Assessment and management of patients with hematologic disorder

The hematologic system consists of the blood and the sites where blood is produced, including the bone marrow and reticuloendothelial system.

Blood

The cellular component of blood consists of 3 primary cell types:

Erythrocytes (RBCs)

Leukocytes (WBCs)

Thrombocytes (platelets)Blood

Component of blood normally make up:

40%-45% of the blood volume.

The adult bone marrow produces about 175 billion erythrocytes each day 70 billion neutrophils and 175 billion platelets each day Blood of the 7% - 10% of the normal body weight and amount to 5 – 6L. of volume.

Blood circulating through the vascular system and serving as a link between body organs, and carries O_2 absorbed from the lung and nutrients absorbed from gastrointestinal tract to the body cells for cellular metabolism. Blood carries hormones, antibodies, and other substances to their sites of action or use.

Blood carries waste products produced by cellular metabolism to the lungs, skin, liver, and kidneys.

Bone Marrow

Is the site of hematopoiesis, In adults, blood cells formation. is usually limited to the pelvic, ribs, vertebrae, and sternum.

Marrow is one of the largest organs of the body, marking up (4% - 5%) of total body weight.

The marrow is highly vascular. Within it are primitive cells called stem cells. The stem cells have the ability to self-replicate, thereby ensuring a continuous supply of stem cells throughout the life cycle.

Stem cells

When stimulated to do so, stem cells can begin a process of differentiation into either: Myeloid or Lymphoid stem cells. These stem cells are committed to produce specific types of blood cells. Lymphoid stem produce either T or B lymphocytes.

Myeloid stem cells differentiate into 3 broad cell types:

Erythrocytes, Leukocytes and platelets

Reticuloendothelial system (RES)

Is an essential component of the immune system, comprised of phagocytic cells located in different organs of the human body.

phagocytic cells

Phagocytic cells are derived from the bone marrow stem cells and become, monocytes, which circulate in the blood. Most of these monocytes migrate to different tissues inside the body. Phagocytic cells capable of engulfing substances, such as bacteria and viruses, rendering them incapable of causing harm to the body. They also ingest abnormal cells and old cells, thus clearing the body of their harmful presence.

Assessment and Diagnostic Evaluation

Hematologic Studies:

CBC to identifies the total number of blood cells (leukocytes, erythrocytes, and platelets). As well as the Hb, hematocrit (% of blood volume consisting of erythrocytes), and RBC

Bone Marrow Aspiration and Biopsy:

These tests are also used to document tumor or infection within the marrow.

Bone marrow is usually aspirated from the iliac crest and occasionally from the sternum.

Leukemia

is a neoplastic proliferation of one particular cell type (granulocytes, monocytes,

lymphocytes, or infrequently erythrocytes or megakaryocytes).

Classification of Leukemia

Leukemia are commonly classified according to the stem cell line involved, either :

lymphoid L.

Acute and chronic

Myeloid L.

Acute and chronic

Nursing Process

The patient with acute Leukemia:

Assessment :

Weakness and fatigue the resulting complication of anemia and infection.

A dry cough, mild dyspnea, and diminished breath sound may indicted a pulmonary infection. The absence of neutrophils delays the inflammatory response against the pulmonary Infection. Bleeding tendency resulting from platelet low.

Nursing Diagnosis

Risk for infection and bleeding

Risk for impaired skin integrity

Impaired gas exchange

Impaired mucous membrane

Imbalance nutrition

Acute pain and discomfort

Hyperthermia Nursing Diagnosis

Hyperthermia

Fatigue and activity intolerance

Impaired physical mobility

Risk for excessive fluid volume

Diarrhea due to altered GI flora due to broad-spectrum antibiotics.

Risk for deficit fluid volume

Self-care deficit

Anxiety

Disturbed body image

Deficient knowledge

Spiritual distress

Nursing Intervention

Prevent infection and bleeding

Managing mucositis

Improving nutritional intake

Easing pain and discomfort

Decreasing fatigue and discomfort

Maintaining fluid and electrolyte balance

Improving self care

Managing anxiety and grief

Encouraging spiritual well-being

Promoting home and community-based care

Anemia

Blood study

Methods of obtaining blood:

Venipuncture

Finger puncture

Bone marrow aspiration

Pathophysiology of anemia

Bone marrow failure

Excessive red cell loss or both

Erythropoiesis may occur as a result of a nutritional deficiency, toxic exposure, tumor invasion, or unknown cause.

Red blood cell may be lost through hemorrhage or hyperhemolysis. Increase destruction.

Etiology of anemia

- **Production defects:**

Nutritional deficiencies- vitamin B12, folate or iron deficiency

Inflammation/ chronic disease

Primary marrow disorders

- **Blood loss**

Bleeding, such as from repeated venipuncture in patients undergoing a medical evaluation, blood losses associated with repeated hemodialysis procedure, or excessive blood donation. Bleeding during or after surgical procedures.

- **Blood destruction**

  Clinical manifestations

  Hb level between 9mg/ 100ml – 11mg/ 100ml

  No symptoms other than **tachycardia** on **exertion**

  Exertional dyspnea:

  Is likely to occur below, but not above 7.5mg/ 100ml

  Weakness, only below 6mg/100ml , **dyspnea** at rest, below 3mg/ 100ml

  Classification of anemia

  Hypoproliferation anemia: the bone marrow is unable to produce adequate numbers of cells, the reticulocyte count is depressed.

  - A plastic anemia(decrease in or damage to marrow stem cell)
  - Iron deficiency anemia
  - Vitamin B12 deficiency (Megaloplastic A)
  - Folic acid deficiency (Megaloplastic A)

  Hemolytic anemia

  Abnormalities is usually within the red cell itself:

  Sickle cell anemia, G-6- PD(Glucose-6- phosphate dehydrogenase deficiency)

  1. Inherited hemolytic anemia: spherocytosis, sickle cell anemia, other hemoglobinopathies (thalassemia)
  2. Acquired hemolytic anemia

  Chart 33-1 p. 911

  Signs and symptoms

  Weakness, fatigue, and general malaise are common

  Pallor of the skin and mucous membrane

  Jaundice may be present in patient with hemolytic anemia.

Tongue may be smooth and red(in iron deficiency anemia(
Dyspnea
Tachycardia and tachypnea
Cold extremities

Nursing diagnosis

Fatigue related to decreased hemoglobin
Altered nutrition, less than body requirements, related to inadequate intake of essential nutrition.
Altered tissue perfusion related to inadequate hemoglobin and hematocrit.
Noncompliance with prescribed therapy.

Collaborative problems/ potential complications

Heart failure
Angina
Parasthesis
confusion

nursing interventions

Maintain the patient diet and with increased fluid

Force fluid

Administer oxygen

Assess cardiovascular and respiratory status

Keep the patient in semi- fowler's position

Monitor and record VS, UO, I/O, and laboratory studies

Administer medication, as prescribed

Allay the patient anxiety

Monitor stool, urine, and emesis for occult blood

Provide mouth, skin, and food care

Keep the patient warm

Protect the patient from falls