NEPHROLOGY Blueprint

For traditional, 10-year Maintenance of Certification (MOC) exam and Longitudinal Knowledge Assessment (LKA®)

ABIM invites diplomates to help develop the Nephrology MOC blueprint

Based on feedback from physicians that MOC assessments should better reflect what they see in practice, in 2016 the American Board of Internal Medicine (ABIM) invited all certified nephrologists to provide ratings of the relative frequency and importance of blueprint topics in practice.

This review process, which resulted in a new MOC exam blueprint, will be used on a periodic basis to inform and update all MOC assessments created by ABIM. No matter what form ABIM's assessments ultimately take, they will need to be informed by front-line clinicians sharing their perspective on what is important to know.

A sample of over 400 nephrologists, similar to the total invited population of nephrologists in age, gender, geographic region, and time spent in direct patient care, provided the blueprint topic ratings. ABIM used this feedback to update the blueprint for MOC assessments (beginning with the Fall 2016 administration of the traditional, 10-year MOC exam).

To inform how assessment content should be distributed across the major blueprint content categories, ABIM considered the average respondent ratings of topic frequency and importance in each of the content categories. A second source of information was the relative frequency of patient conditions in the content categories, as seen by certified nephrologists and documented by national health care data (described further under *Content distribution* below).

To determine prioritization of specific assessment content within each major medical content category, ABIM used the respondent ratings of topic frequency and importance to set thresholds for these parameters in the exam assembly process (described further under *Detailed content outline* below).

Purpose of the Nephrology MOC Assessments

MOC assessments are designed to evaluate whether a certified nephrologist has maintained competence and currency in the knowledge and judgment required for practice. The MOC assessments emphasizes diagnosis and management of prevalent conditions, particularly in areas where practice has changed in recent years. As a result of the blueprint review by ABIM diplomates, MOC assessments place less emphasis on rare conditions and focus more on situations in which physician intervention can have important consequences for patients. For conditions that are usually managed by other specialists, the focus will be on recognition rather than on management.

Assessment format

The traditional, 10-year MOC exam is composed of 220 single-best-answer multiple-choice questions, of which approximately 50 are new questions that do not count in the examinee's score. Examinees taking the traditional, 10-year MOC exam will have access to an external resource (i.e., UpToDate®) for the entire exam.

The LKA for MOC, is a five-year cycle in which physicians answer questions on an ongoing basis and receive feedback on how they're performing along the way. More information on how exams are developed can be found at abim.org/about/exam-information/exam-development.aspx.

Most questions describe patient scenarios and ask about the work done (that is, tasks performed) by physicians in the course of practice:

- **Diagnosis:** making a diagnosis or identifying an underlying condition
- **Testing:** ordering tests for diagnosis, staging, or follow-up
- **Treatment/Care Decisions**: recommending treatment or other patient care
- **Risk Assessment/Prognosis/Epidemiology:** assessing risk, determining prognosis, and applying principles from epidemiologic studies
- **Pathophysiology/Basic Science:** understanding the pathophysiology of disease and basic science knowledge applicable to patient care

ABIM is committed to working toward health equity and believes that board-certified physicians should have an understanding of health care disparities. Therefore, health equity content that is clinically important to each discipline will be included in assessments, and the use of gender, race, and ethnicity identifiers will be re-evaluated.

Clinical scenarios presented take place in outpatient or inpatient settings as appropriate to a typical Nephrology practice. Clinical information presented may include patient photographs, ultrasound images, angiograms, micrographs, radiographs, electrocardiograms, and other media to illustrate relevant patient findings.

Exam tutorials, including examples of ABIM exam question format, can be found at abim.org/maintenance-of-certification/exam-information/nephrology/exam-tutorial.aspx.

Content distribution

Listed below are the major medical content categories that define the domain for the Nephrology traditional, 10-year MOC exam and the LKA. The relative distribution of content is expressed as a percentage of the total assessment. To determine the content distribution, ABIM considered the average respondent ratings of topic frequency and importance. To cross-validate these self-reported ratings, ABIM also considered the relative frequency of conditions seen in Medicare patients by a cohort of certified nephrologists. Informed by these data, the Nephrology Approval Committee and Board have determined the content category targets shown below.

CONTENT CATEGORY	Target %
Sodium and Water Abnormalities	**7%**
Acid-Base and Potassium Disorders	**9%**
Calcium, Phosphorus, and Magnesium Disorders and Stones	**4%**
Chronic Kidney Disease	**25%**
Hypertension	**10%**
Tubular, Interstitial, and Cystic Disorders	**4%**
Glomerular and Vascular Disorders	**11%**
Kidney Transplantation	**10%**
Pharmacology	**5%**
Acute Kidney Injury and Intensive Care Unit Nephrology	**15%**
Total	**100%**

The Nephrology MOC assessments may cover other dimensions of medicine as applicable to the medical content categories, such as adolescent medicine, critical care medicine, clinical epidemiology, geriatric medicine, ethics, and nutrition.

How the blueprint ratings are used to assemble the MOC assessments

Blueprint reviewers provided ratings of relative frequency in practice for each of the detailed content topics in the blueprint and provided ratings of the relative importance of the topics for each of the tasks described in *Assessment format* above. In rating importance, reviewers were asked to consider factors such as the following:

- High risk of a significant adverse outcome
- Cost of care and stewardship of resources
- Common errors in diagnosis or management
- Effect on population health
- Effect on quality of life
- When failure to intervene by the physician deprives a patient of significant benefit

Frequency and importance were rated on a three-point scale corresponding to low, medium, or high. The median importance ratings are reflected in the *Detailed content outline* below. The Nephrology Approval Committee and Board, in partnership with the physician community, have set the following parameters for selecting MOC assessment questions according to the blueprint review ratings:

- At least 75% of questions will address high-importance content (indicated in green)
- No more than 25% of questions will address medium-importance content (indicated in yellow)
- No questions will address low-importance content (indicated in red)

Independent of the importance and task ratings, no more than 15% of questions will address low-frequency content (indicated by “LF” following the topic description).

The content selection priorities below are applicable beginning with the Spring 2017 traditional, 10-year MOC exam and are subject to change in response to future blueprint review.

Note: *The same topic may appear in more than one medical content category.*

Detailed content outline for the Nephrology traditional, 10-year MOC exam and the LKA

✓ – ***High Importance***: *At least 75% of questions will address topics and tasks with this designation.*

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SODIUM AND WATER ABNORMALITIES *(7% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
HYPONATREMIA *(3% of exam)*					
Hypotonic					
Syndrome of inappropriate antidiuretic hormone secretion (SIADH)	✓	✓	✓	✓	✓
Hypervolemic	✓	✓	✓	✓	✓
Low solute intake	✓	✓	✓	⁄	⁄
Thiazides	✓	✓	✓	✓	✓
Other hypotonic (secondary adrenal insufficiency) LF	⁄	⁄	✓	⁄	⁄
Hypertonic	✓	✓	✓	⁄	⁄
Isotonic (pseudohyponatremia) LF	✓	⁄	⁄	⁄	⁄
HYPERNATREMIA OR SERUM HYPEROSMOLALITY *(<2% of exam)*					
Osmotic diuresis					
Urea LF	⁄	⁄	⁄	⁄	⁄
Glucose	✓	✓	✓	⁄	⁄
Water diuresis					
Central diabetes insipidus LF	✓	✓	✓	⁄	⁄
Nephrogenic diabetes insipidus LF	✓	✓	✓	⁄	⁄
Other water diuresis (physiologic saline diuresis)	⁄	⁄	⁄	⁄	⁄
Other hypernatremia or serum hyperosmolality (hypodipsia; extrarenal water loss)	✓	✓	✓	⁄	⁄

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SODIUM AND WATER ABNORMALITIES *continued…* *(7% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
SALT EXCESS (EDEMA) *(2.5% of exam)*					
Heart failure	✓	✓	✓	✓	✓
Cirrhosis	✓	✓	✓	✓	✓
Nephrotic syndrome	✓	✓	✓	✓	✓
Chronic kidney disease	✓	✓	✓	✓	✓
SALT DEPLETION *(<2% of exam)*					
Renal sodium losses					
Postobstructive diuresis	✓	✓	✓	✓	✓
Post-acute kidney injury diuresis	✓	✓	✓	✓	/
Salt-wasting nephropathy **LF**	/	/	/	/	/
Diuretics	✓	✓	✓	✓	✓
Other renal sodium losses (chemotherapy-induced) **LF**	/	/	/	/	/
Extrarenal sodium losses	/	/	/	/	/
POLYURIA *(<2% of exam)*					
Primary polydipsia **LF**	✓	/	/	/	/
Other polyuria (iatrogenic) **LF**	/	/	/	/	/

ACID-BASE AND POTASSIUM DISORDERS *(9% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
METABOLIC ACIDOSIS *(3.5% of exam)*					
Metabolic acidosis (normal anion gap)					
Renal tubular acidosis (normokalemic or hypokalemic)	✓	✓	✓	/	/
Renal tubular acidosis (hyperkalemic)	✓	✓	✓	/	✓
Nonrenal causes	✓	✓	✓	/	/

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ACID-BASE AND POTASSIUM DISORDERS *continued…* *(9% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
METABOLIC ACIDOSIS *continued… (3.5% of exam)*					
Metabolic acidosis (elevated anion gap)					
Lactic acidosis	✓	✓	✓	✓	✓
Ketoacidosis	✓	✓	✓	✓	✓
Toxins	✓	✓	✓	⊘	⊘
Uremic	✓	✓	✓	✓	✓
Other metabolic acidosis (low anion gap in multiple myeloma) **LF**	⊘	⊘	⊘	⊘	⊘
METABOLIC ALKALOSIS *(<2% of exam)*					
Associated with normal or low blood pressure					
Renal origin	✓	✓	✓	⊘	⊘
Other metabolic alkalosis associated with normal or low blood pressure (chemotherapy-induced; hypokalemia; post-hypercapnic)	⊘	⊘	⊘	⊘	⊘
Associated with high blood pressure					
Adrenal **LF**	✓	✓	⊘	⊘	⊘
Other metabolic alkalosis associated with high blood pressure (malignant hypertension)	✓	✓	✓	⊘	⊘
RESPIRATORY ACID-BASE DISTURBANCES *(<2% of exam)*					
Respiratory acidosis	✓	✓	✓	⊘	⊘
Respiratory alkalosis	⊘	⊘	⊘	⊘	⊘
MIXED ACID-BASE DISTURBANCES *(<2% of exam)*					
Mixed acid-base disturbances	✓	✓	✓	⊘	✓

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ACID-BASE AND POTASSIUM DISORDERS *continued…* *(9% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
POTASSIUM DISTURBANCES *(3.5% of exam)*					
Hyperkalemia					
Pseudohyperkalemia **LF**	/	/	/	/	/
Transcellular shifts	✓	✓	✓	/	/
Medication-induced	✓	✓	✓	✓	/
Genetic abnormalities **LF**	/	/	/	/	✗
Other tubular disorders (hepatitis-associated) **LF**	/	/	/	✗	/
Postsurgical	/	/	/	/	/
Other hyperkalemia (peritoneal dialysis) **LF**	/	/	/	/	/
Hypokalemia					
Pseudohypokalemia **LF**	/	/	/	✗	/
Transcellular shifts	/	/	/	/	/
Renal losses	✓	✓	/	/	/
Nonrenal losses	/	/	/	/	/
Other hypokalemia (combined therapeutic hypothermia and barbiturate coma) **LF**	/	/	/	✗	✗

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CALCIUM, PHOSPHORUS, AND MAGNESIUM DISORDERS AND STONES *(4% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
DISORDERS OF CALCIUM METABOLISM *(<2% of exam)*					
Hypercalcemia					
Primary hyperparathyroidism	✓	✓	✓	⁄	⁄
Granulomatous diseases LF	⁄	⁄	⁄	⁄	⁄
Malignancy	✓	✓	✓	⁄	⁄
Familial hypocalciuric hypercalcemia (FHH) LF	⁄	⁄	⁄	⁄	⁄
Vitamin D toxicity LF	⁄	⁄	⁄	⁄	⁄
Medication and vitamin-induced	⁄	⁄	⁄	⁄	⁄
Milk alkali syndrome LF	⁄	⁄	⁄	⁄	⁄
Hypocalcemia					
Hypoparathyroidism LF	⁄	⁄	⁄	⁄	⁄
Pseudohypoparathyroidism LF	⁄	✗	✗	✗	✗
Medication-induced	✓	⁄	⁄	⁄	⁄
Tissue deposition LF	⁄	⁄	⁄	⁄	⁄
Vitamin D deficiency	✓	✓	✓	⁄	⁄
DISORDERS OF PHOSPHATE METABOLISM *(<2% of exam)*					
Hyperphosphatemia					
Decreased renal excretion	✓	✓	✓	✓	✓
Increased intake	✓	⁄	✓	⁄	⁄
Tissue redistribution	⁄	⁄	⁄	⁄	⁄
Genetic causes	⁄	⁄	✓	✗	⁄
Hypophosphatemia					
Increased renal excretion LF	⁄	⁄	⁄	⁄	⁄
Decreased intake and gastrointestinal absorption LF	⁄	⁄	⁄	⁄	⁄
Tissue redistribution LF	⁄	⁄	⁄	⁄	⁄

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CALCIUM, PHOSPHORUS, AND MAGNESIUM DISORDERS AND STONES *continued…* *(4% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
DISORDERS OF MAGNESIUM METABOLISM *(<2% of exam)*					
Hypermagnesemia					
Decreased renal excretion	⊘	⊘	⊘	⊘	⊘
Increased intake **LF**	⊘	⊘	⊘	⊘	⊘
Hypomagnesemia					
Increased renal excretion	⊘	⊘	⊘	⊘	⊘
Decreased gastrointestinal absorption	⊘	⊘	⊘	⊘	⊘
NEPHROLITHIASIS *(<2% of exam)*					
Calcium stones					
Idiopathic hypercalciuria	⊘	⊘	⊘	⊘	⊘
Hypocitraturia	✓	⊘	✓	⊘	⊘
Hyperoxaluria	⊘	⊘	⊘	⊘	⊘
Primary hyperparathyroidism	✓	⊘	⊘	⊘	⊘
Distal renal tubular acidosis	✓	✓	✓	⊘	⊘
Other calcium stones (medullary sponge kidney; hypercalciuria in hypoparathyroidism) **LF**	⊘	⊘	⊘	⊘	⊘
Uric acid stones					
Idiopathic **LF**	⊘	⊘	⊘	⊘	⊘
Other uric acid (postileostomy) **LF**	⊘	⊘	⊘	⊘	⊘
Struvite stones **LF**	⊘	⊘	⊘	⊘	⊘
Cystine stones **LF**	⊘	⊘	⊘	⊘	⊘
Drug stones **LF**	⊘	⊘	⊘	⊘	⊘

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CHRONIC KIDNEY DISEASE *(25% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
KIDNEY FUNCTION PARAMETERS *(<2% of exam)*					
Glomerular filtration rate (creatinine clearance; estimated glomerular filtration rate)	✓	✓	✓	✓	⁄
Proteinuria	✓	✓	✓	✓	✓
Other kidney function parameters (glycemic control; biopsy)	✓	✓	✓	✓	✓
ETIOLOGIES OF CHRONIC KIDNEY DISEASE *(<2% of exam)*					
Diabetic kidney disease	✓	✓	✓	✓	✓
Nondiabetic kidney disease					
Chronic glomerulonephritis	✓	✓	✓	✓	⁄
Hypertensive nephropathy	✓	✓	✓	✓	✓
Chronic interstitial nephritis	✓	✓	✓	⁄	⁄
Genetic diseases **LF**	⁄	⁄	⁄	⁄	⁄
PROGRESSION OF CHRONIC KIDNEY DISEASE *(<2% of exam)*					
Progression of chronic kidney disease	✓	✓	✓	✓	✓
CHRONIC KIDNEY DISEASE COMPLICATIONS *(2% of exam)*					
Hypertension	✓	✓	✓	✓	✓
Fluid overload	✓	✓	✓	✓	✓
Anemia and iron deficiency	✓	✓	✓	✓	⁄
Hyperkalemia	✓	✓	✓	✓	✓
Acidosis	✓	✓	✓	✓	✓
Protein-energy wasting	⁄	⁄	⁄	⁄	⁄
Other complications of chronic kidney disease (hyperparathyroidism; hyperphosphatemia)	✓	✓	✓	✓	✓

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CHRONIC KIDNEY DISEASE *continued…* *(25% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
STAGE 4 AND 5 CHRONIC KIDNEY DISEASE *(2.5% of exam)*					
Advanced uremic symptoms	✓	✓	✓	✓	✓
Preparation for end-stage kidney disease	*Not Applicable*	✓	✓	✓	*Not Applicable*
Initiation and discontinuation of maintenance dialysis	*Not Applicable*	✓	✓	✓	*Not Applicable*
Other stage 4 and 5 chronic kidney disease (parathyroid hormone monitoring)	✓	✓	✓	✓	✓
END-STAGE KIDNEY DISEASE *(12.5% of exam)*					
Hemodialysis					
Adequacy and prescription	✓	✓	✓	✓	✓
Dialyzers and dialysate	✓	✓	✓	✓	✓
Vascular access	✓	✓	✓	✓	✓
Water treatment	✓	✓	✓	✓	✓
Hemodialysis complications					
Hypertension	✓	✓	✓	✓	✓
Hypotension	✓	✓	✓	✓	✓
Interdialytic weight gain	✓	✓	✓	✓	✓
Electrolyte abnormalities	✓	✓	✓	✓	✓
Vascular access complications (clotting, dysfunction, infection)	✓	✓	✓	✓	✓
Other hemodialysis complications (embolism and thrombosis; heparin-induced thrombocytopenia; loss of residual renal function; hypoalbuminemia)	✓	✓	✓	✓	✓
Peritoneal dialysis					
Adequacy and prescription	✓	✓	✓	✓	✓
Dialysate	✓	✓	✓	✓	✓
Catheters	✓	✓	✓	✓	✓
Other peritoneal dialysis issues (hypokalemia and hyperkalemia)	✓	✓	✓	✓	✓

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CHRONIC KIDNEY DISEASE *continued…* *(25% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
END-STAGE KIDNEY DISEASE *continued… (12.5% of exam)*					
Peritoneal dialysis complications					
Peritonitis and infections	✓	✓	✓	✓	✓
Ultrafiltration failure	✓	✓	✓	⊘	⊘
Other peritoneal dialysis complications (inguinal hernia; atrial fibrillation; peripheral edema)	✓	⊘	✓	⊘	⊘
Home hemodialysis	⊘	⊘	⊘	⊘	⊘
End-stage kidney disease complications					
Anemia	✓	✓	✓	✓	✓
Cardiovascular disease	✓	✓	✓	✓	✓
Blood pressure abnormalities	✓	✓	✓	✓	✓
Other complications (hemolysis; hypoalbuminemia; thrombosis; calciphylaxis; uremic polyneuropathy)	✓	✓	✓	⊘	⊘
Medical director responsibilities and conditions of coverage	*Not Applicable*	⊘	⊘	⊘	*Not Applicable*
MINERAL BONE DISEASE *(3% of exam)*					
Laboratory abnormalities					
Hyperphosphatemia	✓	✓	✓	✓	✓
Hyperparathyroidism	✓	✓	✓	✓	✓
Other laboratory abnormalities (calcium balance)	✓	✓	✓	⊘	⊘
Renal osteodystrophy (and related pathophysiology)					
Osteitis fibrosis **LF**	⊘	⊘	⊘	⊘	⊘
Adynamic bone disease **LF**	⊘	⊘	⊘	⊘	⊘
Osteomalacia **LF**	⊘	⊘	⊘	⊘	⊘
Mixed uremic osteodystrophy **LF**	⊘	⊘	⊘	⊘	⊘
Other renal osteodystrophy, including low bone mass (osteoporosis)	⊘	⊘	⊘	⊘	⊘

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CHRONIC KIDNEY DISEASE *continued…* *(25% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
MINERAL BONE DISEASE *continued… (3% of exam)*					
Extraosseous and vascular calcification					
Medial calcification	⊘	⊘	⊘	⊘	⊘
Calciphylaxis **LF**	✓	✓	✓	⊘	⊘
Other extraosseous and vascular calcification, including visceral organs **LF**	⊘	⊘	⊘	⊘	⊘
SPECIAL TOPICS IN CHRONIC KIDNEY DISEASE *(<2% of exam)*					
Epidemiology	*Not Applicable*			⊘	⊘
Ethical considerations	*Not Applicable*		✓	⊘	*Not Applicable*
Pregnancy **LF**	*Not Applicable*	✓	✓	⊘	⊘
Dermatology **LF**	⊘	⊘	⊘	✗	✗
Nephrotoxicity of environmental and occupational agents					
Lead **LF**	⊘	⊘	⊘	⊘	✗
Organic solvents **LF**	⊘	⊘	⊘	✗	✗
Other nephrotoxicity of environmental and occupational agents (cadmium; mercury) **LF**	⊘	⊘	⊘	✗	✗
Other special topics in chronic kidney disease (obesity)	⊘	⊘	⊘	⊘	⊘

HYPERTENSION *(10% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
ESSENTIAL HYPERTENSION *(3.5% of exam)*					
Isolated systolic hypertension	✓	✓	✓	✓	⊘
Severe hypertension	✓	✓	✓	✓	✓
Resistant hypertension	✓	✓	✓	✓	✓
White coat hypertension	✓	✓	✓	✓	⊘

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HYPERTENSION *continued…* *(10% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
ESSENTIAL HYPERTENSION *continued… (3.5% of exam)*					
Pseudohypertension **LF**	⊘	⊘	⊘	⊘	⊘
Masked hypertension **LF**	⊘	⊘	⊘	⊘	⊘
General essential hypertension	✓	✓	✓	⊘	⊘
SECONDARY CAUSES OF HYPERTENSION *(4% of exam)*					
Pheochromocytoma **LF**	✓	✓	✓	⊘	⊘
Renal vascular disease					
Dissection **LF**	✓	✓	✓	✓	⊘
Atherosclerotic	✓	✓	✓	✓	⊘
Hyperaldosteronism					
Adrenal adenoma **LF**	✓	✓	✓	⊘	⊘
Adrenal hyperplasia **LF**	⊘	✓	⊘	⊘	⊘
Genetic causes					
Liddle syndrome **LF**	⊘	⊘	⊘	⊘	⊘
Dexamethasone suppressible hyperaldosteronism **LF**	⊘	⊘	⊘	⊘	⊘
Other genetic causes (fibromuscular dysplasia) **LF**	⊘	⊘	⊘	⊘	⊘

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HYPERTENSION *continued…* *(10% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
SECONDARY CAUSES OF HYPERTENSION *continued… (4% of exam)*					
Miscellaneous causes					
Renin-secreting tumor (juxtaglomerular cell tumor) **LF**	✓	✓	✓	✓	✓
Syndrome of apparent mineralocorticoid excess **LF**	✓	✓	✓	✓	✓
Coarctation **LF**	✓	✓	✓	✓	✓
Vasculitis and arteritis	✓✓	✓✓	✓✓	✓	✓
Tuberous sclerosis **LF**	✓	✓	✓	✗	✓
Sleep apnea	✓✓	✓✓	✓✓	✓✓	✓
Drug-induced	✓✓	✓✓	✓✓	✓	✓
Obstructive uropathy	✓✓	✓✓	✓✓	✓	✓
Renal compression (Page kidney) **LF**	✓	✓	✓	✓	✓
Cushing syndrome **LF**	✓	✓	✓	✓	✓
Other miscellaneous causes (chronic kidney disease; obesity; hypothyroidism)	✓✓	✓✓	✓✓	✓✓	✓
END-ORGAN DAMAGE RESULTING FROM HYPERTENSION *(<2% of exam)*					
Acute kidney injury	✓✓	✓✓	✓✓	✓✓	✓✓
Central nervous system and ophthalmologic	✓	✓	✓	✓	✓
Cardiac (left ventricular hypertrophy; heart failure)	✓✓	✓✓	✓✓	✓✓	✓
HYPERTENSION IN SPECIAL SITUATIONS *(<2% of exam)*					
Pregnancy	✓✓	✓✓	✓✓	✓✓	✓
Stroke or subarachnoid bleeding	✓✓	✓✓	✓✓	✓	✓
Other hypertension in special situations	✓	✓	✓	✓	✓

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TUBULAR, INTERSTITIAL, AND CYSTIC DISORDERS *(4% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
RENAL TUBULAR DISORDERS AND FANCONI'S SYNDROME *(<2% of exam)*					
Drug-induced	✓	✓	✓	✓	✓
Crystal deposition LF	✓	✓	✓	✓	✓
Genetic LF	✓	✓	✓	✗	✗
TUBULOINTERSTITIAL NEPHRITIS *(2% of exam)*					
Acute					
Drug-induced	✓	✓	✓	✓	✓
Immune LF	✓	✓	✓	✓	✓
Infectious LF	✓	✓	✓	✓	✓
Other acute tubulointerstitial nephritis (multifactorial)	✓	✓	✓	✓	✓
Chronic					
Drug-induced	✓	✓	✓	✓	✓
Immune LF	✓	✓	✓	✓	✓
Granulomatous LF	✓	✓	✓	✓	✓
Toxins LF	✓	✓	✓	✓	✓
Hemoglobinopathy LF	✓	✓	✓	✓	✓
Urinary tract infection	✓	✓	✓	✓	✓
Other chronic tubulointerstitial nephritis (hypokalemic nephropathy; medullary cystic kidney) LF	✓	✓	✓	✓	✓
RENAL CYSTIC DISEASE *(<2% of exam)*					
Autosomal dominant polycystic kidney disease (ADPKD)					
Genetics	✓	✓	✓	✓	✓
Renal manifestations	✓	✓	✓	✓	✓
Nonrenal manifestations	✓	✓	✓	✓	✓
End-stage kidney disease	✓	✓	✓	✓	✓
Drug-induced LF	✓	✓	✓	✓	✓

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TUBULAR, INTERSTITIAL, AND CYSTIC DISORDERS *continued…* *(4% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
RENAL MASS *(<2% of exam)*					
Renal mass	✓	✓	✓	⊘	⊘

GLOMERULAR AND VASCULAR DISORDERS *(11% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
NEPHRITIC GLOMERULAR DISORDERS, VASCULITIS, AND VASCULOPATHY *(4.5% of exam)*					
IgA nephropathy and IgA-associated vasculitis (Henoch-Schönlein purpura)	✓	✓	✓	✓	⊘
Vasculitis and antineutrophil cytoplasmic antibody	✓	✓	✓	✓	⊘
Anti-glomerular basement membrane disease **LF**	✓	✓	✓	⊘	⊘
Lupus nephritis	✓	✓	✓	✓	✓
Postinfectious glomerulonephritis **LF**	✓	✓	✓	⊘	⊘
Membranoproliferative glomerulonephritis and C3 glomerulopathies **LF**	✓	✓	✓	⊘	⊘
Cryoglobulinemic glomerulonephritis **LF**	✓	✓	✓	⊘	⊘
Crescentic glomerulonephritis	✓	✓	✓	✓	⊘
Other disorders (rapidly progressive glomerulonephritis) **LF**	✓	✓	✓	✓	⊘
NEPHROTIC AND HEAVY-PROTEINURIC GLOMERULAR DISORDERS *(4.5% of exam)*					
Minimal change disease					
Primary	✓	✓	✓	✓	⊘
Secondary **LF**	✓	✓	✓	⊘	⊘
Focal segmental glomerulosclerosis					
Primary	✓	✓	✓	✓	⊘
Secondary	✓	✓	✓	✓	⊘
Genetic **LF**	⊘	⊘	⊘	⊘	⊘

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GLOMERULAR AND VASCULAR DISORDERS *continued…* *(11% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
NEPHROTIC AND HEAVY-PROTEINURIC GLOMERULAR DISORDERS *continued… (4.5% of exam)*					
Membranous nephropathy					
Primary	✓	✓	✓	✓	⊘
Secondary	✓	✓	✓	✓	⊘
Paraprotein-related disorders					
Primary amyloidosis **LF**	✓	✓	✓	⊘	⊘
Secondary amyloidosis **LF**	✓	✓	⊘	⊘	⊘
Light chain deposition disease and myeloma	✓	✓	✓	⊘	⊘
Other paraprotein-related disorders **LF**	⊘	⊘	⊘	⊘	⊘
Fibrillary and immunotactoid glomerulonephritis **LF**	⊘	⊘	⊘	⊘	⊘
Fabry's disease **LF**	⊘	⊘	⊘	⊘	✗
Other disorders (biopsy complication) **LF**	✓	✓	✓	⊘	✗
THIN BASEMENT MEMBRANE NEPHROPATHY AND ALPORT'S SYNDROME *(<2% of exam)*					
Thin basement membrane nephropathy and Alport's syndrome **LF**	⊘	✓	⊘	⊘	⊘
THROMBOTIC MICROANGIOPATHIES *(<2% of exam)*					
Thrombotic microangiopathies	✓	✓	✓	⊘	⊘
HEMOLYTIC UREMIC SYNDROME *(<2% of exam)*					
Shiga toxin-mediated hemolytic uremic syndrome **LF**	✓	✓	✓	⊘	⊘

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GLOMERULAR AND VASCULAR DISORDERS *continued…* *(11% of exam)*		**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
HEMOLYTIC UREMIC SYNDROME *continued… (<2% of exam)*						
Complement-mediated thrombotic microangiopathy (atypical hemolytic uremic syndrome)						
Drug-associated complement-mediated thrombotic microangiopathy (atypical hemolytic uremic syndrome) (anticancer drugs, clopidogrel, interferon, hemolytic uremic syndrome)	LF	✓	✓	✓	⊘	⊘
Other complement-mediated thrombotic microangiopathy (atypical hemolytic uremic syndrome) (pregnancy-associated)	LF	✓	✓	✓	⊘	⊘
SCLERODERMA RENAL DISEASE *(<2% of exam)*						
Scleroderma renal disease	LF	✓	✓	✓	⊘	⊘

KIDNEY TRANSPLANTATION *(10% of exam)*		**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
PRE-TRANSPLANTATION *(<2% of exam)*						
Transplant immunology						
Detection of pre-transplant alloreactivity and immunologic evaluation of transplant candidates	LF	⊘	⊘	*Not Applicable*	⊘	⊘
Potential kidney transplant recipient evaluation						
Glomerular filtration rate listing requirements		*Not Applicable*		✓	✓	*Not Applicable*
Cancer concerns		*Not Applicable*	✓	✓	✓	⊘
Infection concerns		*Not Applicable*	✓	✓	✓	⊘
Cardiac concerns		*Not Applicable*	✓	✓	✓	⊘
Age concerns		*Not Applicable*		✓	⊘	*Not Applicable*
Comorbidities		*Not Applicable*	✓	✓	✓	⊘
Other potential kidney transplant recipient evaluation (recurrent autoimmune kidney disease)		*Not Applicable*	⊘	⊘	⊘	⊘

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KIDNEY TRANSPLANTATION *continued…* *(10% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
PRE-TRANSPLANTATION *continued… (<2% of exam)*					
Potential living kidney donor					
Donor evaluation	*Not Applicable*	✓	*Not Applicable*		
Risks	*Not Applicable*			✓	*Not Applicable*
Ethics	*Not Applicable*		✓	*Not Applicable*	
Organ allocation					
Deceased donor wait list	*Not Applicable*		✓	*Not Applicable*	
Organ shortage strategies	*Not Applicable*		✓	*Not Applicable*	
Paired kidney donation and chains **LF**	*Not Applicable*		✓	*Not Applicable*	
TRANSPLANTATION *(<2% of exam)*					
Indications	*Not Applicable*	✓	✓	✓	✓
Contraindications	*Not Applicable*	✓	✓	✓	✓
Deceased donor kidney transplantation					
Types	*Not Applicable*	✓	✓	✓	✓
Outcomes	*Not Applicable*	✓	✓	✓	✓
Living donor kidney transplant					
Types	*Not Applicable*	✓	✓	✓	✓
Outcomes	*Not Applicable*	✓	✓	✓	✓
POST-TRANSPLANTATION *(7% of exam)*					
Immunosuppression					
Induction **LF**	✓	✓	✓	✓	✗
Maintenance	✓	✓	✓	✓	✓
Short-term post-transplantation management					
Perioperative management and complications	✓	✓	✓	✓	✓
Graft dysfunction	✓	✓	✓	✓	✓

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KIDNEY TRANSPLANTATION *continued…* *(10% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
POST-TRANSPLANTATION *continued… (7% of exam)*					
Long-term post-transplantation management					
Graft dysfunction	✓	✓	✓	✓	⊘
Complications	✓	✓	✓	✓	⊘
Other long-term post-transplantation management (graft failure)	✓	✓	✓	✓	⊘
Rejection					
Hyperacute **LF**	⊘	⊘	⊘	⊘	✗
T cell **LF**	⊘	⊘	⊘	⊘	⊘
Antibody-mediated	✓	⊘	⊘	⊘	⊘
Male and female fertility					
Pregnancy **LF**	*Not Applicable*		⊘	⊘	⊘
Male fertility **LF**	*Not Applicable*		⊘	⊘	✗
MULTIORGAN AND EXTRARENAL TRANSPLANTATION *(<2% of exam)*					
Multiorgan and extrarenal transplantation **LF**	⊘	⊘	⊘	⊘	✗
ETHICS, SOCIETY, AND PUBLIC POLICY *(<2% of exam)*					
Ethics, society, and public policy	*Not Applicable*		⊘	⊘	*Not Applicable*

PHARMACOLOGY *(5% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
BASIC PHARMACOLOGY *(<2% of exam)*					
Pharmacokinetics and other basic concepts	⊘	⊘	⊘	⊘	⊘
Renal handling of drugs	✓	⊘	✓	⊘	⊘
Principles of dialytic drug removal	*Not Applicable*		✓	⊘	⊘

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PHARMACOLOGY *continued…* *(5% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
DRUG SELECTION IN KIDNEY DISEASE *(<2% of exam)*					
Antibiotics					
Vancomycin	*Not Applicable*		✓	✓	✓
Aminoglycosides	*Not Applicable*		✓	✓	✓
Other antibiotics (cephalosporins)	*Not Applicable*		✓	✓	✓
Antineoplastic agents	*Not Applicable*		✓	✓	✓
Antiviral agents	*Not Applicable*		✓	✓	✓
Other drug selection in kidney disease (metformin; fentanyl)	*Not Applicable*		✓	✓	✓
NEPHROTOXICITY OF MEDICATIONS *(2% of exam)*					
Principles and mechanisms of nephrotoxicity	*Not Applicable*		✓	✓	✓
Antibacterial agents					
Aminoglycosides	✓	✓	✓	✓	✓
Vancomycin	✓	✓	✓	✓	✓
Antiviral agents	✓	✓	✓	✓	✓
Antifungal agents **LF**	✓	✓	✓	✓	✓
Antiparasitic agents **LF**	✗	✗	✗	✗	✗
Additional antimicrobials	✓	✓	✓	✓	✗
Pain medications					
Nonsteroidal anti-inflammatory drugs	✓	✓	✓	✓	✓
Fentanyl **LF**	✓	✓	✓	✓	✗
Gabapentin	✓	✓	✓	✓	✓
Tramadol	✓	✓	✓	✓	✓
Propofol	✓	✓	✓	✓	✓

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PHARMACOLOGY *continued…* *(5% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
NEPHROTOXICITY OF MEDICATIONS *continued… (2% of exam)*					
Renin-angiotensin-aldosterone system (RAAS) blockade					
Angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, and renin inhibitors	✓	✓	✓	✓	✓
Aldosterone antagonists	✓	✓	✓	✓	✓
Antihypertensive agents					
Beta-adrenergic blockers	⊘	⊘	✓	⊘	⊘
Calcium channel blockers	⊘	⊘	✓	⊘	⊘
Minoxidil **LF**	⊘	⊘	⊘	⊘	⊘
Antineoplastic chemotherapy agents					
Interferon **LF**	⊘	✗	⊘	✗	✗
Cisplatin **LF**	⊘	⊘	⊘	⊘	⊘
Methotrexate **LF**	⊘	⊘	⊘	⊘	✗
Vascular endothelial growth factor inhibitors **LF**	⊘	⊘	⊘	⊘	⊘
Immune checkpoint inhibitors **LF**	✓	✓	✓	✓	✓
Iodinated contrast and other imaging agents	✓	✓	✓	✓	⊘
Lithium	✓	✓	✓	✓	⊘
Supplements and herbs					
Aristolochic acid **LF**	⊘	⊘	⊘	⊘	✗
SGLT2 inhibitors **LF**	✓	✓	✓	✓	✓
Other nephrotoxicity of medications (cardiac glycosides; bisphosphonates)	⊘	⊘	⊘	⊘	⊘
NEPHROTOXICITY OF ILLICIT DRUGS *(<2% of exam)*					
Heroin and other intravenous drugs	⊘	⊘	⊘	⊘	⊘
Ecstasy **LF**	⊘	⊘	⊘	⊘	⊘
Cocaine **LF**	⊘	⊘	⊘	⊘	⊘

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PHARMACOLOGY *continued…* *(5% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
DRUG-DRUG INTERACTIONS AND ADVERSE EFFECTS OTHER THAN NEPHROTOXICITY *(<2% of exam)*					
Drug-drug interactions and adverse effects other than nephrotoxicity	✓	⊘	✓	⊘	⊘
DIALYSIS AND OTHER TREATMENT OF TOXIC SUBSTANCES *(<2% of exam)*					
Ethylene glycol **LF**	*Not Applicable*	✓	✓	✓	⊘
Methanol **LF**	*Not Applicable*	✓	✓	✓	⊘
Other alcohols **LF**	*Not Applicable*	⊘	⊘	⊘	⊘
Lithium **LF**	*Not Applicable*	✓	✓	✓	⊘
Other dialysis and treatment of toxic substances (salicylates; dialysis duration prescription) **LF**	*Not Applicable*	✓	✓	⊘	⊘
ACUTE KIDNEY INJURY AND INTENSIVE CARE UNIT NEPHROLOGY *(15% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
HEMODYNAMIC (PRERENAL) ACUTE KIDNEY INJURY *(4% of exam)*					
True volume depletion					
Renal fluid losses	✓	✓	✓	✓	⊘
Extrarenal fluid losses	✓	✓	✓	✓	⊘
Effective volume depletion					
Heart failure	✓	✓	✓	✓	✓
Cirrhosis	✓	✓	✓	✓	⊘
Nephrotic syndrome	✓	✓	✓	✓	✓
Drugs					
Nonsteroidal anti-inflammatory drugs	✓	✓	✓	✓	⊘
Calcineurin inhibitors	✓	✓	✓	⊘	⊘
Angiotensin-converting enzyme inhibitors and angiotensin receptor blockers	✓	✓	✓	✓	✓
Radiocontrast agents	✓	✓	✓	✓	⊘
Other drugs (tenofovir, cisplatin) **LF**	⊘	⊘	⊘	⊘	⊘

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ACUTE KIDNEY INJURY AND INTENSIVE CARE UNIT NEPHROLOGY *continued…* *(15% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
HEMODYNAMIC (PRERENAL) ACUTE KIDNEY INJURY *continued… (4% of exam)*					
Abdominal compartment syndrome **LF**	✓	✓	✓	⊘	⊘
PARENCHYMAL (INTRINSIC) ACUTE KIDNEY INJURY *(4.5% of exam)*					
Vascular					
Systemic diseases and vasculitis	✓	✓	✓	✓	⊘
Atheroemboli **LF**	✓	✓	✓	⊘	⊘
Renal vein thrombosis **LF**	✓	⊘	✓	⊘	⊘
Glomerular					
Drug-induced	✓	✓	✓	✓	⊘
Infectious	✓	✓	✓	⊘	⊘
General glomerular parenchymal acute kidney injury **LF**	✓	✓	✓	⊘	⊘
Tubular					
Ischemic	✓	✓	✓	✓	✓
Nephrotoxic	✓	✓	✓	✓	⊘
Systemic disease	✓	✓	✓	⊘	⊘
Interstitial					
Drugs	✓	✓	✓	✓	⊘
Systemic disease	✓	✓	✓	⊘	⊘
Malignancy (infiltrative) **LF**	⊘	⊘	⊘	⊘	⊘
POSTRENAL ACUTE KIDNEY INJURY *(<2% of exam)*					
Retroperitoneal and ureteral					
Idiopathic retroperitoneal fibrosis **LF**	⊘	⊘	⊘	⊘	⊘
Malignancy	⊘	⊘	⊘	⊘	⊘
Crystals and stones	✓	✓	✓	⊘	⊘
Bleeding (intrarenal hemorrhage) **LF**	⊘	⊘	⊘	⊘	⊘

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✗ – ***Low Importance***: *No questions will address topics and tasks with this designation.*

LF – ***Low Frequency***: *No more than 15% of questions will address topics with this designation, regardless of task or importance.*

ACUTE KIDNEY INJURY AND INTENSIVE CARE UNIT NEPHROLOGY *continued…* *(15% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
POSTRENAL ACUTE KIDNEY INJURY *continued… (<2% of exam)*					
Bladder, bladder outlet, and benign prostatic hyperplasia	✓	✓	✓	⊘	⊘
KIDNEY REPLACEMENT THERAPY *(4.5% of exam)*					
Indications					
Solute accumulation (potassium, hydrogen ions, phosphate, urea)	✓	✓	✓	⊘	⊘
Hemodynamic	✓	✓	✓	✓	⊘
Acute kidney injury associated with intoxication	✓	✓	✓	✓	⊘
Tumor lysis syndrome	✓	✓	✓	✓	⊘
Techniques					
Intermittent hemodialysis	*Not Applicable*	✓	✓	✓	✓
Continuous kidney replacement therapy	*Not Applicable*	✓	✓	✓	✓
Kidney replacement therapy prescription					
Dialysate and replacement fluid	*Not Applicable*	✓	✓	✓	✓
Anticoagulation	*Not Applicable*	✓	✓	✓	⊘
Complications					
Hemodynamic	✓	✓	✓	✓	⊘
Other complications (dialysis disequilibrium syndrome, electrolyte abnormalities) **LF**	✓	✓	✓	⊘	⊘
INTENSIVE CARE UNIT NEPHROLOGY *(<2% of exam)*					
Hemodynamic measures	*Not Applicable*	✓	✓	✓	✓
Intravenous fluids and volume status	*Not Applicable*	✓	✓	✓	✓
Ethics and palliative care	*Not Applicable*		✓	✓	*Not Applicable*