Disorders of the Red Blood Cells – 2022

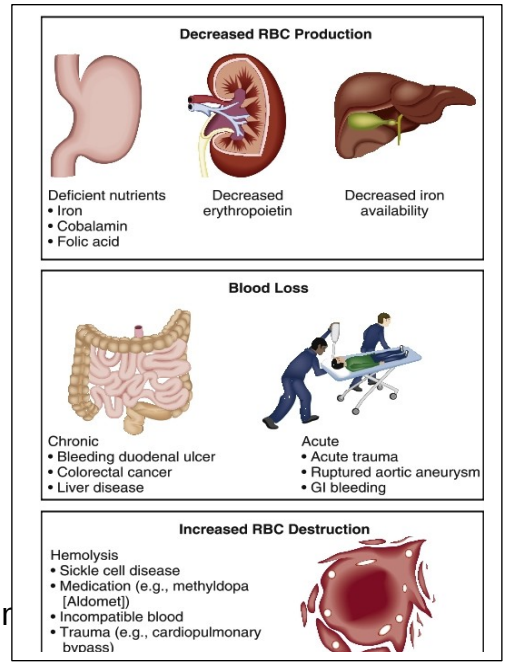
(Pg. 606 ch 30 in Textbook)

Anemia

- A deficiency in
  - Number of RBCs
  - Quantity or quality of hemoglobin (Hgb)
  - Volume of packed RBCs (Hct)
- Results in a decrease in oxygen transport and hypoxia

3 Main Causes of Anemia:

- Decreased production of erythrocytes
  - Nutrient deficiencies (Table 30-5)
    - Decreased erythropoietin, iron, B12, folic acid
- Blood loss
- Increased destruction of erythrocytes



Anemia = Not a specific disease

- Manifestation of a pathologic process
- Diagnosed based on
  - Complete blood count (CBC)
  - Reticulocyte count
  - Peripheral blood smear
- Classified according to
  - Morphology
    - Cellular characteristic
    - RBC size and color
  - Etiology
    - Cause
    - Clinical condition causing anemia

Clinical Manifestations (Table 30.3 manifestations of anemia, pg 608 in

- Caused by body's response to tissue hypoxia
  - Manifestations vary based on how fast anemia has evolved, its severity, and any coexisting disease
- Hgb levels are often used to determine severity of anemia
  - Mild Anemia: Hgb 10-12 g/dl
    - May have no symptoms
    - Palpitations
    - Mild fatigue
    - Exertional dyspnea
  - Moderate Anemia: Hgb 6-10 g/dl
    - Can be noted with activity and at rest
    - Increased palpitations
    - Fatigue
    - Dyspnea
    - "Roaring in the ears"
  - Severe Anemia: Hgb less than 6 g/dl
    - May involves multiple body symptoms
    - CV – tachycardia, HF, MI
    - Eyes – Jaundice
    - GI – Anorexia, hepatomegaly, splenomegaly

- Skin – pallor, jaundice, pruritus
- Mouth – glossitis, smooth tongue
- Musculoskeletal – bone pain
- Pulmonary – dyspnea at rest
- Neuro – headache, confusion

Gerontologic Considerations

- Anemia is not normal
  - More common in the 70s and beyond
  - Often related to an underlying cause
- Signs and symptoms may be overlooked
  - Other health issues
  - May be mistaken for normal aging

Types of Anemia

- Decreased RBC production
  - Iron Deficiency
  - Megaloblastic anemia
    - Cobalamin Deficiency
    - Folic Acid Deficiency
  - Anemia of Chronic Disease
- Anemia of Blood Loss
- Increased RBC Destruction
  - Hemolytic Anemia

<u>Iron Deficiency Anemia</u>

- Most common nutritional disorder in the world
- Susceptible populations:
  - Very young
  - Poor diet
  - Women in reproductive years

Etiology

- Inadequate dietary intake
  - Normally dietary intake is enough
  - Need more with menstruation, pregnancy
- Malabsorption
  - Iron absorption occurs in the duodenum
  - Diseases or surgeries that alter, destroy, or remove the absorption surface of this area of intestine lead to anemia.
- Blood loss
  - Major cause of iron deficiency in adults
  - Chronic blood loss most commonly through GI and GU systems
    - 2 mL whole blood = 1 mg iron.
    - When stored iron is not replaced, Hgb production is reduced.
    - If it is in low stores, process of erythropoiesis will be affected and less hgb will be synthesized
    - Iron is essential to O2 carrying function of Hgb
  - Postmenopausal bleeding, CKD, and dialysis may also contribute

Clinical Manifestations

- General manifestations of anemia

- Pallor most common finding
- Glossitis second most common finding
    - Inflammation of the tongue
- Cheilitis also found
    - Inflammation of the lips

Diagnostic Studies

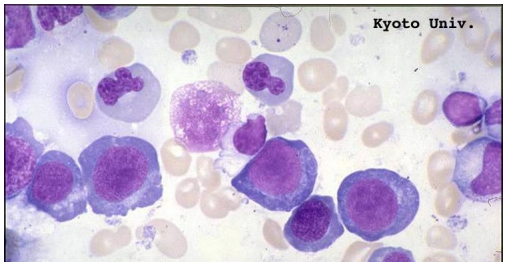
- CBC
    - H/H _____
    - MCV _____
- Iron Studies
    - Serum Iron, Ferritin _____
    - TIBC _____
- Serum B12 or Folate _____
- Stool for occult blood
- Endoscopy / Colonoscopy
- Bone Marrow biopsy

Interprofessional/Nursing Management

- Goal
    - Treat underlying problem causing loss, reduced intake, or poor absorption of iron
- Replace iron
    - Nutritional therapy
    - Oral or occasional parenteral iron supplements
    - Transfusion of packed RBCs
- Drug Therapy
    - Oral iron
        - Inexpensive
        - Convenient
        - Factors to consider
            - Daily dose is 150 to 200 mg
            - Best absorbed in an acidic environment (give 1 hr before food if you can)
                - 2 acidic substance to enhance absorption = _____ and _____
            - Side effects
                - Heartburn, constipation, diarrhea, nausea
            - Teach stools will become _____
    - Parenteral iron
        - Indicated for malabsorption, oral iron intolerance, need for iron beyond normal limits, poor patient compliance
        - Can be given IM or IV
- Reassess Hgb and RBC count to evaluate response to therapy
- Emphasize adherence to dietary & drug therapy
    - Need to take supplement for 2 to 3 months after Hgb returns to normal
    - Monitor for liver problems with lifelong therapy

Megaloblastic Anemias

- Group of disorders
    - Caused by impaired DNA synthesis
    - Presence of megaloblasts
    - Large, fragile cell membrane



- Majority result from deficiency in
    - Cobalamin (vitamin B12)
    - Folic acid

Megaloblastic Anemia

Cobalamin (B12) Deficiency

- **Etiology:**
    - Most commonly caused by pernicious anemia
        - Caused by absence of intrinsic factor (IF)
    - Gradual onset
        - Begins in middle age or later
    - Intrinsic factor (IF)
        - Protein secreted by parietal cells of gastric mucosa
    - IF is required for cobalamin absorption in the distal ileum
        - If IF is not secreted, cobalamin will not be absorbed
    - Can also occur:
        - Surgery or chronic diseases of the GI tract
        - Excess alcohol or hot tea ingestion
        - Smoking
        - Long-term users of H_2 histamine receptor blockers & proton pump inhibitors
        - Strict vegetarians
        - Familial predisposition

Clinical Manifestations

- General anemia symptoms
- GI manifestations
    - Smooth, sore, bright red tongue
    - Anorexia
    - N/V, abdominal pain
- Neuromuscular manifestations
    - Muscle weakness
    - Paresthesias of hands/feet
    - Ataxia (Loss of balance)
    - Impaired thought processes: confusion to dementia

Diagnostic Studies

- CBC
    - H/H – _____
    - MCV – _____
- Cobalamin levels (B12)--_____
- Folate levels--_____
- Upper GI endoscopy with biopsy of gastric mucosa
    - Patients at high risk for gastric cancer

Interprofessional/Nursing Management

- Parenteral or intranasal administration of cobalamin is treatment of choice (<u>for life</u>!)
    - Patients will die in 1 to 3 years without treatment
    - Anemia reversible w/ ongoing TX but long-standing neuromuscular complications may not be reversible
- High dose oral or sublingual cobalamin = options for pts. <u>if</u> GI absorption intact

Megaloblastic Anemia

Folic Acid Deficiency

- Folic acid needed for normal DNA synthesis and erythropoiesis
- Clinical manifestations are similar to those of cobalamin (B12) deficiency, but absence of neurologic problems differentiates them.

Etiology

- Common causes
  - Dietary deficiency
    - Alcohol abuse and anorexia
  - Malabsorption syndromes
  - Meds impeding absorption (i.e. some anticonvulsants, methotrexate)
  - Loss during hemodialysis
  - Increased requirement

Diagnostic Studies

- CBC
  - H/H – _____
  - MCV – _____
- Folate level – _____
- Cobalamin level – _____

Interprofessional/Nursing Management

- Folic acid 1 mg/day po
  - Up to 5mg/day po
- Diet high in folic acid (Table 30-5)
  - Examples:

Megaloblastic Anemia

Interprofessional/Nursing Management

- Early detection & treatment
- Ensure safety
  - Diminished sensations to heat and pain from neurologic impairment
  - Protect from falling, burns, and trauma
  - PT may be needed
- Focus on compliance with treatment
- Regular screening for gastric cancer

Anemias of Blood Loss (Acute vs. Chronic)

Acute Blood Loss = sudden hemorrhage

- Trauma, complications of surgery, etc.
  - Caused by body's attempts to maintain adequate blood volume and meet oxygen requirements
  - Clinical signs and symptoms are *more important* than laboratory values
    - With *sudden* blood loss, lab values may seem normal or high for 2 to 3 days
    - Once plasma volume is replaced, low RBC concentrations become evident
      - Low RBC, Hgb, and Hct levels reflect actual blood loss

Interprofessional/Nursing Management

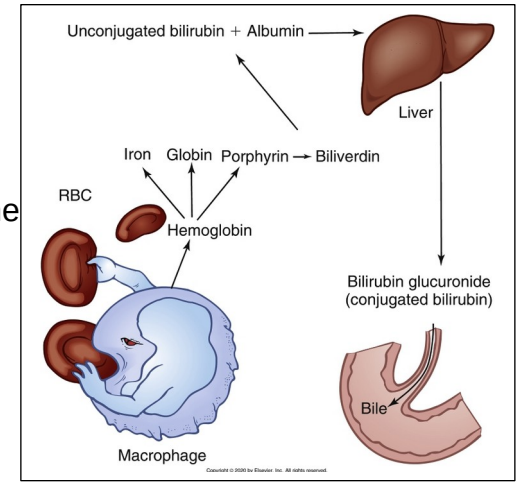
- Replace volume
  - IV fluid (NSS or LR)
- ID & stop source of bleeding

    - Pressure, bandage or surgical intervention
- Blood transfusions especially if significant losses!
- Iron supplements

Chronic Blood Loss
- Sources of chronic blood loss:
    - Bleeding ulcer
    - Hemorrhoids
    - Menstrual & postmenopausal blood loss
- Management involves
    - ID source & stop bleeding
    - **o** Providing supplemental iron prn

Hemolytic Anemia
- Destruction or hemolysis of RBC's at a rate that exceeds production
- Causes
    - Intrinsic
        - Defective Hgb (sickle-cell disease)
    - Extrinsic
        - Hyperactive spleen
        - Blood transfusion reaction
        - Mechanical trauma to RBCs
        - Infectious agents/toxins

Clinical Manifestations
- General manifestations of anemia
- Specific manifestations including
    - Jaundice
    - Enlargement of the spleen and liver
- Maintenance of renal function is a major focus of treatme



Diagnostic Studies
- CBC- decreased H/H
- _____ Reticulocyte count
- _____ Bilirubin

Treatment and Management
- Supportive care until able to remove causative agent
    - Aggressive hydration to flush kidneys
    - Blood products
    - Corticosteroids
- Possible splenectomy

Hemochromatosis (bonus material – not tested with this content)
- Usually an Inherited disorder
    - Increase in intestinal iron absorption
    - Increase in iron deposition into tissues
- Liver enlargement→cirrhosis
- Skin becomes "bronzed"
- Elevated serum iron
- Confirmed by genetic testing

- Treat with phlebotomy or chelation therapy

Polycythemia
Polycythemia Vera (primary)
- Excessive stem cell action
- Excessive bone marrow production of
    - Erythrocytes, leukocytes, thrombocytes
- Results in increased blood viscosity and volume
- Pt. also at risk for clot formation
    - CVA, MI, thrombus/emboli

Secondary Polycythemia
- Hypoxia-driven
    - Low O2 stimulates EPO production in kidney
        - Makes more RBCs
    - Low oxygen situations could result from
        - High altitude, COPD, CV disease
- Hypoxia-independent
    - Cancer or benign tumor makes EPO →makes more

Clinical Manifestations
- HTN
    - Dizziness, headache, tinnitus, visual disturbances
- Increased clotting/thrombus →CVA and HF
- Enlarged liver and spleen
- Bleeding due to overfull blood vessels
- Plethora (ruddy complexion)

Diagnostic Studies
- RBC , H/H _____
- WBC Count _____
- Platelet count _____
- Bone marrow biopsy
    - Hyperplastic bone marrow

Interprofessional/Nursing Management
- Phlebotomy
    - Reduce blood volume
- Hydration
    - Reduce blood viscosity
- Myelosuppressive Agents
    - Reduce bone marrow activity
- Low-dose Aspirin (ASA)
    - Thrombus prevention
- Teaching to prevent secondary polycythemia

Clinical Application

- Type of anemia:

- Priority nursing diagnosis/patient problem:

- A realistic goal/EO is:

- List 3 nursing interventions that will help the patient meet the goal:
    -
    -
    -