Disorders of the Red Blood Cells – 2023

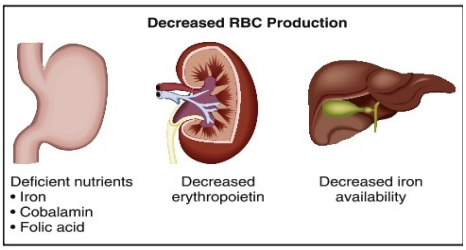
(Pg. 606 ch 30 in Textbook)

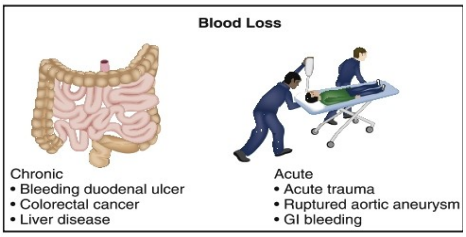
Anemia

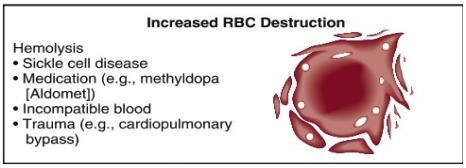
- A deficiency in:
  - Number of RBCs
  - Quantity or quality of hemoglobin (Hgb)
  - Volume of packed RBCs (Hct)
- Results in a decrease in oxygen transport and hypoxia
- The goal of tx is to restore and maintain adequate tissue oxygenation

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

- 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

Iron Deficiency Anemia

- 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
- Spoon-shaped nails

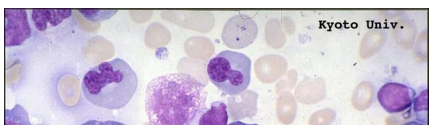
Diagnostic Studies

- 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 /Client Teaching
    - Daily dose is 150 to 200 mg
    - Best absorbed in an acidic environment
      - Give between meals (1 hr before food if you can)
      - 2 acidic substance to enhance absorption = _____ and _____.
    - Side effects
      - Heartburn, constipation, diarrhea, nausea
    - Teach stools will become _____
    - Do not take with antacids or dairy products
- Parenteral iron
  - Only indicated for severe anemia, 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
- Intrinsic Factor 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 –low
- MCV – high
- Cobalamin levels (B12) -low
- Folate levels-WNL
- 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 (for life!)
  - 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. if 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 – low
- MCV – high
- Folate level – low
- Cobalamin level – WNL

Interprofessional/Nursing Management

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

Megaloblastic Anemias

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

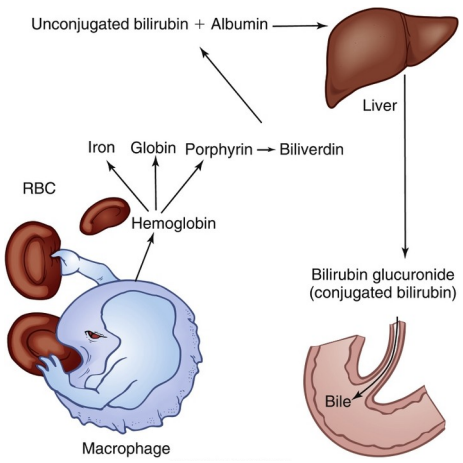
- Sources of chronic blood loss:
  - Bleeding ulcer
  - Hemorrhoids
  - Menstrual & postmenopausal blood loss
- Management involves
  - ID source & stop bleeding
  - Providing supplemental iron prn

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 treatment.



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

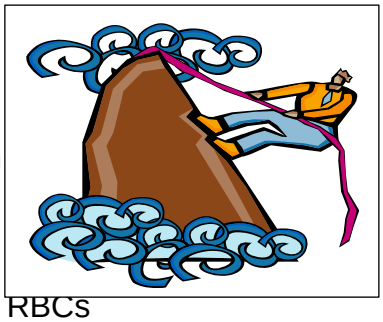
- Liver enlargement→cirrhosis
- Skin becomes “bronzed”
- Elevated serum iron
- Confirmed by genetic testing
- Treat with phlebotomy or chelation therapy

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
    - ONLY affects RBC’s, not a stem cell mutation
  - Low oxygen situations could result from
    - High altitude, COPD, CV disease
- Hypoxia-independent
  - Cancer or benign tumor makes EPO →makes more RBCs

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:
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