

The University of Arizona Pediatric Residency Program

Primary Goals for Rotation

Nephrology

1. **GOAL:** Understand the general pediatrician's role in diagnosis and management of hypertension in children.
2. **GOAL:** Understand the role of the pediatrician in preventing renal disease, and in counseling and screening individuals at risk for these diseases.
3. **GOAL:** Differentiate between normal and pathological states related to the renal system.
4. **GOAL:** Evaluate, treat, and/or refer patients with presenting signs and symptoms that may indicate a nephrologic disease process.
5. **GOAL:** Diagnose and manage patients with common renal conditions who generally do not require referral.
6. **GOAL:** Recognize, initiate management of patients with renal conditions who generally require referral.
7. **GOAL:** Understand the physiology of body fluids and electrolytes, abnormalities, and treatment.
8. **GOAL:** Appropriately manage and refer, when necessary, patients with urinary tract infections.
9. **GOAL:** Understand the pediatrician's role in the management of nephrotic syndrome.
10. **GOAL:** Understand the pathophysiology and management of common systemic conditions that may present with renal involvement, and seek consultation or referral appropriately.
11. **GOAL:** Demonstrate high standards of professional competence while working with patients under the care of a subspecialist.

1. GOAL: Hypertension. Understand the general pediatrician's role in diagnosis and management of hypertension in children.

A. Classify a patient with hypertension as to severity according to current national guidelines, e.g., mild, moderate or severe.

B. Develop a diagnostic plan for a child with hypertension that accounts for severity of the condition, including recognition and management of hypertensive emergencies.

C. Manage a patient with hypertension using a step-wise approach that includes the role of diet, exercise, weight control and medications.

D. Compare the commonly used antihypertensive drugs, considering indications and contraindications for use, mechanism of action and side effects.

E. Identify the indicators for a cardiology or nephrology referral in a child with hypertension.

2. GOAL: Prevention, Counseling and Screening (Nephrology). Understand the role of the pediatrician in preventing renal disease, and in counseling and screening individuals at risk for these diseases.

A. Provide routine prevention counseling about kidney health and disease to all parents and patients, addressing:

1. Normal voiding, toilet training and attainment of bladder control
2. Female hygiene
3. Urinary tract infections and nonspecificity of physical complaints in infants and young children
4. Strategies to assure normal bowel and bladder habits
5. Importance of routinely measuring blood pressures in children, especially overweight children and those with a family history of hypertension

B. In conjunction with a specialist, provide specific prevention counseling to parents and patients with renal diseases, addressing:

1. Need for medication adjustments in patients with impaired renal function, including many over-the-counter medicines
2. Need for prophylactic medications for certain renal conditions
3. Altered immunization schedule for children with specific renal diseases (e.g., those immunocompromised following renal transplantation, with chronic renal failure, nephritic syndrome, etc.)
4. Importance of continued home and office monitoring in children with specific diseases (e.g., blood pressures in children with hypertension or urine protein for children with nephrotic syndrome)
5. Risks of contact and other sports in children with a single kidney

C. Provide routine nephrologic screening.

1. Use blood pressures beginning at age 3 to screen for hypertension, using age- and height-specific BP norms and blood pressure cuffs appropriate for patient's height and weight; discuss criteria for repeated measurements and further evaluation or referral.
2. Obtain and accurately interpret urine for dipstick examination to screen for blood and protein at certain milestones (e.g., pre-school and pre-sports examinations).

3. GOAL: Normal Vs. Abnormal (Nephrology). Differentiate between normal and pathological states related to the renal system.

- A. Discuss the normal physiological development of the kidneys and bladder, including renal concentrating ability, glomerular filtration and sodium handling, normal voiding pattern, urine output and attainment of bladder control.
- B. Describe age-related changes in blood pressure and normal ranges from birth through adolescence.
- C. Differentiate transient or physiological proteinuria and/or orthostatic proteinuria from clinically significant (i.e. pathological) persistent or intermittent proteinuria.
- D. Differentiate transient hematuria from clinically significant gross or microscopic hematuria.
- E. Explain the findings on clinical history and examination that suggest renal disease and require further evaluation and treatment.
- F. Discuss indications for, order and interpret clinical and laboratory tests to identify renal disease. Tests should include: urinalysis (dipstick and microscopic), 24-hr urine studies, spot urine calcium/creatinine, protein/creatinine and albumin/creatinine ratios, serum electrolytes, BUN, creatinine (and methods to estimate glomerular filtration rate), calcium, phosphorous and albumin; complete renal ultrasound (kidneys, collecting systems, bladder), intravenous pyelography, voiding cystourethrogram (radiographic and radionuclide), renal nuclear scans.

4. GOAL: Undifferentiated Signs and Symptoms (Nephrology). Evaluate, treat, and/or refer patients with presenting signs and symptoms that may indicate a nephrologic disease process.

- A. Create a strategy to determine if the following presenting signs and symptoms are caused by a renal disease process and determine if the patient needs treating, consultation or referral.
 - 1. Hypertension
 - 2. Edema
 - 3. Hematuria
 - 4. Proteinuria
 - 5. Growth retardation
 - 6. Vasculitic ashes.
 - 7. Arthritis and arthralgia.
 - 8. Urinary frequency and/or dysuria
 - 9. Oliguria
 - 10. Polyuria and/or polydipsia
 - 11. Abdominal pain
 - 12. Abdominal mass
 - 13. Acidosis
 - 14. Enuresis
 - 15. Deteriorating school performance
 - 16. Nausea, poor appetite, weight loss
 - 17. Pruritus
 - 18. Unexpected fractures
 - 19. Unusual cravings for salt or potassium

5. GOAL: Common Conditions Not Referred (Nephrology). Diagnose and manage patients with common renal conditions who generally do not require referral.

- A. Diagnose, explain, and manage the following renal conditions:
1. Urinary tract infection, uncomplicated
 2. Minor electrolyte disturbances
 3. Dehydration
 4. Orthostatic and physiologic proteinuria
 5. Nonspecific urethritis
 6. Hypertension, mild
 7. Steroid-responsive nephrotic syndrome
 8. Nocturnal enuresis
 9. Urinary frequency without renal cause
 10. Hematuria without proteinuria, including resolving postinfectious glomerulonephritis
 11. Henoch-Schonlein purpura without persistent renal involvement

B. Describe how the primary care of children with chronic kidney disease differs from routine primary care, including changes in immunization schedules, management of growth and development, and learning and behavioral issues.

6. GOAL: Conditions Generally Referred (Nephrology). Recognize, initiate management of patients with renal conditions who generally require referral.

- A. Identify, explain, initially manage, and refer the following renal conditions:
1. Acute and chronic renal failure
 2. Hemolytic uremic syndrome
 3. Hypertension, moderate to severe
 4. Renal mass, cyst, hydronephrosis, dysplasia
 5. Diabetes insipidus
 6. Urolithiasis and/or nephrocalcinosis/hypercalcinuria
 7. Tubular defects (e.g., renal tubular acidosis, Fanconi's, Bartter's)
 8. Glomerulonephritis
 9. Steroid-resistant nephrotic syndrome
 10. Severe electrolyte imbalance
 11. Abnormal renal function in the acutely ill
 12. Vesicoureteral reflux
 13. Obstructive uropathy
 14. Henoch-Schonlein purpura (persistent renal involvement)
 15. Autoimmune diseases with potential for renal involvement (e.g., systemic lupus erythematosus, Wegener)
 16. Urinary tract infections with vesicoureteral reflux, hypertension, or other renal abnormalities
 17. Unexplained hematuria
 18. Proteinuria, other than orthostatic and physiologic

B. Identify the role and general scope of practice of nephrologists and contrast with that of urologists; recognize situations where children benefit from the skills of specialists trained in the care of children; and work effectively with these professionals to care for children with renal disease.

C. Discuss the indications for, basic principles and complications of substitution therapy in renal failure, e.g., hemodialysis, peritoneal dialysis and continuous hemofiltration.

7. GOAL: Fluid and Electrolytes. Understand the physiology of body fluids and electrolytes, abnormalities, and treatment.

- A. Discuss the normal physiology of body fluids (water) and salts, including: intracellular vs. extracellular component, composition of salt in each (Na, K), intake and output, measured and insensible losses, and normal daily requirements.
- B. Recall the composition of commonly used intravenous and oral rehydration solutions.
- C. Implement maintenance and replacement fluid therapy (either oral or IV) in patients and make changes based on changes in the clinical condition, taking into account fluid and electrolyte deficits, maintenance needs, insensible losses, output, and intracellular vs. extracellular components.
- D. Diagnose dehydration in a child, classify as to type and amount of dehydration, and evaluate the etiology.
- E. Discuss the different types of dehydration, methods of fluid replacement based on the type, and initial need for frequent assessment.
- F. Interpret acid-base laboratory values and discuss the differential diagnosis of metabolic acidosis and alkalosis. Describe one's approach to diagnosis and treatment.

8. GOAL: Urinary Tract Infection (UTI). Appropriately manage and refer, when necessary, patients with urinary tract infections.

- A. Discuss findings on clinical history and examination that lead one to suspect a UTI.
- B. Compare and contrast the different methods of obtaining a urine specimen.
- C. Describe the method for making an appropriate diagnosis of a UTI prior to treatment and differentiate between pyelonephritis and cystitis.
- D. Implement appropriate antibiotic treatment of a suspected UTI and list indicators that would result in changes in therapy.
- E. Discuss the appropriate radiologic evaluation for a child presenting with a first UTI, taking into account the age and sex of the child.
- F. Describe indications for antibiotic prophylaxis for recurrent UTI and the long-term risks of recurrent UTIs.
- G. Identify indicators for a nephrology or urology consult or referral of a child with a UTI.

9. GOAL: Nephrotic Syndrome. Understand the pediatrician's role in the management of nephrotic syndrome.

- A. Discuss findings on clinical history and physical examination that would lead one to suspect nephrotic syndrome.
- B. Discuss the different types of nephrotic syndrome, the current therapy of each, and the need for consistent therapy.
- C. Describe age-related differences in the etiology of nephrotic syndrome.
- D. Differentiate between steroid-resistant and steroid-responsive nephrotic syndrome.
- E. Identify indicators of the need for emergent management and urgent vs. non-urgent nephrology referral of a child with nephrotic syndrome.

- F. Along with a nephrologist, provide counseling to parents of children with nephrotic syndrome, addressing such issues as risk of infection, venous thrombosis and pulmonary edema, as well as treatment, medication side effects and importance of home monitoring.

10. GOAL: Systemic Conditions with Renal Involvement. Understand the pathophysiology and management of common systemic conditions that may present with renal involvement, and seek consultation or referral appropriately.

- A. Identify and explain the renal involvement seen in the following systemic conditions:
1. Henoch-Schonlein purpura
 2. Systemic lupus erythematosus
 3. Sickle cell anemia
 4. Bacteremia and sepsis
 5. Shock
 6. Dehydration
 7. Vasculitis
 8. Diabetes mellitus

11. 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: 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.
Bladder: catheterization
Bladder: suprapubic tap

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.

Radiologic interpretation: abdominal ultrasound

Radiologic interpretation: voiding cystourethrogram

Renal biopsy

Adapted From

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