

Nephrology and Hypertension Elective
Inova Fairfax Medical Campus
Internal Medicine Residency Program

Faculty representative/Course Director: Dr. Kevin Lowery or Dr. Anup Manoharan
(note: rotations with Dr. Manoharan may only be in the inpatient setting and at PGY-2 or 3 level)

1. Educational Purpose and Goals

- a. Expose residents to common renal problems seen in outpatient and inpatient settings.
- b. Learn how to take a detailed history pertaining to complaints related to nephrology and hypertension.
- c. Perform and interpret a detailed physical exam in a patient with a suspected renal problem or hypertension.
- d. Develop a rational diagnostic and therapeutic approach to problems in nephrology and hypertension.
- e. Learn about various modes of renal replacement therapy.

2. Principal Teaching/Learning Methods

- a. *Supervised patient care:* Residents will encounter patients in nephrology and hypertension clinic and in the hospital setting. Residents will perform initial consultations when requested by the attending. The resident will formulate a hypothesis and a treatment plan and present it to the attending. Both the resident and attending will examine the patient and discuss the plan of care. Residents will continue to follow patients after the initial consultation. In the outpatient clinic, a faculty nephrologist will supervise the resident, and residents will evaluate in the same fashion as above. Ambulatory setting will also include experience in dialysis clinic and management of patients with end stage kidney disease.
- b. *Didactics/Small group sessions*
 - i. Noon conference Series on Nephrology and Hypertension.
 - ii. Faculty will provide lectures and ward or clinic-based didactics throughout the rotation
 - iii. Residents will attend medical grand rounds and noon conferences when in the hospital.
- c. *Brief (30 minutes) lecture* on a nephrology/hypertension topic - to the office nephrology group.
- d. *Independent reading* – all residents are expected to read about patients they see in the hospital and office (suggested resources below) and also should do the Hopkins modules related to this rotation if not already done. These modules include:
 - i. *Acid Base Disorders*
 - ii. *Chronic Kidney Disease*
 - iii. *Hypertension.*

3. Educational Content

- a. Patient/Disease mix – Inpatients at Inova Fairfax Hospital who are over 18 years old provide an ethnically diverse patient population with a broad array of common and rare diseases. Residents will be expected to provide consultation on patients with acute renal failure, disorders of water or electrolytes, acid-base disorders, chronic kidney disease, end-stage renal disease, glomerular diseases, essential and secondary hypertension. In the clinic, patients with CKD, ESRD, and hypertension will be the primary focus.
- b. Learning venues
 - i. Inova Fairfax Hospital
 - ii. Nephrology clinic: Virginia Nephrology Group 3930 Walnut Street, Suite 101, Fairfax, VA
 - iii. Outpatient dialysis center (optional)
 - iv. NOTE: PGY-1 elective will be all outpatient/ambulatory setting based, PGY2/3 level nephrology elective will be inpatient consultation.
- c. Structure – The rotation is typically a four week block but may be offered for two to three week blocks in certain cases. Residents will not be on call for this service, although they may be on disaster call for the program during this elective. There are no weekend duties. Residents will continue to attend their continuity clinic during this rotation. The educational coordinator will orient the resident to the rotation at the beginning of the block and will review the specific schedule at that time. Residents (PGY2/3s) will spend 2-3 half days/week in the clinic and the remainder of the time doing inpatient consultations. There will always be at least 4.5 hours of teaching attending rounds per week, and usually these will be integrated with work rounds. Residents will never work more than 14 hours in a day and typically will work for approximately 10 hours per day, five days per week.

4. Principal Educational Materials

- a. At the beginning of the rotation, the educational director will provide materials, including this curriculum, and a resource list.

5. Methods of Evaluation

- a. Feedback will be given throughout the rotation as appropriate. At the end of the rotation, a core faculty nephrologist will complete a web-based evaluation (MedHub) and review it with the resident.
- b. The residents will also evaluate faculty and the rotation in an anonymous fashion (summarized annually in a composite form).
- c. Pre-test and post-test in the Hopkins modules to assist in curriculum and structure adjustment (in-training exam results will also be utilized for this purpose).
- d. A nurse or manager from the clinic will be chosen to evaluate the resident (360 degree component) where applicable
- e. Lectures will be evaluated by the supervising faculty immediately after the session.

6. Resource List

- a. Harrison's Principles of Internal Medicine, "Alterations in Renal and Urinary Tract Function (Cardinal Manifestations of Disease)"; "Disorders of the Kidney and Urinary Tract."
- b. "Clinical Physiology of Acid-Base and Electrolyte disorders." Rose, Post, Rose.
- c. Hopkins online modules ilc.peaconline.org with pre and post-tests. 3 core sections as listed above.

Learning Venues

1. Supervised patient care/Attending rounds/Attending review of cases in clinic
2. Small group and Didactic sessions
3. Lecture to nephrology group
4. Independent reading
5. Pre and post test from Hopkins modules.

Methods of Evaluation

- A. Attending evaluation
- B. Nurse evaluation
- C. Direct observation with feedback
- D. Lecture evaluation
- E. Pre and post-test from Hopkins modules for self-evaluation by the resident.

The following competencies are applicable to all levels of trainees, PGY-1, PGY-2 and PGY3. Progressive resident responsibilities for the Nephrology rotation is as outlined below based on the PGY1 level and assessments will be based on their level of training.

Progressive Resident Responsibilities during the Nephrology Rotation:

PGY-1 Residents:

Interns should learn how to gather the pertinent history, perform physical exam, and perform and interpret urinalysis including microscopy, interpret serum electrolytes, and renal function markers in context of acute and chronic renal disease. They should understand the age-related changes in the normal values of renal function markers. They should be able to assimilate this information into a preliminary diagnosis and plan of care to present to the attending. They should understand the indications and contraindications to various modes of renal replacement therapy in acute and chronic renal failure patients. They should be able to differentiate between prerenal azotemia and acute tubular necrosis based on urinary electrolytes and sediment. They should learn the basic principles of dialysis treatment and vascular access functioning.

PGY-2 Residents:

In addition to the above responsibilities, the second-year residents should be experts in interpreting arterial blood gas results, urinary electrolytes to help diagnosis the disorders of sodium, potassium and acid-base problems. They should understand the pathogenesis and progression of chronic kidney disease and its associated co-morbidities. They should be able to institute appropriate therapy for hypertension and know the indications for initiating the work up for secondary hypertension. They should know how to manage divalent ion disorders and understand the role kidneys play in their pathogenesis. They should know about the common primary and secondary glomerular diseases and their

conservative management strategies. They should know the common indications and complications of renal biopsy. They should demonstrate understanding of both the initial and ongoing management of common renal diseases, and begin to understand initial management of more complex and rare renal diseases.

PGY-3 Residents:

In addition to being proficient in all the responsibilities listed above, the third-year residents should be experts in interpreting the pathological findings on renal biopsies to differentiate between proliferative versus non-proliferative disorders. They should be experts in managing hypertension, indications for various classes of antihypertensive agents, treatment of diabetic nephropathy and the basics of management of proliferative renal diseases such SLE, pauci-immune GN, and HUS/TTP. Residents should also understand the principles of managing common acid-base and electrolytes disorders seen in the intensive care units. They should be experts in diagnosing the ingestion of various toxins and the role of renal replacement therapy in their removal. They should be experts in renal manifestations of systemic diseases. They should know the basic immunosuppression in renal transplant patients and should be able to recognize the infectious and non-infectious complications of immunosuppressive therapy. Residents should be familiar with the important relevant literature and will be expected to present this literature during the ward rounds.

| Competency: Patient Care | Learning Venues | Evaluation Methods |
|--|------------------------|---------------------------|
| Demonstrate the ability to use history, physical exam, laboratory, and ancillary tests to assess clinical volume status | 1,2,4,5 | ACE |
| Demonstrate ability to generate differential diagnosis, diagnostic strategy, and to define appropriate therapeutic plan and modifications to ongoing therapy in patient with acute renal failure | “ | “ |
| Demonstrate the ability to generate differential diagnosis, diagnostic strategy, and to define appropriate therapeutic plan and modifications to ongoing therapy in patient with a serious fluid, electrolyte, or complex acid-base disorders | “ | “ |
| Demonstrate the ability to analyze urine sediment and use the results to affect patient care | “ | “ |
| Demonstrate the ability to diagnose and define the markers of protein calorie malnutrition in patients with acute and chronic renal failure and recommend appropriate dietary modifications | “ | “ |
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| Competency: Medical Knowledge | Learning Venues | Evaluation Methods |
|---|------------------------|---------------------------|
| Articulate the pathophysiology, evaluation, and management (including dialysis) of acute renal failure | 1,2,4,5 | ACE |
| Articulate the pathophysiology, evaluation, and management (including renal replacement therapy) of chronic kidney disease (CKD) and endstage renal disease (ESRD) | “ | “ |
| Articulate the pathophysiology, evaluation, and management of common disorders of sodium, potassium, and water metabolism | “ | “ |
| Articulate the pathophysiology, evaluation, and management of common acid-base disorders, including renal tubular acidoses | “ | “ |
| Articulate the pathophysiology, evaluation, and management of primary and secondary glomerular diseases | “ | “ |
| Articulate the pathophysiology, evaluation, and management of essential and secondary hypertension | “ | “ |
| Competency: Interpersonal and Communication Skills | Learning Venues | Evaluation Methods |
| Interact in an effective way with physicians and nurses participating in the care of patients requiring renal consultation or care (including physicians requesting consultation, fellows, attendings, and dialysis unit personnel) | 1 | ABC |
| Show understanding of differing patient preferences in diagnostic evaluation and management of renal disorders | “ | AC |
| Competency: Professionalism | Learning Venues | Evaluation Methods |
| Treat team members, primary care-givers, and patients with respect | 1 | ABC |
| Actively engage in the academic process | 1-5 | ACDE |
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| Attend and participate in all scheduled conferences | 2,3 | A |
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| Competency: Practice-Based Learning | Learning Venues | Evaluation Methods |
|--|------------------------|---------------------------|
| Identify limitations of medical knowledge in evaluation and management of patients with renal disorders and use medical literature (primary and reference), colleagues, ancillary staff, fellows, attendings to address these gaps in medical knowledge | 1-5 | ACDE |
| Competency: Systems-Based Practice | Learning Venues | Evaluation Methods |
| Understand barriers to optimal care and adherence of and for patients with hypertension, CKD, and ESRD | 1 | AC |
| Understand how financing of ESRD care can influence patient care | “ | AC |
| Understand need for effective communication between multiple caregivers and sites (eg, nephrologists, primary care physicians, surgeons, interventional radiologists, dialysis nurses, dieticians, social workers, hospitals, in- and out-patient dialysis units in delivering optimal care to ESRD patients | “ | ABC |