Evaluation of CBC

- Evaluate type of WBCs
- Reticulocyte count
- RBC size, shape, color
  - MCV: size
  - RBC color (hypo or normo-chromic)
    - Mean corpuscular hemoglobin concentration (MCHC)
    - Mean corpuscular hemoglobin (MCH)

Other labs

- PT, PTT (APTT)
- Bleeding time
- Platelet agglutination
Hematopoiesis

- Liver
  - Blood clotting factors
  - Vit K
- Bone marrow
  - Major hematopoietic organ
  - Erythropoietin secreted by kidneys

Spleen

- Immunologic function until age 5
- Stores platelets
- Destroys aged RBC's
- Filters blood

Nutritional requirements for erythropoiesis

- Protein
- Vit B₁₂
- Folic acid
- Vitamin B₆
- Vitamin C
- Iron
Iron

- Iron necessary synthesis of Hgb
- Hgb carries oxygen to tissues
- Iron absorbed from small intestine
- Binds with transferrin for transport
- 30% stored as ferritin

Anemia

Anemia: a reduction of RBCs and/or Hgb concentration from age norm.

Causes
- Excess loss of blood
- Excess RBC destruction
- Insufficient RBC production
- Morphology problem (size, shape, color of RBCs)
Clinical Manifestations: Anemia

- Pallor
- Tachycardia
- Fatigue/lethargy
- Muscle weakness
- Irritability
- Decreased pulses/cap refill

Iron Deficiency Anemia

- Anemia d/t lack of adequate iron to meet needs for Hgb formation

Diagnostic labs:
- CBC
  - Hgb, Hct, retic count
- Serum iron
- TIBC (total iron binding capacity)
- Serum ferritin

Consequences of IDA

- More susceptible to infection
- Developmental & behavioral delays
- Lifetime behavior & learning problems
- Increases lead absorption
Causes of Iron Deficiency

- Insufficient intake or blood loss
- Neonatal stores of iron
- Premature infants
- Cow’s milk
- Adolescent growth spurt
- Female puberty

Health Promotion

- Prenatal nutrition
- Iron fortified formula
- Iron fortified foods after 6 mo
- Limit cows milk
- Screening
- Iron supplements
- Foods rich in iron ("Parents Want to Know")

Proper administration of iron supplements

- Dosage based on elemental iron
- Empty stomach w/fruit juice
  - Vit C helps w/absorption
  - Take with straw
- Calcium binds w/iron
- Teach about side effects
- Safe storage
Nursing Diagnoses IDA

- Knowledge deficit
- Activity intolerance
- Altered nutrition: < body requirements
- High risk for altered growth & development

Lead

- Competes for iron-binding sites
- Cellular injury all organs
- Children absorb more readily

Symptoms of lead poisoning:
- Non-specific
- Behavior & learning problems
- Slowed growth
- Hearing problems
- Headaches
- Anemia
Lead Poisoning: sources

• Lead based paint
• Soil, water pipes
• Pottery (improper glaze)
• Parent’s clothes
• Traditional medicines
• Toddlers & preschoolers more at risk

Lead Poisoning:

• Primary Prevention
  – Education
  – Screening
  – Hand washing
  – Foods high in iron, calcium & Vit C
  – Damp mop
  – Clean toys/pacifier – soapy water
• secondary prevention
  – Chelation

Sickle Cell Disease-Intro

• Hereditary hemoglobinopathies
• Normal Hgb replaced by sickle-shaped Hgb S
• Neonates: Hgb F
General Clinical Manifestations

- Possible growth retardation
- Chronic anemia
- Possible delayed puberty
- Susceptibility to sepsis
- Pain: acute & chronic

Complications of Sickle Cell Disease

- Vasoocclusive crisis
  - Painful episode
  - Acute chest syndrome
  - Dactylitis (hand-and-foot syndrome)
  - Priapism (persistent erection of the penis)
  - Cerebrovascular accident
- Acute sequestration crisis
- Aplastic crisis
Triggers: Vaso-occlusive Crisis

• Hypoxia
• Dehydration
• Infection
• Stress - physiological & emotional
• Cold

Therapeutic Management: Vaso-occlusive Crisis

• Fluids (hydration)
• Analgesics ATC
• Heat to painful site
• Oxygen – prn
• Rest
• Blood transfusions
• Emotional support

Therapeutic Management SCD

• Prevent crisis
• Splenectomy
• Hydroxyurea
• Others under investigation
  – Nitrous oxide
  – Stem cell transplant
Nursing Diagnoses

- Risk for infection
- Impaired physical mobility
- Altered family process
- Pain
- Altered tissue perfusion
- Knowledge deficit

SICKLE CELL ANEMIA CRISIS
(Inherited Red Blood Cell Disorder)

- Cell Clumping
- Complications
- Infection
- Stroke
- Ulcer
- Leg Ulcer
- Splenectomy
- Pain
- Abdominal & Lumbar pain
- Hand Foot Syndrome
- Joint Pain

Hemophilia – Intro

- Coagulation deficiency factor VIII, IX, XI
- Hereditary; X-linked recessive
- Group of disorders
  - hemophilia A most common
  - Factor VIII deficiency
Diagnosis

• History, presenting sx, lab
• Lab
  – Prolonged PTT
  – Decreased Factor VIII or IX
  – Normal PT, thrombin time, fibrinogen, & platelet count.

Nursing Diagnoses

• Risk for Injury (internal)
• Pain
• Impaired physical mobility
• Knowledge deficit

Risk for Injury (internal)

Outcome:
Interventions:
• No rectal temps
• Injury protection with activities
• Any head injury: check for SDH
• Administer necessary factor
• Transfuse – whole blood or FFP
• DDAVP (desmopressin acetate)
### Therapeutic Intervention: Deficient Knowledge

**Outcome:**
- Medic Alert bracelet
- Injury prevention appropriate for age
- CMs of internal bleeding
- Soft toothbrush; regular checkups
- Avoid meds w/ASA
- Med administration & storage

### HEMOPHILIA
(Deficiency of Factor VIII, Classic, or Type A)

- No Cure
- Avoid injury & meds that promote bleeding
- Good Nutrition
- Good Dental Hygiene
- IV Administration Of Deficient clotting Factor
- Intracranial Hemorrhage
- Prolonged Nosebleeds
- Bruise Easily
- Warm, Painful Swollen Joints
- With ↓ Movement
- GI Hemorrhage

### Common Problem: Hemarthrosis

<table>
<thead>
<tr>
<th>Clinical Manifestations</th>
<th>Treatment</th>
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</thead>
<tbody>
<tr>
<td>• Impaired ROM</td>
<td>• Immobilization</td>
</tr>
<tr>
<td>• Pain</td>
<td>• Elevation</td>
</tr>
<tr>
<td>• Swelling</td>
<td>• Ice</td>
</tr>
<tr>
<td></td>
<td>• Appropriate clotting factor</td>
</tr>
<tr>
<td></td>
<td>• Control pain</td>
</tr>
<tr>
<td></td>
<td>• Maintain Mobility</td>
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</tbody>
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### Overview of Childhood Cancers

- 1% of all cancers; 2nd leading cause of childhood deaths [McKinney]
- Leukemia, Brain & spinal tumors, lymphoma – most common
- Treatment challenge:
  - Minimize treatment-related side effects
  - Maintain normal growth & development
- Fight for palliative care and hospice when indicated.

### Cardinal Signs and Symptoms of Cancer in Children

- **Overt signs**
  - A mass
  - Purpura
  - Pallor
  - Weight loss
  - Whitish reflex in the eye
  - Vomiting in early morning
  - Recurrent or persistent fever

- **Signs and symptoms that may be covert**
  - Bone pain
  - Headache
  - Persistent lymphadenopathy
  - Change in balance, gait, or personality
  - Fatigue, malaise
Neuroblastoma

- Originate from neural crest cells
- Can be present wherever sympathetic nervous tissue is found
- Exclusively in infants & children
- Usually in abdomen
- Infringes on adjacent normal tissue & organs

Treatment

- No metastasis: surgical excision
- Later stages:
  - Tumor debulking
  - Chemo &/or radiation
  - Surgery if chemo/radiation reduces tumor size
  - Stem cell transplant

Brain tumor

- most common solid tumor in children
- present w/signs increased ICP
- Tx: surgery, chemo, radiation