

Rotation Name: Consults - Nephrology

Rotation Site Leader: Anna Burgner

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Updated by: 7/5/2021- mapped to milestones 2.0 (sm)

Goal:

The purpose of this educational unit is for residents to have training in the diagnosis of and management of acute and chronic kidney disease, electrolyte disorders, hypertension, and systemic diseases that affect the kidneys.

Skills that will likely be covered during this rotation include:

- Obtain and report a focused pertinent history and physical exam for patients with kidney related disease.
- Know the common causes of acute renal failure, importance of prognostic indicators such as oliguria, and understand the diagnostic approach to and initial management of patients with acute renal failure, including the indications for acute dialysis.
- Understand the principles of management of patients with chronic renal disease, including the risk factors for progression of renal disease, and the metabolic complications of chronic renal disease.
- Accurately describe acid-base disorders, both simple and complex, and know the common causes of metabolic acid-base disorders.
- Know the differential diagnosis for the diagnostic approach to and management of common electrolyte disorders, including hyponatremia, hypernatremia, hypokalemia, hyperkalemia, hypocalcemia, and hypercalcemia.
- Understand the principles of fluid status and management, as well as the selection of appropriate intravenous fluid solutions.
- Know at a level appropriate for a general internist, the different types of renal replacement therapy (including transplant), their mechanism of action, their relative risks/benefits and their indications/contraindications.
- Know the common causes of glomerular disease, the presentation of patients with glomerular diseases, and the appropriate work-up for patients with suspected glomerular disease.
- Understand the inpatient management, including dialysis, for hospitalized ESRD patients.
- Management of hospitalized patients with chronic kidney disease, including understanding risks for progression to ESRD and risks associated with hospitalization and procedures.
- Diagnosis and treatment of systemic disease affecting the kidney, including diabetes and hypertension, glomerulonephritis, pulmonary-renal syndromes, SLE, thrombotic microangiopathies, and many others.
- Principles of plasmapheresis and its role in the treatment of specific organ system disorders, including nephrologic, hematologic, rheumatologic, and neurologic disease.
- Preparing and analyzing urine specimens under microscopy from patients with AKI/ARF, with emphasis on identification of casts, dysmorphic RBCs, and crystals.
- Understand when it is appropriate to refer patients with kidney-related disease for consultation with a nephrologist

Over the course of the rotation the resident will have ample exposure to both general nephrology and a greater understanding of specific disease states as well. The knowledge gained from this rotation will aid the resident in the initial evaluation of kidney disease, as well as in deciding when formal nephrology consultation is warranted and appropriate.

Objectives:

By the end of this educational block, learners in this rotation will be able to:

Patient Care

- 1) Perform a detailed and accurate nephrologic history and physical exam including the renal review of systems, relevant examination features, and relevant chart review.
- 2) Integrate information obtained from the history and physical exam to develop a pertinent and prioritized nephrologic problem list and an initial differential diagnosis.
- 3) Based on the initial differential diagnosis, select initial diagnostic (laboratory, imaging, etc.) studies and therapeutic interventions, with some supervision.

Medical Knowledge

- 1) Describe common kidney diseases that are encountered at a level that is appropriate for a general internist. This should be demonstrated by the ability to develop a comprehensive diagnostic and treatment approach to these conditions with minimal or no need for supervision.
- 2) Describe rare or complex kidney diseases commonly encountered in nephrology, as demonstrated by the ability to:
 - a. Develop an appropriate Initial diagnostic and treatment approach
 - b. Refer to a consultant, when appropriate.

Interpersonal and Communication Skills

- 1) Participate in family/team meetings, including discussions of end-of-life care in a dialysis patient.
- 2) Explain a renal patient's condition and plan of care to the patient and family in terms that are understandable and appropriate.
- 3) Effectively communicate with physicians as a renal consultant, and be able to provide succinct, explicit recommendations both verbally and in writing.

Professionalism

- 1) Safeguard patient confidentiality and protected health information. Respect patients' autonomy and their right to make informed decisions about their own health care including in dialysis unit.
- 2) Treat everyone else- dialysis unit nursing staff, ancillary healthcare providers, program personnel, students, residents from our own and other programs, attending physicians in all specialties, others - with respect and courtesy, and in a way that reflects positively on them as individuals and the medical profession as a whole.

Systems based practice

- 1) Describe the role of all the members of the kidney team.
- 2) Complete all charting/documentation/dictations in a timely manner.

- 3) Anticipate patients' discharge needs and begin discharge planning early in the hospitalization, with minimal or no prompting by the attending physician.

Practice-based learning and improvement

- 1) Utilize current medical evidence (e.g. guidelines, original literature) to correct deficits in knowledge related to the diagnosis and treatment of kidney patients.
- 2) Seek feedback from attendings and utilize that feedback to improve their clinical performance.
- 3) Develop a plan of systematic, independent study to expand their knowledge of nephrology.

Expectations for daily workflow and tasks while on this rotation:

- 1) Act as initial consultant on hospitalized patients hospitalized with with AKI, CKD, ESRD and acid-base/electrolyte disorders.
- 2) Develop a plan of care based on assessment with the renal fellow, and present to the consult service attending.
- 3) Act as initial consultant on hospitalized patients with systemic disease requiring nephrology consultation for plasmapheresis.
- 4) Responsibility for inpatient continuity and daily progress notes of those patients on whom the resident provided the initial consultation. The resident may also follow patients on the consult service that will prove educational or interesting to the internal medicine resident in training. Such patients will be distributed at the discretion of the attending and fellows.
- 5) Daily communication with consulting teams and residents, including planned procedures, disposition, and changes in patient status.
- 6) If desired by the resident, opportunities for placement of central venous catheters for dialysis access under supervision of a fellow familiar with dialysis catheter placement.
- 7) Optional attendance of outpatient nephrology clinic once per week to gain further knowledge of AKI, CKD, and ESRD from an outpatient perspective.

Educational Strategies:

Educational Strategy	Skills (taught and/or assessed)
Bed side rounds	Interpreting acute vs. chronic kidney injury Adjusting doses of medicines correctly for patients with renal disease Define an initial work up for new AKI that is complete and relevant for each clinical scenario Management of AKI Management of chronic complications of kidney disease Accurate description of volume status
Didactic lecture	Acid / base disorders Renal replacement therapies Hypo/Hyponatremia Hypo/Hyperkalemia

Attending eliciting learning goals at the start of rounds each day	Residents drive self-learning by identifying one learning goal for each consult day
Attending/Fellow observations with staff	Conduct patient centered bedside rounds Complete documentation in a timely and efficient manner Describe how the team assembles for emergent dialysis and describe the roles each team member plays
Attending review of documentation when attesting	Complete documentation in a timely and efficient manner

Required Reading:

Vanderbilt Nephrology Faculty and Fellows, "Vanderbilt Nephrology Renal Consult Primer (PDF)" last edited 2019

Fatehi, Pedram, Hsu, Chi-Yuan "Evaluation of acute kidney injury among hospitalized adult patients" In: UpToDate, Post TW (Ed), UpToDate, Waltham, MA.

Okusa, Mark, Rosner, Mitchell, "Overview of the management of acute kidney injury (AKI) in adults" In: UpToDate, Post TW (Ed), UpToDate, Waltham, MA.

Suggested Reading and/or Resources:

Moore, Peter K., Raymond K. Hsu, and Kathleen D. Liu. "Management of acute kidney injury: core curriculum 2018." *American Journal of Kidney Diseases* 72.1 (2018): 136-148.

Berend, Kenrick, Aiko PJ de Vries, and Rijk OB Gans. "Physiological approach to assessment of acid–base disturbances." *New England Journal of Medicine* 371.15 (2014): 1434-1445.

Tolwani, Ashita. "Continuous renal-replacement therapy for acute kidney injury." *New England Journal of Medicine* 367.26 (2012): 2505-2514.

Himmelfarb, Jonathan, and T. Alp Ikizler. "Hemodialysis." *New England Journal of Medicine* 363.19 (2010): 1833-1845.

Sterns, Richard H. "Disorders of plasma sodium—causes, consequences, and correction." *New England Journal of Medicine* 372.1 (2015): 55-65.

Gumz, Michelle L., Lawrence Rabinowitz, and Charles S. Wingo. "An integrated view of potassium homeostasis." *New England Journal of Medicine* 373.1 (2015): 60-72.

Bart, Bradley A., et al. "Ultrafiltration in decompensated heart failure with cardiorenal syndrome." *New England Journal of Medicine* 367.24 (2012): 2296-2304.

Mehran, Roxana, George D. Dangas, and Steven D. Weisbord. "Contrast-associated acute kidney injury." *New England Journal of Medicine* 380.22 (2019): 2146-2155.

Legrand, Matthieu, and Patrick Rossignol. "Cardiovascular consequences of acute kidney injury." *New England Journal of Medicine* 382.23 (2020): 2238-2247.

Rosner, Mitchell H., and Mark A. Perazella. "Acute kidney injury in patients with cancer." *New England Journal of Medicine* 376.18 (2017): 1770-1781.

Howard, Scott C., Ching-Hon Pui, and Raul C. Ribeiro. "Tumor lysis syndrome." *Renal Disease in Cancer Patients* (2014): 39-64.

Bosch, Xavier, Esteban Poch, and Josep M. Grau. "Rhabdomyolysis and acute kidney injury." *New England Journal of Medicine* 361.1 (2009): 62-72.

KDIGO guidelines: Glomerulonephritis: <https://kdigo.org/wp-content/uploads/2017/02/KDIGO-2012-GN-Guideline-English.pdf>

KDIGO guidelines: CKD Evaluation and management: https://kdigo.org/wp-content/uploads/2017/02/KDIGO_2012_CKD_GL.pdf

KDIGO guidelines: AKI <https://kdigo.org/wp-content/uploads/2016/10/KDIGO-2012-AKI-Guideline-English.pdf>

Evaluation:

(Ideally, the evaluation items below resemble the learning objectives above)

Assessment Form:

1. Please identify 3 skills you observed the resident do well? (Text Box)
2. Please identify 3 skills the resident needs to improve or should do differently. How should they do it differently? (Text Box)

(Ideally, limit to 8-10 skills that you ask your faculty to assess)

For the remaining items, please rate 1-5 (or did not observe):

1 = cannot do this skill

2 = can do this skill only with direct supervision (some needs to be there to supervise)

3 = can do this skill with indirect supervision (an attending or fellow is close by or available by phone)

4 = can do this skill unsupervised (they are ready to graduate for this skill)

5 = has achieved mastery of this skill (They can teach others how to do this skill well)

- 3) Perform a detailed and accurate nephrology history and physical including the renal review of systems, relevant examination features and relevant chart review. PC-1,PC-2
- 4) Generate a differential for acute renal failure and use the urinary indices to differentiate between pre-renal causes and others. PC-3, MK3
- 5) Recognize the clinical presentation of a rapidly progressive glomerular nephritis (RPGN) and its differential. PC-3, MK-3
- 6) Interpret an arterial blood gas result. MK-1, MK-3
- 7) Manage various electrolyte disorders including hypo-and hyperkalemia, hypo- and hyponatremia, and hypo- and hypercalcemia. PC-4, MK-1, MK-2, MK-3
- 8) Assess the medication list and diet daily for the appropriateness for the level of kidney function. PC-4, MK-1, MK-2
- 9) Describe the indications for acute and maintenance hemodialysis in both acute renal failure and end-stage renal disease. PC-4, MK-2
- 10) Differentiate among the types of continuous renal replacement therapies (CRRT) including hemodialysis, hemofiltration, hemodiafiltration, and ultrafiltration. MK-1, MK-2, PC-4

