

The University of Arizona Pediatric Residency Program

Primary Goals for Rotation

Endocrinology

1. **GOAL:** Understand the role of the pediatrician in preventing endocrine dysfunction, and in counseling and screening individuals at risk for these diseases.
2. **GOAL:** Differentiate between normal, physiologic deviations from normal, and pathological states related to endocrinology.
3. **GOAL:** Evaluate, treat and/or refer patients who present with undifferentiated signs and symptoms that may represent an endocrine disease process.
4. **GOAL:** Diagnose and manage endocrine conditions in patients not generally requiring referral.
5. **GOAL:** Recognize, initiate management of, and refer patients with endocrine conditions that require referral.
6. **GOAL:** Diagnose and manage uncomplicated diabetes mellitus with or without the assistance of an endocrinologist.
7. **GOAL:** Understand the general pediatrician's role in the diagnosis and management of patients with congenital and acquired hypothyroidism and hyperthyroidism.
8. **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 endocrine dysfunction, and in counseling and screening individuals at risk for these diseases.

A. Identify the individual at risk for developing endocrine dysfunction through routine endocrine counseling and screening of all patients and parents, addressing:

1. Normal variations in growth (including genetic short stature and constitutional growth delay)
2. Expected and normal variations in body changes during puberty (information should be ethnic group specific)
3. The importance of vitamin D supplements in breast-fed infants and select populations with low intake of vitamin D, calcium or phosphorus
4. Diabetic screening for patients with symptoms of polyuria, polydipsia and polyphagia
5. Diabetic, hypercholesterolemia and hypertriglyceridemia screening for any child who is obese
6. Newborn metabolic screening, when appropriate

B. Provide preventive counseling to parents and patients with specific endocrine conditions about:

1. The need for influenza vaccination in children with certain endocrine disorders (hypoadrenalism, diabetes mellitus, hypopituitarism, chronic steroid use, Cushing syndrome)
2. The association of chronic steroid use and decreased bone density
3. The importance of diabetes control for prevention of long-term complications such as retinopathy, neuropathy, nephropathy and gastroparesis
4. The value of support groups and camps for children with diabetes mellitus

2. GOAL: Differentiate between normal, physiologic deviations from normal, and pathological states related to endocrinology.

A. Describe the normal developmental patterns of statural growth and weight gain, along with normal variations. Describe body proportions that can help to differentiate proportionate from disproportionate short stature.

B. Perform Tanner staging (SMR) and explain the sequential physiologic events associated with puberty.

C. Identify early puberty and differentiate it from premature thelarche and premature adrenarche.

D. Describe the hypothalamus-pituitary-peripheral gland axis along with their stimulatory and inhibitory feedback mechanisms.

E. Describe calcium and phosphorus homeostasis, vitamin D metabolism, parathyroid hormone functions, and their interrelationships.

F. Explain the findings on clinical history and examination that suggest a disease of endocrine origin and require further evaluation and treatment. Such diseases include hypo- and hyper-thyroid states, diabetes mellitus, diabetes insipidus, rickets, obesity, delayed or accelerated growth, early or delayed puberty, adrenal insufficiency and hyperactivity, and congenital adrenal hyperplasia.

G. Interpret clinical and laboratory endocrine tests to identify endocrine disease, including: bone age, vitamin D, calcium, phosphate and alkaline phosphatase, glucose, insulin, and hemoglobin A1C, T4, free T4, TSH, parathyroid hormone, serum and urine electrolytes and osmolality, cortisol and ACTH, FSH, LH, estradiol, testosterone, cortisol, rennin, adrenal androgens and precursor hormone levels, growth hormone, imaging studies (MRI, CT Scan, Ultrasound, and thyroid scans) and bone densitometry.

3. GOAL: Evaluate, treat and/or refer patients who present with undifferentiated signs and symptoms that may represent an endocrine disease process.

A. Create a strategy for determining if the following presenting signs and symptoms are caused by an endocrine disease process and determine if the patient needs treatment or referral:

1. Fatigue
2. Vomiting/Weight loss
3. Short and tall stature
4. Obesity
5. Polydipsia
6. Hypoglycemia
7. Hyperglycemia
8. Hypocalcemia
9. Early or delayed puberty
10. Acanthosis nigricans
11. Headaches
12. Dizziness
13. Diplopia and blurred vision
14. Polyuria

4. GOAL: Diagnose and manage endocrine conditions in patients not generally requiring referral.

A. Diagnose, explain the pathophysiology of, and manage the following endocrine conditions:

1. Abnormal newborn metabolic screening, including hypothyroidism, congenital adrenal hyperplasia, PKU, and galactosemia

2. Premature adrenarche
3. Premature thelarche
4. Delayed puberty due to chronic disease or anorexia nervosa
5. Exogenous obesity
6. Familial short stature, constitutional delay of growth or puberty
7. Short stature variants not meeting criteria for hormone therapy
8. Gynecomastia in a pubertal male
9. Infant of mother with gestational diabetes
10. Transient hypocalcemia of a newborn
11. Transient hypoglycemia of a newborn

5. GOAL: Recognize, initiate management of, and refer patients with endocrine conditions that require referral.

A. Identify, explain the pathophysiology of, provide initial management for, and refer to a subspecialist the following endocrine conditions:

1. Adrenal insufficiency
2. Ambiguous genitalia, hypogonadism, and micropenis
3. Central and nephrogenic diabetes insipidus and psychogenic polydipsia
4. Congenital adrenal hyperplasia
5. Delayed or precocious puberty
6. Diabetes mellitus type I (diabetic ketoacidosis (DKA), long-term management)
7. Endocrine and genetic causes of obesity
8. Genetic syndromes and familial inheritance patterns with endocrine abnormalities
9. Hirsutism, hyperandrogenism, and polycystic ovaries
10. Hypoglycemia in childhood and adolescence
11. Metabolic bone disease including rickets and skeletal dysplasias
12. Abnormalities of calcium, phosphorus, or magnesium homeostasis
13. Short stature variants meeting criteria for hormonal treatment
14. Tall stature and excessive growth syndromes
15. Thyroid dysfunction and goiters
16. Diabetes mellitus type II

B. Identify the role and general scope of the practice of endocrinology. Recognize situations where children benefit from the skills of specialists trained in the care of children, and work effectively with endocrine specialists to care for children with endocrinology problems.

6. GOAL: Diagnose and manage uncomplicated diabetes mellitus with or without the assistance of an endocrinologist.

A. List the findings on clinical history and examination that suggest a diagnosis of diabetes mellitus and/or diabetic ketoacidosis.

B. Identify the risk factors for developing type 2 diabetes and provide routine screening for those at elevated risk.

C. Differentiate Type I and Type II diabetes on the basis of findings from the clinical history, physical examination, and laboratory tests.
D. Diagnose diabetes mellitus and diabetic ketoacidosis from presenting symptoms and confirmatory lab tests.
E. Order appropriate confirmatory diagnostic serum and urine tests for diabetes mellitus and accurately interpret the results.
F. Compare and contrast the different preparations of insulin and describe the pharmacokinetics of each.
G. Discuss treatment regimens available for patients with Type II diabetes, including the use of oral medications, determination of initial dosages, drug pharmacokinetics, dose adjustments based on serum glucose levels, possible side effects and monitoring for safety.
H. Order appropriate initial dosages of insulin, based on both clinical and laboratory findings, and adjust subsequent dosages based on serum glucose levels.
I. Order appropriate IV and PO fluids to manage ketoacidosis and initial hyperglycemia with or without ketosis, realizing that insulin therapy may be required in the initial treatment of Type II diabetes.
J. Recognize immediate life-threatening complications associated with the diagnosis and treatment of diabetic ketoacidosis and steps for initial treatment and stabilization. Refer for intensive care as indicated.
K. Develop an educational plan for parents and patients that provides effective education regarding diabetes, availability of support groups and diabetic camps, diet and exercise, home glucose monitoring, adjustment of insulin or oral medications dosages, use of insulin pumps, response to illness, and preventive care.
L. Develop a cost-effective plan for monitoring patients with diabetes, including use of hemoglobin A1-C levels and daily glucose profiles to assess control, frequency and severity of hypoglycemia and hyperglycemia, treatment compliance, and the development of long term complications such as retinopathy, nephropathy and neuropathy.
M. Identify the clinical and biochemical indicators that necessitate consultation or referral of a child with diabetes.
7. GOAL: Understand the general pediatrician's role in the diagnosis and management of patients with congenital and acquired hypothyroidism and hyperthyroidism.
A. Explain the findings on clinical history, examination, and laboratory tests that suggest the presence of a thyroid disorder (hypo- or hyperthyroidism), including abnormal growth patterns, goiter, etc.
B. Identify the thyroid function tests, including newborn screening, available for detecting and diagnosing a thyroid disorder, and describe the indications for ordering, limitations and interpretations.

C. Discuss the identification, treatment, and follow-up in a patient with congenital hypothyroidism. Discussion should include the importance of early detection and limitations of newborn screenings, as well as treatment, monitoring and parental education.
D. Identify imaging studies available for patients with a thyroid disorder and the indications for obtaining such studies.
E. Discuss the causes of hyperthyroidism.
F. Compare and contrast the different treatment options for hyperthyroidism, including oral medications, irradiation and surgery, and discuss the selection criteria for each treatment modality.
G. Create an education, treatment and follow-up plan for a patient with a thyroid disorder that includes treatment, monitoring, potential complications, and long-term follow-up.
H. Identify indicators for an endocrine referral of a child with a thyroid disorder.
8. 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.

D. **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.

E. **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.

F. **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: 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. Bone age: interpretation
2. Bone densitometer
3. Radiologic interpretation: CT of head
4. Radiologic interpretation: MRI of head
5. Radiologic interpretation: skeletal X-ray (incl. abuse)

Adapted From

Kittredge, D., Baldwin, C. D., Bar-on, M. E., Beach, P. S., Trimm, R. F. (Eds.). (2004). APA Educational Guidelines for Pediatric Residency. Ambulatory Pediatric Association Website. Available online: www.ambpeds.org/egweb.