

Nephrology Curriculum

Goal

Nephrology involves disease of the kidneys, the contiguous collecting system and vasculature. The kidneys play a key role in fluid, electrolyte and acid-base regulation and are affected by a wide range of systemic disorders, drugs and toxins.

Rotation on the medical ward services, in general medical clinic and on nephrology service will provide training for the resident to (1) understand risk factors for the development and/or exacerbation of renal disease, (2) understand the importance of primary and secondary prevention and the social impact of chronic renal disease, (3) diagnose and treat renal diseases commonly encountered in a general internal medicine practice, (4) understand how renal function changes with age and recognize the substantial numbers of elderly patients on dialysis, (5) appreciate the options for management of end-stage renal disease, and (6) recognize the need for and appropriate timing of nephrology referral.

Objectives

Patient Care

- I. Provide patient care that is compassionate, appropriate and effective for the prevention and treatment of nephrology-related disorders.

Medical Knowledge

- I. Develop the knowledge and skills to obtain an appropriate history on patients at risk for or with renal disease.
 - a. Elicit risk factors for acute and chronic renal disease
 - b. Use history to determine duration of kidney disease
 - c. Identify symptoms pertinent to the genitourinary system including symptoms of uremia and symptoms of systemic diseases that impact renal function
 - d. Elicit complete medication history with attention to renal toxins (nsaids, contrast dye, etc), herbal medications and OTCs

- II. Develop the knowledge and skills for performing and interpreting physical exam findings on patients with renal disease including:
 - a. alterations of mental status
 - b. asterixis
 - c. blood pressure
 - d. changes of advanced diabetic retinopathy
 - e. CVA tenderness
 - f. enlarged bladder
 - g. enlarged kidneys and kidney transplant
 - h. evidence of atheroembolic disease
 - i. evidence of comorbid diseases
 - j. pericardial rub

- k. peripheral pulses
 - l. renal bruit
 - m. volume status
- III. Develop an approach to patients with common complaints associated with disease of the genitourinary system including:
- a. dysuria
 - b. edema
 - c. hematuria
 - d. history of nephrolithiasis
 - e. impotence
 - f. incontinence
 - g. nocturia
 - h. polyuria
 - i. proteinuria
 - j. renal colic
 - k. scrotal pain, masses and swelling
 - l. systemic features of secondary renal disease (rash, arthritis, etc.)
- IV. Recognize risk factors, symptoms and signs, differential diagnosis and management of the following disease processes:
- a. Acid base disorders including RTA
 - b. Acute renal failure
 - c. Acute tubular necrosis
 - d. Analgesic nephropathy
 - e. Chronic renal failure and end-organ manifestations of uremia
 - f. Cystic kidney diseases
 - g. Diabetic nephropathy
 - h. Fluid and electrolyte disorders including hypo/hyperkalemia, hypo/hyponatremia, hypo/hypercalcemia, hypo/hyperphosphatemia and hypo/hypermagnesemia
 - i. Glomerulonephritis and nephritic syndrome
 - j. Hypertensive nephrosclerosis
 - k. Hypovitaminosis D
 - l. Nephrolithiasis
 - m. Nephrotic syndrome
 - n. Papillary necrosis
 - o. Post-renal renal failure
 - p. Pre-renal renal failure
 - q. Primary and secondary hypertension
 - r. Renal manifestations of drugs of abuse, HIV, Munchausen's Syndrome
 - s. Renal manifestations of systemic disorders, including hematologic disorders (eg paraproteinemias), liver disease (eg hepatorenal syndrome), and cardiac disease (eg chronic CHF)
 - t. Renal neoplasms
 - u. Secondary and tertiary hyperparathyroidism

- v. Surreptitious vomiting and laxative or diuretic use
 - w. Tubulo/interstitial renal diseases
 - x. Urinary tract infections including cystitis, pyelonephritis, and renal abscess
 - y. Vasculitis
- V. Understand normal renal physiology including the physiology of ADH, the renin-angiotensin-aldosterone system, parathyroid hormone and vitamin D metabolism and disorders affecting this equilibrium.
- VI. Understand issues related to the evaluation and internal medicine management of patients awaiting or with a history of living-related or cadaver donor renal transplant, including familiarity with the management of immunosuppressive treatment and its complications.
- VII. Understand appropriate use and interpretation of diagnostic studies, including:
- a. Serum and urine electrolytes
 - b. Arterial blood gas
 - c. Osmolality
 - d. Renal imaging including ultrasound, captopril renal scan, CT, MRI, MRA, angiogram, IVP, retrograde pyelogram and cystoscopy
 - e. Urinalysis
 - f. Serum and urine eosinophils
 - g. Urine culture
 - h. Urine protein and creatinine clearance
 - i. Serum complements
 - j. ANA, Anti double-stranded DNA
 - k. ANCA
 - l. Anti-glomerular basement membrane antibody
 - m. Cryoglobulins
 - n. Serum protein electrophoresis and urine immunoelectrophoresis
 - o. Renal biopsy
- VIII. Understand the following aspects of management of renal disease, including
- a. renal drug dosing
 - b. management of antihypertensive drug therapy, including knowledge of drug classes, use of drugs singly and in combination, and complications of treatment
 - b. prophylaxis of radiocontrast-associated nephropathy in at-risk patients with hydration versus other agents
 - c. pros, cons and complications of options for management of end-stage renal disease, including conservative care without dialysis; peritoneal and hemodialysis and indications, and transplant
 - d. continuous renal replacement therapies for critically ill patients
 - e. dietary modification in acute and chronic renal failure
 - f. anemia and iron deficiency
 - g. dialysis preparation including patient education and peritoneal or vascular access preparation

Practice-Based Learning and Improvement

- I. Utilize multidisciplinary team including nephrologist, social worker, nurse, pharmacist and dietician to care for patients with nephrology-related problems.
- II. Be able to access clinical practice guidelines to help improve care of nephrology patients.
 - a. National Kidney Foundation K/DOQI clinical practice guidelines for standards of care in chronic kidney disease and maintenance dialysis patients.
- III. Perform independent research for evidence-based practice to answer specific clinical questions arising from patient care.
- IV. Review current literature for changes in standard of care applicable to general practice.
- V. Review patient care errors with attention to changes in systems to prevent recurrence.
- VI. Utilize information technology to enhance patient education.

Interpersonal and Communication Skills

- I. Communicate effectively with patients and families in a compassionate, culturally sensitive and patient-centered manner to improve understanding and compliance.
- II. Accurately describe the risks and benefits of renal replacement therapy for informed consent.
- III. Ensure charting is legible, thoughtful, complete and timely to facilitate communication within the health care team.

Professionalism

- I. Understand how to function effectively as a team leader to advocate for patient care.
- II. Understand impact of gender, age, culture, religion, and socioeconomic status on choices regarding therapies which may hasten need for dialysis.
- III. Develop a respectful, compassionate approach to counseling patients on withdrawal from dialysis.
- IV. Understand how to inform patients regarding the natural history of their disease and therapeutic interventions and to obtain consent to implement a treatment plan.
- V. Provide meaningful feedback to colleagues and students regarding performance and behavior.

Systems-Based Practice

- I. Apply evidence-based, cost-conscious strategies to prevention, diagnosis and disease management.
- II. Develop skills in identifying opportunities for quality improvement, risk management and cost-effectiveness within a practice.

Teaching Methods

- I. Attending supervision of resident activities in patient care
- II. Teaching rounds
- III. Conferences
- IV. Recommended reading

Resident Evaluation

- I. Attending feedback to residents on strengths and weaknesses throughout the rotation
- II. Attending written evaluation of residents at the end of the rotation
- III. Mini-CEX bedside evaluation tool

Resources

Harrison's Principles of Internal Medicine, 15th ed. McGraw Hill, 2001.

Cecil Textbook of Medicine, 21st ed, Saunders, 2000.

Brenner and Rector's The Kidney, Saunders, 2003.

Rose BD, Post T. *Clinical Physiology of Acid-Base and Electrolyte Disorders*, 5th ed., McGraw-Hill Medical Publishing Division, 2001.

On-line Resources

- UptoDate
- MDConsult

Residents should review *Annals of Internal Medicine* for recent Updates in Nephrology section as well as ACP journal club for pertinent articles.