Nephrology
Certification Examination Blueprint

Purpose of the exam

The exam is designed to evaluate the knowledge, diagnostic reasoning, and clinical judgment skills expected of the certified nephrologist in the broad domain of the discipline. The ability to make appropriate diagnostic and management decisions that have important consequences for patients will be assessed. The exam may require recognition of common as well as rare clinical problems for which patients may consult a certified nephrologist.

Exam content

Exam content is determined by a pre-established blueprint, or table of specifications. The blueprint is developed by the ABIM and is reviewed annually and updated as needed for currency. Trainees, training program directors, and certified practitioners in the discipline are surveyed periodically to provide feedback and inform the blueprinting process.

The primary medical content categories of the blueprint are shown below, with the percentage assigned to each for a typical exam:

<table>
<thead>
<tr>
<th>Medical Content Category</th>
<th>% of Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium and Water Abnormalities</td>
<td>8%</td>
</tr>
<tr>
<td>Acid-Base and Potassium Disorders</td>
<td>9%</td>
</tr>
<tr>
<td>Calcium, Phosphorus, and Magnesium Disorders and Stones</td>
<td>4%</td>
</tr>
<tr>
<td>Chronic Kidney Disease</td>
<td>22%</td>
</tr>
<tr>
<td>Hypertension</td>
<td>10%</td>
</tr>
<tr>
<td>Tubular, Interstitial, and Cystic Disorders</td>
<td>4%</td>
</tr>
<tr>
<td>Glomerular and Vascular Disorders</td>
<td>12%</td>
</tr>
<tr>
<td>Kidney Transplantation</td>
<td>11%</td>
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<tr>
<td>Pharmacology</td>
<td>5%</td>
</tr>
<tr>
<td>Acute Kidney Injury and Intensive Care Unit Nephrology</td>
<td>15%</td>
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<tr>
<td></td>
<td><strong>100%</strong></td>
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</tbody>
</table>
Exam questions in the content areas above may also address clinical topics in adolescent medicine, critical care medicine, clinical epidemiology, geriatric medicine, and nutrition that are important to the practice of nephrology.

**Exam format**

The exam is composed of multiple-choice questions with a single best answer, predominantly describing patient scenarios. Questions ask about the work done (that is, tasks performed) by physicians in the course of practice:

- Making a diagnosis
- Ordering and interpreting results of tests
- Recommending treatment or other patient care
- Assessing risk, determining prognosis, and applying principles from epidemiologic studies
- Understanding the underlying pathophysiology of disease and basic science knowledge applicable to patient care

Clinical information presented may include patient photographs, ultrasound images, angiograms, micrographs, radiographs, electrocardiograms, and other media to illustrate relevant patient findings.

A tutorial including examples of ABIM exam question format can be found at [http://www.abim.org/certification/exam-information/nephrology/exam-tutorial.aspx](http://www.abim.org/certification/exam-information/nephrology/exam-tutorial.aspx).

The blueprint can be expanded for additional detail as shown below. Each of the medical content categories is listed there, and below each major category are the content subsections and specific topics that *may* appear in the exam. Please note: actual exam content may vary.

<table>
<thead>
<tr>
<th>Sodium and Water Abnormalities</th>
<th>8% of Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hyponatremia</strong></td>
<td>3%</td>
</tr>
<tr>
<td>Hypotonic</td>
<td></td>
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<tr>
<td>Syndrome of inappropriate antidiuretic hormone secretion (SIADH)</td>
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<tr>
<td>Hypervolemic</td>
<td></td>
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<tr>
<td>Low solute intake</td>
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<tr>
<td>Thiazides</td>
<td></td>
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<tr>
<td>Other hypotonic (secondary adrenal insufficiency)</td>
<td></td>
</tr>
<tr>
<td>Hypertonic</td>
<td></td>
</tr>
<tr>
<td>Isotonic (pseudohyponatremia)</td>
<td></td>
</tr>
</tbody>
</table>
Hypernatremia or serum hyperosmolality

- Osmotic diuresis
  - Urea
  - Glucose

- Water diuresis
  - Central diabetes insipidus
  - Nephrogenic diabetes insipidus
  - Other water diuresis (physiologic saline diuresis)

- Other hypernatremia or serum hyperosmolality
  (hypoosmolality; extrarenal water loss)

Salt excess (edema) 2.5%

- Heart failure
- Cirrhosis
- Nephrotic syndrome
- Chronic kidney disease

Salt depletion <2%

- Renal sodium losses
  - Postobstructive diuresis
  - Post-acute kidney injury diuresis
  - Salt-wasting nephropathy
  - Diuretics
  - Other renal sodium losses (chemotherapy-induced)

- Extrarenal sodium losses

Polyuria <2%

- Primary polydipsia
- Other polyuria (iatrogenic)

Acid-Base and Potassium Disorders 9% of Exam

Metabolic acidosis 3.5%

- Metabolic acidosis (normal anion gap)
  - Renal tubular acidosis (normokalemic or hypokalemic)
  - Renal tubular acidosis (hyperkalemic)
  - Nonrenal causes

- Metabolic acidosis (elevated anion gap)
  - Lactic acidosis
  - Ketoacidosis
  - Toxins
  - Uremic

- Other metabolic acidosis (low anion gap in multiple myeloma)
**Metabolic alkalosis**

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
- Other metabolic alkalosis associated with high blood pressure (malignant hypertension)

**Respiratory acid-base disturbances**

- Respiratory acidosis
- Respiratory alkalosis

**Mixed acid-base disturbances**

**Potassium disturbances**

- Hyperkalemia
  - Pseudohyperkalemia
  - Transcellular shifts
  - Medication-induced
  - Genetic abnormalities
  - Other tubular disorders (hepatitis-associated)
  - Postsurgical
  - Other hyperkalemia (peritoneal dialysis)

- Hypokalemia
  - Transcellular shifts
  - Renal losses
  - Nonrenal losses
  - Other hypokalemia (combined therapeutic hypothermia and barbiturate coma)

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**Calcium, Phosphorus, and Magnesium Disorders and Stones**

**Disorders of calcium metabolism**

- Hypercalcemia
  - Primary hyperparathyroidism
  - Granulomatous diseases
  - Malignancy
  - Familial hypocalciuric hypercalcemia (FHH)
  - Vitamin D toxicity
  - Medications and vitamins
  - Milk alkali syndrome
Hypocalcemia
  Hypoparathyroidism
  Pseudohypoparathyroidism
Medications
Tissue deposition
Vitamin D deficiency

Disorders of phosphate metabolism <2%
Hyperphosphatemia
  Decreased renal excretion
  Increased intake
  Tissue redistribution
Hypophosphatemia
  Increased renal excretion
  Decreased intake and gastrointestinal absorption
  Tissue redistribution
Genetic causes

Disorders of magnesium metabolism <2%
Hypermagnesemia
  Decreased renal excretion
  Increased intake
Hypomagnesemia
  Increased renal excretion
  Decreased gastrointestinal absorption

Nephrolithiasis <2%
Calcium stones
  Idiopathic hypercalciuria
  Hypocitraturia
  Hyperoxaluria
  Primary hyperparathyroidism
  Distal renal tubular acidosis
  Other calcium stones (medullary sponge kidney; hypercalciuria in hypoparathyroidism)
Uric acid stones
  Idiopathic
  Other uric acid (postileostomy)
Struvite stones
Cystine stones
Drug stones
<table>
<thead>
<tr>
<th>Chronic Kidney Disease</th>
<th>22% of Exam</th>
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</thead>
</table>

**Kidney function parameters**
- Glomerular filtration rate
- Proteinuria
- Other kidney function parameters (glycemic control; biopsy)

**Etiologies of chronic kidney disease**
- Diabetic kidney disease
- Nondiabetic kidney disease
  - Chronic glomerulonephritis
  - Hypertensive nephropathy
  - Chronic interstitial nephritis
  - Genetic diseases

**Progression of chronic kidney disease**

**Chronic kidney disease complications**
- Hypertension
- Fluid overload
- Anemia and iron deficiency
- Hyperkalemia
- Acidosis
- Protein-energy wasting
- Other complications of chronic kidney disease
  - (hyperparathyroidism; hypervitaminosis D; hyperphosphatemia)

**Stage IV and V chronic kidney disease**
- Advanced uremic symptoms
- Preparation for end-stage renal disease
- Initiation and discontinuation of maintenance dialysis
- Other stage IV and V chronic kidney disease
  - (parathyroid hormone monitoring)

**End-stage renal disease**
- 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 (hyperkalemia)

Peritoneal dialysis complications
Peritonitis and infections
Ultrafiltration failure
Other peritoneal dialysis complications (inguinal hernia; atrial fibrillation; peripheral edema)

Home hemodialysis
End-stage renal disease complications
Anemia
Cardiovascular disease
Blood pressure abnormalities
Other complications (hemolysis; hypoalbuminemia; thrombosis; calciphylaxis; uremic polyneuropathy)

Medical director responsibilities and conditions of coverage

Mineral bone disease
Laboratory abnormalities
Hyperphosphatemia
Hyperparathyroidism
Other laboratory abnormalities (calcium balance)

Renal osteodystrophy (and related pathophysiology)
Osteitis fibrosis
Adynamic bone disease
Osteomalacia
Mixed uremic osteodystrophy
Other renal osteodystrophy, including low bone mass (osteoporosis)

Extraosseous and vascular calcification
Medial calcification
Calciphylaxis
Other extraosseous and vascular calcification, including visceral organs
Special topics in chronic kidney disease

Epidemiology
Ethical considerations
Pregnancy
Laboratory studies
Dermatology
Nephrotoxicity of environmental and occupational agents
  Lead
  Organic solvents
  Other nephrotoxicity of environmental and occupational agents
    (cadmium; mercury)
Other special topics in chronic kidney disease (obesity)

Hypertension 10% of Exam

Essential hypertension 3.5%
  Isolated systolic hypertension
  Severe hypertension
  Resistant hypertension
  White coat hypertension
  Pseudohypertension
  Masked hypertension
  Other essential hypertension (stage 2 hypertension; thiazide effect)

Secondary causes of hypertension 4%
  Pheochromocytoma
  Renal vascular disease
    Dissection
    Atherosclerotic
  Hyperaldosteronism
    Adrenal adenoma
    Adrenal hyperplasia
Genetic causes
  Liddle syndrome
  Dexamethasone suppressible hyperaldosteronism
  Other genetic causes (Hashimoto’s thyroiditis; scleroderma renal crisis)
Miscellaneous causes
  Renin-secreting tumor (juxtaglomerular cell tumor)
  Syndrome of apparent mineralocorticoid excess
  Coarctation
  Vasculitis and arteritis
Tuberous sclerosis
Sleep apnea
Drug-induced
Obstructive uropathy
Renal compression (Page kidney)
Cushing syndrome
Other miscellaneous causes
  (chronic kidney disease; obesity)

**End-organ damage resulting from hypertension**  <2%
  Acute kidney injury
  Central nervous system and ophthalmologic
  Cardiac (left ventricular hypertrophy; heart failure)

**Hypertension in special situations**  <2%
  Pregnancy
  Stroke or subarachnoid bleeding
  Other hypertension in special situations

<table>
<thead>
<tr>
<th><strong>Tubular, Interstitial, and Cystic Disorders</strong></th>
<th>4% of Exam</th>
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</thead>
<tbody>
<tr>
<td><strong>Renal tubular disorders and Fanconi's syndrome</strong></td>
<td>&lt;2%</td>
</tr>
<tr>
<td>Drug-induced</td>
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<tr>
<td>Crystal deposition</td>
<td></td>
</tr>
<tr>
<td>Genetic</td>
<td></td>
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<tr>
<td><strong>Tubulointerstitial nephritis</strong></td>
<td>2%</td>
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<tr>
<td>Acute</td>
<td></td>
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<tr>
<td>Drug-induced</td>
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<tr>
<td>Immune</td>
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<tr>
<td>Infectious</td>
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<tr>
<td>Other acute tubulointerstitial nephritis (multifactorial)</td>
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<tr>
<td>Chronic</td>
<td></td>
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<tr>
<td>Drug-induced</td>
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<tr>
<td>Immune</td>
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<tr>
<td>Granulomatous</td>
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<td>Toxins</td>
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<td>Hemoglobinopathy</td>
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<tr>
<td>Urinary tract infection</td>
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<tr>
<td>Other chronic tubulointerstitial nephritis (hypokalemic nephropathy; medullary cystic kidney)</td>
<td></td>
</tr>
</tbody>
</table>
Renal cystic disease  
- Autosomal dominant polycystic kidney disease (ADPKD)  
  - Genetics  
  - Renal manifestations  
  - Nonrenal manifestations  
  - End-stage renal disease  
- Drug-induced

Renal mass  
- <2%

<table>
<thead>
<tr>
<th>Glomerular and Vascular Disorders</th>
<th>12% of Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nephritic glomerular disorders, vasculitis, and vasculopathy</td>
<td>5%</td>
</tr>
<tr>
<td>- IgA nephropathy and Henoch-Schönlein purpura</td>
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<tr>
<td>- Vasculitis and antineutrophil cytoplasmic antibody</td>
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<tr>
<td>- Anti-glomerular basement membrane disease</td>
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<tr>
<td>- Lupus nephritis</td>
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<tr>
<td>- Postinfectious glomerulonephritis</td>
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<tr>
<td>- Membranoproliferative glomerulonephritis and C3 glomerulopathies</td>
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<tr>
<td>- Cryoglobulinemic glomerulonephritis</td>
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<tr>
<td>- Crescentic glomerulonephritis</td>
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<tr>
<td>- Other disorders (rapidly progressive glomerulonephritis)</td>
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</tr>
</tbody>
</table>

Nephrotic and heavy-proteinuric glomerular disorders  
- 5%

- Minimal change disease  
  - Primary  
  - Secondary  
- Focal segmental glomerulosclerosis  
  - Primary  
  - Secondary  
  - Genetic  
- Membranous nephropathy  
  - Primary  
  - Secondary  
- Paraprotein-related disorders  
  - Primary amyloidosis  
  - Secondary amyloidosis  
  - Light chain deposition disease and myeloma  
  - Other paraprotein-related disorders  
- Fibrillary and immunotactoid glomerulonephritis  
- Fabry’s disease  
- Other disorders (biopsy complication)
Thin basement membrane nephropathy and Alport’s syndrome <2%
Thrombotic microangiopathies <2%
Hemolytic uremic syndrome <2%
  Shiga toxin-mediated hemolytic uremic syndrome
  Atypical hemolytic uremic syndrome
    Drug-associated atypical hemolytic uremic syndrome
      (anticancer drugs, clopidogrel, interferon, quinine)
    Other atypical hemolytic uremic syndrome
      (pregnancy-associated)
Scleroderma renal disease <2%

Kidney Transplantation 11% of Exam

Pre-transplantation <2%
  Transplant immunology
    Detection of pre-transplant alloreactivity and
    immunologic evaluation of transplant candidates
  Potential kidney transplant recipient evaluation
    Glomerular filtration rate listing requirements
    Cancer concerns
    Infection concerns
    Cardiac concerns
    Age concerns
    Comorbidities
    Other potential kidney transplant recipient evaluation
      (recurrent autoimmune kidney disease)
  Potential living kidney donor
    Donor evaluation
    Risks
    Ethics
  Organ allocation
    Deceased donor wait list
    Organ shortage strategies
    Paired kidney donation and chains

Transplantation <2%
  Indications
  Contraindications
  Deceased donor kidney transplantation
    Types
    Outcomes
Living donor kidney transplant
  Types
  Outcomes

Post-transplantation
  7%
  Immunosuppression
    Induction
    Maintenance
  Short-term post-transplantation management
    Perioperative management and complications
    Graft dysfunction
  Long-term post-transplantation management
    Graft dysfunction
    Complications
    Other long-term post-transplantation management (graft failure)
  Rejection
    Hyperacute
    T cell
    Antibody-mediated
  Male and female fertility
    Pregnancy
    Male fertility

Multiorgan and extrarenal transplantation
  <2%

Ethics, society, and public policy
  <2%

Pharmacology
  5% of Exam

  Basic pharmacology
    <2%
      Pharmacokinetics and other basic concepts
      Renal handling of drugs
      Principles of dialytic drug removal

  Drug selection in kidney disease
    <2%
      Antibiotics
        Vancomycin
        Aminoglycosides
        Other antibiotics (cephalosporins)
      Antineoplastic agents
      Antiviral agents
      Other drug selection in kidney disease (metformin; fentanyl)
Nephrotoxicity of medications

Principles and mechanisms of nephrotoxicity

Antibacterial agents
  Aminoglycosides
  Vancomycin

Antiviral agents

Antifungal agents

Antiparasitic agents

Additional antimicrobials

Pain medications
  Nonsteroidal anti-inflammatory drugs
  Fentanyl
  Gabapentin
  Tramadol

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

Antineoplastic chemotherapy agents
  Interferon
  Cisplatin
  Methotrexate
  Vascular endothelial growth factor inhibitors
  Immune checkpoint inhibitors

Iodinated contrast and other imaging agents

Lithium

Supplements and herbs
  Aristolochic acid

SGLT2 inhibitors

Other nephrotoxicity of medications (cardiac glycosides; bisphosphonates)

Nephrotoxicity of illicit drugs

Heroin and other intravenous drugs

Ecstasy

Cocaine

Drug-drug interactions and adverse effects other than nephrotoxicity

<2%
Dialysis and other treatment of toxic substances <2%
- Ethylene glycol
- Methanol
- Other alcohols
- Lithium
- Other dialysis and treatment of toxic substances (salicylates; dialysis duration prescription)

Acute Kidney Injury and Intensive Care Unit Nephrology 15% of Exam

Hemodynamic (prerenal) acute kidney injury 4%
- True volume depletion
  - Renal
  - Extrarenal
- 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 (anticoagulants; interferon)
- Abdominal compartment syndrome

Parenchymal (intrinsic) acute kidney injury 4.5%
- Vascular
  - Systemic diseases and vasculitis
  - Atheroemboli
  - Renal vein thrombosis
- Glomerular
  - Drug-induced
  - Infectious
  - Other glomerular parenchymal acute kidney injury (relapsed microscopic polyangiitis)
- Tubular
  - Ischemic
  - Nephrotoxic
  - Systemic disease
Interstitial
  Drugs
  Systemic disease
  Malignancy (infiltrative)

**Postrenal acute kidney injury**
  Retroperitoneal and ureteral
    Idiopathic retroperitoneal fibrosis
    Malignancy
    Stones and crystals
    Bleeding
  Bladder, bladder outlet, and benign prostatic hyperplasia

**Renal replacement therapy**
  Indications
    Solute accumulation
    Hemodynamic
    Acute kidney injury associated with intoxication
    Tumor lysis syndrome
  Techniques
    Intermittent hemodialysis
    Continuous renal replacement therapy
  Renal replacement therapy prescription
    Dialysate and replacement fluid
    Anticoagulation
  Complications
    Hemodynamic
    Citrate intoxication
    Other complications (dialysis disequilibrium syndrome)

**Intensive care unit nephrology**
  Hemodynamic measures
  Intravenous fluids and volume status
  Ethics and palliative care

January 2021