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>
</tr>
<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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</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.](http://www.abim.org/certification/exam-information/nephrology/exam-tutorial.aspx)

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>
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</thead>
<tbody>
<tr>
<td><strong>Hyponatremia</strong></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)

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

Salt depletion

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

- Extrarenal sodium losses

Polyuria

- Primary polydipsia
- Other polyuria (iatrogenic)

<table>
<thead>
<tr>
<th>Acid-Base and Potassium Disorders</th>
<th>9% of Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metabolic acidosis</td>
<td>3.5%</td>
</tr>
<tr>
<td>Metabolic acidosis (normal anion gap)</td>
<td></td>
</tr>
<tr>
<td>Renal tubular acidosis (normokalemic or hypokalemic)</td>
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<tr>
<td>Renal tubular acidosis (hyperkalemic)</td>
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</tr>
<tr>
<td>Nonrenal causes</td>
<td></td>
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<tr>
<td>Metabolic acidosis (elevated anion gap)</td>
<td></td>
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<tr>
<td>Lactic acidosis</td>
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<tr>
<td>Ketoacidosis</td>
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<tr>
<td>Toxins</td>
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<tr>
<td>Uremic</td>
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<tr>
<td>Other metabolic acidosis (low anion gap in multiple myeloma)</td>
<td></td>
</tr>
</tbody>
</table>
**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  
- Pseudohypokalemia  
- 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  
4% of Exam

**Disorders of calcium metabolism**  
- Hypercalcemia  
  Primary hyperparathyroidism  
  Granulomatous diseases  
  Malignancy  
  Familial hypocalciuric hypercalcemia (FHH)  
  Vitamin D toxicity  
  Medication and vitamin-induced
Milk alkali syndrome
Hypocalcemia
Hypoparathyroidism
Pseudohypoparathyroidism
Medication-induced
Tissue deposition
Vitamin D deficiency

**Disorders of phosphate metabolism**  
<2%

Hyperphosphatemia
  - Decreased renal excretion
  - Increased intake
  - Tissue redistribution
  - Genetic causes

Hypophosphatemia
  - Increased renal excretion
  - Decreased intake and gastrointestinal absorption
  - Tissue redistribution

**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; hypocalciuria 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 (creatinine clearance; estimated 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; 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 3%
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)

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### 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

### Tubular, Interstitial, and Cystic Disorders 4% of Exam

**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
  <2%
  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>
<td></td>
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<tr>
<td>Vasculitis and antineutrophil cytoplasmic antibody</td>
<td></td>
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<tr>
<td>Anti-glomerular basement membrane disease</td>
<td></td>
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<tr>
<td>Lupus nephritis</td>
<td></td>
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<tr>
<td>Postinfectious glomerulonephritis</td>
<td></td>
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<tr>
<td>Membranoproliferative glomerulonephritis and</td>
<td></td>
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<tr>
<td>C3 glomerulopathies</td>
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<tr>
<td>Cryoglobulinemic glomerulonephritis</td>
<td></td>
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<tr>
<td>Crescentic glomerulonephritis</td>
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<tr>
<td>Other disorders (rapidly progressive glomerulonephritis)</td>
<td></td>
</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

**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

### Indications

**Deceased donor kidney transplantation** <2%

**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%

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### 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)

<table>
<thead>
<tr>
<th>Acute Kidney Injury and Intensive Care Unit Nephrology</th>
<th>15% of Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hemodynamic (prerenal) acute kidney injury</strong></td>
<td>4%</td>
</tr>
<tr>
<td>True volume depletion</td>
<td></td>
</tr>
<tr>
<td>Renal</td>
<td></td>
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<tr>
<td>Extrarenal</td>
<td></td>
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<tr>
<td>Effective volume depletion</td>
<td></td>
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<tr>
<td>Heart failure</td>
<td></td>
</tr>
<tr>
<td>Cirrhosis</td>
<td></td>
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<tr>
<td>Nephrotic syndrome</td>
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<tr>
<td><strong>Drugs</strong></td>
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<tr>
<td>Nonsteroidal anti-inflammatory drugs</td>
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<td>Calcineurin inhibitors</td>
<td></td>
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<tr>
<td>Angiotensin-converting enzyme inhibitors and angiotensin receptor blockers</td>
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<td>Radiocontrast agents</td>
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<tr>
<td>Other drugs (anticoagulants; interferon)</td>
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<td><strong>Abdominal compartment syndrome</strong></td>
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<table>
<thead>
<tr>
<th><strong>Parenchymal (intrinsic) acute kidney injury</strong></th>
<th>4.5%</th>
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<tbody>
<tr>
<td><strong>Vascular</strong></td>
<td></td>
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<tr>
<td>Systemic diseases and vasculitis</td>
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<tr>
<td>Atheroemboli</td>
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<tr>
<td>Renal vein thrombosis</td>
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<tr>
<td><strong>Glomerular</strong></td>
<td></td>
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<tr>
<td>Drug-induced</td>
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<tr>
<td>Infectious</td>
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<tr>
<td>Other glomerular parenchymal acute kidney injury</td>
<td></td>
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<tr>
<td>(relapsed microscopic polyangiitis)</td>
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<tr>
<td><strong>Tubular</strong></td>
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<tr>
<td>Ischemic</td>
<td></td>
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<tr>
<td>Nephrotoxic</td>
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<tr>
<td>Systemic disease</td>
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</tbody>
</table>
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 (potassium, hydrogen ions, phosphate, urea)
    
    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, electrolyte abnormalities)

**Intensive care unit nephrology**  \(2\%
  
  Hemodynamic measures
  
  Intravenous fluids and volume status
  
  Ethics and palliative care

January 2023