

## **NEPHROLOGY CLERKSHIP**

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### **General Description**

#### **Elective Rotation**

This elective rotation is a four (4) week introductory, structured clinical experience under direct supervision designed to provide the student experience diagnosing, treating and caring for patients with nephrology disorders. There is *no* post-rotation exam for the elective.

#### **Purpose**

Clinical experiences are intended to assist the student's transition from didactic to integrated clinical evaluation and patient management. Under supervision, students are expected to assist in the management of acute and chronic nephrologic and hypertensive diseases. The student should also develop fundamental psychomotor skills by performing routine basic procedures under direct supervision.

### **Course Objectives**

#### **General Overview**

The student should be able to:

- identify the different stages of chronic kidney disease
- understand the signs, symptoms and management of common renal syndromes including acute kidney injury and chronic renal failure, glomerulonephritis, and nephrotic syndrome.
- understand and interpret laboratory tests, medical imaging and diagnostic studies employed in the assessment of renal function.
- understand the diagnosis and management of fluid, electrolyte and acid-base disorders.
- understand the diagnosis and management of primary and secondary hypertension.

#### **Technical and Interpretation Skills**

Students are expected to acquire certain technical skills and interpretation that are commonly employed in medical care. Wherever possible, appropriate students are encouraged to participate in procedures under adequate supervision.

The student should be able to:

- interpret a complete blood count.
- interpret common chemistry measurements
- calculate creatinine clearance (cockcroft-gault, abbrev. mdrd)
- interpret results of a urinalysis and culture
- interpret microalbumin/creatinine ratio
- interpret arterial blood gas measurements.
- interpret serum and urine electrolyte measurements.

### **General Clinical Core Competencies**

The curriculum detailed below (adapted from the CDIM-SGIM Core Medicine Clerkship Curriculum Guide Ver.3.0) specifies and prioritizes course objectives in terms of the basic internal medicine core clinical competencies and the specific learning objectives (knowledge, skills, and attitudes) pertinent to those competencies. **Every effort should be made to integrate them into the nephrology clerkship.**

### **RENAL CORE TOPICS AND DISEASES**

The student is responsible for reviewing these topics during the rheumatology elective. Introductory information can be found in Internal Medicine Clerkship Guide, 3rd Ed. by Paauw \*. Also there are excellent questions with answers and critiques in MKSAP for Students 5 †.

- Nephrology (Section 7<sup>†</sup>)
- Acute kidney injury (pp. 431-438\*)
- Acid-base disorders (pp. 426-431\*)
- Fluid and electrolyte disorders (pp. 438-445\*)
- Hypertension (pp. 445-455\*)
- Dysuria (pp. 412-415\*)

Students are encouraged to supplement these basic discussions by reference to Cecil Medicine or Harrison's Principles of Internal Medicine and current clinical papers from refereed journals. Additional reading in the following areas is recommended:

- Primary and secondary arterial hypertension
- Disorders of sodium and water homeostasis
- Potassium disorders
- Disorders of calcium, magnesium and phosphorus
- Acid-Base disorders
- Acute kidney injury
- Glomerular disorders and nephrotic syndrome
- Tubulointerstitial disease
- Nephrolithiasis
- Vascular disorders to the kidney
- Dialysis in the treatment of renal failure
- Transplantation in the treatment of renal failure
- Obstructive uropathy
- Urinary tract infections, pyelonephritis, and prostatitis
- Polycystic kidney disease

## **Implementation**

Course objectives are to be accomplished in a College affiliated hospital or clinical facility, under supervision. Course objectives should be covered during the rotation to assure adequate student preparation for board examinations and clinical practice. The use of diverse methods appropriate to the individual and the clinical site are encouraged, but patient-centered teaching is optimal.

Didactic methods to achieve required objectives include:

- Reading assignments
- Lectures
- Computer-assisted programs (if available)
- Student attendance at/participation in formal clinical presentations by medical faculty

Clinically oriented teaching methods may include:

- Assignment of limited co-management responsibilities under supervision
- Participation in clinic visits, daily patient rounds and conferences
- Supervised and critiqued clinic work-ups of patients admitted to the service
- Assigned, case-oriented reading case presentations

## **POST-ROTATION EVALUATION**

**At the beginning of the rotation, the physician/mentor should review expectations/guidelines of performance with the student. A mid-rotation evaluation is encouraged. On the last day of service, the supervising physician should review the student's performance with the student and have the student sign the evaluation form before submission. A student's signature simply indicates that the student has received a grade directly from the attending; it does not indicate agreement with the grade. Evaluations of students must be completed within two weeks of completion of the rotation.**

## **TEXTS AND RESOURCES**

### **Required Assignment Texts**

Kasper, et al (eds), Harrison's Principles of Internal Medicine 18<sup>th</sup> Ed., McGraw-Hill, 2012. ([Available through DMU Library Portal-AccessMedicine](#))

**or**

Goldman, et al (eds), Cecil Medicine, 24<sup>th</sup> Ed., Saunders, 2011. ([Available through DMU Library Portal-MD Consult](#))

Paauw, DS. (eds), Internal Medicine Clerkship Guide, 3<sup>rd</sup> Ed., St. Louis, Mosby, 2008.

American College of Physicians, MKSAP for Students 5, 5th Ed., Philadelphia, ACP, 2011. ([Available through DMG Library Portal- STAT! Ref](#))

### **Optional Reference Text**

Gilbert, S., National Kidney Foundation's Primer on Kidney Diseases, 6<sup>th</sup> Ed. Saunders, 2014.

Taal, M., Brenner and Rector's The Kidney, 9<sup>th</sup> Ed. Saunders, 2012.  
(Available through DMU library portal-Clinical Key)

Eaton, D. Vander's Renal Physiology, 8<sup>th</sup> Ed. McGraw-Hill, 2013 (Available through DMU library portal-AccessMedicine)

Rennke, H.G., Renal Pathophysiology: The Essentials, 4th Ed. Lippincott Williams Wilkins, 2014.

Rose, BD, Clinical Physiology of Acid-Base and Electrolyte Disorders, 5<sup>th</sup> Ed. McGraw-Hill, 2001.

Schrier, RW, Renal and Electrolyte Disorders, 7<sup>th</sup> Ed. Lippincott Williams Wilkins, 2010.

## **READING ASSIGNMENTS**

1. **Review all core topics and diseases listed above.**
2. In-depth reading (Cecil or Harrison) of individual diseases and disorders listed above.

## **ELECTRONIC RESOURCES**

(All are available through DMU library portal)

### **Evidence-Based Medicine:**

- **Cochrane Library for Evidence-Based Medicine-** The Cochrane Library contains high-quality, independent evidence to inform healthcare decision-making.
- **UpToDate®** - an evidence-based knowledge system authored by physicians to help clinicians make the right decisions at the point of care. All UpToDate content is written and edited by a global community of 4,800 physicians, world-renowned experts in their specialties..
- **Essential Evidence Plus-** A powerful resource packed with content, tools, calculators and alerts for clinicians who deliver first-contact care.
- **ACP Smart Medicine-** ACP Smart Medicine is a comprehensive, evidence-based reference for fast, current answers on the best clinical care.

### **Electronic Texts:**

- **Vander's Renal Physiology-AccessMedicine**
- **Brenner and Rector's The Kidney,-Clinical Key**
- **Cecil Medicine-Clinical Key**
- **Harrison's Online-AccessMedicine**
- **Current Medical Diagnosis and Treatment 2012-AccessMedicine**
- **Clinical Key-** Provides full-text access to approximately 40 medical textbooks, 50 medical journals, comprehensive drug information, and more than 600 clinical practice guidelines
- **eJournals A-to-Z** - Database provides link and coverage information to more than 124,000 unique titles from more than 1,100 database and e-journal packages.
- **The Medical Letter on Drugs and Therapeutics-** An independent, peer-reviewed, nonprofit publication that offers unbiased critical evaluations of drugs, with special emphasis on new drugs.

## APPENDIX

### Detailed General Clinical Competencies

#### **HISTORY-TAKING AND PHYSICAL EXAMINATION**

##### **Rationale:**

The ability to obtain an accurate medical history and carefully perform a physical examination is fundamental to providing comprehensive care to adult patients. In particular, the internist must be thorough and efficient in obtaining a history and performing a physical examination with a wide variety of patients, including adults with acute and chronic renal and hypertensive diseases.

##### **Specific learning objectives:**

- A. Knowledge:** Students should be able to define, describe, and discuss:
1. The significant attributes of a symptom, including: location and radiation, intensity, quality, temporal sequence (onset, duration, frequency), alleviating factors, aggravating factors, setting, associated symptoms, functional impairment, and patient's interpretation of symptom. *(MK, OPP)*
  2. The four methods of physical examination (inspection, palpation, percussion, and auscultation), including where and when to use them, their purposes, and the findings they elicit. *(MK, OPP)*
  3. The physiologic mechanisms that explain key findings in the history and physical exam. *(MK, OPP)*
- B. Skills:** Students should be able to demonstrate specific skills, including:
1. Using language appropriate for each patient. *(PC, CS)*
  2. Eliciting the patient's chief complaint as well as a complete list of the patient's concerns. *(PC, CS)*
  3. Obtaining a patient's history in a logical, organized, and thorough manner, covering the history of present illness; past medical history; preventive health measures; social, family, and occupational history; and review of systems.
  4. Demonstrating proper hygienic practices whenever examining a patient. *(PC)*
  5. Performing a physical examination for a patient in a logical, organized, respectful, and thorough manner, giving attention to the patient's general appearance, vital signs, and pertinent body regions. *(PC)*
- C. Attitudes and professional behaviors:** Students should be able to:
1. Recognize the essential contribution of a pertinent history and physical examination to patient care. *(P)*
  2. Establish a habit of updating historical information and repeating important parts of the physical examination during follow-up visits. *(P)*
  3. Demonstrate consideration for the patient's feelings, limitations, and cultural and social background whenever taking a history and performing a physical exam. *(P)*

##### **AOA Competencies:**

PC = Patient Care  
MK = Medical Knowledge  
PLI = Practice-Based Learning and Improvement  
OPP = Osteopathic Philosophy, Principles and Practice

CS = Communication Skills  
P = Professionalism  
SBP = Systems-Based Practice

## INTERPRETATION OF CLINICAL INFORMATION

### Rationale:

In the routine course of clinical practice, most physicians are required to order and interpret a wide variety of diagnostic tests and procedures. Determining how these test results will influence clinical decision making and communicating this information to patients in a timely and effective manner are core clinical skills that third-year medical students should possess.

### Specific learning objectives:

- A. Knowledge:** Students should be able to:
1. Interpret specific diagnostic tests and procedures that are ordered to evaluate patients who present with common symptoms and diagnoses encountered in the practice of nephrology. *(PC, MK)*
  2. Take into account the important differential diagnostic considerations, including potential diagnostic emergencies. *(PC, MK)*
  3. Define and describe for the tests and procedures listed:
    - Indications for testing. *(PC, MK)*
    - Critical values that require immediate attention. *(PC, MK)*
  4. Independently interpret the results of the following laboratory tests:
    - Creatinine clearance (Cockcroft-Gault equation, abbreviated MDRD), chemistry panels, urine and serum electrolytes, microscopic urinalysis, arterial blood gases, CBC , microalbumin/creatinine ratio *(PC, MK)*
- B. Skills:** Students should be able to demonstrate specific skills, including:
1. Performing microscopic urinalysis *(PC)*
  2. Indications and contraindications of the following: IVP, CT/MRI of abd/pelvis, renal scans, ultrasound of retroperitoneum, hemodialysis, peritoneal dialysis *(PC)*
  3. Recording the results of laboratory tests and diagnostic studies in an organized manner, using flow sheets when appropriate. *(PC)*
- C. Attitudes and professional behaviors:** Students should be able to:
1. Appreciate the importance of follow-up on all diagnostic tests and procedures and timely communication of information to patients and appropriate team members. *(P)*
  2. Personally review medical imaging and lab studies, etc. to assess the accuracy and significance of the results. *(P)*

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## DIAGNOSTIC DECISION-MAKING

### Rationale:

Physicians are responsible for directing and conducting the diagnostic evaluation of patients with acute and chronic renal and hypertensive diseases. In a time of rapidly proliferating tests, medical students must learn how to design safe, expeditious, and cost-effective diagnostic evaluations.

### Specific learning objectives:

- A. Knowledge:** Students should be able to define, describe, and discuss:
1. Key history and physical examination findings pertinent to the differential diagnosis. (*MK, OPP*)
  2. Information resources for determining diagnostic options for patients with common and uncommon renal and hypertensive disorders. (*MK, PLI*)
  3. How critical pathways or practice guidelines can be used to guide diagnostic test ordering. (*MK*)
- B. Skills:** Students should demonstrate specific skills, including:
1. Identifying problems with which a patient presents, appropriately synthesizing these into logical clinical syndromes. (*PC*)
  2. Identifying which problems are of highest priority. (*PC*)
  3. Formulating a differential diagnosis based on the findings from the history and physical examination. (*PC, OPP*)
  4. Using the differential diagnosis to help guide diagnostic test ordering and sequencing. (*PC*)
- C. Attitudes and professional Behaviors:** Students should be able to:
1. Seek feedback regularly regarding diagnostic decision-making and respond appropriately (*P*)
  2. Recognize the importance of and demonstrate a commitment to the utilization of other health care professionals in diagnostic decision making. (*P, SBP*)

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## THERAPEUTIC DECISION-MAKING

### Rationale:

Internists are responsible for directing and coordinating the therapeutic management of patients with a wide variety of renal and hypertensive problems. To manage patients effectively, physicians need basic therapeutic decision-making skills that incorporate both pathophysiologic reasoning and evidence-based knowledge.

### Specific learning objectives:

- A. Knowledge:** Students should be able to define, describe, and discuss:
1. Information resources for determining medical and surgical treatment options for patients with common and uncommon renal problems. *(MK)*
  2. How to use critical pathways and clinical practice guidelines to help guide therapeutic decision making. *(MK)*
  3. Factors that frequently alter the effects of medications, including drug interactions and compliance problems. *(MK)*
  4. Factors to consider in selecting a medication from within a class of medications. *(MK)*
  5. Factors to consider in monitoring a patient's response to treatment, including potential adverse effects. *(MK)*
  6. Methods of monitoring therapy and how to communicate them in both written and oral form. *(MK)*
- B. Skills:** Students should be able to demonstrate specific skills, including:
1. Formulating an initial therapeutic plan. *(PC)*
  2. Accessing and utilizing, when appropriate, information resources to help develop an appropriate and timely therapeutic plan. *(PC, PLI)*
  3. Writing prescriptions and inpatient orders safely and accurately. *(PC)*
  4. Counseling patients about how to take their medications and what to expect when doing so, including beneficial outcomes and potential adverse effects. *(PC, CS)*
  5. Monitoring response to therapy. *(PC)*
- C. Attitudes and professional behaviors:** Students should be able to:
1. Incorporate the patient in therapeutic decision making, explaining the risks and benefits of treatment. *(CS, P)*
  2. Respect patient's informed choices, including the right to refuse treatment. *(P)*
  3. Recognize the importance of and demonstrate a commitment to the utilization of other health care professionals in therapeutic decision making. *(P, SBP)*

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## CASE PRESENTATION SKILLS

### Rationale:

Communicating patient care information to colleagues and other health care professionals is an essential skill regardless of specialty. Students should develop facility with different types of case presentations (e.g. written, oral, new patient, follow-up, inpatient and outpatient).

### Specific learning objectives:

- A. Knowledge:** Students should be able to define, describe, and discuss components of comprehensive and abbreviated case presentations (oral and written) and settings appropriate for each. *(MK)*
- B. Skills:** Students should be able to demonstrate specific skills, including:
1. Prepare legible, comprehensive, and focused new patient workups that include the following features as clinically appropriate:
    - Concise history of the present illness organized chronologically with minimal repetition, omission, or extraneous information, and including pertinent positives and negatives. *(PC, CS)*
    - A comprehensive physical examination with detail pertinent to the patient's problem. *(PC, CS, OPP)*
    - A succinct, prioritized, and, where appropriate, complete list of all problems identified by the history and physical examination. *(PC, CS, OPP)*
    - A differential diagnosis for each problem (appropriate for the student's level of training). *(PC, CS)*
    - A diagnostic and treatment plan for each problem (appropriate for the student's level of training). *(PC, CS, OPP)*
  2. Orally present a new or follow-up inpatient's or outpatient's case in a logical manner, chronologically developing the present illness, summarizing the pertinent positive and negative findings as well as the differential diagnosis and plans for further testing and treatment. *(PC, CS)*
- C. Attitudes and professional behaviors:** Students should be able to:
1. Demonstrate ongoing commitment to improving case presentation skills by regularly seeking feedback on presentations. *(PLI, P)*
  2. Accurately and objectively record and present all data. *(P)*

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