

The University of Arizona Pediatric Residency Program

Primary Goals for Rotation

Hematology/Oncology/BMT

1. **GOAL:** Understand the role of the pediatrician in preventing hematologic or oncologic conditions, and in counseling and screening individuals at risk for these diseases.
2. **GOAL:** Distinguish normal from pathologic states of the hematologic and lymphatic systems.
3. **GOAL:** Evaluate, treat, and/or refer patients with presenting signs and symptoms that may indicate a hematologic or oncologic disease process.
4. **GOAL:** Diagnose and manage patients with hematological disorders that generally do not need referral.
5. **GOAL:** Diagnose and initiate management of patients with hematological or oncological disorders that generally need referrals.
6. **GOAL:** Common Malignancies. Discuss the presentation, pathophysiology, and prognosis of important malignancies in children and adolescents.
7. **GOAL:** Iron Disorders. Discuss the appropriate methods of diagnosis and management of a patient with iron disorders.
8. **GOAL:** Blood Products. Understand indications for and complications related to the use of blood products.
9. **GOAL:** Sickle Cell Disease. Understand the general pediatrician's role in the diagnosis and management of patients with sickle cell disease.
10. **GOAL:** Demonstrate high standards of professional competence while working with patients under the care of a subspecialist.

1. GOAL: Understand the role of the pediatrician in preventing hematologic or oncologic conditions, and in counseling and screening individuals at risk for these diseases.

A. Provide routine preventive counseling about hematology to all patients and families, addressing:

1. Adequate diet and iron intake to prevent iron deficiency
2. Signs and symptoms of malignant disease

B. Provide preventive counseling to parents and patients with specific hematology/oncology conditions, addressing:

1. In a child with a sickle hemoglobinopathy, the importance of antibiotic prophylaxis, pneumococcal and routine immunizations, folic acid supplementation, and urgent need for evaluation for fever
2. Risk of infections related to transfusion of blood or blood products, and alternatives to routine transfusion (i.e., direct donation, irradiation, freezing, filtration)
3. Expected course of common childhood malignancies, with good and bad prognosticators
4. Support groups and information available for children with cancer

C. Provide regular hematology/oncology screening for patients:

1. Screen for hemoglobinopathies in the newborn period.
2. Screen for iron deficiency anemia during the first two years of life, with particular emphasis on premature infants.
3. Screen adolescent females for signs of iron deficiency and anemia yearly after menses has begun.
4. Screen infants and toddlers for lead poisoning.

2. GOAL: Distinguish normal from pathologic states of the hematologic and lymphatic systems.

A. Describe the changes that occur over time in the hematologic indices of the normal infant and child (e.g., hemoglobin, hematocrit, MCV).

B. Explain the findings on clinical history and examination that suggest a hematologic or oncologic disease that requires further evaluation and treatment.

C. Interpret clinical and laboratory tests to identify hematologic or oncologic disease (CBC, including indices and blood smear review, reticulocyte count, ESR, PT, PTT, hemoglobin electrophoresis, iron, iron binding capacity, ferritin, transferrin, lead, uric acid, LDH, electrolytes, renal function, urinalysis).

D. Explain the interpretation of a bone marrow aspirate.

3. GOAL: Evaluate, treat, and/or refer patients with presenting signs and symptoms that may indicate a hematologic or oncologic disease process.

A. Develop a strategy to determine if the following presenting signs and symptoms are caused by a hematology/oncology disease process and determine if the patient needs treatment or referral:

1. Fatigue/malaise
2. Fever
3. Bruising/bleeding
4. Headache
5. Limb pain/limp
6. Seizure
7. Lymphadenopathy
8. Hepatomegaly and/or splenomegaly
9. Weight loss
10. Abdominal pain
11. Vomiting
12. Dizziness and gait disturbances
13. Nevi

4. GOAL: Diagnose and manage patients with hematological disorders that generally do not need referral.

A. Diagnose, explain, and manage the following hematologic or oncologic conditions:

1. Iron deficiency
2. Hemoglobin traits, including alpha and beta thalassemia, sickle cell, and hemoglobin E
3. Transient erythropenia of childhood
4. Minor, common reactions to blood transfusions
5. Benign bone cyst
6. Idiopathic thrombocytopenic purpura

5. GOAL: Diagnose and initiate management of patients with hematological or oncological disorders that generally need referrals.

A. Identify, explain, initially manage, and seek consultation or refer the following hematology/oncology conditions:

1. Anemia (exclusive of common iron deficiency or transient erythropenia)
2. Abnormal bruising or bleeding (inherited and acquired)
3. Major complications of inherited bleeding disorders
4. Hemoglobinopathies (sickle cell and other sickling disorders), including severe pain crisis, fever, stroke, sequestration and aplastic crises
5. Urgent conditions in children under treatment for cancer, including fever and neutropenia, chicken pox exposure or illness, bleeding
6. Neutropenia
7. Thrombocytopenia including ITP
8. Abdominal masses
9. Mediastinal masses

10. Lytic bone lesions
11. Suspected or confirmed CNS tumor
12. Conditions that might predispose to malignancy (e.g., neurofibromatosis, Bloom syndrome (retinoblastoma), Down's syndrome, McCune Albright, and familial cancer)
13. Coagulation disorders

B. In cases of serious or life-threatening disease, counsel the patient's families with sensitivity to their desire and need to know about:

1. Prognosis and possible impact of the disease
2. Likely steps in immediate and future treatment
3. Decisions about treatment options which they may face
4. Support services that they may seek in the hospital and community

C. Identify the role and general scope of practice of hematology/oncology; recognize situations where children benefit from the skills of specialists trained in the care of children; and work effectively with these professionals in the care of children with hematologic or oncologic diseases.

6. GOAL: Common Malignancies. Discuss the presentation, pathophysiology, and prognosis of important malignancies in children and adolescents.

A. Summarize the common ages, presenting signs and symptoms, diagnostic procedures, principles of current therapy, prognosis, and long-term complications (due to disease or treatment) for the following malignancies and conditions:

1. Leukemia (ALL, AML)
2. Brain tumor
3. Hodgkin's and non-Hodgkin's lymphoma
4. Neuroblastoma
5. Wilms' tumor
6. Soft tissue sarcomas (rhabdomyosarcoma)
7. Bone tumors (osteosarcoma and Ewing's sarcoma)
8. Retinoblastoma
9. Langerhans cell histiocytosis

B. Compare and contrast the common acute side effects of frequently used chemotherapeutic drugs, including: cyclophosphamide, cytarabine, vincristine, anthracycline compounds, methotrexate and prednisone.

C. Be familiar with adjunctive medications that increase patients' tolerance of chemotherapy, e.g. folate, epogen, GCSF.

D. Discuss the common late complications of childhood cancer treatment that may present in childhood or adolescence. These include: learning disabilities, endocrine suppression and second cancers.

7. GOAL: Iron Disorders. Discuss the appropriate methods of diagnosis and management of a patient with iron disorders.

A. Describe the normal requirements, absorption, and metabolism of iron from birth through adolescence.

B. Identify the common causes and features of iron deficiency (including anemia) in all age groups and compare and contrast with anemia caused by chronic inflammation.

C. Describe the diagnosis and treatment of iron deficiency, and discuss the follow-up necessary to assure success in treatment.

D. Develop a treatment and education plan for managing iron deficiency. This should include: dietary management, replacement therapy, parent education, and follow-up.

8. GOAL: Blood Products. Understand indications for and complications related to the use of blood products.

A. Explain the appropriate indications for and potential risks of various blood products (e.g., red blood cell products, platelet concentrates, coagulation factors).

B. Describe alternatives to blood transfusions. These should include: erythropoietin, GCSF, and other cytokines.

C. Describe the indications for leukofiltration, irradiation of blood products, and use of CMV negative blood products.

D. Summarize the signs and symptoms of a transfusion reaction. Develop an effective treatment plan to manage a transfusion reaction.

9. GOAL: Sickle Cell Disease. Understand the general pediatrician's role in the diagnosis and management of patients with sickle cell disease.

A. Explain the findings on clinical history, examination, and laboratory tests (including newborn screening) that suggest a diagnosis of sickle cell disease.

B. Compare and contrast the different sickle cell syndromes, including presentation, treatment and complications. These syndromes include sickle cell anemia, hemoglobin SC, and hemoglobin S beta thalassemia.

C. Discuss the common complications seen in a child with sickle cell disease. These include: hemolysis, hand-foot syndrome, anemia, aplastic crises, bone infarction, stroke, skin ulcers, pain episodes, priapism, sepsis and infections, cholelithiasis, chest syndrome, retinopathy, renal failure, and sequestration crises.

D. Outline the management of a patient who presents with a sickle crisis. These should include discussion and proper use of IV fluids, analgesics, antibiotics, oxygen, blood transfusions, and indications for hydroxyurea and stem cell transplant.

E. Develop a preventive care plan for a patient with a sickle disease. These should include use of folate, prophylactic antibiotics, immunizations, prompt evaluation of febrile episodes and stroke screening.

F. Identify the indicators for a hematology referral in a child with sickle cell disease.

10. GOAL: Demonstrate high standards of professional competence while working with patients under the care of a subspecialist.

A. **Competency 1: Patient Care.** Provide family-centered patient care that is development- and age-appropriate, compassionate, and effective for the treatment of health problems and the promotion of health.

1. Use a logical and appropriate clinical approach to the care of patients presenting for specialty care, applying principles of evidence-based decision-making and problem-solving.
2. Describe general indications for subspecialty procedures and interpret results for families.
B. 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. Acquire, interpret and apply the knowledge appropriate for the generalist regarding the core content of this subspecialty area.
2. Critically evaluate current medical information and scientific evidence related to this subspecialty area and modify your knowledge base accordingly.
C. Competency 3: Interpersonal Skills and Communication. Demonstrate interpersonal and communication skills that result in information exchange and partnering with patients, their families and professional associates.
1. Provide effective patient education, including reassurance, for a condition(s) common to this subspecialty area.
2. Communicate effectively with primary care and other physicians, other health professionals, and health-related agencies to create and sustain information exchange and teamwork for patient care.
3. Maintain accurate, legible, timely and legally appropriate medical records, including referral forms and letters, for subspecialty patients in the outpatient and inpatient setting.
4. 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. Identify standardized guidelines for diagnosis and treatment of conditions common to this subspecialty area and adapt them to the individual needs of specific patients.
2. Identify personal learning needs related to this subspecialty; systematically organize relevant information resources for future reference; and plan for continuing acquisition of knowledge and skills.
5. Competency 5: Professionalism. Demonstrate a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to diversity.
1. Demonstrate personal accountability to the well-being of patients (e.g., following up on lab results, writing comprehensive notes, and seeking answers to patient care questions).
2. Demonstrate a commitment to carrying out professional responsibilities.
3. Adhere to ethical and legal principles, and be sensitive to diversity.

6. **Competency 6: Systems-based Practice.** Understand how to practice high-quality health care and advocate for patients within the context of the health care system.

1. Identify key aspects of health care systems as they apply to specialty care, including the referral process, and differentiate between consultation and referral.

2. Demonstrate sensitivity to the costs of clinical care in this subspecialty setting, and take steps to minimize costs without compromising quality.

3. Recognize and advocate for families who need assistance to deal with systems complexities, such as the referral process, lack of insurance, multiple medication refills, multiple appointments with long transport times, or inconvenient hours of service.

4. Recognize one's limits and those of the system; take steps to avoid medical errors.

Procedures

A. GOAL: Technical and therapeutic procedures. Describe the following procedures, including how they work and when they should be used; competently perform those commonly used by the pediatrician in practice.

1. Bone marrow: aspiration/biopsy

2. Central line: use/care

3. Lumbar puncture

4. Medication delivery: IV

B. GOAL: Diagnostic and screening procedures. Describe the following tests or procedures, including how they work and when they should be used; competently perform those commonly used by the pediatrician in practice.

1. Radiologic interpretation: abdominal ultrasound

2. Radiologic interpretation: abdominal X-ray

3. Radiologic interpretation: chest X-ray

4. Radiologic interpretation: CT of head

5. Radiologic interpretation: extremity X-ray

6. Radiologic interpretation: MRI of head

7. Radiologic interpretation: renal ultrasound

8. Radiologic interpretation: renogram

Adapted From

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