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>
</tr>
<tr>
<td></td>
<td>100%</td>
</tr>
</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>
<td></td>
</tr>
<tr>
<td>Hypervolemic</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>
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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
  - Cerebral salt wasting
  - Diuretics
  - Other renal sodium losses (chemotherapy-induced)
- Extrarenal sodium losses

**Polyuria**
- Primary polydipsia
- Other polyuria (iatrogenic)

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**Acid-Base and Potassium Disorders**

<table>
<thead>
<tr>
<th>Metabolic acidosis</th>
<th>3.5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metabolic acidosis (normal anion gap)</td>
<td></td>
</tr>
<tr>
<td>Renal tubular acidosis (normokalemic or hypokalemic)</td>
<td></td>
</tr>
<tr>
<td>Renal tubular acidosis (hyperkalemic)</td>
<td></td>
</tr>
<tr>
<td>Nonrenal causes</td>
<td></td>
</tr>
<tr>
<td>Metabolic acidosis (elevated anion gap)</td>
<td></td>
</tr>
<tr>
<td>Lactic acidosis</td>
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<tr>
<td>Ketoacidosis</td>
<td></td>
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<tr>
<td>Toxins</td>
<td></td>
</tr>
<tr>
<td>Uremic</td>
<td></td>
</tr>
<tr>
<td>Other metabolic acidosis (low anion gap in multiple myeloma)</td>
<td></td>
</tr>
</tbody>
</table>
**Metabolic alkalosis**  
<2%  
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**  
<2%  
Respiratory acidosis  
Respiratory alkalosis  

**Mixed acid-base disturbances**  
<2%  

**Potassium disturbances**  
3.5%  
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**  
4% of Exam  

**Disorders of calcium metabolism**  
<2%  
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** 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)

<table>
<thead>
<tr>
<th>Hypertension</th>
<th>10% of Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Essential hypertension</strong></td>
<td>3.5%</td>
</tr>
<tr>
<td>Isolated systolic hypertension</td>
<td></td>
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<tr>
<td>Severe hypertension</td>
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<td>Resistant hypertension</td>
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<tr>
<td>White coat hypertension</td>
<td></td>
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<tr>
<td>Pseudohypertension</td>
<td></td>
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<tr>
<td>Masked hypertension</td>
<td></td>
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<tr>
<td>Other essential hypertension (stage 2 hypertension; thiazide effect)</td>
<td></td>
</tr>
<tr>
<td><strong>Secondary causes of hypertension</strong></td>
<td>4%</td>
</tr>
<tr>
<td>Pheochromocytoma</td>
<td></td>
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<tr>
<td>Renal vascular disease</td>
<td></td>
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<tr>
<td>Dissection</td>
<td></td>
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<tr>
<td>Atherosclerotic</td>
<td></td>
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<tr>
<td>Hyperaldosteronism</td>
<td></td>
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<tr>
<td>Adrenal adenoma</td>
<td></td>
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<tr>
<td>Adrenal hyperplasia</td>
<td></td>
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<tr>
<td>Genetic causes</td>
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<tr>
<td>Liddle syndrome</td>
<td></td>
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<tr>
<td>Cushing syndrome</td>
<td></td>
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<tr>
<td>Dexamethasone suppressible hyperaldosteronism</td>
<td></td>
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<tr>
<td>Other genetic causes (Hashimoto’s thyroiditis; scleroderma renal crisis)</td>
<td></td>
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<tr>
<td>Miscellaneous causes</td>
<td></td>
</tr>
<tr>
<td>Renin-secreting tumor (juxtaglomerular cell tumor)</td>
<td></td>
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<tr>
<td>Syndrome of apparent mineralocorticoid excess</td>
<td></td>
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<tr>
<td>Coarctation</td>
<td></td>
</tr>
</tbody>
</table>
Vasculitis and arteritis
Tuberous sclerosis
Sleep apnea
Drug-induced
Obstructive uropathy
Renal compression (Page kidney)
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
  (nocturnal hypertension)

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<table>
<thead>
<tr>
<th>Tubular, Interstitial, and Cystic Disorders</th>
<th>4% of Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Renal tubular disorders and Fanconi's syndrome</strong></td>
<td>&lt;2%</td>
</tr>
<tr>
<td>Drug-induced</td>
<td></td>
</tr>
<tr>
<td>Crystal deposition</td>
<td></td>
</tr>
<tr>
<td>Genetic</td>
<td></td>
</tr>
</tbody>
</table>

**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%
    Cystic
    Solid

<table>
<thead>
<tr>
<th>Glomerular and Vascular Disorders</th>
<th>12% of Exam</th>
</tr>
</thead>
</table>

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
  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
  Desensitization
  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**

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

2%

Principles and mechanisms of nephrotoxicity

Antibacterial agents
  Aminoglycosides
  Vancomycin

Antiviral agents

Antifungal agents
  Amphotericin B

Antiparasitic agents

Additional antimicrobials

Pain medications
  Nonsteroidal anti-inflammatory drugs
  Fentanyl
  Gabapentin

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

Iodinated contrast and other imaging agents

Lithium

Supplements and herbs
  Aristolochic acid

Other nephrotoxicity of medications (cardiac glycosides; bisphosphonates)

Nephrotoxicity of illicit drugs

<2%

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

<table>
<thead>
<tr>
<th>Hemodynamic (prerenal) acute kidney injury</th>
<th>4%</th>
</tr>
</thead>
<tbody>
<tr>
<td>True volume depletion</td>
<td></td>
</tr>
<tr>
<td>Renal</td>
<td></td>
</tr>
<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>
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<tr>
<td>Cirrhosis</td>
<td></td>
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<tr>
<td>Nephrotic syndrome</td>
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<tr>
<td>Drugs</td>
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<tr>
<td>Nonsteroidal anti-inflammatory drugs</td>
<td></td>
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<tr>
<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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<tr>
<td>Radiocontrast agents</td>
<td></td>
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<tr>
<td>Other drugs (anticoagulants; interferon)</td>
<td></td>
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<tr>
<td>Abdominal compartment syndrome</td>
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</tbody>
</table>

### Parenchymal (intrinsic) acute kidney injury

<table>
<thead>
<tr>
<th>Vascular</th>
<th>4.5%</th>
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</thead>
<tbody>
<tr>
<td>Systemic diseases and vasculitis</td>
<td></td>
</tr>
<tr>
<td>Atheroemboli</td>
<td></td>
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<tr>
<td>Renal vein thrombosis</td>
<td></td>
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<tr>
<td>Glomerular</td>
<td></td>
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<tr>
<td>Drug-induced</td>
<td></td>
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<tr>
<td>Infectious</td>
<td></td>
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<tr>
<td>Other glomerular parenchymal acute kidney injury (relapsed microscopic polyangiitis)</td>
<td></td>
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<tr>
<td>Tubular</td>
<td></td>
</tr>
<tr>
<td>Ischemic</td>
<td></td>
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<tr>
<td>Nephrotoxic</td>
<td></td>
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<tr>
<td>Systemic disease</td>
<td></td>
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<tr>
<td>Interstitial</td>
<td></td>
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<tr>
<td>Drugs</td>
<td></td>
</tr>
<tr>
<td>Systemic disease</td>
<td></td>
</tr>
<tr>
<td>Malignancy (infiltrative)</td>
<td></td>
</tr>
</tbody>
</table>
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

July, 2020