Nephrology Study Topics Guide: Curated UpToDate Reading Plan

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March 2026

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Learning Objectives

By the end of this guide, you will: - Have a structured reading plan covering essential nephrology topics - Understand the progression from foundational to advanced nephrology knowledge - Know which UpToDate topics provide the most clinically-relevant content - Be able to prioritize reading based on your rotation schedule and level - Have a reference resource for systematic nephrology learning

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Introduction

This handout provides a curated list of **UpToDate clinical topic readings** organized by clinical priority and learning progression. The topics span from foundational kidney function assessment through specialized disease management, giving you a comprehensive self-study curriculum that complements didactic teaching and clinical practice.

How to use this guide: - **Week 1-2 (Foundation):** Read Sections A and B - **Week 3-4 (Core Acute Problems):** Read Sections C and D - **Week 5-6 (Chronic Management):** Read Sections E and F - **Week 7-8 (Advanced Topics):** Read Sections G and H - **Ongoing:** Reference Sections I and J during specific patient encounters

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SECTION A: FOUNDATIONAL ASSESSMENT — START HERE

Essential Diagnostic Skills (Read in this order)

1. Urinalysis in the diagnosis of kidney disease - **Why read:** Urinalysis is your first window into kidney pathology - **Key learning:** Interpretation of proteinuria, hematuria, casts, crystals - **Clinical pearls:** - RBC casts = glomerulonephritis until proven otherwise - Dysmorphic RBCs suggest glomerular source - WBC casts suggest pyelonephritis or interstitial inflammation - **Time needed:** 45-60 minutes - **How to study:** Review case examples; practice interpreting microscopy images

2. Radiologic assessment of kidney disease - **Why read:** Imaging often provides diagnosis when labs are ambiguous - **Key learning:** Understanding ultrasound, CT, MRI findings in different kidney diseases - **Clinical pearls:** - Echogenicity correlates with fibrosis burden - Hydronephrosis = obstruction until proven otherwise - "Normal-appearing kidneys" on ultrasound can still have disease on biopsy - **Time needed:** 60-90 minutes - **How to study:** Look at images while reading; memorize normal measurements

3. Laboratory evaluation of kidney function - **Why read:** Creatinine and eGFR are imperfect; understand their limitations - **Key learning:** How to interpret eGFR, creatinine, BUN; when to use cystatin C - **Clinical pearls:** - A "normal" creatinine can represent significant kidney dysfunction in elderly/frail - eGFR less reliable during acute changes - BUN:Cr ratio distinguishes prerenal from intrinsic disease - **Time needed:** 45-60 minutes - **How to study:** Learn equations; practice calculating eGFR by hand

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SECTION B: ACUTE KIDNEY INJURY — CRITICAL FOUNDATION

Recognizing and Managing AKI

4. Evaluation of acute kidney injury among hospitalized adult patients - **Why read:** AKI is common and often managed incorrectly (over-fluiding or under-fluiding) - **Key learning:** KDIGO staging, differentiation of prerenal vs. intrinsic vs. postrenal AKI - **Clinical pearls:** - FENa <1% = kidney conserving sodium (prerenal) - FENa >2% = kidney wasting sodium (intrinsic) - Always get baseline creatinine before diagnosing AKI - **Time needed:** 60-90 minutes - **Key sections:** KDIGO staging (memorize), diagnostic approach by type, management principles - **How to study:** Create a decision tree for AKI classification; practice with case examples

5. Causes of acute interstitial nephritis - **Why read:** AIN is easily missed and can be reversible if caught early - **Key learning:** Common medications causing AIN, diagnostic findings, treatment - **Clinical pearls:** - Eosinophiluria (>5% of WBC) suggests drug-induced AIN - NSAIDs, antibiotics, PPIs are most common causes - Can develop 1-2 weeks after medication start - **Time needed:** 30-45 minutes - **How to study:** Make a list of AIN-causing drugs; present a case to a colleague

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SECTION C: CHRONIC KIDNEY DISEASE FUNDAMENTALS

Understanding CKD Across Stages

6. Overview of the management of chronic kidney disease in adults - **Why read:** This is THE comprehensive management topic — foundational for all CKD patients - **Key learning:** Staging, complications, slowing progression, preparing for RRT - **Clinical pearls:** - Proteinuria reduction is universal goal (every patient benefits from ACEi/ARB) - BP target <120 systolic in many CKD patients (personalize) - Screen for complications at each CKD stage - **Time needed:** 90-120 minutes - **Key sections:** Definition and staging, complications, management by stage, progression factors - **How to study:** Create management checklists for each CKD stage (1-5)

7. Evaluation and diagnosis of diabetic kidney disease - **Why read:** Diabetic nephropathy is the #1 cause of ESRD in developed countries - **Key learning:** Early detection (microalbumin-

uria), differentiation from non-diabetic disease - **Clinical pearls:** - Microalbuminuria (30-300 mg/g) is often first sign - Absence of retinopathy suggests non-diabetic kidney disease - SGLT2i now recommended for all T2DM with albuminuria/CKD - **Time needed:** 45-60 minutes - **How to study:** Review criteria for diabetic vs. non-diabetic kidney disease

8. Treatment of diabetic kidney disease - **Why read:** SGLT2 inhibitors and GLP-1 agonists have transformed diabetic kidney disease management - **Key learning:** SGLT2i are now first-line; GLP-1 agents add benefit - **Clinical pearls:** - SGLT2i reduce progression even without diabetes (surprising finding) - GLP-1 agents reduce albuminuria and cardiovascular risk - Traditional therapy: ACEi/ARB + SGLT2i + GLP-1 ± low-dose diuretic - **Time needed:** 45-60 minutes - **How to study:** Compare outcomes in SGLT2i trials; understand mechanisms

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SECTION D: GLOMERULAR DISEASE AND RAPID DECLINE

When to Worry: Glomerulonephritis

9. Rapidly progressive glomerulonephritis: A clinical overview and diagnostic approach - **Why read:** RPGN is a medical emergency; missing it costs kidney function - **Key learning:** Clinical presentation, diagnostic categories (ANCA, anti-GBM, immune complex), urgency of treatment - **Clinical pearls:** - RBC casts + rising creatinine = possible RPGN (urgent biopsy) - 4-week timeline: 2 weeks pre-symptomatic, 2 weeks for diagnosis/treatment - Plasma exchange required for anti-GBM and ANCA with pulmonary hemorrhage - **Time needed:** 60-90 minutes - **Key sections:** Clinical presentation, diagnostic approach, treatment by type - **How to study:** Present a RPGN case; understand why plasma exchange must be urgent

10. IgA nephropathy: Clinical features and diagnosis - **Why read:** IgA nephropathy is most common glomerulonephritis worldwide; often presents in young patients - **Key learning:** Presentation (hematuria, proteinuria), progression patterns, biopsy findings - **Clinical pearls:** - Hematuria may be intermittent; proteinuria develops with progression - 20-30% progress to ESRD over 20 years - ACEi/ARB first-line; corticosteroids in high-risk disease - **Time needed:** 30-45 minutes - **How to study:** Review pathology photos; understand Oxford classification prognostic factors

11. Membranous nephropathy: Clinical presentation and diagnosis - **Why read:** Common cause of nephrotic syndrome in adults; prognosis highly variable - **Key learning:** Clinical features, progression patterns, distinction between primary and secondary - **Clinical pearls:** - Serologic: Check PLA2R and THSD7A antibodies - ~33% spontaneous remission, ~33% persistent proteinuria, ~33% progression to ESRD - Treatment varies by risk stratification - **Time needed:** 30-45 minutes - **How to study:** Understand risk factors for progression; know secondary causes (malignancy, infections)

12. Focal segmental glomerulosclerosis (FSGS): Clinical features and diagnosis - **Why read:** Common cause of nephrotic syndrome; understanding variants guides treatment - **Key learning:** Primary vs. secondary FSGS, prognosis, treatment - **Clinical pearls:** - Primary (genetic) FSGS: Younger age, positive family history, severe proteinuria - Secondary: Obesity, hyperfiltration, sickle cell, HIV, heroin - Treatment: Corticosteroids, calcineurin inhibitors, SGLT2i - **Time needed:** 30-45 minutes - **How to study:** Compare genetics of primary vs. secondary; review immunosuppression protocols

SECTION E: SPECIALIZED NEPHROLOGY CONDITIONS

The Cardiorenal Connection

13. Cardiorenal syndrome: Definition, prevalence, diagnosis and pathophysiology - **Why read:** Heart failure and kidney disease are inextricably linked; treatment requires understanding both - **Key learning:** CRS types (1-5), mechanisms, diagnostic approach - **Clinical pearls:** - Type 1: Acute heart failure ☐ acute kidney injury - Type 2: Chronic heart failure ☐ progressive CKD - Type 5: Systemic disease affecting both (sepsis, cardiorenal-hepatic) - **Time needed:** 60-90 minutes - **Key sections:** Pathophysiology, diagnosis, prognostic markers - **How to study:** Compare medication effects in CHF+CKD scenarios

14. Cardiorenal syndrome: Prognosis and treatment - **Why read:** Treatment differs from isolated CKD or isolated CHF - **Key learning:** Diuretic use, RAAS inhibitor dosing, novel agents - **Clinical pearls:** - Avoid aggressive diuresis if possible; gentle diuresis preferred - ARNI (sacubitril/valsartan) superior to ACE inhibitor in CHF - Sodium-glucose cotransporter inhibitors benefit both organs - **Time needed:** 45-60 minutes - **How to study:** Build management algorithms for different CRS types

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SECTION F: DIALYSIS AND RENAL REPLACEMENT THERAPY

When Kidneys Fail: RRT Modalities

15. Overview of the hemodialysis apparatus - **Why read:** Understanding how dialysis works helps you manage dialysis patients - **Key learning:** Vascular access types, dialyzer characteristics, anticoagulation - **Clinical pearls:** - Arteriovenous fistula (AVF) best access; can last 20+ years - Arteriovenous graft (AVG) intermediate longevity - Central venous catheter (CVC) temporary but has highest infection risk - **Time needed:** 45-60 minutes - **How to study:** Review vascular anatomy; understand why AVF superior to other access

16. Prescribing and assessing adequate hemodialysis - **Why read:** Dialysis prescription directly impacts patient survival and quality of life - **Key learning:** Kt/V, urea reduction ratio, adjusting dialysis dose - **Clinical pearls:** - Kt/V target >1.2; URR target >65% - Inadequate dialysis linked to higher mortality and morbidity - Can be improved by longer sessions, more frequent sessions, or higher flow rates - **Time needed:** 45-60 minutes - **How to study:** Calculate Kt/V for case examples; understand how to adjust prescriptions

17. Prescribing peritoneal dialysis - **Why read:** PD is underutilized option; increases residual renal function and allows more autonomy - **Key learning:** CAPD vs. APD, dosing, adequacy assessment, complications - **Clinical pearls:** - Better quality of life for many patients - Preserves residual renal function longer than HD - Higher cost barrier and patient selection critical - **Time needed:** 30-45 minutes - **How to study:** Compare PD vs. HD; understand patient selection factors

18. Acute complications during hemodialysis - **Why read:** Dialysis sessions can trigger serious complications; knowledge prevents morbidity - **Key learning:** Hypotension, cramping, arrhythmias, dialysis disequilibrium - **Clinical pearls:** - Hypotension most common; managed

by ultrafiltration goals and fluid removal rate - Dialysis disequilibrium: Headache, nausea, seizures from osmotic shifts - Hypoxemia occurs in 5-10% of sessions - **Time needed:** 30-45 minutes - **How to study:** Make a management flow chart for common complications

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SECTION G: ELECTROLYTE AND ACID-BASE DISORDERS

Critical Fluid and Electrolyte Management

19. Hyponatremia: Etiology, clinical manifestations, and diagnosis - **Why read:** Hyponatremia is most common electrolyte disorder; mismanagement causes brain damage - **Key learning:** Classification by volume status, pathophysiology, diagnostic approach - **Clinical pearls:** - Most important factor: Is it acute (<48 hrs) or chronic (>48 hrs)? - Acute: Risk of seizures; rapid correction possible - Chronic: Risk of osmotic demyelination; correction must be slow (<8 mEq/L per 24 hrs) - **Time needed:** 60-90 minutes - **Key sections:** Classification, diagnosis by urine osmolality + serum osmolality, treatment

20. Hypernatremia: Etiology, clinical manifestations, and diagnosis - **Why read:** Hypernatremia carries worse prognosis than hyponatremia - **Key learning:** Classification, pathophysiology, when diabetes insipidus is involved - **Clinical pearls:** - Water deprivation test distinguishes central from nephrogenic DI - Central DI: Responds to desmopressin - Nephrogenic DI: Does NOT respond to desmopressin - **Time needed:** 45-60 minutes - **How to study:** Practice interpreting water deprivation test results

21. Hypokalemia: Treatment - **Why read:** Hypokalemia causes cardiac arrhythmias; treatment requires thoughtfulness about replacement rate and route - **Key learning:** Calculating deficits, oral vs. IV replacement, monitoring - **Clinical pearls:** - Each 1 g KCl = 13.4 mEq K+ - Refractory hypokalemia often due to magnesium depletion - Must replete magnesium for potassium to normalize - **Time needed:** 30-45 minutes - **How to study:** Calculate replacement amounts for case examples

22. Hyperkalemia: Causes, clinical features, diagnosis, and treatment - **Why read:** Hyperkalemia with ECG changes is a medical emergency; treatment has narrow margins - **Key learning:** "ABCs" approach: Antagonize (calcium), Shift (insulin/glucose), Remove (diuretics/dialysis) - **Clinical pearls:** - ECG progression: Peaked T waves ☐ widened QRS ☐ loss of P wave ☐ sine wave ☐ asystole - Calcium gluconate acts immediately but doesn't lower K+ - Insulin + dextrose shifts K+ intracellular (onset 10-20 mins) - **Time needed:** 45-60 minutes - **Key sections:** Causes, treatment algorithms, monitoring - **How to study:** Create emergency management protocol for K+ >6.5 with ECG changes

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SECTION H: SPECIAL POPULATIONS AND ADVANCED TOPICS

Nephrology Beyond the Mainstream

23. Acute kidney injury in the critically ill patient - **Why read:** ICU patients have complex AKI; context matters for management - **Key learning:** Multifactorial AKI, when to dialyze, nutritional support - **Clinical pearls:** - Often combination of prerenal + intrinsic + toxic insults - CRRT often preferred over IHD in hemodynamically unstable - Nutritional needs change with

dialysis; coordinate with nutrition - **Time needed:** 45-60 minutes - **How to study:** Review ICU case examples; understand CRRT indications

24. Contrast-induced acute kidney injury - **Why read:** Preventable complication occurring routinely in medical practice - **Key learning:** Pathophysiology, prevention strategies, management - **Clinical pearls:** - Risk highest with high-osmolality contrast; low-osmolality safer - IV hydration is primary prevention - Metformin should be held; check eGFR post-contrast - **Time needed:** 30 minutes - **How to study:** Create pre/post-contrast orders for your institution

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SECTION I: ESSENTIAL QUICK REFERENCES

Topics for Specific Patient Encounters

Beyond the main reading: - Pregnancy and kidney disease (preeclampsia, gestational hypertension) - Kidney disease in cancer patients (onco-nephrology) - Medication dosing in kidney disease (pharmacokinetics) - Kidney transplant evaluation and management - Nephrolithiasis (kidney stones): Prevention and treatment - Polycystic kidney disease (genetic counseling, management) - Vasculitis and ANCA-associated disease - Systemic lupus erythematosus and lupus nephritis

Read these topics when you encounter patients with these conditions.

SECTION J: STUDY STRATEGY AND INTEGRATION

How to Get Maximum Value from Reading

General Principles:

1. **Read actively, not passively**
    - Keep notes while reading
    - Write down definitions and key concepts
    - Create your own diagrams and algorithms
2. **Connect to patients you've seen**
    - After each topic, recall a patient encounter
    - Ask: "Does this explain what I saw?"
    - Discuss cases with faculty and colleagues
3. **Build your own resource library**
    - Favorite images and diagrams
    - Most useful algorithms
    - Key references for common conditions
4. **Practice clinical reasoning**
    - Present cases to colleagues
    - Ask "What would you do?" before reading answers
    - Explain your clinical reasoning to a student
5. **Focus on clinical applicability**
    - Every concept should connect to patient care
    - Ask "When will I use this knowledge?"
    - Prioritize common conditions over rare diseases

Suggested Reading Sequence by Rotation Length

2-Week Rotation

Must-read (Sections A & B): Topics 1, 2, 4, 5 **Time commitment:** ~4 hours

4-Week Rotation

Add (Sections C & D): Topics 3, 6, 7, 9 **Time commitment:** ~8 hours total

6-Week Rotation

Add (Sections E & F): Topics 13, 14, 15, 16 **Time commitment:** ~12 hours total

8-Week Rotation

Add (Sections G & H): Topics 19, 20, 21, 22 **Time commitment:** ~16 hours total

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Clinical Pearls Summary (Read First)

If you read nothing else, understand these principles:

1. **Urinalysis interpretation = kidney disease diagnosis**
   - RBC casts = glomerulonephritis
   - WBC casts = infection/inflammation
   - Proteinuria = glomerular disease
2. **FENa <1% = kidney conserving sodium (prerenal)**
   - FENa >2% = kidney wasting sodium (intrinsic AKI)
3. **Proteinuria reduction is universal therapy for CKD**
   - ACEi/ARB first-line (all stages)
   - SGLT2i now added for most
   - Lower proteinuria = slower progression
4. **Tight BP control slows CKD**
   - Target individualized
   - Goal <120 systolic in many patients
   - RAAS inhibition priority
5. **Know thy baseline creatinine**
   - Can't diagnose AKI without it
   - Most important number in chart

Related Handouts

- nephrology quick start guide — Foundational concepts and frameworks
- nephrology glossary student handout — Terminology reference

- structure of renal disease student handout — Organizational framework

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Acknowledgments

This reading guide is based on UpToDate™ clinical topics and reflects current evidence-based practice in nephrology as of early 2026. Topics are current, but always verify recommendations against your institution's protocols and current guidelines.

This study guide provides structure; clinical experience provides wisdom. Combine both.