

# House Staff – Learning Objectives

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# House Staff – Learning Objectives

The learning objectives are described by the following components:

## Patient Care and Medical Knowledge

### **Resources**

Utilize the extensive electronic, paper-based and person-based (physician consult services, social work, nursing, pharmacy, practice management, other allied health professionals) resources available to help residents care for patients with nephrology-related problems

### **Core Knowledge**

- Demonstrate the ability to use the serum creatinine concentration to estimate Glomerular Filtration Rate.
- Explain the assumption of steady-state concentration.
- Discuss shortcomings of creatinine-based methods of estimating GFR.
- Demonstrate the ability to interpret a spot protein-to-creatinine ratio and/or a spot albumin-to-creatinine ratio on a random urine sample as a marker of kidney damage and a quantitative measure of proteinuria.
- Relate this test to 24-hour urine results.
- Recognize that 24-hour urine collections for the purposes of:
  - ~ GFR estimation from creatinine clearance.
  - ~ Diagnosing and following proteinuria are not superior to the spot tests above (in the majority of situations).
- Know the patient populations at risk for chronic kidney disease.
- Discuss risk factors for acute renal failure in out- and in-patient settings.
- Categorize, based on both frequency of occurrence and on dominant Pathological site(s) of injury (Pre-renal, Intra-renal [includes vascular, glomerular, tubular and interstitial] and Post-renal), the causes of:
  - ~ Chronic Kidney Disease
  - ~ Acute Renal Failure
- Define and list the most common causes of:
  - ~ Nephrotic syndrome
  - ~ Rapidly progressive glomerulonephritis
- Define and list the most common causes of:
  - ~ Isolated hematuria (i.e. without other abnormalities)
  - ~ Isolated proteinuria (i.e. without other abnormalities)

- ~ Hematuria and proteinuria without a decreased GFR
- Discuss the physiological concept of clearance and apply this to:
  - ~ Native renal function (GFR).
  - ~ Principles governing solute clearance by peritoneal dialysis, intermittent hemodialysis and continuous renal replacement therapy.
  - ~ Principles governing handling of medications by the kidney.
- Discuss the pathophysiology underlying normal and abnormal proteinuria.
- Define nephrotic-range proteinuria, glomerular proteinuria, tubular proteinuria and Benz-Jones protein.
- Describe the basic metabolic, homeostatic regulatory and endocrine functions of the kidney.

### ***History Taking***

- Elicit history of/distinguish risk factors for acute and chronic renal disease.
- Demonstrate consistent ability to use history and historical records thoroughly to determine temporal duration of kidney disease.
- Elicit specific symptoms of a genitourinary systems review.
- Elicit symptoms of uremia.
- Elicit symptoms of systemic disease and understand the diagnostic and therapeutic importance of seeking associated renal involvement.
- Elicit medication history (prescribed and over-the-counter) and completely explore potential contributions and ongoing risks for adverse drug effects.
- Elicit family history of kidney disease.
- Elicit symptoms of comorbid conditions and complications related to kidney failure (diabetes, accelerated atherosclerosis, hypertension, anemia, salt and water retention, mineral and bone disease, malnutrition, neuropathy, sexual dysfunction, electrolyte and acid-base disturbance).

### ***Physical Exam***

Demonstrate performance of physical exam to accurately assess:

- Blood pressure.
- Cardiovascular system.
- Volume status: signs of overload or depletion.
- Signs of Uremia.
- Presence of enlarged urinary bladder.
- Presence of ballotable kidneys and/or kidney transplant.
- Evidence of atherosclerotic disease.
- Evidence for comorbid diseases (including systemic diseases such as SLE and vasculitis).
- Evidence of atheroembolic disease.
- Signs of complications of uremia.

### ***Urinalysis***

- Demonstrate ability to read a urine dipstick.

- Demonstrate ability to recognize RBCs, WBCs, tubular, transitional and squamous epithelial cells, and bacteria on microscopy of urine sediment.
- Discuss potential sources of origin of each constituent.
- Demonstrate ability to recognize hyaline, granular and cellular casts (red cells, white cells and tubular epithelial cells).
- Discuss pathophysiology of their formation and source of origin.
- Demonstrate an ability to interpret quantitative estimates of proteinuria (dipstick, spot protein-to-creatinine ratio, 24 hour urine collection).
- Discuss the pathophysiology leading to abnormal proteinuria.

### ***Diagnostic Evaluation***

Plan further diagnostic evaluation by integrating core knowledge, history taking, physical exam, serum chemistries and urinalysis.

- For each of the clinical problems and/or disease processes listed below, describe expected presentations in terms of symptoms, signs, serum chemistries and pattern of urinalysis findings and discuss differential diagnosis:
  - ~ Pre-renal renal failure
  - ~ Diabetic nephropathy
  - ~ Hypertensive nephrosclerosis
  - ~ Atheroembolic kidney disease
  - ~ Renovascular disease
  - ~ Nephritic Syndrome
  - ~ Acute tubular necrosis
  - ~ Tubulo/interstitial renal diseases
  - ~ Cystic kidney diseases
  - ~ Latrogenic renal toxins (e.g., NSAIDs, contrast dye, etc.)
  - ~ Renal stone disease
  - ~ Post-renal renal failure
- Demonstrate ability to interpret, in the context of varied clinical presentations and in an integrative manner, measurements of serum electrolytes and osmolarity, arterial blood gas parameters, urine electrolytes and osmolarity. Be able to use these interpretations to assist in formulating differential diagnoses of patients with:
  - ~ Acute renal failure
  - ~ Chronic kidney disease
  - ~ Clinical disorders of salt and water metabolism
  - ~ Clinical disorders of major electrolytes (K<sup>+</sup>, Ca<sup>2+</sup>, Mg<sup>2+</sup>, PO<sub>4</sub><sup>2-</sup>)
  - ~ Clinical acid-base disorders
  - ~ Renal stone disease
- Define the implications for urgency of diagnostic evaluation of a decreased GFR of acute or undetermined duration in contrast to a chronic duration.
- Define the implications for urgency of diagnostic evaluation of an active urine sediment (white and red cells, granular casts, +/- cellular casts) in the setting of a decreased GFR.
- Describe the relative merits, indications for, and information gained from diagnostic imaging studies including ultrasound, CT, IVP, conventional and MR angiography,

MR urography, antegrade and retrograde urography, cystoscopy, and radioisotope studies in investigations of:

- ~ Hypertension
  - ~ Hematuria
  - ~ Acute renal failure
  - ~ Chronic Kidney Disease
  - ~ A patient with a renal cyst, mass or abnormality of the lower urinary tract
  - ~ Lower urinary tract disease
- Describe, in the context of the pretest probabilities for specific renal diseases, the discriminant value and appropriate ordering of the following serologic tests:
    - ~ Serum complement components
    - ~ Anti-neutrophil cytoplasmic antibody
    - ~ Anti-glomerular basement membrane antibody
    - ~ ANA, anti double-stranded DNA
    - ~ Anti-cardiolipin antibodies
    - ~ Hepatitis serologies
    - ~ Cryoglobulins
    - ~ Serum Protein Electrophoresis
    - ~ Urine Immunoelectrophoresis
    - ~ Serum and urine eosinophils
  - List the indications for renal biopsy.
  - List the risks and relative and absolute contraindications of renal biopsy.
  - Discuss the implications for patient choice if there is a low versus high probability for underlying treatable disease.
  - Discuss the implications of the possibility of a rapidly progressive yet potentially treatable underlying disease for urgency of biopsy.

### ***Effective Patient Management Plans***

- Be able to coordinate multidisciplinary care and develop management plans based on medical evidence for patients across the full spectrum of diseases and presentations that lead to:
  - ~ Acute renal failure
  - ~ Chronic kidney disease
- Be able to coordinate multidisciplinary care and develop management plans based on medical evidence for patients across the full spectrum of diseases and presentations that lead to:
  - ~ Clinical disorders of salt and water metabolism
  - ~ Clinical disorders of major electrolytes (K<sup>+</sup>, Ca<sup>2+</sup>, Mg<sup>2+</sup>, PO<sub>4</sub><sup>2-</sup>)
  - ~ Clinical acid-base disorders
  - ~ Infections of upper and lower urinary tract
  - ~ Other lower urinary tract disease
- Recognize importance of achieving blood pressure control to prevent progression of chronic kidney disease. Know the evidence for this.

- Identify blood pressure control targets for preventing progressive disease.
- Discuss the role of converting enzyme inhibitors and/or angiotensin receptor blockers in preventing kidney disease progression.
- Identify chronic kidney disease as an indication for aggressive cardiovascular risk factor reduction.
- Develop and apply specific skills appropriate to the management of:
  - ~ Fluid and electrolytes in patients with Acute Renal Failure
  - ~ Fluid and electrolytes in patients with Chronic kidney diseases
  - ~ Hypertensive urgencies and emergency
  - ~ Avoidance of unnecessary nephrotoxic exposures
  - ~ Prophylaxis of radiocontrast-associated nephropathy in at-risk patients
  - ~ Dietary modification in acute and chronic renal failure
  - ~ Anemia and iron deficiency in kidney disease
  - ~ Ca, Phosphorus and parathyroid hormone in kidney disease
  - ~ Upper and lower urinary tract infection
  - ~ Nephrolithiasis
- Recognize the need for coordinated disease-specific management plans in:
  - ~ Patients with various glomerulonephritides
  - ~ Patients with renal vasculitis
  - ~ Patient with lupus nephritis
  - ~ Patients with acute interstitial nephritis
  - ~ Patients with progressive chronic kidney diseases

### ***Dialysis for End-stage renal disease (ESRD) and Acute Renal Failure***

- Know the appropriate GFR for initiating timely (well enough in advance of anticipated end-stage kidney disease):
  - ~ Patient education regarding ESRD
  - ~ Renal replacement modality selection
  - ~ Transplant evaluation
  - ~ Vascular access preparation
- Discuss referral of chronic kidney disease patients to nephrology clinic.
- Be able to describe:
  - ~ Indications for dialysis, acute and chronic
  - ~ Relative advantages/disadvantages of hemodialysis versus peritoneal dialysis
  - ~ Concept of adequate/optimal dialysis
  - ~ Preferred vascular access for maintenance hemodialysis
  - ~ The large burden of morbidity accruing from catheter-related infections
  - ~ Relative merits of continuous renal replacement (CVVHD) versus intermittent hemodialysis in acute renal failure

### ***Kidney Transplantation***

- Recognize the need for early kidney transplant evaluation to:
  - ~ Facilitate early identification of potential living donors

- ~ Facilitate preemptive transplantation where possible
- ~ Facilitate early activation of suitable patients on cadaveric wait-list (UNOS listing criteria GFR < 20 cc/min)
- Be able to describe:
  - ~ Side effects, drug interactions and blood level monitoring of common transplant immunosuppressive drugs
  - ~ Discuss antibiotic and antiviral prophylaxis post transplant
  - ~ Differential diagnosis and investigation of increased creatinine in transplant patients and the role of transplant renal biopsy
- Recognize the symptoms and signs, and discuss the diagnosis, management and prevention of:
  - ~ Acute rejection
  - ~ Cyclosporin nephrotoxicity
  - ~ Chronic allograft nephropathy
  - ~ Cytomegalovirus infection
  - ~ Other opportunistic infections
  - ~ Allograft pyelonephritis
  - ~ Post-transplant lymphoproliferative disease
  - ~ Neoplasia – skin, other
  - ~ Atherosclerotic vascular disease
  - ~ Hypertension
  - ~ Post-transplant bone disease
  - ~ Recurrent kidney disease

### ***Drug Dosing***

Be able to access information to guide:

- Drug dosing adjustments based on GFR
- Drug interactions in patients with kidney diseases

### ***Procedures***

- Perform a dipstick urinalysis and prepare urine sediment for microscopy
- Perform bladder catheterization

## **Practice-Based Learning and Improvement**

- Be able to access and utilize the extensive electronic, paper-based, and person-based (physician consult services, social work, nursing, pharmacy, practice management, other allied health professionals) resources available to help residents care for patients with nephrology-related problems.
- Be able to access the National Kidney Foundation K/DOQI clinical practice guidelines for standards of care in chronic kidney disease and maintenance dialysis patients.
- Perform independent research for evidence-based practice in response to specific clinical questions arising from patient-care experiences.
- Engage actively in feedback.

## **Interpersonal and Communication Skills**

- Effectively coordinate multidisciplinary involvement (primary in-patient service, physician consult services, social work, nursing, pharmacy, practice management, other allied health professionals) in patient care.
- Communicate effectively with patients, family members, dieticians, social work, nursing, other physicians and other providers in the care of ESRD patients.
- Coordinate effectively multidisciplinary patient care.
- Accurately describe the risks and benefits of renal replacement therapy for informed consent.
- Discuss the impact of renal replacement therapy on quality of life.

## **Professionalism**

- Discuss ethical principles in clinical practice.
- Describe present approaches to counseling patients on end-of-life decision-making in ESRD (including withdrawal from dialysis).

## **Systems-Based Practice**

- Review the epidemic growth in end-stage renal disease and describe contributions of diabetes and/or hypertension.
- Describe individual and societal costs of ESRD.
- Acknowledge the extent of undiagnosed and inadequately treated chronic kidney disease.
- Discuss the systematic scope for prevention of ESRD.