Nursing Assessment in Pediatric Hematology/Oncology

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OBJECTIVES

• Recognize abnormal laboratory results and associated nursing implications.

• Discuss the special aspects of the role of the nurse in the care of the child or adolescent with cancer and their families.

• Implement practices designed to improve the quality of life for patients and families affected by childhood cancer.
Childhood Cancer: Symptom Onset

- May be rapid or insidious
- Diagnosis often delayed
- Symptoms often vague
Childhood Cancer: Common Chief Complaints

• Pallor, bleeding
• Fatigue
• Persistent fever
• Headache, visual changes
• Lymphadenopathy
• Bone pain, joint pain, limp
• Abdominal mass
• Cough, respiratory difficulties
The Diagnostic Workup: “Waiting and Not Knowing”

- Uncertainty regarding diagnosis and prognosis
- Worry and preoccupation with anticipated outcome
- Intensity/agony of this period often unrecognized
- Nurses can listen, debrief, and offer support

Clarke-Steffen, 1993
Clinical Manifestations of Cancer

- **Changes in blood cell production**, due to:
  - bone marrow infiltration by tumor
  - chronic disease
- **Mass**, resulting in:
  - compression of organs
  - compression of vital structures
- **Tumor byproducts**, causing alterations in:
  - electrolytes
  - hormones, metabolism
  - immunologic response
Findings Related to Alterations in Blood Cell Production

- **Pallor**
  - conjunctivae
  - oral mucosa
  - nailbeds
  - palmar creases

- **Petechiae**
  - nonblanching
  - pressure points
  - < 5mm

- **Purpura**
  - > 5mm
Findings Related to Alterations in Blood Cell Production

- Fever
- Infection
- Fatigue
The Mediastinum: What is It?

Space between:
- sternum and spine
- suprasternal notch and diaphragm
- parietal pleura
The Mediastinum: What's Inside?

- Thymus
- Thyroid
- Esophagus
- Lymph nodes
- Trachea & bronchi
- Heart & pericardium
- Great vessels
- Nerves
Causes of Mediastinal Mass

- Leukemia, lymphoma
- Neuroblastoma
- Other tumors
- Infections (e.g., TB)
Findings Related to Mediastinal Mass: Respiratory Compromise

- Cough
- Wheezing
- Tracheal/bronchial compression
- Respiratory distress/arrest
**Mediastinal Mass**

*Never* force a child with a mediastinal mass to lie down—this could result in respiratory arrest!

*Never* sedate a child with a mediastinal mass unless you are prepared to intubate!
Findings Related to Mediastinal Mass: Superior Vena Cava Syndrome

- Facial swelling and/or distended neck veins
- Compression of great vessels/vital structures
- May be misdiagnosed as an allergic reaction

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Findings Related to Masses: Lymphadenopathy

- Abnormal enlargement of lymph nodes
  - > 1 cm
  - often firm, matted
- Location of enlarged nodes
  - regional versus generalized
  - epitrochlear (elbow) & supraclavicular nodes usually pathologic
Findings Related to Abdominal Masses

• Abdominal masses can be:
  - tumor
  - enlarged liver and/or spleen
  - bladder/feces

• Common symptoms:
  - pain
  - GI symptoms
  - urinary symptoms
Findings Related to Musculoskeletal Masses

• **Constitutional symptoms**
  - fatigue
  - fever
  - weight loss

• **Pain (onset/timing/location)**

• **Gait problems**
Findings Related to CNS Tumors

- Morning headaches
- Vomiting
- Hemiparesis
- Cranial nerve palsies
- Diplopia, nystagmus, strabismus
- Ataxic gait
- Decreased coordination
- Seizures
Findings Related to CNS Tumors

- Irritability, lethargy
- Personality changes
- Head tilt
- Macrocephaly
- Bulging fontanelle
- Short stature
- Growth deceleration
- Precocious puberty
Assessing Lab Values
How to Read a CBC

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How to Read a CBC

• **Measure of formed elements:**
  - red blood cells
  - white blood cells
  - platelets

• **Additional information:**
  - hemoglobin
  - hematocrit
  - RBC size/shape
  - WBC differential

• **Always check norms for age!!**
Red Blood Cell Assessment

- **RBC count**
  - total # of RBCs in each ml of blood

- **Hemoglobin**
  - iron-rich protein found inside RBCs, measured in gm/dl
  - indicator of $O_2$-carrying capacity

- **Hematocrit**
  - % of RBC's by volume
Red Blood Cell Assessment: RBC, Hgb, Hct

- Normal
- Low (anemia)
- High (polycythemia)

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Red Blood Cell Assessment: Size & Color

- **MCV** (mean cell volume)
  - RBC size

- **MCH** (mean cell hemoglobin)
  **MCHC** (mean cell hemoglobin concentration)
  - RBC hemoglobin content (color)

- **RDW** (red cell distribution width)
  - variation in RBC size
Red Blood Cell Assessment: Size & Color

- **MCV (RBC size):**
  - normal (normocytic)
  - low (microcytic)
  - high (macrocytic)

- **MCH, MCHC (RBC color):**
  - normal (normochromic)
  - low (hypochromic)

- **RDW (RBC size variation):**
  - normal
  - high (wide variation in RBC size)
Platelet Count

• Platelets
  - plug holes in damaged blood vessels
  - prevent bleeding
Platelet Count Assessment

- Normal
- Low (thrombocytopenia)
- High (thrombocytosis)

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White Blood Count

- White blood cells:
  - fight infection
  - make antibodies
  - several subtypes of WBCs make up the “differential count”
White Blood Count Assessment

- Normal
- Low (*leukopenia*)
- High (*leukocytosis*)

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WBC Differential

• Assesses percentage of each different subtype of WBC in blood
• Reported as % of total cells counted
• % of all types reported should add up to 100
WBC Differential: Types of Cells

• Neutrophils (infection-fighters)
  - segs or polys (mature)
  - bands or stabs (young)
• Lymphocytes (immunity)
• Monocytes (phagocytosis)
• Eosinophils (allergy, parasites)
• Basophils (hypersensitivity)
• Blasts (very immature)
  (Blasts should ALWAYS be considered ABNORMAL unless proven otherwise)
Evaluating the Neutrophil Count

• Neutrophil count **increases** with:
  - bacterial infections
    • increased % of neutrophils
    • increased % of immature neutrophils (bands/stabs)
    • “shift to the left”
  - glucocorticoid therapy, stress, epinephrine

• Neutrophil count **decreases** with:
  - viral infections, certain drugs
  - diseases involving the bone marrow
  - congenital and acquired neutropenias
  - hypersplenism
Evaluating the Neutrophil Count

• Patients with low neutrophil counts are at high risk of developing bacterial infections.

• The lower the neutrophil count, and the longer it stays low, the higher the risk of infection.

• Patients with very low neutrophil counts may not be able to mount a response (show an increase in WBC) in the presence of infection.
Calculating the Absolute Neutrophil Count (ANC)

\[ \text{ANC} = \% \text{ segs (polys)} + \% \text{ bands (stabs)} \times \text{ total WBC (in 1000s)} \]

\[
33 \, (\% \text{ segs}) + 1 \, (\% \text{ bands}) \times 34\% \\
\times 3,600 \, (\text{WBC in 1000s})
\]

\[ = 1224 \, (\text{ANC}) \]

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Absolute Neutrophil Count (ANC)

- $>1500 = \text{normal}$
- $<1000 = \text{impaired ability to fight infection}$
- $<500 = \text{at risk for serious infection}$
Evaluating Blood Coagulation

Check for abnormalities of:

- PT
- PTT
- FDP
- D-Dimer
- Fibrinogen
Evaluating Kidney Function

Check for abnormalities of:

- U/A
- BUN
- serum creatinine
- creatinine clearance
- GFR
Evaluating Liver Function

Check for abnormalities of:

- bilirubin
- ALT
- AST
- alkaline phosphatase
- prothrombin time
Evaluating Cultures

- Check culture reports on all of your patients
- Report positive cultures IMMEDIATELY
- Patient therapy may change based on results
Evaluating Vital Signs

• Know norms for age

• Measure precisely using correct technique

• Always evaluate every set of vital signs on each patient (whether or not you take them yourself)!!!
Evaluating Vital Signs: Temperature

- No rectal temps for oncology patients!
- Fever is an emergency:
  - in neutropenic patients
  - in patients with central lines or other implanted apparatus (e.g., shunts)
  - in immunodeficient or asplenic patients (e.g., Wiskott-Aldrich, sickle cell)
Evaluating Vital Signs: Fever

- **Shaking chills**
  - may occur before onset of fever
  - also considered an emergency

- **Check capillary refill**
  - normal = brisk (immediate)
  - report if delayed (> 2 seconds)

- **Notify MD/NP/PA immediately**
  - urgent evaluation/intervention required
Evaluating Vital Signs: Tachycardia

Potential causes:

- Anxiety
- Anemia
- Hypovolemic

- Shock
- Fever
- Pain
Evaluating Vital Signs: Tachypnea

• Evaluate:
  - retractions
  - nasal flaring
  - color (dusky, cyanotic)
  - breath sounds

• Potential causes
  - anxiety
  - hypoxia
  - fever
  - pain
  - respiratory compromise
Evaluating Vital Signs: Hypotension

- Hypotension is an emergency - report immediately!
- Potential causes:
  - septic shock (can be rapidly fatal!!)
  - hypovolemia (dehydration, bleeding)
Evaluating Vital Signs: Hypertension

- Requires prompt assessment and intervention
- Potential etiology:
  - steroids
  - renal
  - increased intracranial pressure - report!

may require prn or routine medication
Evaluating Vital Signs: Pain

• Assess pain with all vital signs
• Use age-appropriate assessment tool
• Potential causes:
  - disease
  - treatment (e.g., mucositis, surgery)
  - infection
• Pain requires intervention!
Nursing Assessment

• Thorough physical assessment

• Special attention to:
  - mouth
  - skin
  - perianal area
Evaluating Neutropenic Patients

• Usual signs of infection may be absent:
  - erythema
  - warmth
  - pus/drainage
  - rales

• Pain/tachypnea/fever may be only signs of infection

• Fever or shaking chills require immediate intervention!


BIBLIOGRAPHY


