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>
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<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>
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<tr>
<td>Acute Kidney Injury and Intensive Care Unit Nephrology</td>
<td>15%</td>
</tr>
</tbody>
</table>

100%
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 up to 240 single-best-answer multiple-choice questions, of which approximately 40 are new questions that do not count in the examinee’s score. Most questions describe patient scenarios and 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. Learn more information on how exams are developed.

A tutorial including examples of ABIM exam question format can be found at 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>Hyponatremia</td>
<td>3%</td>
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<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>
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<tr>
<td>Low solute intake</td>
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<tr>
<td>Thiazides</td>
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<tr>
<td>Other hypotonic (secondary adrenal insufficiency)</td>
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</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
  (hypodipsia; 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)

Calcium, Phosphorus, and Magnesium Disorders and Stones  4% of Exam

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
Chronic Kidney Disease

**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 <2%
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)

<table>
<thead>
<tr>
<th>Hypertension</th>
<th>10% of Exam</th>
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<tbody>
<tr>
<td><strong>Essential hypertension</strong> 3.5%</td>
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<tr>
<td>Isolated systolic hypertension</td>
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<td>Severe hypertension</td>
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<td>Resistant hypertension</td>
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<td>White coat hypertension</td>
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<td>Pseudohypertension</td>
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<td>Masked hypertension</td>
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<tr>
<td>Other essential hypertension (stage 2 hypertension; thiazide effect)</td>
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<tr>
<td><strong>Secondary causes of hypertension</strong> 4%</td>
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<tr>
<td>Pheochromocytoma</td>
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<tr>
<td>Renal vascular disease</td>
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<td>Dissection</td>
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<tr>
<td>Atherosclerotic</td>
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<tr>
<td>Hyperaldosteronism</td>
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<td>Adrenal adenoma</td>
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<tr>
<td>Adrenal hyperplasia</td>
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<td>Genetic causes</td>
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<td>Liddle syndrome</td>
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<tr>
<td>Dexamethasone suppressible hyperaldosteronism</td>
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<tr>
<td>Other genetic causes (Hashimoto’s thyroiditis; scleroderma renal crisis)</td>
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<tr>
<td>Miscellaneous causes</td>
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<tr>
<td>Renin-secreting tumor (juxtaglomerular cell tumor)</td>
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<tr>
<td>Syndrome of apparent mineralocorticoid excess</td>
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<tr>
<td>Coarctation</td>
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<tr>
<td>Vasculitis and arteritis</td>
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</tbody>
</table>
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>Tubular, Interstitial, and Cystic Disorders</th>
<th>4% of Exam</th>
</tr>
</thead>
</table>
| Renal tubular disorders and Fanconi's syndrome <2%
  Drug-induced
  Crystal deposition
  Genetic
| Tubulointerstitial nephritis 2%
  Acute
    Drug-induced
    Immune
    Infectious
    Other acute tubulointerstitial nephritis (multifactorial)
  Chronic
    Drug-induced
    Immune
    Granulomatous
    Toxins
    Hemoglobinopathy
    Urinary tract infection
    Other chronic tubulointerstitial nephritis (hypokalemic nephropathy; medullary cystic kidney)
Renal cystic disease

Autosomal dominant polycystic kidney disease (ADPKD)
Genetics
Renal manifestations
Nonrenal manifestations
End-stage renal disease
Drug-induced

Renal mass

Glomerular and Vascular Disorders 12% of Exam

Nephritic glomerular disorders, vasculitis, and vasculopathy 5%
- IgA nephropathy and Henoch-Schönlein purpura
- Vasculitis and antineutrophil cytoplasmic antibody
- Anti-glomerular basement membrane disease
- Lupus nephritis
- Postinfectious glomerulonephritis
- Membranoproliferative glomerulonephritis and C3 glomerulopathies
- Cryoglobulinemic glomerulonephritis
- Crescentic glomerulonephritis
- Other disorders (rapidly progressive glomerulonephritis)

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 <2%
  Retroperitoneal and ureteral
    Idiopathic retroperitoneal fibrosis
    Malignancy
    Stones and crystals
    Bleeding
  Bladder, bladder outlet, and benign prostatic hyperplasia

Renal replacement therapy 4%
  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 2%
  Hemodynamic measures
  Intravenous fluids and volume status
  Ethics and palliative care

January 2022