome. ●**Anemia with thrombocytosis** − Iron inadequacy anemia is commonly associated with thrombocytosis but can also be associated with thrombocytopenia [21]. Other causes of anemia associated with elevated PLT count include postsplenectomy anemia and infection or inflammation. ●**Anemia with leukocytosis** − Causes of anemia associated with elevated WBC count include leukemia and infection.

Classification of anemia — Anemias are classified based upon red blood cell (RBC) size and the physiologic response of the bone marrow (i.e., the reticulocyte response). Approaching the evaluation of an anemic patient using these classification schemes helps to further narrow the diagnostic possibilities

Microcytic anemia — Microcytic anemia is defined as anemia with a low mean corpuscular volume (MCV, i.e., ≤2.5th percentile for age, race, and sex

The most common causes of microcytic anemia in children are iron inadequacy and thalassemia The red cell distribution width (RDW) can be helpful in differentiating iron inadequacy from thalassemia. Anisocytosis (high RDW) is typical of iron inadequacy whereas the RDW is usually normal in patients with thalassemia (though elevated RDW can occur).

Normocytic anemia — Normocytic anemia is defined as anemia with a normal MCV (ie, between the 2.5th and 97.5th percentile for age, race, and sex Common causes of normocytic anemia include hemolytic anemias, blood loss, infection, medication, and anemia of chronic disease

Macrocytic anemia — Macrocytic anemia is defined as anemia with a high MCV (ie, ≥97.5th percentile for age, race, and sex

The most common cause of macrocytosis in children is exposure to certain medications (e.g., anticonvulsants, zidovudine, and immunosuppressive agents) Other causes include vitamin B12 or folate deficiency, liver disease, Diamond-Blackfan anemia, hypothyroidism, and aplastic

Reticulocyte response — The reticulocyte count is especially helpful in evaluating children with normocytic anemia

●**High reticulocyte count** − A high reticulocyte count (>3 percent) reflects an increased erythropoietic response to blood loss or hemolysis Common causes include: hemorrhage; autoimmune hemolytic

anemia; membranopathies (e.g., hereditary spherocytosis); enzymopathies (eg, glucose-6-phosphate dehydrogenase [G6PD] deficiency); hemoglobinopathies (eg, sickle cell disease); and microangiopathic hemolytic anemia (eg, HUS)

●**Low or normal reticulocyte count** − A low or normal reticulocyte count reflects deficient production of RBCs (i.e., a reduced marrow response to the anemia).

Causes of inadequate marrow response include infections, lead poisoning, hypoplastic anemias, transient erythroblastopenia of childhood, Diamond-Blackfan anemia (which typically presents with macrocytic anemia), drugs (most drugs that decrease erythropoiesis affect other cell lines as well; cisplatin is an example of a medication that can cause isolated suppression of erythropoiesis), and kidney disease (In addition, anemia due to acute blood loss can be associated with low absolute reticulocyte count if there has not been time for the bone marrow to mount an appropriate reticulocyte response, which typically takes approximately one week

Cure

Anemia cure depends on the cause.

- **Iron inadequacy anemia.** Cure for this form of anemia usually involves taking iron supplements and changing your diet.

  If the cause of iron inadequacy is loss of blood — other than from menstruation — the source of the bleeding must be located and the bleeding stopped. This might involve surgery.
- **Vitamin deficiency anemias.** Cure for folic acid and vitamin C deficiency involves dietary supplements and increasing these nutrients in your diet.

  If your digestive system has trouble absorbing vitamin B-12 from the food you eat, you might need vitamin B-12 shots. At first, you might have the shots every other day. Eventually, you'll need shots just once a month, possibly for life, depending on your situation.
- **Anemia of chronic disease.** There's no specific cure for this type of anemia. Doctors focus on treating the underlying disease. If manifestation become severe, a blood transfusion or injections of a synthetic hormone normally produced by your kidneys (erythropoietin) might help stimulate red blood cell production and ease fatigue.
- **Aplastic anemia.** Cure for this anemia can include blood transfusions to boost levels of red blood cells. You might need a bone marrow transplant if your bone marrow can't make healthy blood cells.
- **Anemias associated with bone marrow disease.** Cure of these various diseases can include medication, chemotherapy or bone marrow transplantation.
- **Hemolytic anemias.** Managing hemolytic anemias includes avoiding suspect medications, treating infections and taking drugs that suppress your immune system, which could be attacking your red blood cells.

  Depending on the cause or your hemolytic anemia, you might be referred to a heart or vascular specialist.
- **Sickle cell anemia.** Cure might include oxygen, pain relievers, and oral and intravenous fluids to reduce pain and ward off complications. Doctors might also recommend blood transfusions, folic acid supplements and antibiotics.

  A cancer drug called hydroxyurea (Droxia, Hydrea, Siklos) also is used to treat sickle cell anemia.
- **Thalassemia.** Most forms of thalassemia are mild and require no cure. More severe forms of thalassemia generally require blood transfusions, folic acid supplements, medication, removal of the spleen, or a blood and bone marrow stem cell transplant.

PREVENTION

Iron-deficiency anemia and other nutritional anemias can be prevented by ensuring that your child eats a well-balanced diet. Talk with your doctor about any specific dietary restrictions in your household as your child *may* require a nutritional supplementation to ward off anemia.

Here are ways to ward off nutritional anemia:

- **Do not give your baby cow's milk until he or she is over 12 months old**. Giving cow's milk before your child is ready may cause blood loss in his or her stool and can also decrease the amount of iron absorbed in the gut.
  - **Breastfeeding:** Your baby will have an adequate supply of iron until at least 4 months of age. At 4 months of age breastfed new born should be supplemented with iron until they are eating enough complementary foods that contain are rich in iron (e.g. red meat or iron-fortified cereals). Talk with your pediatrician about foods best suited for this purpose, and how much additional iron supplementation is needed.

- **Formula-feeding baby:** Give your baby formula with added iron. Low-iron formula can result in iron-deficiency anemia and should not be used.

- **After 12 months of age, avoid giving your child more than 2 cups a day of whole cow's milk**. Milk is low in iron and can make children feel full, which can decrease the amount of other iron-rich foods they eat.
- **Feed older children a well-balanced diet with foods that contain iron.** Many grains and cereals have extra added iron (check labels to be sure). Other good sources of iron include red meat, egg yolks, potatoes, tomatoes, beans, molasses, and raisins.
- **Encourage the whole family to eat citrus fruits or eat other foods high in Vitamin C** to increase the body's absorption of iron. Although green vegetables contain lots of iron, the iron from many vegetables comes in a form that is difficult for your body to absorb, but Vitamin C can help!

CARE:

- Train the patient to avoid contact with potential sources of infection which can harbor organisms.
- Reassure and support the patient and his family by explaining the disease and its cure, particularly if the patient has recurring acute episodes.
- Explain the purpose of all prescribed drugs, and discuss possible adverse reactions, including those he should report promptly.
- Tell the patient who does not require hospitalization that he can continue his normal lifestyle with appropriate restrictions.
- To ward off folic acid deficiency anemia, emphasize the importance of a well balanced diet high in folic acid. Teach the patient to meet daily folic acid requirements by including a food from each food group in every meal, Advise the patient not to stop taking the supplements when he begins to feel better.
- To help ward off exacerbation of sickle cell anemia, advise the patient to avoid tight clothing that restricts circulation.
- Explain the need to increase fluid intake to ward off dehydration that results from impaired ability to properly concentrate urine. Tell parents to encourage a child with sickle cell anemia to drink more fluids.
- To encourage normal mental and social growth, warn parents against being overprotective. Although the child must avoid strenuous exercise, he can enjoy most everyday activities.
- Refer parents of children with sickle cell anemia for genetic counseling to answer their questions about the risk to future offspring. Recommend screening of other family members to determine if they are heterozygote carriers.
- In sickle cell anemia Inform the patient and his parents that if he must be hospitalized for a vaso-occlusive crisis, I.V. fluids and a parenteral analgesic may be administered. He may also receive oxygen therapy and blood transfusions.
- Women with sickle cell anemia Warn them that they are poor obstetric risks.
- Emphasize the need for preventing trauma, abrasions, and breakdown of the skin.
- Be sure the patient understands the need to maintain a good nutritional intake to enhance the immune system and resistance to infections.
- Teach the patient the potential for bleeding and hemorrhage, and instruction to stop bleeding.
- Explain the importance of maintaining regular bowel movements to ward off straining.

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