

RENAL / GENITOURINARY • NGN NCLEX 2026

Hemodialysis & Peritoneal Dialysis

Life-sustaining renal replacement therapies for acute and chronic kidney failure — mastering vascular access, peritonitis prevention, and disequilibrium syndrome is exam-critical.

Aligned with NCJMM Clinical Judgment Model • Priority-Safety Framework



1 Definition & Overview

🔴 Hemodialysis (HD)

- ▶ Blood is pumped through an **artificial kidney (dialyzer)** outside the body, then returned cleaned
- ▶ Uses **diffusion, osmosis, and ultrafiltration** to remove wastes, excess fluid, and toxins
- ▶ Typical schedule: **3–4 hours, 3× per week** at a dialysis center

💧 Peritoneal Dialysis (PD)

- ▶ Uses the client's own **peritoneum as a semipermeable membrane**
- ▶ **Dialysate** is instilled into the peritoneal cavity via a catheter, dwells, then drains
- ▶ Can be done at home: **CAPD** (manual, 4×/day) or **CCPD** (automated at night)

2 Pathophysiology Flow

Hemodialysis Circuit

Blood pulled from AV access (arterial side) →

Heparinized & pumped into dialyzer →

Diffusion of wastes across membrane →

Clean blood returned (venous side)

Peritoneal Dialysis Cycle (3 Phases)

1. INFLOW

~2L warmed dialysate

2. DWELL

4–6 hours

3. OUTFLOW

Drain 20–30 min

in ~10 minutes

(exchange occurs)

clear/straw = normal

3 HD vs. PD — Side-by-Side

Feature	 Hemodialysis	 Peritoneal Dialysis
Access	AV fistula (preferred), AV graft, or CVC	Tenckhoff catheter in peritoneal cavity
Speed	Fast — 3–4 hrs, 3×/week	Slower, gentler — continuous
Setting	Dialysis center (usually)	Home-based (CAPD or CCPD)
Anticoagulation	Yes — heparin required during treatment	No systemic anticoagulation
#1 Complication	Disequilibrium syndrome & hypotension	Peritonitis (cloudy outflow!)
Diet	Low K ⁺ , low phosphorus, fluid restricted, moderate protein	HIGH protein (protein is lost in effluent)
Best for	Acute needs, rapid clearance, unstable patients in ICU	Stable, ambulatory, home-independent clients
Contraindicated	Severe hemodynamic instability without close monitoring	Recent abdominal surgery, adhesions, peritonitis

4 Signs, Symptoms & Complications

Hemodialysis Complications

Early / During Treatment

- **Hypotension** (from rapid fluid removal)
- Muscle cramps
- Nausea & vomiting
- Headache
- Dizziness / lightheadedness

Late / Severe (RED FLAGS)

- **Disequilibrium syndrome**: confusion, seizures, coma
- **Loss of thrill/bruit** at fistula → clotted access
- Bleeding (due to heparinization)
- Infection — especially at CVC
- Air embolism (rare but lethal)

DISEQUILIBRIUM SYNDROME — Highest-Priority Recognition

Caused by **too-rapid removal of urea & electrolytes** → cerebral edema. Signs: headache, N/V, confusion, twitching, **seizures**. Action: **Slow or stop the dialysis rate immediately** and notify HCP.

Peritoneal Dialysis Complications

⚠️ Early / Common

- Outflow problems (kinks, constipation, position)
- Mild abdominal discomfort during inflow
- Respiratory distress (diaphragm pressure)
- Hyperglycemia (dextrose in dialysate)
- Exit-site redness / drainage

🚑 Peritonitis — #1 Serious Complication

- **Cloudy / milky effluent** (first & earliest sign)
- Abdominal pain, rebound tenderness
- Fever, chills, nausea
- Elevated WBC in effluent
- Bloody or brown outflow → call provider STAT

🚑 CLOUDY OUTFLOW = PERITONITIS UNTIL PROVEN OTHERWISE

Send effluent sample for **culture, gram stain, and cell count**. Notify HCP. Antibiotics are often added directly to the dialysate. Untreated peritonitis can rapidly become septic.

5 Priority Nursing Interventions

🔴 HEMODIALYSIS — Nurse Actions

- ▶ **PRE:** Weigh client (compare to dry weight), VS, assess access for thrill & bruit **ASSESS**
- ▶ **HOLD** antihypertensives & water-soluble meds before dialysis (dialyzed out)
- ▶ **PROTECT the access arm:** NO BP, NO IV, NO blood draws, NO tight sleeves **SAFETY**
- ▶ Palpate **thrill** (vibration) & auscultate **bruit** (whooshing) every shift
- ▶ **DURING:** Monitor VS q15min, watch for hypotension & disequilibrium **CIRCULATION**
- ▶ **POST:** Weigh client, assess bleeding at access site, monitor BP standing/sitting
- ▶ Fistula takes **4–6 weeks to mature**; graft 2–4 weeks; CVC used immediately

💧 PERITONEAL DIALYSIS — Nurse Actions

- ▶ **STRICT STERILE TECHNIQUE** during bag changes **SAFETY**
- ▶ **Warm dialysate to body temp** (reduces cramping, improves clearance) — use warmer, NOT microwave
- ▶ Daily weight, VS, blood glucose (hyperglycemia risk from dextrose)
- ▶ **Assess effluent every exchange:** should be clear/pale yellow
- ▶ **If outflow is slow:** reposition (turn side to side), check for kinks, assess for constipation
- ▶ HOB up if SOB during dwell (diaphragm pressure) **AIRWAY**
- ▶ Inflow/outflow **strictly monitored:** positive fluid balance = retained dialysate
- ▶ Provide **HIGH-PROTEIN diet** — albumin is lost through peritoneum

6 Pharmacology Considerations

ANTICOAGULANT

Heparin

Why/When: Given during HD to prevent clotting in the dialyzer circuit

Side Effects: Bleeding, thrombocytopenia (HIT)

Nursing: Monitor aPTT; hold pressure post-dialysis; watch for bleeding

PHOSPHATE BINDER

Calcium Acetate / Sevelamer (Renagel)

Why: Lower serum phosphate in CKD

Nursing: **Give WITH meals** to bind dietary phosphorus

Teach: Watch for constipation; monitor Ca^{2+} & phosphorus levels

ERYTHROPOIETIN STIMULATOR

Epoetin alfa (Epogen) / Darbepoetin (Aranesp)

Why: Treat anemia of CKD (kidneys no longer make erythropoietin)

Side Effects: HTN, thrombotic events, headache

Nursing: Monitor H&H, BP; target Hgb 10–11 g/dL (not normal — overshoot = clot risk)

VITAMIN D ANALOG

Calcitriol (Rocaltrol)

Why: Kidneys can't activate vit D → low Ca^{2+} → bone disease

Nursing: Monitor Ca^{2+} (risk hypercalcemia), phosphorus

ANTIBIOTIC (PD)

Intraperitoneal antibiotics

Why: Added directly to dialysate to treat peritonitis

Nursing: Strict sterile technique when adding to bag; monitor effluent clarity

AVOID / HOLD PRE-HD

Water-soluble meds & Antihypertensives

Examples: B vitamins, vit C, many antibiotics, BP meds

Why: They'll be dialyzed out — give AFTER HD. BP meds → profound hypotension

7 NCLEX Test Traps ⚠️

TRAP #1 — FISTULA ARM

Taking BP on the fistula arm "just this once" → Use the opposite arm, ALWAYS. Any compression can damage or clot the access.

TRAP #2 — DISEQUILIBRIUM

Continuing dialysis at the same rate when patient develops headache & confusion → SLOW or STOP the rate and notify HCP. Rapid clearance is causing cerebral edema.

TRAP #3 — CLOUDY EFFLUENT

Documenting and continuing exchanges when PD effluent is cloudy → Cloudy effluent = peritonitis. Send sample for C&S, notify provider.

TRAP #4 — GIVING BP MEDS PRE-HD

"Administer all scheduled morning meds before dialysis" → HOLD antihypertensives and water-soluble meds; give after dialysis.

TRAP #5 — WEIGHING MATTERS

Skipping daily weights → Daily weight is the single most reliable indicator of fluid status. Weight gain between HD sessions = fluid overload.

TRAP #6 — SLOW OUTFLOW IN PD

Calling the provider immediately for slow outflow → Try nursing interventions FIRST: reposition client, check for kinks, assess bowel pattern (constipation is a common cause).

TRAP #7 — PROTEIN DIET CONFUSION

Low protein for all dialysis clients → PD clients need HIGH protein (lost in effluent). HD clients get moderate protein.

TRAP #8 — MICROWAVING DIALYSATE

Warming PD dialysate in the microwave → Uneven heating = burn risk. Use a commercial warmer or warm water bath.

8 Patient Education

HD Patient Teaching

- ✓ NEVER allow BP, IV, or blood draws on the fistula arm
- ✓ Check the **thrill daily** — feel the vibration; report loss immediately
- ✓ Don't sleep on the access arm; avoid tight jewelry or clothing
- ✓ Follow fluid and dietary restrictions: low K⁺, low phosphorus
- ✓ Report: weight gain >2–3 lbs between sessions, shortness of breath, swelling
- ✓ Carry emergency ID indicating dialysis dependence
- ✓ Take phosphate binders WITH meals
- ✓ No heavy lifting (>5–10 lbs) with the access arm

PD Patient Teaching

- ✓ Wash hands and wear mask during exchanges — STRICT sterile technique
- ✓ Inspect effluent every exchange — **cloudy = call provider STAT**
- ✓ Eat HIGH protein; watch blood sugar (dextrose absorption)
- ✓ Daily weights; report weight gain or abdominal fullness
- ✓ Warm dialysate with a warmer — NEVER the microwave
- ✓ Keep exit site clean & dry; report redness, drainage, or pain
- ✓ Prevent constipation — it causes outflow problems

- ✓ Keep a log of exchanges, weights, VS, and any symptoms

9 Memory Boosters & Mnemonics

"FISTULA" — Access Care

- F**eel the thrill daily (vibration)
- I**nspect for redness, drainage, swelling
- S**ound the bruit with stethoscope
- T**ight clothing & jewelry — AVOID
- U**se the OTHER arm for BP, IV, labs
- L**imit heavy lifting with that arm
- A**ssess circulation distal to the site

"Cloudy = Call" — Peritonitis Rule

If the PD effluent is **CLOUDY** → **CALL the provider**. It is the **earliest and most reliable sign** of peritonitis. Don't wait for fever or pain — the cell count in effluent rises first.

"Same Time, Same Scale, Same Clothes" — Daily Weight Rule

Weight is the #1 indicator of fluid status in dialysis. A 1-kg weight gain $\approx$ 1 L of retained fluid.

"DISEQUILIBRIUM = Drop the rate"

Headache + confusion + nausea during HD? **Slow the rate**. Don't keep going.

"Warm, Not Hot" — Dialysate Rule

Warm PD dialysate to **body temperature**. Cold causes cramping; microwaved is unevenly hot & can burn the peritoneum.

10 NCJMM Clinical Judgment Framework

Applying the Next Generation NCLEX Model to Dialysis Care

1

Recognize Cues

Cloudy PD effluent, absent thrill/bruit, BP drop during HD, confusion, weight gain >2 kg, fever after exchange.

2

Analyze Cues

Cloudy = peritonitis. Absent thrill = clotted access. BP drop = rapid fluid removal. Confusion during HD = disequilibrium.

3

Prioritize / Generate Solutions

ABCs first. Stop or slow dialysis if disequilibrium. Send effluent for culture. Notify HCP for access concerns. Protect fistula arm.

4

Take Action & Evaluate

Implement interventions; reassess VS, LOC, effluent clarity, access function, daily weight. Document response and adjust plan.



High-Yield NCLEX Dialysis Card — NGN 2026 Aligned

Next up in the series: **CKD/ESRD Management or Fluid & Electrolyte Imbalances in Renal Failure?**