

NGN NCLEX 2026 · RENAL & URINARY SYSTEM

Renal Diagnostic *Procedures* Cystoscopy · Renal Angiogram · Bladder Scan

Indications · Pre/Intra/Post-procedure Care · Complications · Priority Monitoring

NCLEX 2026 TEST PLAN

PHYSIOLOGICAL ADAPTATION

REDUCTION OF RISK POTENTIAL



Source transparency: This topic is **not present in your uploaded reference notes**. Content below is compiled from standard NGN NCLEX 2026 references.

Sources: Saunders Comprehensive Review for NCLEX-RN (2026) · ATI RN Adult Medical-Surgical Nursing · Lippincott Illustrated Reviews · ACR Manual on Contrast Media (2024) · AUA/SUNA Clinical Practice Guidelines

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DEFINITION · OVERVIEW

What Each Procedure Is & Why It Matters

PROCEDURE 01

Cystoscopy

Direct **visualization** of the urethra and bladder using a rigid or flexible cystoscope inserted through the urinary meatus.

Performed under local, regional, or general anesthesia, often in lithotomy position.

Allows for biopsy, stone removal, stent placement, and tumor evaluation in a single procedure.

SETTING: OUTPATIENT · CYSTOSCOPY SUITE OR OR

PROCEDURE 02

Renal Angiogram

Fluoroscopic imaging of renal arteries using iodinated contrast dye, injected via a catheter threaded through the **femoral artery**.

Evaluates renal blood flow, stenosis, masses, and vascular anatomy.

Considered an **invasive** arterial procedure with risk of bleeding, embolism, and contrast-induced AKI.

SETTING: INTERVENTIONAL RADIOLOGY SUITE

PROCEDURE 03

Bladder Scan

Non-invasive portable ultrasound that measures post-void residual (PVR) bladder volume in mL.

Performed at the bedside by the nurse — no provider order typically required for assessment.

Prevents **unnecessary catheterization** by quantifying retention objectively before deciding to cath.

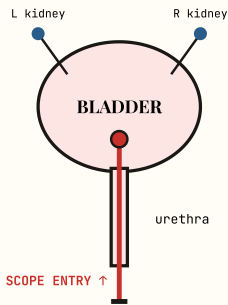
SETTING: BEDSIDE · ANY CARE SETTING

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PROCEDURE MECHANISM • VISUAL FLOW

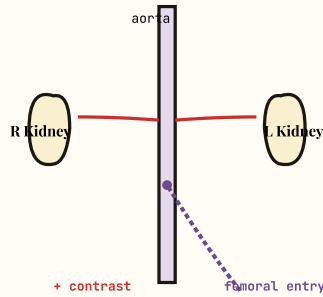
How Each Procedure Works

Cystoscopy Pathway



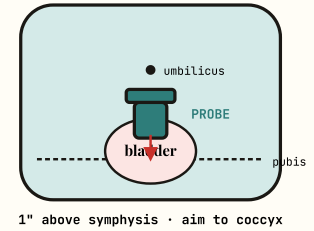
Scope inserted → through urethra → into bladder → direct visualization

Renal Angiogram Path



Femoral artery → aorta → renal artery → contrast injected → X-ray

Bladder Scan Setup



Probe placed → ultrasound waves → volume calculated → PVR displayed (mL)

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INDICATIONS • WHEN & WHY

Clinical Reasons to Order Each Procedure

Cystoscopy

- ▶ Gross or microscopic hematuria
- ▶ Recurrent UTIs (esp. ≥ 3 /year)
- ▶ Suspected bladder tumor/cancer
- ▶ Urinary retention of unknown cause
- ▶ Interstitial cystitis evaluation
- ▶ Urethral stricture assessment
- ▶ Bladder stone removal
- ▶ Ureteral stent placement/removal
- ▶ Biopsy of suspicious lesions
- ▶ BPH follow-up

Renal Angiogram

- ▶ Suspected renal artery stenosis
- ▶ Renovascular hypertension workup
- ▶ Renal mass/tumor evaluation
- ▶ Renal trauma assessment
- ▶ Pre-transplant evaluation (donor & recipient)
- ▶ Suspected renal vein thrombosis
- ▶ Arteriovenous malformations
- ▶ Embolization treatment
- ▶ Unexplained GFR decline with HTN

Bladder Scan

- ▶ Suspected urinary retention
- ▶ Post-void residual (PVR) measurement
- ▶ Post-op urinary monitoring (esp. post-anesthesia)
- ▶ Post-Foley removal voiding trial
- ▶ Neurogenic bladder assessment
- ▶ BPH symptom monitoring
- ▶ Avoid unnecessary catheterization
- ▶ Confirm bladder distension before cath
- ▶ Evaluate effectiveness of voiding

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EXPECTED VS RED FLAG • POST-PROCEDURE

Normal Findings vs Complications

✓ EXPECTED / NORMAL FINDINGS

After Cystoscopy

- ✓ Pink-tinged urine for 24–48 hrs
- ✓ Burning on urination (transient)
- ✓ Mild urinary frequency
- ✓ Mild bladder spasms
- ✓ Low-grade discomfort with first void

After Renal Angiogram

- ✓ Small bruise at femoral puncture site
- ✓ Mild soreness at puncture site
- ✓ Warm flushing sensation during contrast injection (transient)
- ✓ Metallic taste with contrast (transient)

Bladder Scan

- ✓ No complications — non-invasive
- ✓ PVR < 50 mL = normal voiding
- ✓ PVR 50–100 mL = borderline

🚨 RED FLAG — REPORT IMMEDIATELY

Cystoscopy Complications

- 🚨 Bright red bleeding or clots in urine
- 🚨 Inability to void (urinary retention)
- 🚨 Fever > 101°F (38.3°C) → sepsis/UTI
- 🚨 Severe abdominal/flank pain → perforation
- 🚨 Decreasing urine output

Renal Angiogram Complications

- 🚨 Hematoma at puncture site (expanding)
- 🚨 Loss of distal pulse — limb ischemia
- 🚨 Cool, pale, mottled extremity
- 🚨 Hypotension + tachycardia → hemorrhage
- 🚨 Rising creatinine → contrast-induced AKI
- 🚨 Allergic reaction (hives, wheezing, anaphylaxis)
- 🚨 Back/flank pain → retroperitoneal bleed
- 🚨 Embolism/thrombosis (cold, painful limb)

Bladder Scan Findings

- 🚨 PVR > 200–300 mL → catheterization needed
- 🚨 Distended palpable bladder + inability to void

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PRIORITY NURSING CARE • ABC FRAMEWORK

Pre / Intra / Post Interventions for All 3

A • B • C • SAFETY FIRST → AIRWAY • BREATHING • CIRCULATION • RISK FOR BLEED • INFECTION • AKI

PRE BEFORE THE PROCEDURE

● Cystoscopy

- Verify informed consent
- NPO 6–8 hr if general anesthesia
- Have client void immediately before
- Baseline VS, document allergies
- Pre-procedure antibiotic prophylaxis if ordered
- Reduce anxiety; explain procedure

● Renal Angiogram

- Verify informed consent
- NPO 4–8 hr before
- Check **iodine/shellfish/contrast** allergy
- Baseline **BUN & creatinine** (kidney function)
- Hold **metformin 48 hr** before/after
- Mark distal pulses (DP, PT)
- IV access · hydrate per protocol
- Baseline VS & weight

● Bladder Scan

- Explain procedure (non-painful)
- Have client void first if measuring PVR
- Position supine, expose lower abdomen
- Select correct gender on device (**select Male if post-hysterectomy/no uterus**)
- Apply ultrasound gel to probe

INTRA DURING THE PROCEDURE

● Cystoscopy

- Position in lithotomy (drape for dignity)
- Monitor for vagal response (↓ HR, ↓ BP)
- Assess pain & LOC if conscious sedation
- Observe pulse oximetry & airway

● Renal Angiogram

- Continuous ECG & SpO2 monitoring
- Warn client about warm flushing with contrast
- Monitor for allergic reaction (hives, ↓ BP, wheeze)
- Frequent VS during contrast injection

● Bladder Scan

- Place probe 1 inch above symphysis pubis
- Aim probe toward coccyx
- Hold steady until volume reading appears
- Take 2–3 readings for accuracy

POST AFTER THE PROCEDURE — HIGHEST PRIORITY

● Cystoscopy

- Monitor VS per protocol
- Encourage fluids **2,500–3,000 mL/day**
- Monitor I&O · first void within 8 hr
- Warm sitz bath for comfort
- Mild analgesics (acetaminophen)
- Antispasmodic (B&O suppository) if ordered
- Assess color of urine (pink OK, bright red NOT)
- Monitor for fever, severe pain

● Renal Angiogram

- **Bedrest 4–6 hr** with affected leg straight
- Pressure dressing & sandbag to site
- Assess puncture site q15min × 1 hr, then q30min
- **Palpate distal pulses** (compare to baseline)
- Check color, warmth, sensation of limb (5 P's)
- Monitor VS frequently — watch for ↓ BP
- Push **IV & PO fluids** to flush contrast
- Strict I&O; urine output > 30 mL/hr
- Recheck BUN/Cr next AM
- Watch for delayed allergic reaction (24–48 hr)

● Bladder Scan

- Clean gel from client's abdomen
- Disinfect probe per facility policy
- Document PVR volume & time
- If PVR > 200–300 mL → notify HCP, consider straight cath
- Reassess after voiding attempts
- Trend serial PVRs for patterns

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PHARMACOLOGY • KEY DRUGS

Medications Related to These Procedures

DRUG / CLASS	USE / MECHANISM	KEY SIDE EFFECTS	NURSING CONSIDERATIONS
Phenazopyridine (Pyridium)	Urinary analgesic — local anesthetic effect on bladder mucosa post-cystoscopy	Bright orange-red urine; stains clothes/contacts; headache; GI upset	Warn client about color change. Take with food. Short-term use only (2 days). Not for renal impairment.
Belladonna & Opium (B&O) suppositories	Antispasmodic for bladder spasms after cystoscopy or stent	Sedation, dry mouth, constipation, urinary hesitancy	Schedule II controlled. Monitor for over-sedation. Avoid in glaucoma, BPH.
Iodinated contrast media	Radiopaque dye used during renal angiogram for fluoroscopy	Allergic reaction (mild hives → anaphylaxis); contrast-induced nephropathy; warm flushing; metallic taste	Verify iodine/shellfish allergy. Check baseline creatinine. Hydrate aggressively pre/post. Watch for delayed reaction 24–48 hr.
Metformin	Oral antidiabetic — must HOLD around contrast procedures	Risk of lactic acidosis if combined with contrast in renal impairment	Hold 48 hr BEFORE & AFTER contrast. Resume only after creatinine confirmed normal.
Diphenhydramine (Benadryl) + Corticosteroids	Pre-medication for clients with known contrast allergy	Drowsiness, dry mouth, hypertension (steroids), hyperglycemia	Give per protocol typically 12 hr & 2 hr pre-procedure. Monitor for sedation.
Lidocaine jelly (topical)	Local anesthetic for urethral lubrication before cystoscopy	Rare systemic absorption; local irritation	Allow 5 min to take effect. Verify no lidocaine allergy.
Prophylactic antibiotics (e.g., ciprofloxacin)	Prevent UTI/sepsis after cystoscopy in high-risk clients	GI upset, photosensitivity, tendon rupture (FQ), C. diff	Give within 1 hr pre-procedure. Monitor for allergic reaction. Encourage fluids.
Conscious sedation: Midazolam (Versed) + Fentanyl	Moderate sedation during cystoscopy or angiogram	Respiratory depression, hypotension, amnesia	Continuous SpO2 & ECG. Reversal agents on hand: Flumazenil (Versed), Naloxone (Fentanyl).

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NCLEX TEST TRAPS • COMMON PITFALLS

Wrong Thinking → Right Thinking

✗ WRONG

"Pink-tinged urine after cystoscopy means the client is hemorrhaging — call rapid response."

VS

✓ RIGHT

Pink-tinged urine is **expected for 24–48 hours**. Only **bright red blood or clots** require immediate notification of the HCP.

✗ WRONG

"Resume metformin the morning after the renal angiogram — the procedure is over."

VS

✓ RIGHT

Metformin is **held 48 hours after** contrast and resumed only when serum **creatinine confirms normal renal function** (risk of lactic acidosis).

✗ WRONG

"After renal angiogram, the client can ambulate as soon as they feel ready."

VS

✓ RIGHT

Strict **bedrest 4–6 hours** with the affected leg held **straight**. Early movement risks puncture site bleeding/hematoma.

✗ WRONG

"Bladder scan reads 250 mL after the client voided — straight cath right away without further assessment."

VS

✓ RIGHT

Repeat scan to verify. Confirm gender setting (select **Male if post-hysterectomy**) and proper probe placement before deciding to catheterize.

✗ WRONG

"Check the femoral pulse first — that's where the catheter went in."

VS

✓ RIGHT

Assess **distal pulses** (dorsalis pedis, posterior tibialis) — these tell you if blood flow is reaching the foot despite the femoral puncture. Compare to **pre-procedure marked pulses**.

✗ WRONG

"Bladder scan requires a provider order before the nurse can perform it."

VS

✓ RIGHT

Bladder scan is a **nursing assessment** tool — independent nursing action. **Catheterization** based on the result usually does require an order.

✗ WRONG

"After cystoscopy, the client can't void in 6 hours — that's just from the local anesthetic, wait it out."

VS

✓ RIGHT

Inability to void within 8 hours post-procedure is a **red flag** — assess for retention with bladder scan, notify HCP, and prepare for possible catheterization.

✗ WRONG

"The puncture site dressing is dry — no further site checks needed."

VS

✓ RIGHT

Assess for an **expanding hematoma under the skin** and palpate the area. Arterial bleeds can pool retroperitoneally — watch for **back/flank pain** and falling BP/H&H.

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PATIENT & FAMILY EDUCATION

What to Teach Before Discharge

Post-Cystoscopy Self-Care

- Drink **2,500–3,000 mL fluids/day** to dilute urine and flush bladder
- Expect **pink-tinged urine** for 1–2 days — this is normal
- Mild burning with urination for 24–48 hr is normal
- Warm sitz baths 2–3× daily for comfort
- Take acetaminophen for mild pain
- If prescribed Pyridium → urine will be **orange-red**; can stain clothes
- Avoid heavy lifting and strenuous activity 24–48 hr
- No sexual activity until cleared by HCP

Post-Renal Angiogram Self-Care

- Keep puncture site clean and dry × 24 hr
- **Limit activity 24–48 hr**; no heavy lifting or strenuous exercise × 1 week
- Drink extra fluids to flush dye
- Resume metformin only when HCP confirms kidney function OK
- Small bruise at site is expected; will fade over weeks
- Sit/stand slowly to prevent orthostatic hypotension
- Apply gentle pressure if bleeding restarts; call 911 if won't stop
- Continue to monitor for any delayed allergic reaction up to 48 hr

Cystoscopy — Call HCP Immediately If...

- △ Bright red bleeding or blood clots in urine
- △ Unable to void within 8 hours
- △ Fever > 101°F (38.3°C) or chills
- △ Severe abdominal or low back pain
- △ Cloudy, foul-smelling urine (UTI)
- △ Persistent burning > 48 hours

Renal Angiogram — Call HCP Immediately If...

- △ Bleeding from puncture site that won't stop with pressure
- △ Swelling, hard lump, or enlarging bruise at site
- △ Numbness, tingling, coldness, or color change in leg
- △ Severe back, flank, or abdominal pain
- △ Fever, chills, redness, or drainage from site
- △ Decreased urine output / dark concentrated urine
- △ Hives, itching, wheezing, swelling (delayed allergy)

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MEMORY BOOSTERS • MNEMONICS

Quick-Recall Patterns for the Exam

P-U-M-P

POST-RENAL-ANGIOGRAM CARE

P – Pulses

Palpate distal pulses; compare with marked baseline

U – Urine output

Maintain > 30 mL/hr; trend BUN/Cr (contrast nephropathy)

M – Monitor site

Q15 min × 1 hr for bleeding/hematoma; check flank for retroperitoneal bleed

P – Position flat

Bedrest 4–6 hr; leg **straight**; HOB ≤ 30°

F-L-U-S-H

POST-CYSTOSCOPY PRIORITIES

F – Fluids ↑

2,500–3,000 mL/day to dilute urine, prevent clots

L – Look at urine

Pink OK; bright red or clots = report

U – Urinate within 8 hr

If not → assess for retention; bladder scan

S – Sitz bath

Warm sitz baths for comfort & perineal soreness

H – Heat & pain meds

Acetaminophen + antispasmodic for spasms

5 P's

DISTAL LIMB ASSESSMENT (POST-ANGIOGRAM)

P – Pulse

Present and equal to baseline?

P – Pallor

Skin color compared to other limb?

P – Pain

Disproportionate or worsening?

P – Paresthesia

Numbness or tingling?

P – Paralysis

Loss of movement = severe ischemia

S-C-A-N

BLADDER SCAN SETUP

S – Symphysis pubis

Place probe 1 inch above; aim toward coccyx

C – Correct gender

Select Male if post-hysterectomy (no uterus)

A – Apply gel

Ensure good probe-skin contact

N – Numbers > 200–300

Suggest catheterization; notify HCP

One-Glance High-Yield Pearls

★ Pink urine after cysto = OK · Bright red = NOT OK

★ Hold metformin 48 hr before AND 48 hr after contrast

★ Check creatinine + iodine/shellfish allergy before angio

★ Mark distal pulses BEFORE renal angiogram

★ Bedrest 4–6 hr post-angio · leg STRAIGHT

★ Bladder scan = independent nursing action

★ PVR > 200–300 mL → consider catheterization

★ Encourage 2,500–3,000 mL fluids post-cystoscopy

★ Flank pain post-angio = think retroperitoneal bleed

★ Inability to void in 8 hr post-cysto = red flag

★ Post-hysterectomy → select MALE on bladder scan

★ Reversal agents ready: Flumazenil (Versed), Naloxone (Fentanyl)

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NCJMM • NEXT-GEN CLINICAL JUDGMENT

Six-Step Clinical Judgment Scenario

Case Setup

A **68-year-old female client** with a history of **type 2 diabetes (on metformin)**, hypertension, and CKD stage 2 is admitted for a scheduled **renal angiogram** to evaluate suspected renal artery stenosis. She returns to the unit **2 hours post-procedure**. The nurse begins post-procedure monitoring.

1

RECOGNIZE CUES

What information is most relevant?

"VS: BP 102/64 (baseline 138/82), HR 108, RR 22, SpO₂ 96%. Right groin: small bruise but dressing dry. Right dorsalis pedis pulse +1 (baseline +2). Client reports new dull right flank pain rated 5/10. Urine output 18 mL in last hour. Creatinine pending."

Relevant cues:

- ↓ BP (102/64 from baseline 138/82) + ↑ HR (108) → possible **hypovolemia/bleeding**
- Weakened distal pulse (+1 from +2 baseline) → possible **arterial compromise**
- New **flank pain** → classic for **retroperitoneal bleed**
- Decreased urine output (< 30 mL/hr) → possible AKI or hypovolemia
- Risk factors: diabetic on metformin, CKD, female (smaller vessels), older adult

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ANALYZE CUES

What do these cues mean together?

The cluster of **hypotension + tachycardia + new flank pain + diminished distal pulse + low urine output** is highly concerning for a **retroperitoneal hemorrhage** from the femoral artery puncture — even with a dry external dressing, blood can pool internally without obvious visible bleeding.

The low urine output may also reflect **contrast-induced nephropathy** given her diabetic and CKD status, compounded by the recent metformin exposure (which should have been held).

Both conditions are **time-sensitive**; bleeding takes priority because it threatens circulatory status (the "C" in ABCs).

3

PRIORITIZE HYPOTHESES

What's the most likely & most urgent problem?

1. **#1 (Highest priority):** Retroperitoneal hemorrhage from femoral puncture → hypovolemic shock
2. **#2:** Arterial compromise distal to puncture (thrombus/embolus) → limb ischemia
3. **#3:** Contrast-induced acute kidney injury (CI-AKI)
4. **#4:** Pain management

ABC framework: Circulation (bleeding/shock) is most urgent. Limb ischemia is second. AKI develops over hours–days and is monitored, not the immediate emergency.

4

GENERATE SOLUTIONS

What interventions should be considered?

Anticipated nursing & collaborative actions:

- Notify the HCP / rapid response **immediately**
- Maintain strict bedrest with affected leg straight; reinforce dressing & apply manual pressure if external bleeding visible
- Establish/confirm 2 large-bore IV lines
- Increase IV fluid rate per orders (NS or LR) to support perfusion
- Prepare to draw STAT **H&H, type & crossmatch, BUN, creatinine, coags**
- Anticipate STAT **CT angiogram or abdominal ultrasound** to confirm retroperitoneal bleed
- Continuous VS, SpO₂, ECG monitoring
- Prepare for possible **blood transfusion** (T&C, consent on file)
- Reassess distal pulses, color, sensation q5–15 min
- Keep NPO in case surgical/IR intervention needed

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TAKE ACTION

What does the nurse do first?

Immediate action sequence:

1. **Stay with the client** & activate rapid response / call HCP
2. Recheck VS, apply firm pressure to puncture site, ensure leg is straight
3. Open IV fluids per protocol; ensure patent large-bore access
4. Place client flat (head of bed flat) to support cerebral perfusion
5. Send STAT labs (H&H, T&C, BUN/Cr, coags)
6. Continuous monitoring; reassess distal pulses, abdomen for distention
7. Hold metformin (should have been held — communicate to provider)
8. Document findings, interventions, and response

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EVALUATE OUTCOMES

How does the nurse know it worked?

Expected positive outcomes within 1–2 hours:

- BP returns toward baseline (≥ 120 systolic) with HR < 100
- Distal pulses return to +2 baseline; limb pink, warm, with normal sensation
- Flank pain decreases; abdomen soft, non-distended
- Urine output ≥ 30 mL/hr
- H&H stable; no further drop on repeat labs
- Imaging confirms bleeding controlled (no expanding hematoma)

Indicators of worsening (escalate further):

- Continued BP drop, HR rising, altered LOC
- Loss of distal pulse, mottled cold limb
- Abdominal distension, severe pain, drop in H&H
- Anuria or rapidly rising creatinine