COMPETENCY 1. Patient Care. Provide family centered patient care that is developmentally and age appropriate, compassionate, and effective for the treatment of health problems and the promotion of health.

1. Gather essential and accurate information from the clinical history, systematic physical examination and appropriate use of diagnostic studies in children presenting with conditions related to hematology/oncology.

2. Develop a strategic plan utilizing data obtained from the history, physical examination and ancillary studies and determine if the following non-specific signs and symptoms are caused by a hematologic/oncologic disease process and decide if the patient needs treatment or referral:
   - prolonged fever
   - fatigue / malaise
   - bleeding / bruising
   - headache
   - seizure
   - gait abnormality
   - behavioral changes
   - lymphadenopathy
   - hepatomegaly
   - splenomegaly
   - abdominal pain
   - weight loss
   - vomiting
   - abdominal mass
   - jaundice
   - hematuria
   - joint swelling
   - nevi

3. Diagnose and manage common childhood hematologic conditions such as:
   - iron deficiency
   - anemia of infection
   - transient erythroblastopenia of childhood (TEC)
   - immune thrombocytopenic purpura (ITP)
   - benign neutropenia of childhood
   - minor transfusion reactions

4. Identify, explain, do the initial management and seek consultation for the following hematologic / oncologic conditions:
   - anemias: underproduction and hemolytic anemias
   - bleeding disorders, congenital and acquired
   - major complications of inherited coagulation disorders like hemophilia and von Willebrand disease
   - hemoglobinopathies like sickle cell disease and its complications like pain crises, fever, splenic sequestration, acute chest syndrome, aplastic crisis and stroke
   - neutropenia, congenital and acquired, including neutropenic fever in children with cancer
- thrombocytopenia
- abdominal mass
- mediastinal mass
- lytic bone lesions
- suspected brain tumor
- conditions that predispose to malignancy or associated with it including Down’s syndrome, neurofibromatosis, familial cancer and hemihypertrophy.

5. Develop a keen diagnostic acumen to recognize and plan the initial management of common hematologic / oncologic emergencies.
- mediastinal mass causing superior vena caval syndrome
- hyperleukocytosis
- tumor lysis syndrome
- spinal cord compression
- neutropenic fever in children with cancer

6. Provide supportive care to children with malignancy or blood disorders.
- empiric antibiotics for neutropenic fever
- antiemetic use in cancer chemotherapy
- use of growth factors i.e. GCSF and erythropoietin in cancer chemotherapy
- transfusion therapy
- central line care

7. Provide preventive counseling to families of children with blood disorders or cancer.
- provision of adequate diet and avoidance of excessive milk intake to prevent iron deficiency anemia
- in children with sickle cell disorders, the importance of routine immunizations including pneumococcal vaccination, antibiotic prophylaxis and emergent evaluation for fever and early signs of crises
- avoidance of drugs known to induce hemolysis in children with G6PD deficiency

8. Provide screening for common hematologic conditions
- screening for hemoglobinopathies in the newborn period
- screening for iron deficiency anemia in the first two years of life
- screening infants and toddlers for lead poisoning
- screening adolescents for signs of iron deficiency anemia
- screening for bleeding disorder in a pre-operative patient
- screening for the risk of stroke in children with sickle cell anemia

9. Observe and assist common clinical procedures in hematology / oncology
- bone marrow aspiration
- bone marrow biopsy
- lumbar puncture with administration of intrathecal chemotherapy
- exchange transfusion
- pheresis procedures

## COMPETENCY 2. Medical Knowledge.

Understand the scope of established and evolving biomedical, clinical, epidemiological and social-behavioral knowledge needed by a pediatrician; demonstrate the ability to acquire, critically interpret and apply this knowledge in patient care.

1. Distinguish normal from pathologic states of the hematologic system
   - Know the changes in normal values of hemoglobin, hematocrit, concentrations of hemoglobin A and F, and MCV with age
   - Know the normal range of white blood cell count and differential for a newborn infant, an infant below the age of 1 year and children greater than 1 year of age
Distinguish normal lymph node from infectious lymphadenitis and malignant lymphadenopathy
Distinguish normal-sized liver and spleen from hepatosplenomegaly

2. Describe the etiology, pathophysiology, epidemiology, clinical manifestations and differential diagnoses as well as management of common childhood anemias.

Iron deficiency anemia
- Describe the normal requirements, absorption, metabolism of iron from birth to adolescence
- Identify the common causes and clinical features of iron deficiency anemia
- Distinguish iron deficiency from other microcytic, hypochromic anemias like thalassemia trait, anemia of chronic disease, lead poisoning through appropriate use of laboratory tests including red cell indices, reticulocyte count, ferritin, total iron binding capacity, transferrin saturation and iron level.
- Describe the management of iron deficiency anemia including iron replacement therapy, diet modification, parent education and appropriate follow-up to assess treatment response

Hemolytic anemias
- Distinguish the different hemolytic anemias in terms of clinical manifestations, pathophysiology, laboratory features and management
  - autoimmune hemolytic anemia
  - hereditary spherocytosis
  - G6PD deficiency
  - hemolytic-uremic syndrome
  - hemoglobinopathy including sickle cell disorders and thalassemia
- Know the principles behind the tests used to diagnose hemolytic disorders
  - hemoglobin electrophoresis including quantification of hemoglobin F and A2
  - direct antiglobulin test
  - osmotic fragility test
  - enzyme assay for G6PD
- Know the characteristic morphologic appearance of the hemolytic disorders on a peripheral smear.

Sickle cell disorders
- Know the various sickle cell syndromes ( homozygous sickle cell anemia, sickle beta-zero thalassemia, sickle-hemoglobin C disease and sickle beta-plus thalassemia) including characteristic baseline hemoglobin values, hemoglobin electrophoresis findings and clinical manifestations and severity of disease.
- Discuss the common complications and management of a child with sickle cell anemia: including pain crisis, dactylitis, splenic sequestration, aplastic crisis, acute chest syndrome, stroke, gallstones, priapism, retinopathy and suspected bacterial infection.
- Outline the management of common sickle cell complications including fluid management, use of analgesics, appropriate use of antibiotics, indications for blood transfusion or exchange transfusion and use of hydroxyurea.
- Develop a preventive care plan for a child with sickle cell diseases: provision of immunizations, prophylactic penicillin, use of folate and screening for stroke using transcranial Doppler.

Thalassemia disorders
- Describe the clinical and laboratory features of alpha and beta thalassemia traits and disease.
- Discuss the major complications of thalassemia major
o Know the rationale for chronic transfusion therapy, prophylactic penicillin, iron chelation therapy and prompt evaluation of fever.

3. Understand the physiology, pathophysiology and management of common bleeding disorders
   ♦ Outline an appropriate diagnostic evaluation for thrombocytopenia in a newborn infant and a child
   ♦ Discuss the pathogenesis, clinical features and management of common causes of thrombocytopenia like neonatal alloimmune thrombocytopenia, thrombocytopenia in a baby with maternal ITP and childhood ITP.
   ♦ Know the indications for platelet transfusion as well as the management and clinical recognition of patients who become refractory to platelet transfusion.
   ♦ Describe the schema of blood coagulation.
   ♦ Indicate the proper questions for obtaining a bleeding history in the child and family members.
   ♦ Outline a differential diagnosis and a diagnostic work-up of a patient with abnormal bleeding in the newborn period as well as in childhood.
   ♦ Cite the common conditions that would result in abnormalities of common coagulation screening tests like the Ivy bleeding time, prothrombin time and partial thromboplastin time.
   ♦ State the clinical features, laboratory findings, complications and management of hemophilia A, hemophilia B, von Willebrand disease, disseminated intravascular coagulation, vitamin K deficiency and Henoch-Schonlein purpura.

4. Discuss the presentation, pathophysiology, and prognosis of common malignancies in children and adolescents.
   ♦ Summarize the presenting signs and symptoms, common age at presentation, diagnostic procedures, staging, principles of current therapy, prognosis and long-term complications for the following malignancies:
     o Leukemia (ALL, AML)
     o Brain tumors
     o Neuroblastoma
     o Hodgkin’s and non-Hodgkin’s lymphoma
     o Wilms’ tumor
     o Rhabdomyosarcoma and other soft tissue sarcomas
     o Bone tumors like osteosarcoma and Ewing’s sarcoma
     o Langerhans cell histiocytosis
   ♦ Know the mechanisms of action, mode of administration and important side effects of commonly used chemotherapeutic agents: vincristine, asparaginase, prednisone, methotrexate, cyclophosphamide, cytarabine, anthracycline agents and epipodophyllotoxins.
   ♦ Know the adjunctive medications that can increase a patient’s tolerance to chemotherapy, e.g., leukovorin rescue for methotrexate, cardioprotectants like dezrazoxane for anthracyclines, mesna for cyclophosphamide as well as growth factors like GCSF and erythropoietin.
   ♦ Discuss the common early and late complications of cancer treatment such as myelosuppression, endocrine suppression and risk for secondary cancer.
   ♦ Discuss the principles, indications and complications of stem cell or bone marrow transplantation.
COMPETENCY 3. Communication Skills. Demonstrate interpersonal and communication skills that result in information exchange and partnering with patients, their families and professional associates.

1. Obtain, record and present in a systematic and organized fashion the history, physical examination findings and pertinent data from ancillary studies of patients presenting with hematologic/oncologic conditions.
2. Provide accurate and detailed information to the patient, the parents, and other family members pertaining to the patient’s diagnosis, prognosis, course of management, alternative treatments if any, risks, side effects and complications of treatment.
   - Assist the specialist in delivering bad news to the family of a child with a life-threatening condition like malignancy
   - Assist the specialist in obtaining an informed consent from the family when enrolling a child in a clinical trial.
   - Prepare a set of patient education materials a list of pertinent peer-reviewed web sites to assist the family.
3. Maintain constant communication with the referring physician and other health care professionals on matters pertaining to the patient’s condition including providing continuing feedback on the patient during the course of treatment.
4. Motivate patient and parents in maintaining and promoting health, infection prevention through anticipatory guidance and counseling
5. Demonstrate sensitivity in communicating with patients and families taking into consideration their level of education, age, cultural background, religion and personal beliefs.

COMPETENCY 4. Practice-based Learning and Improvement. Demonstrate knowledge, skills and attitudes needed for continuous self-assessment, using scientific methods and evidence to investigate, evaluate, and improve one’s patient care practice.

1. Use scientific methods that are evidence-based to update and improve the standards of patient care
   - Be able to access information and do online searches on particular presenting problems and conditions in a patient.
   - Identify standardized guidelines for diagnosis and treatment of hematologic/oncologic conditions such as clinical protocols for the treatment of children with cancer and practice guidelines in the management of patients with sickle cell disease.
2. Be aware of new trends and advances in the field of hematology/oncology and be prepared to alter or modify one’s practice in response to these changes
3. Critique new scientific information encountered in the medical literature and determine its relevance to clinical practice.
4. Evaluate one’s performance through self-assessment as well as through feedback from patients, peers and superiors to improve patient care.

COMPETENCY 5. Professionalism. Demonstrate a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to diversity.
1. Demonstrate personal responsibility and accountability for patient care through diligent follow-up of a patient’s progress, laboratory and ancillary procedures, writing comprehensive notes and communicating regularly with the referring physician.

2. Display behaviors that foster and maintain a family’s trust and confidence such as appropriate attire, good grooming, honesty, courtesy, respect for confidentiality at all times.

3. Meet high standards of legal and ethical behavior in dealing with patients, families, as well as peers, superiors and non-medical support staff.

4. Advocate the interests of one’s patients over self-interest.

5. Demonstrate sensitivity to patients’ and colleagues’ gender, age, culture, religion, disabilities, ethnicity and sexual orientation.

**COMPETENCY 6. Systems-Based Practice.** Understand how to practice quality health care and advocate for patients within the context of the health care system.

1. Interact with the case manager and social worker to facilitate setting up home care services to facilitate patient access to nursing care and other services outside the hospital with awareness of the family situation and resources.

2. Help set-up a follow-up plan for a patient prior to discharge to ensure compliance and continuity of care.

3. Interact with the social worker in setting up hospice care to children with chronic debilitating conditions or terminal illness.

4. Be aware of the support groups available to families dealing with children with special needs and chronic conditions like: Leukemia Society, American Cancer Society, Cooley’s Anemia Foundation, Fanconi’s Anemia, Aplastic Anemia Organization and others.

5. Know the resources available locally and in the hospital to improve quality of care and enhance a patient’s well-being such as:
   - Child Life
   - School Program to tutor the children
   - Make a Wish Foundation
   - Special Friends Program