# New Grad
## Nurse Bundle

Pass the NCLEX and feel ready for your first year on the floor

**By Mary Veneman BSN RN CEN**

**10 guides • 47 pages**

Full-color visual review • practice questions with rationales • original content

- NCLEX-RN Study Guide
- Lab Values
- Isolation Precautions
- ABG Interpretation
- BLS Study Guide
- NCLEX-RN 8-Week Study Plan
- Med Math
- Rhythm Strips
- Sepsis Quick Guide
- Course Prep Planner

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*Study aid only — verify drug doses and protocols against current references and your institution’s policies.*

# NCLEX-RN®

## Study Guide

Clinical judgment • priorities • pharmacology • labs • all 8 client-needs areas

**By Mary Veneman BSN RN CEN**

A visual, high-yield review for nursing graduates preparing for the NCLEX-RN. It follows the 2026 NCLEX-RN Test Plan, which took effect April 1, 2026, and focuses on how the exam thinks: safety first, priorities, and clinical judgment.

### Inside this guide

- How the exam works and the 2026 test plan
- The clinical judgment model and NGN question types
- Prioritization frameworks and delegation
- High-yield content for all eight client-needs areas
- Lab values, drug classes and stem suffixes
- Maternity, pediatric and mental health essentials
- Test-taking strategies and 15 practice questions

**★ HEADS UP**

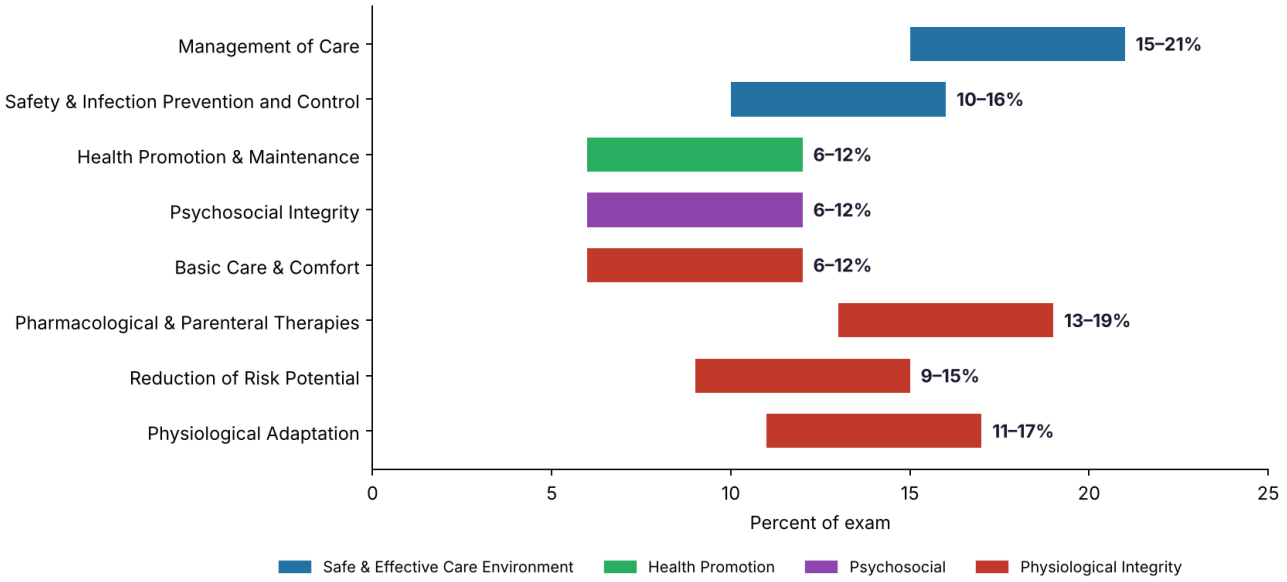
**What changed in 2026?** Very little. The category percentages, question count and format are the same as 2023. The main change is the name: “Safety and Infection Control” is now **“Safety and Infection Prevention and Control.”**

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## How the exam works

| Feature | Details |
|---|---|
| **Length** | 85 to 150 questions; up to 5 hours, including the tutorial and optional breaks |
| **Format** | Computerized adaptive testing (CAT): each answer changes the difficulty of the next question |
| **Scored items** | 70–135; 15 unscored pretest items are mixed in and look the same |
| **Case studies** | 3 scored case studies of 6 questions each (18 items), within the first 85 |
| **Scoring** | Pass/fail against a standard — no percentage. Many NGN items give partial credit |
| **Ending** | Stops when the computer is 95% sure you are above or below the standard, or you reach 150 items or 5 hours |

## 2026 test plan — client needs




*Percent ranges from the NCSBN 2026 NCLEX-RN Test Plan (same ranges as 2023).*

★ **MYTH BUSTER**

**The exam ending early doesn't mean you failed.** Shutting off at 85 questions happens to strong and weak test-takers. Don't read anything into the length — just answer each question as it comes.

## Clinical judgment — the heart of NGN



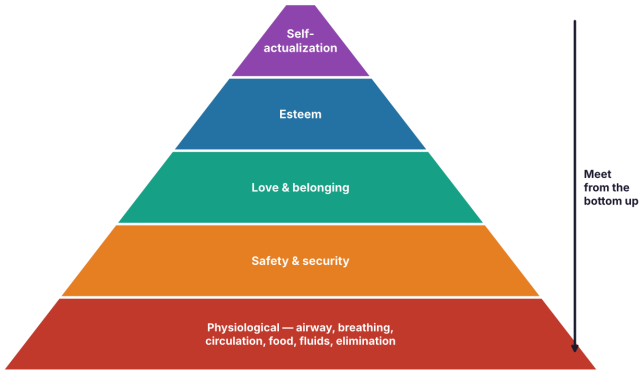

NGN questions follow NCSBN's clinical judgment model. Case studies walk through all six steps with one patient.

- **Recognize cues:** which findings matter?
- **Analyze cues:** what conditions fit?
- **Prioritize hypotheses:** which problem is most urgent?
- **Generate solutions:** what outcomes and actions?
- **Take action:** which interventions first?
- **Evaluate outcomes:** is the patient better, same or worse?

### NGN question types

| Type | What you do | Tip |
|---|---|---|
| **Extended multiple response** | Select all that apply from 5–10 options | Judge each option alone — true or false? |
| **Matrix / grid** | Check a box in each row (e.g., indicated / not indicated) | Each row is its own mini-question |
| **Drop-down (cloze)** | Pick words to complete a sentence or table | Read the whole sentence first |
| **Drag-and-drop** | Move options into blanks or put steps in order | For ordering, find the first and last steps |
| **Highlight** | Highlight relevant findings in notes or a table | Highlight only what's abnormal or relevant |
| **Bowtie** | Condition in the middle, 2 actions and 2 parameters to monitor | Pick the condition first; the rest follows |
| **Trend** | Review data over time (vital signs, labs, notes) | Look for the direction of change |

## Prioritization frameworks




- **ABCs:** airway → breathing → circulation (except CPR: compressions first)
- **Maslow:** physical needs before safety, then emotional needs
- **Acute before chronic;** unstable before stable; unexpected before expected
- **Actual problems before potential** ones
- **Safety:** the least restrictive option that keeps the patient safe
- **Assess before acting** — unless the patient is in danger now (e.g., stop a transfusion reaction first)

## Delegation and assignment

| RN | LPN / LVN | UAP / CNA |
|---|---|---|
| • Initial and ongoing assessment | • Stable, predictable patients | • Vital signs on stable patients |
| • Care planning and evaluation | • Data collection, reinforce teaching | • Bathing, feeding, toileting |
| • Teaching (new info) | • Oral, IM, subQ meds | • Ambulating, turning |
| • Unstable or unpredictable patients | • Tube feedings, suctioning | • Intake & output |
| • IV push meds, blood products | • Sterile dressing changes | • Obtaining weights |
| • Discharge teaching | • Urinary catheter insertion | • Report changes to the nurse |

**Five rights of delegation:** right task, right circumstance, right person, right directions and communication, right supervision and evaluation. The RN stays accountable for delegated care. Remember: **you can't delegate assessment, teaching or evaluation**, and never delegate an unstable patient.

## Safe and Effective Care Environment

| MANAGEMENT OF CARE (15–21%) | |
|---|---|
| **Consent** | The provider explains the procedure; the nurse witnesses the signature and confirms understanding. Minors need a guardian unless emancipated. |
| **Advance directives** | Living will and health care power of attorney. Ask on admission; respect DNR orders (DNR ≠ do not treat). |
| **Confidentiality** | Share information only with the care team and people the patient authorizes. No photos, no social media. |
| **Ethics** | Autonomy, beneficence, nonmaleficence, justice, fidelity, veracity. Report unsafe practice through the chain of command. |
| **Communication** | SBAR for reports; read back verbal and phone orders; use qualified interpreters, never children. |
| **Discharge** | Start planning on admission; teach-back; arrange case management and home services. |

| SAFETY & INFECTION PREVENTION AND CONTROL (10–16%) | |
|---|---|
| **Precautions** | **Contact:** C. diff (soap and water), MRSA, VRE, scabies. **Droplet:** flu, pertussis, meningitis (N. meningitidis), mumps — surgical mask within 6 feet. **Airborne:** TB, measles, varicella — N95 and negative-pressure room. |
| **Restraints** | Last resort with an order; check every 15 minutes or per policy; release and reposition at least every 2 hours; tie to the bed frame with quick-release knots. |
| **Falls** | Bed low and locked, call light in reach, non-skid socks, hourly rounding, bed alarms. |
| **Fire (RACE)** | Rescue, Alarm, Contain, Extinguish. Extinguisher: PASS (pull, aim, squeeze, sweep). |
| **ID and meds** | Two identifiers; six rights of medication administration; report errors with an incident report (not mentioned in the chart). |
| **Ergonomics** | Wide base of support, bend at the knees, use lift equipment. |

## Health Promotion and Maintenance (6–12%)

- **Pregnancy:** Naegele's rule = first day of last period − 3 months + 7 days + 1 year
- Normal fetal HR **110–160**; late decelerations = placental problem → turn left side, stop oxytocin, give $O_2$, IV fluids, notify
- Early decels mirror contractions (head compression) — normal; variable decels = cord compression → change position
- **Rh-negative mother:** RhoGAM at 28 weeks and within 72 h after birth
- Postpartum: boggy uterus → massage fundus; check bladder
- **Newborn:** APGAR at 1 and 5 min; vitamin K and eye ointment
- **Milestones:** rolls over ~4–6 mo, sits ~6 mo, walks ~12 mo, 2-word phrases ~2 y
- **Erikson:** trust (infant), autonomy (toddler), initiative (preschool), industry (school age), identity (teen)
- **Screening:** follow current guidelines for blood pressure, cancer and other screenings
- **Live vaccines** (MMR, varicella): avoid in pregnancy and in people with weakened immune systems

## Psychosocial Integrity (6–12%)

| Topic | Key points |
|---|---|
| **Therapeutic communication** | Open-ended questions, reflection, silence. Avoid "why" questions, false reassurance and giving advice. |
| **Suicide risk** | Ask directly about a plan and means. Risk is high when mood suddenly lifts after depression. 1:1 observation; remove harmful objects. |
| **Lithium** | Level about 0.6–1.2 mEq/L; keep sodium and fluid intake steady; toxicity = vomiting, diarrhea, tremor, confusion. |
| **Antipsychotics** | Watch for extrapyramidal symptoms, tardive dyskinesia, and neuroleptic malignant syndrome (fever, rigidity, unstable vital signs). |
| **Alcohol withdrawal** | Starts 6–24 h after the last drink; seizures and delirium tremens possible. Benzodiazepines, thiamine, seizure precautions. |
| **Abuse** | Interview alone; document objectively; nurses are mandatory reporters for child and elder abuse. |
| **Crisis and grief** | Stay with the patient, be honest, support coping. Grief stages are not always in order. |

## Physiological Integrity

| BASIC CARE & COMFORT (6–12%) | |
|---|---|
| **Mobility** | Crutches: 2–3 finger widths below the armpit, weight on hands. Cane: opposite the weak leg; "up with the good, down with the bad." |
| **Nutrition** | Check tube placement before feeds; head of bed 30–45°. Dysphagia: sit upright, thickened liquids as ordered, chin tuck. |
| **Elimination** | Catheter bag below the bladder; no routine irrigation; remove as soon as possible (CAUTI). |
| **Comfort** | Use pain scales (numeric, FACES, FLACC for infants/nonverbal); reassess 30–60 min after a dose. |
| **Sleep** | Reduce noise and light, cluster care, limit caffeine. |

## PHARMACOLOGICAL & PARENTERAL THERAPIES (13–19%)

| | |
|---|---|
| **Insulin** | Rapid (lispro): onset 15 min — give with meals. Regular: only insulin given IV. NPH: cloudy, peak 4–12 h. Glargine: no peak; don't mix. |
| **Anticoagulants** | Heparin: aPTT, antidote protamine. Warfarin: INR 2–3, antidote vitamin K, steady vitamin K diet. Watch for bleeding. |
| **Cardiac** | Digoxin: hold if apical HR < 60; toxicity = nausea, yellow/green vision; low potassium raises risk. Beta-blockers: hold for low HR/BP. |
| **Antibiotics** | Get cultures first. Vancomycin: trough/AUC, infuse over at least 60 min. Aminoglycosides: kidney and hearing toxicity. |
| **Blood** | Verify with 2 nurses; 18–20 gauge IV; normal saline only; stay with the patient 15 min; stop for any reaction. |
| **IV therapy** | Infiltration: stop, elevate, cool or warm compress per drug. Phlebitis: stop, warm compress. TPN: glucose checks; don't stop suddenly. |

### Drug class suffixes

| Suffix | Class | Example | Watch for |
|---|---|---|---|
| -pril | ACE inhibitor | lisinopril | Dry cough, angioedema, high potassium |
| -sartan | ARB | losartan | High potassium, dizziness |
| -olol | Beta-blocker | metoprolol | Low HR/BP; masks low-sugar signs |
| -dipine | Calcium channel blocker | amlodipine | Low BP, swelling of ankles |
| -statin | Cholesterol lowering | atorvastatin | Muscle pain, liver tests |
| -prazole | Proton pump inhibitor | pantoprazole | Take before breakfast |
| -azepam / -azolam | Benzodiazepine | lorazepam | Sedation; antidote flumazenil |
| -mycin / -micin | Aminoglycoside / macrolide | gentamicin | Kidney and hearing damage |
| -parin | Anticoagulant | enoxaparin | Bleeding; low platelets |
| -sone / -olone | Corticosteroid | prednisone | High glucose, infection; taper off |

## REDUCTION OF RISK POTENTIAL (9–15%)

| | |
|---|---|
| **Procedures** | Cardiac cath: check pulses, keep leg straight, watch for bleeding. Contrast: check allergies and kidney function; hold metformin per policy. |
| **Post-op** | Watch for bleeding, low urine output, atelectasis (incentive spirometer 10×/hour), DVT (early walking, SCDs), and wound separation (cover with sterile saline gauze). |
| **Lines and tubes** | Chest tube: keep below the chest; continuous bubbling in water seal = air leak. NG tube: check placement and patency. |
| **Vital signs** | Report new changes from baseline: $SpO_2$ drop, new irregular heart rhythm, change in level of consciousness. |

## Lab values to know (typical adult ranges)

| Lab | Normal | Lab | Normal |
|---|---|---|---|
| Sodium | 135–145 mEq/L | Hemoglobin | M 14–18, F 12–16 g/dL |
| Potassium | 3.5–5.0 mEq/L | Platelets | 150,000–400,000 |
| Calcium | 8.5–10.5 mg/dL | WBC | 5,000–10,000 |
| Magnesium | 1.5–2.5 mEq/L | INR (no warfarin) | 0.8–1.2 (on warfarin 2–3) |
| Glucose (fasting) | 70–100 mg/dL | aPTT | 30–40 s (heparin 1.5–2.5×) |
| BUN | 10–20 mg/dL | HbA1c | < 5.7% normal; diabetes ≥ 6.5% |
| Creatinine | 0.6–1.2 mg/dL | ABG pH | 7.35–7.45 |
| Albumin | 3.5–5.0 g/dL | $PaCO_2$ / $HCO_3$ | 35–45 mmHg / 22–26 mEq/L |

*Ranges vary slightly by lab — the NCLEX gives reference ranges when exact numbers matter.*

## PHYSIOLOGICAL ADAPTATION (11–17%)

| | |
|---|---|
| **Respiratory** | COPD: $SpO_2$ 88–92%, pursed-lip breathing. Asthma: silent chest is an emergency. PE: sudden dyspnea and chest pain → $O_2$, anticoagulation. |
| **Cardiac** | MI: aspirin, ECG within 10 min. Heart failure: daily weights (report 2–3 lb in a day or 5 lb in a week), low sodium, diuretics. |
| **Neuro** | Increased ICP: Cushing's triad (high BP with wide pulse pressure, low HR, irregular breathing); head of bed 30°. Stroke: last known well time, swallow screen. |
| **Endocrine** | DKA: insulin drip, fluids, watch potassium. Hypoglycemia: rule of 15. Thyroid storm vs myxedema coma. |
| **Renal and fluids** | AKI: watch potassium and fluid overload. Dialysis: no BP or IV in the fistula arm; feel the thrill, hear the bruit. |
| **Shock and sepsis** | Early signs: tachycardia, tachypnea, confusion. Sepsis: cultures, antibiotics, fluids within the first hour. |

## Test-taking strategies

- Read the **last line first** — what is the question really asking?
- Look for key words: **first, best, priority, needs further teaching**
- "Needs further teaching" = pick the **wrong** statement
- Assume you have the staff and supplies you need
- Choose the answer that helps the patient **now**, at the bedside
- Eliminate answers with "always" or "never"
- If two answers say the same thing, both are usually wrong
- Don't pick "call the provider" if a nursing action can come first
- SATA: treat each option as true or false
- Breathe, pace yourself, and take the optional breaks

## Practice questions

**1.** Which patient should the nurse see first after report?
- **A.** A patient with COPD and $SpO_2$ 90%
- **B.** A post-op patient with new restlessness and $SpO_2$ 85%
- **C.** A patient asking for pain medication, pain 5/10
- **D.** A patient with diabetes and glucose 210

**2.** Which task can the RN delegate to a UAP?
- **A.** Assessing a new admission
- **B.** Evaluating response to pain medication
- **C.** Taking vital signs on a stable patient
- **D.** Teaching a patient about a new inhaler

**3.** A patient has measles. Which precautions are needed?
- **A.** Droplet
- **B.** Airborne
- **C.** Standard only
- **D.** Contact

**4.** A patient with C. difficile is in contact isolation. How should the nurse clean their hands after care?
- **A.** Chlorhexidine wipes
- **B.** Alcohol-based gel
- **C.** Soap and water
- **D.** Gloves only

**5.** The fetal heart tracing shows late decelerations. What is the first action?
- **A.** Turn the patient to her left side
- **B.** Increase the oxytocin
- **C.** Prepare for discharge
- **D.** Document and keep watching

**6.** A patient on lithium has vomiting, diarrhea and a coarse tremor. What should the nurse suspect?
- **A.** Serotonin syndrome
- **B.** Alcohol withdrawal
- **C.** Normal side effects
- **D.** Lithium toxicity

**7.** Before giving digoxin, the apical pulse is 54. What should the nurse do?
- **A.** Give half the dose
- **B.** Give the dose
- **C.** Hold the dose and notify the provider
- **D.** Recheck in 4 hours and give

**8.** Which potassium level should be reported right away?
- **A.** 4.2 mEq/L
- **B.** 4.8 mEq/L
- **C.** 3.8 mEq/L
- **D.** 6.1 mEq/L

**9.** A patient with heart failure gained 3 lb since yesterday. What does this suggest?
- **A.** Normal variation
- **B.** Dehydration
- **C.** Better nutrition
- **D.** Fluid retention

**10.** Which statement by a patient taking warfarin needs further teaching?
- **A.** “I’ll report blood in my urine.”
- **B.** “I’ll eat a lot more spinach starting this week.”
- **C.** “I’ll keep my INR appointments.”
- **D.** “I’ll use a soft toothbrush.”

**11.** A patient receiving blood develops chills and back pain. First action?
- **A.** Stop the transfusion
- **B.** Give acetaminophen
- **C.** Call the lab
- **D.** Slow the transfusion

**12.** Which is the best example of therapeutic communication?
- **A.** “Tell me more about how you’re feeling.”
- **B.** “If I were you, I’d have the surgery.”
- **C.** “Why did you stop taking your medicine?”
- **D.** “Don’t worry, everything will be fine.”

**13.** A patient using a cane has a weak right leg. Which hand should hold the cane?
- **A.** Left
- **B.** Both
- **C.** Right
- **D.** Either

**14.** A patient with a head injury has BP 186/60, HR 48 and irregular breathing. What do these findings suggest?
- **A.** Hypoglycemia
- **B.** Hypovolemic shock
- **C.** Sepsis
- **D.** Increased intracranial pressure

**15.** A client is 2 hours post-op and has urine output of 20 mL/h for 2 hours. Weight 80 kg. What should the nurse do?
- **A.** Restrict fluids
- **B.** Keep watching
- **C.** Assess and notify the provider
- **D.** Remove the catheter

## Answers and rationales

| # | Ans | Why |
|---|---|---|
| 1 | **B** | New restlessness with hypoxia is an airway/breathing problem — unstable. |
| 2 | **C** | Routine tasks for stable patients can be delegated; assessment, teaching and evaluation can't. |
| 3 | **B** | Measles, varicella and TB need airborne precautions with an N95 and negative-pressure room. |
| 4 | **C** | Alcohol doesn't kill C. diff spores; use soap and water. |
| 5 | **A** | Late decels mean poor placental blood flow: turn left, stop oxytocin, give $O_2$, IV fluids, notify. |
| 6 | **D** | GI upset and coarse tremor are signs of toxicity; hold the dose and check the level. |
| 7 | **C** | Hold digoxin for an adult apical HR under 60. |
| 8 | **D** | Normal is 3.5–5.0; 6.1 can cause dangerous rhythms. |
| 9 | **D** | A gain of 2–3 lb in a day suggests fluid retention — notify the provider. |
| 10 | **B** | Big changes in vitamin K intake change warfarin's effect; keep it steady. |
| 11 | **A** | Stop the transfusion first, then keep the line open with saline through new tubing and notify. |
| 12 | **A** | Open-ended statements invite the patient to share. |
| 13 | **A** | Hold the cane on the strong side (opposite the weak leg). |
| 14 | **D** | This is Cushing's triad, a late sign of increased ICP — an emergency. |
| 15 | **C** | Minimum is about 0.5 mL/kg/h (40 mL/h for 80 kg); check the bladder and catheter, then report. |

**★ ABOUT THE AUTHOR**

**Mary Veneman BSN RN CEN** is a Certified Emergency Nurse (CEN®) and critical care nurse with experience in med-surg, ICU, and ER nursing. She shares that experience with nurses who want to deepen their knowledge and become certified.

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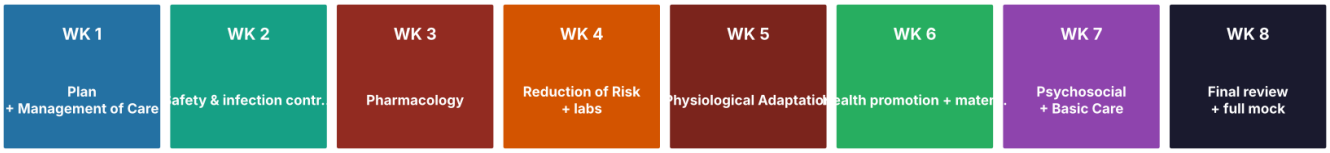
# NCLEX-RN®

## 8-Week Study Plan

A weekly routine built on the 2026 NCLEX-RN® Test Plan — with checkpoints

**By Mary Veneman BSN RN CEN**

Eight weeks, one client-needs area at a time, following the 2026 NCLEX-RN Test Plan (85–150 questions, up to 5 hours, three scored case studies). Plan on about 1–2 hours a day and roughly 75 practice questions a week, including NGN-style case studies.




### Your weekly routine

| Day | What to do |
|---|---|
| **Mon** | Read the week's topic in the guide; make a one-page summary |
| **Tue–Wed** | 25–30 practice questions a day; read every rationale |
| **Thu** | One NGN case study (6 questions); re-read missed topics |
| **Fri** | 25 mixed practice questions |
| **Sat** | Rest or light flashcards |
| **Sun** | Miss log review + next week preview |

**★ HOW TO USE THIS PLAN**

Keep a **miss log**: for every practice question you miss, write the topic and why you missed it (didn't know it, misread it, changed my answer). Review it every Sunday. Each week points to the matching section of the **NCLEX-RN Study Guide**.

### Exam week checklist

- Confirm your Authorization to Test, date and Pearson VUE center
- Bring acceptable ID exactly matching your registration
- Plan the route; arrive 30 minutes early
- Sleep — no cramming the night before
- Read the last line of each question first
- Answer as if you have staff and supplies
- Don't read into when the test shuts off
- Use the optional breaks

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Study plan for personal use.

## Week by week

| Wk | Focus | Key topics | Practice / resources | ✓ |
|---|---|---|---|---|
| 1 | **Plan + Management of Care** 15–21% | How the exam works, clinical judgment model, priorities (ABCs, Maslow), delegation and assignment, consent, ethics, advance directives | Baseline: 50 mixed questions. Guide: exam, CJ and delegation pages | ☐ |
| 2 | **Safety & infection control** 10–16% | Precautions (contact, droplet, airborne), restraints, falls, fire (RACE/PASS), med safety, error reporting | Isolation Precautions guide; 75 questions | ☐ |
| 3 | **Pharmacology** 13–19% | Drug suffixes, insulin, anticoagulants, cardiac drugs, antibiotics, blood transfusion, IV complications | Med Math guide; 75 questions | ☐ |
| 4 | **Reduction of Risk + labs** 9–15% | Lab values, procedures, post-op complications, lines and tubes, vital sign changes | Lab Values guide; **checkpoint: 85-question timed practice test** | ☐ |
| 5 | **Physiological Adaptation** 11–17% | Respiratory, cardiac, neuro (ICP), endocrine (DKA), renal, shock and sepsis, ABGs | ABG and Sepsis guides; 75 questions | ☐ |
| 6 | **Health promotion + maternity/peds** 6–12% | Pregnancy, fetal monitoring, newborn, growth and development, immunizations | 75 questions incl. maternity/peds | ☐ |
| 7 | **Psychosocial + Basic Care** 6–12% each | Therapeutic communication, suicide risk, psych meds, withdrawal, abuse; mobility, nutrition, elimination, comfort | NGN case studies (at least 3); 75 questions | ☐ |
| 8 | **Final review + full mock** your miss log | Restudy the weakest areas. Mid-week: full 150-question timed practice test. Stop new material 2 days before | Exam-day checklist below | ☐ |

## Score tracker

| Area | Baseline | Midpoint | Final mock | Notes |
|---|---|---|---|---|
| Management of Care | | | | |
| Safety & Infection Prevention | | | | |
| Pharmacology | | | | |
| Reduction of Risk | | | | |
| Physiological Adaptation | | | | |
| Health Promotion / Psychosocial / Basic Care | | | | |
| **Overall** | | | | |

**About the author:** Mary Veneman BSN RN CEN is a Certified Emergency Nurse (CEN®) and critical care nurse with experience in med-surg, ICU, and ER nursing. She shares that experience with nurses who want to deepen their knowledge and become certified.

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# Lab Values

## Quick Guide

Electrolytes • kidney • liver • blood • cardiac • ABG

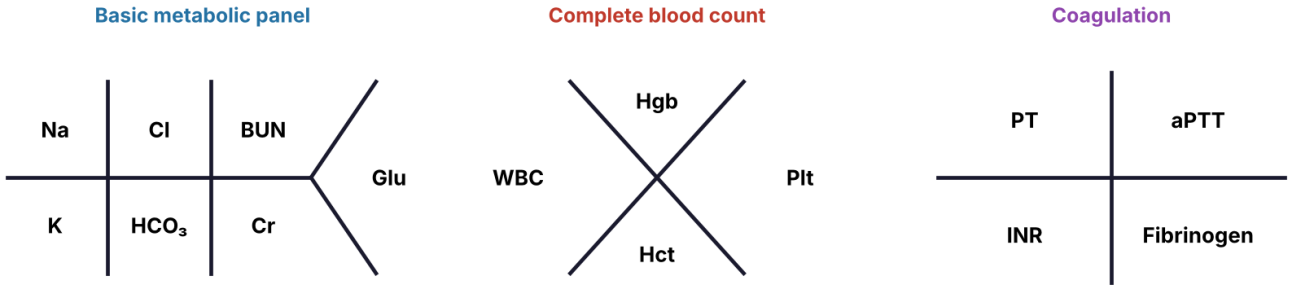
**By Mary Veneman BSN RN CEN**

A quick reference for common adult lab values with what highs and lows look like at the bedside.

### Inside this guide

- Fishbone shorthand
- Electrolytes
- Kidney, liver, blood and coagulation
- Cardiac, infection and drug levels
- 8 practice questions

## Charting shorthand (fishbones)




## Electrolytes

| Lab | Normal (adult) | Too low | Too high |
|---|---|---|---|
| **Sodium** | 135–145 mEq/L | Confusion, seizures; correct slowly (≤ 8–10 in 24 h) | Thirst, confusion; often dehydration |
| **Potassium** | 3.5–5.0 mEq/L | Weakness, U waves, dysrhythmias | Peaked T waves → calcium, insulin + glucose |
| **Calcium** | 8.5–10.5 mg/dL | Tingling, tetany, Chvostek/Trousseau, long QT | Stones, bones, groans, confusion |
| **Magnesium** | 1.5–2.5 mEq/L | Tremor, torsades; low Mg keeps K low | Low reflexes, low RR (Mg drips in OB) |
| **Phosphate** | 2.5–4.5 mg/dL | Refeeding syndrome, weakness | Kidney failure |
| **Glucose** | 70–100 fasting | < 70: rule of 15 | DKA/HHS; infection risk |

## Kidney, liver and blood

| Lab | Normal | Notes |
|---|---|---|
| **BUN / creatinine** | 10–20 / 0.6–1.2 mg/dL | BUN:Cr > 20 suggests dehydration or GI bleed |
| **AST / ALT** | About 10–40 units/L | Liver injury (ALT more specific) |
| **Bilirubin (total)** | 0.3–1.2 mg/dL | Jaundice above ~2.5–3 |
| **Albumin** | 3.5–5.0 g/dL | Low = malnutrition, liver disease; low Ca may be falsely low |
| **Lipase** | Lab-specific | ≥ 3× normal supports pancreatitis |
| **Hemoglobin** | M 14–18, F 12–16 g/dL | Transfuse usually at < 7 (< 8 with heart disease) |
| **WBC** | 5,000–10,000/mm³ | ANC < 500 = severe neutropenia (precautions) |
| **Platelets** | 150,000–400,000 | < 50,000 bleeding risk; < 20,000 spontaneous bleeding |
| **PT/INR** | INR 0.8–1.2 | Warfarin goal usually 2–3 (2.5–3.5 for some valves) |
| **aPTT** | 30–40 s | Heparin goal 1.5–2.5× control or anti-Xa per protocol |

## Cardiac, infection and other

| Lab | Normal | Notes |
|---|---|---|
| **Troponin** | Assay-specific (high-sensitivity) | Rise and fall pattern = myocardial injury; repeat per protocol |
| **BNP / NT-proBNP** | BNP < 100 pg/mL | Heart failure; NT-proBNP cutoffs vary by age |
| **Lactate** | < 2 mmol/L | ≥ 4 = high risk in sepsis; repeat if high |
| **HbA1c** | < 5.7% | Diabetes ≥ 6.5% |

| Lab | Normal | Notes |
|---|---|---|
| **ABG** | pH 7.35–7.45, $PaCO_2$ 35–45, $HCO_3$ 22–26, $PaO_2$ 80–100 | See the ABG guide in this series |
| **Digoxin** | About 0.5–2.0 ng/mL | Toxicity risk higher with low K |
| **Lithium** | About 0.6–1.2 mEq/L | Toxicity: tremor, vomiting, confusion |

**★ REMEMBER**
Reference ranges vary by lab and method — always use your lab's ranges. On exams, look for the trend and the patient: a potassium of 5.6 with peaked T waves is an emergency.

## Practice questions

**1.** Which potassium needs immediate attention?
- **A.** 6.3
- **B.** 3.6
- **C.** 4.4
- **D.** 4.9

**2.** Low calcium sign:
- **A.** Bradycardia only
- **B.** Kidney stones
- **C.** Constipation
- **D.** Hyperactive reflexes and tingling

**3.** BUN 48, creatinine 1.0 in a patient with melena suggests:
- **A.** Upper GI bleed or dehydration
- **B.** Normal
- **C.** Kidney failure
- **D.** Liver failure

**4.** Platelets 18,000. Priority?
- **A.** Ambulate
- **B.** Rectal temps
- **C.** Bleeding precautions
- **D.** IM injections

**5.** Usual INR goal for warfarin (AF)?
- **A.** 1.0–1.5
- **B.** 2–3
- **C.** > 5
- **D.** 4–5

**6.** Lactate 4.6 in suspected sepsis means:
- **A.** Normal
- **B.** High risk — aggressive resuscitation
- **C.** Lab error
- **D.** Dehydration only

**7.** Sodium 118 — correction speed?
- **A.** Only fluids restriction always
- **B.** As fast as possible
- **C.** No treatment
- **D.** Slowly to avoid osmotic demyelination

**8.** Low magnesium makes which problem hard to fix?
- **A.** Low glucose
- **B.** High sodium
- **C.** Low potassium
- **D.** High calcium

## Answers and rationales

| # | Ans | Why |
|---|---|---|
| 1 | **A** | Normal is 3.5–5.0. |
| 2 | **D** | Tetany, Chvostek/Trousseau. |
| 3 | **A** | High BUN:Cr ratio. |
| 4 | **C** | Risk of spontaneous bleeding. |
| 5 | **B** | 2–3. |
| 6 | **B** | ≥ 4 is high risk. |
| 7 | **D** | Usually ≤ 8–10 mEq/L in 24 h. |
| 8 | **C** | Replace Mg to correct K. |

**★ ABOUT THE AUTHOR**
**Mary Veneman BSN RN CEN** is a Certified Emergency Nurse (CEN®) and critical care nurse with experience in med-surg, ICU, and ER nursing. She shares that experience with nurses who want to deepen their knowledge and become certified.

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# Med Math

## Dosage Calculations

Conversions • tablets • liquids • IV rates • drips • pediatric doses

**By Mary Veneman BSN RN CEN**

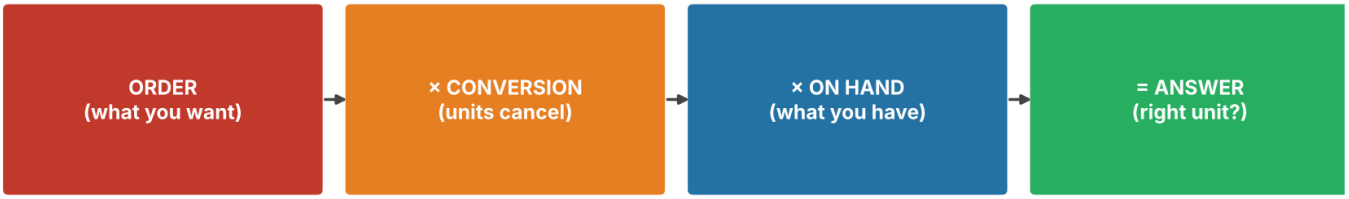
A step-by-step dosage calculation guide using one method for every problem — dimensional analysis — with worked examples.

### Inside this guide

- The one method that works for everything
- Conversions
- 10 worked examples
- Pediatric safe-dose check
- Rounding and abbreviation safety
- 8 practice questions

Quick-reference study guide by Mary Veneman BSN RN CEN.
Study aid only — verify against current references and your institution’s policies.

## One method for everything: dimensional analysis




Set up a chain of fractions so that every unit you don't want cancels, leaving only the unit you need. Check: does the answer make sense?

## Conversions to know

| Conversion | Value | Conversion | Value |
|---|---|---|---|
| 1 kg | 2.2 lb | 1 g | 1,000 mg |
| 1 mg | 1,000 mcg | 1 L | 1,000 mL |
| 1 tsp | 5 mL | 1 tbsp | 15 mL |
| 1 oz | 30 mL | 1 inch | 2.54 cm |
| °C | (°F − 32) ÷ 1.8 | °F | °C × 1.8 + 32 |

## Worked examples

| Problem | Setup | Answer |
|---|---|---|
| **Tablets:** order 0.5 g; have 250 mg tablets | 0.5 g × 1,000 mg/g ÷ 250 mg/tab | **2 tablets** |
| **Liquid:** order 80 mg; have 40 mg/5 mL | 80 mg × 5 mL ÷ 40 mg | **10 mL** |
| **Weight-based:** 15 mg/kg for 44 lb child | 44 ÷ 2.2 = 20 kg × 15 mg | **300 mg** |
| **IV pump:** 1,000 mL over 8 h | 1,000 ÷ 8 | **125 mL/h** |
| **Gravity drip:** 1,000 mL over 8 h, 15 gtt/mL | 125 mL/h × 15 ÷ 60 min | **31 gtt/min** |
| **Heparin:** 18 units/kg/h, 80 kg, 25,000 units/250 mL | 18 × 80 = 1,440 units/h ÷ 100 units/mL | **14.4 mL/h** |
| **Heparin bolus:** 80 units/kg, 80 kg | 80 × 80 | **6,400 units** |
| **mcg/kg/min:** dopamine 5 mcg/kg/min, 70 kg, 1,600 mcg/mL | 5 × 70 × 60 ÷ 1,600 | **13.1 mL/h** |
| **Insulin:** 0.1 units/kg/h, 90 kg, 1 unit/mL | 0.1 × 90 | **9 mL/h** |
| **Reconstitution:** add 2.5 mL to make 500 mg/3 mL; order 250 mg | 250 ÷ 500 × 3 mL | **1.5 mL** |

## Pediatric safe-dose check

Calculate the safe range in mg/kg/day, divide by the number of doses, then compare with the order. Example: 20 kg child, safe range 25–50 mg/kg/day divided every 8 hours → 500–1,000 mg/day → **167–333 mg per dose**. An order for 250 mg every 8 hours is safe.

★ **SAFETY**

**Rounding rules (common):** round mL to tenths (or hundredths under 1 mL), drops to whole numbers, and never round until the final step. Use a leading zero (0.5 mg) and never a trailing zero (5 mg, not 5.0 mg).

## Abbreviations to avoid (Joint Commission)

| Don’t write | Write instead |
|---|---|
| U, IU | units, international units |
| QD, QOD | daily, every other day |
| Trailing zero (1.0 mg) | 1 mg |
| No leading zero (.5 mg) | 0.5 mg |
| MS, $MSO_4$, $MgSO_4$ | morphine sulfate, magnesium sulfate |

## Practice questions

**1.** Order: 750 mg. Available: 250 mg tablets. Give:
- **A.** 4
- **B.** 2
- **C.** 1.5
- **D.** 3

**2.** Order 125 mg; available 250 mg/5 mL. Give:
- **A.** 5 mL
- **B.** 1.5 mL
- **C.** 2.5 mL
- **D.** 10 mL

**3.** A child weighs 33 lb. Weight in kg?
- **A.** 15
- **B.** 18
- **C.** 72.6
- **D.** 12

**4.** 500 mL over 4 hours by pump?
- **A.** 100 mL/h
- **B.** 125 mL/h
- **C.** 150 mL/h
- **D.** 200 mL/h

**5.** 1,000 mL over 10 h with 20 gtt/mL tubing:
- **A.** 50 gtt/min
- **B.** 33 gtt/min
- **C.** 100 gtt/min
- **D.** 25 gtt/min

**6.** Heparin 1,000 units/h; bag 25,000 units/500 mL. Rate?
- **A.** 20 mL/h
- **B.** 50 mL/h
- **C.** 10 mL/h
- **D.** 40 mL/h

**7.** Which is written correctly?
- **A.** .5 mg
- **B.** 5 U
- **C.** 5.0 mg
- **D.** 0.5 mg

**8.** Dobutamine 5 mcg/kg/min, 80 kg, 2,000 mcg/mL. Rate?
- **A.** 3 mL/h
- **B.** 6 mL/h
- **C.** 12 mL/h
- **D.** 24 mL/h

## Answers and rationales

| # | Ans | Why |
|---|---|---|
| 1 | **D** | 750 ÷ 250 = 3. |
| 2 | **C** | 125 × 5 ÷ 250. |
| 3 | **A** | 33 ÷ 2.2 = 15. |
| 4 | **B** | 500 ÷ 4. |
| 5 | **B** | 100 mL/h × 20 ÷ 60 = 33. |
| 6 | **A** | 50 units/mL → 20 mL/h. |
| 7 | **D** | Leading zero, no trailing zero. |
| 8 | **C** | 5 × 80 × 60 ÷ 2,000 = 12. |

**★ ABOUT THE AUTHOR**
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# Isolation

## Precautions Study Guide

Standard, contact, droplet, airborne, protective — PPE, rooms, durations, mnemonics

**By Mary Veneman BSN RN CEN**

### The six precaution types

| STANDARD<br>EVERY patient | CONTACT<br>Touch / surfaces | CONTACT-ENTERIC<br>Spores & GI bugs |
|---|---|---|
| • Hand hygiene | • Gown + gloves on entry | • Gown + gloves |
| • Gloves for body fluids | • Dedicated equipment | • **SOAP & WATER (no gel)** |
| • Mask/eyewear if splash risk | • Private room or cohort | • Bleach / sporicidal cleaning |
| • Safe sharps, respiratory etiquette | • MRSA, VRE, scabies, RSV | • C. diff, norovirus |

| DROPLET<br>Large droplets (≈ 3–6 ft) | AIRBORNE<br>Tiny particles hang in air | PROTECTIVE<br>Protects the PATIENT |
|---|---|---|
| • Surgical mask on entry | • Fit-tested N95 or PAPR | • **POSITIVE-pressure room, HEPA** |
| • Private room / 3-ft separation | • **NEGATIVE-pressure AIIR** | • No fresh flowers/plants |
| • Patient masks for transport | • Door closed | • Strict hand hygiene |
| • Flu, pertussis, meningococcus | • TB, measles, varicella | • Neutropenia, stem-cell transplant |

**★ THE KEY IDEA**

**Standard precautions apply to everyone, always.** Transmission-based precautions (contact, droplet, airborne) are **added on top** when an infection is suspected — start them on **suspicion**, don't wait for lab confirmation. Some diseases need more than one (e.g., varicella = airborne + contact).

# Mnemonics

### AIRBORNE — "MTV"

| | |
|---|---|
| **M** | Measles (rubeola) |
| **T** | Tuberculosis |
| **V** | Varicella / chickenpox and disseminated zoster (+ contact) |

### DROPLET — "SPIDERMAN"

| | |
|---|---|
| **S** | Sepsis, scarlet fever, strep pharyngitis |
| **P** | Parvovirus B19, pneumonia, pertussis, plague (pneumonic) |
| **I** | Influenza |
| **D** | Diphtheria (pharyngeal) |
| **E** | Epiglottitis (H. influenzae) |
| **R** | Rubella |
| **M** | Mumps, meningitis (bacterial), Mycoplasma |
| **A** | Adenovirus |
| **N** | Neisseria meningitidis |

### CONTACT — "MRS. WEE"

| | |
|---|---|
| **M** | Multidrug-resistant organisms (MRSA, VRE, CRE) |
| **R** | Respiratory infections (RSV) |
| **S** | Skin: impetigo, scabies, lice, herpes simplex, cutaneous diphtheria, varicella |
| **W** | Wound infections (draining) |
| **E** | Enteric: C. diff, norovirus, E. coli O157, rotavirus, hepatitis A (incontinent) |
| **E** | Eye: viral conjunctivitis |

## PPE order

**PUTTING ON (DONNING) — hand hygiene first**

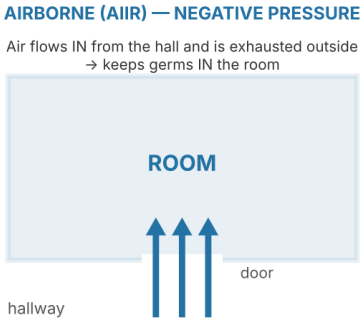
1 Gown → 2 Mask or N95 → 3 Goggles / face shield → 4 Gloves (over cuffs)

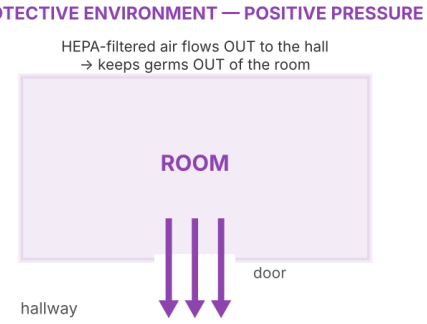
**TAKING OFF (DOFFING) — dirtiest first**

1 Gloves → 2 Goggles / face shield → 3 Gown → 4 Mask / N95 (outside room)

Remove gloves, eyewear, and gown at the doorway or in the anteroom; remove the **respirator after leaving** the room and closing the door. Hand hygiene after removing all PPE (and between steps if hands become contaminated). Some facilities remove gown and gloves together — follow policy.

## Room pressure



## Disease look-up table

| Disease / organism | Precautions | Duration / key point |
|---|---|---|
| C. difficile | **Contact-enteric** | Until diarrhea resolves (many facilities: 48 h symptom-free); soap and water, bleach cleaning |
| Norovirus | **Contact-enteric** | Until 48 h after symptoms resolve; bleach |
| MRSA, VRE, CRE, other MDROs | **Contact** | Per facility policy; dedicated equipment |
| RSV | **Contact** (± droplet) | Duration of illness; common in infants |
| Scabies, lice | **Contact** | Until 24 h after effective treatment |
| Impetigo | **Contact** | Until 24 h after effective therapy |
| Herpes zoster — localized, immunocompetent | Standard | Keep lesions covered; susceptible staff should not care for the patient |
| Herpes zoster — disseminated or immunocompromised | **Airborne** + **Contact** | Until all lesions are crusted |
| Varicella (chickenpox) | **Airborne** + **Contact** | Until all lesions are dry and crusted |
| Measles (rubeola) | **Airborne** | 4 days after rash onset (duration of illness if immunocompromised) |
| Tuberculosis (pulmonary/laryngeal) | **Airborne** | Until 3 negative AFB sputum smears or TB ruled out, with clinical improvement on therapy |
| Influenza | **Droplet** | 7 days from onset or 24 h after fever and symptoms resolve, whichever is longer |
| Pertussis | **Droplet** | Until 5 days of effective antibiotics |
| N. meningitidis (meningococcal) | **Droplet** | Until 24 h of effective antibiotics; prophylaxis for close contacts |
| Strep pharyngitis / scarlet fever | **Droplet** | Until 24 h of effective antibiotics |
| Mumps | **Droplet** | 5 days after onset of parotid swelling |
| Rubella | **Droplet** | 7 days after rash onset; pregnant staff should avoid |
| COVID-19, SARS, MERS | **Special** | N95, gown, gloves, eye protection; AIIR for aerosol-generating procedures; follow current CDC/facility guidance |
| Mpox | **Special** | Gown, gloves, eye protection, N95; until lesions crust and new skin forms |
| Viral hemorrhagic fever (Ebola) | **Special** | Enhanced PPE with trained observer for donning/doffing; dedicated equipment |

*Durations follow CDC guidance; always confirm with your facility's infection-prevention policy.*

## Nursing practice pearls

- **Hand hygiene**: alcohol rub is preferred for routine care — except C. diff, norovirus, and visibly soiled hands → **soap and water**.
- **Transport**: only when necessary. Droplet/airborne patients wear a **surgical mask** (never an N95 on the patient). Contact: cover wounds, clean gown/linen. Notify the receiving department.
- **Room assignment**: private room preferred; cohort patients with the **same** organism if needed. Airborne must go to an AIIR — keep the door closed.
- **Equipment**: dedicated stethoscope, BP cuff, thermometer; disinfect anything that leaves the room.
- **N95** must be fit-tested and seal-checked every time it's put on. Facial hair breaks the seal.
- **Visitors**: teach PPE use and hand hygiene; limit visitors for airborne; immunocompromised or pregnant visitors may need to avoid certain patients.
- **Protective environment**: no fresh flowers, plants, or standing water; avoid raw fruits/vegetables per policy; staff/visitors with infections stay out.
- **Psychosocial**: isolation causes loneliness and fewer staff visits — cluster care thoughtfully but check in often; explain why precautions are needed.
- **Pregnant staff**: avoid patients with rubella, CMV-shedding, parvovirus B19, and varicella if not immune.
- **Exposure**: needlestick → wash with soap and water, report immediately, post-exposure evaluation (HIV PEP ideally within 2 hours).

## Practice questions

| # | Question | Answer |
|---|---|---|
| 1 | A patient is admitted with suspected pulmonary TB. Which room is required? | Airborne infection isolation room (negative pressure) with N95 for staff. |
| 2 | Which hand hygiene method is required after caring for a patient with C. difficile? | Soap and water — alcohol does not kill spores. |
| 3 | A patient on droplet precautions needs a CT scan. What should the patient wear during transport? | A surgical mask. |
| 4 | Which patient can share a room with a patient who has MRSA in a wound? | Another patient colonized/infected with MRSA (cohorting same organism). |
| 5 | Correct order to remove PPE? | Gloves → goggles/face shield → gown → mask/respirator (outside the room) → hand hygiene. |
| 6 | A child has chickenpox. Which precautions? | Airborne + contact until all lesions are crusted. |
| 7 | A neutropenic patient's family brings fresh flowers. Best response? | Explain flowers/plants can carry organisms and are not allowed in a protective environment; suggest photos or cards. |
| 8 | A patient with meningococcal meningitis has been on IV antibiotics for 30 hours. Can droplet precautions stop? | Yes — droplet precautions can be discontinued after 24 hours of effective antibiotic therapy (per policy). |

**★ ABOUT THE AUTHOR**
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# Rhythm Strips

## Quick Guide

Sinus • atrial • heart blocks • lethal rhythms

**By Mary Veneman BSN RN CEN**

A fast, visual approach to telemetry strips: five questions for every strip, sample strips, and what to do for each rhythm.

### Inside this guide

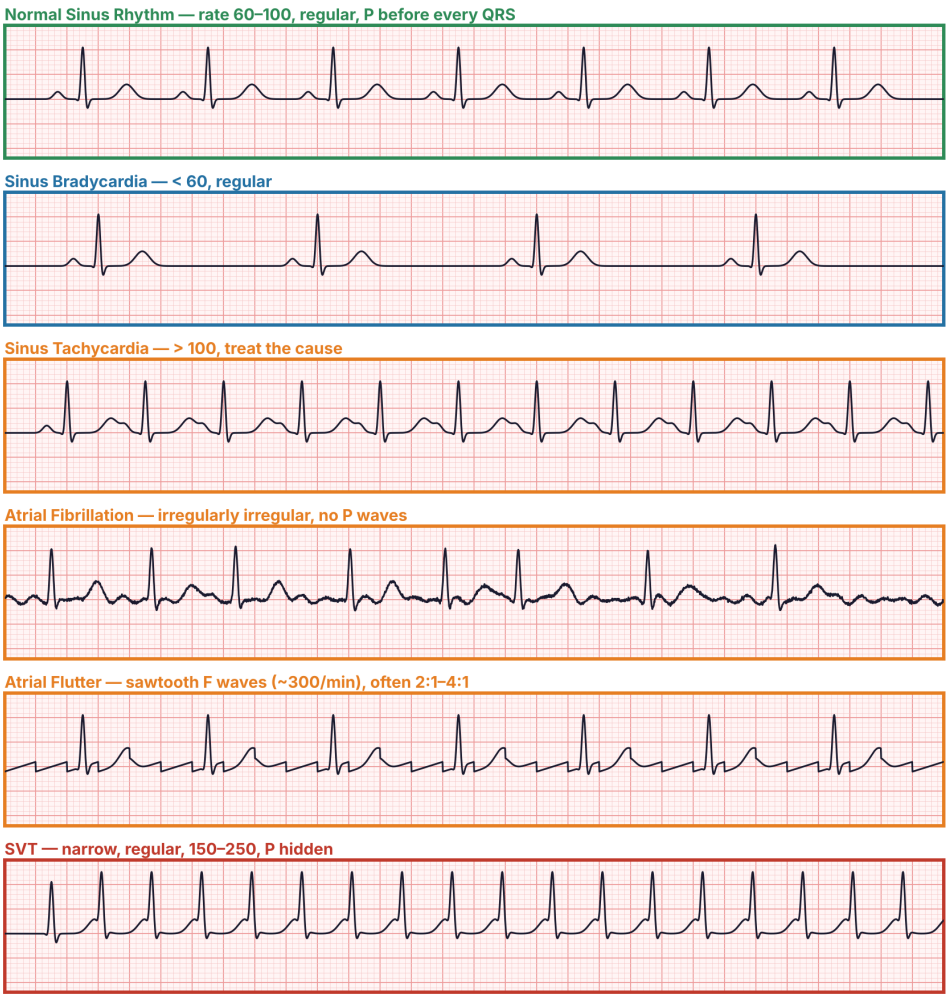

- The five-question approach
- Sinus and atrial rhythms
- Heart blocks
- Lethal rhythms and actions
- 8 practice questions


Quick-reference study guide by Mary Veneman BSN RN CEN.
Study aid only — verify against current references and your institution’s policies.

## Five questions for every strip

| # | Question | Normal sinus |
|---|---|---|
| 1 | What is the rate? | 60–100 |
| 2 | Is it regular? (march out R–R) | Regular |
| 3 | Is there a P wave before every QRS, and do they all look alike? | Yes, upright in II |
| 4 | What is the PR interval — and is it constant? | 0.12–0.20 s, constant |
| 5 | Is the QRS narrow or wide? | < 0.12 s |

## Sinus and atrial rhythms

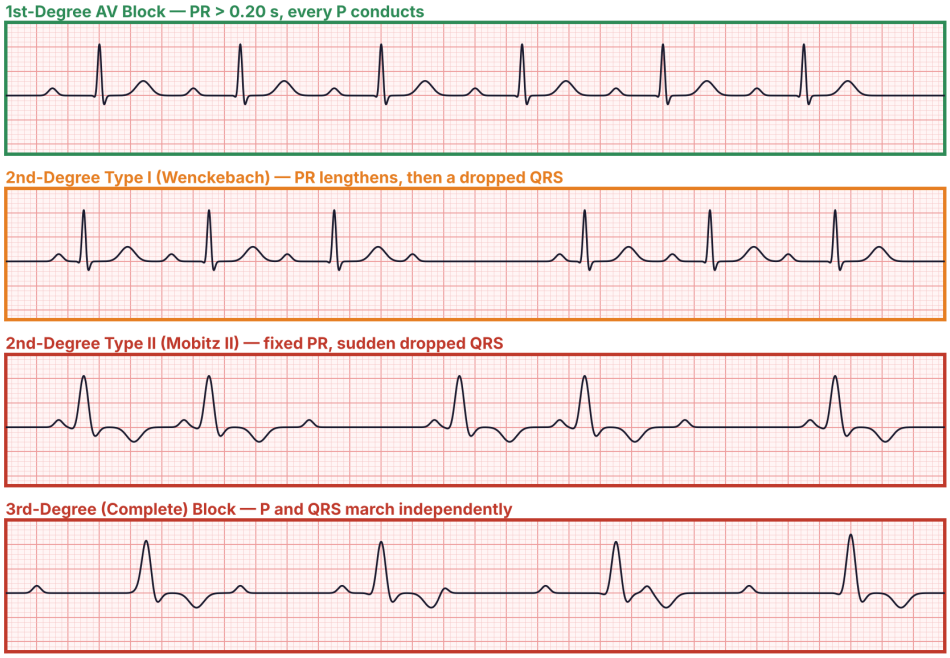



*Original sample strips.*

| Rhythm | Key features | Nursing / treatment |
|---|---|---|
| **Sinus bradycardia** | Sinus, rate < 60 | Treat only if symptomatic: atropine, pacing |
| **Sinus tachycardia** | Sinus, rate > 100 (usually < 150) | Treat the cause: pain, fever, fluid loss, anxiety, hypoxia |
| **Atrial fibrillation** | Irregularly irregular, no P waves, wavy baseline | Rate control, anticoagulation by stroke risk; unstable → synchronized cardioversion |
| **Atrial flutter** | Sawtooth flutter waves, often 2:1 (rate ~150) | Rate control, cardioversion, ablation |
| **SVT** | Narrow, regular, often > 150, P waves hidden | Vagal maneuvers → adenosine 6 mg then 12 mg; unstable → synchronized cardioversion |

| Rhythm | Key features | Nursing / treatment |
|---|---|---|
| **PACs / PVCs** | Early narrow beat with P (PAC) or early wide bizarre beat without P (PVC) | Check potassium, magnesium, ischemia, caffeine |

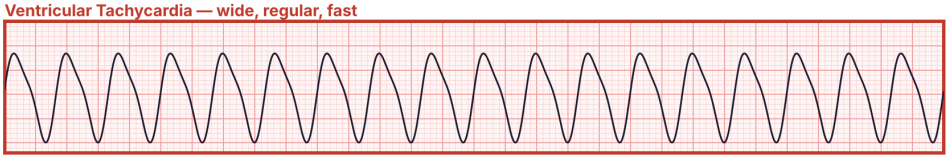
## Heart blocks



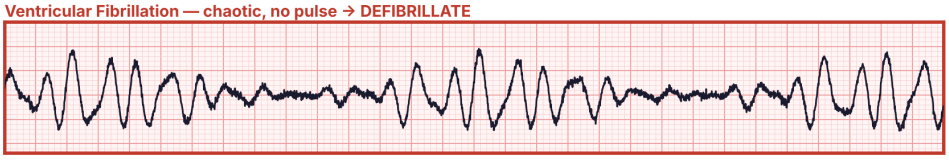

| Block | Pattern | Danger |
|---|---|---|
| **1st degree** | PR > 0.20 s, constant; every P conducts | Low |
| **2nd degree type I (Wenckebach)** | PR gets longer and longer, then a QRS drops | Usually low (AV node) |
| **2nd degree type II** | PR constant, then a QRS suddenly drops | High — can progress; pacing pads on |
| **3rd degree (complete)** | P waves and QRS march independently | High — pacing |

## Lethal rhythms

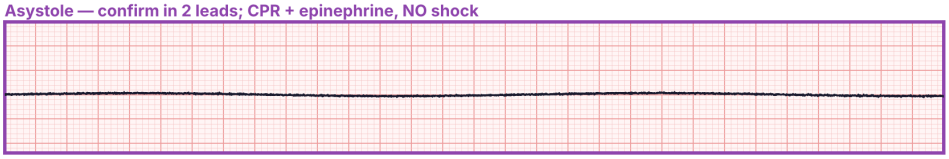
Ventricular Tachycardia — wide, regular, fast



Ventricular Fibrillation — chaotic, no pulse → DEFIBRILLATE



Asystole — confirm in 2 leads; CPR + epinephrine, NO shock



ST-Elevation (STEMI pattern) — door-to-balloon ≤ 90 min



| Rhythm | Action |
|---|---|
| **VF** | CPR + defibrillate |
| **VT without pulse** | CPR + defibrillate |
| **VT with pulse** | Stable: amiodarone, expert consult. Unstable: synchronized cardioversion |
| **Torsades** | Magnesium 1–2 g IV; defibrillate if pulseless |
| **Asystole / PEA** | CPR + epinephrine; never shock; find H's & T's. Confirm asystole in 2 leads |

**★ NURSING TIP**
**Treat the patient, not the monitor.** Check the patient first — loose leads and movement can mimic VF. A pulse check decides between VT with a pulse and pulseless VT.

## Practice questions

**1.** Irregularly irregular rhythm, no P waves, narrow QRS:
- **A.** Atrial flutter
- **B.** Atrial fibrillation
- **C.** Sinus arrhythmia
- **D.** SVT

**2.** PR gets longer until a QRS drops, then repeats:
- **A.** Mobitz I
- **B.** 1st degree
- **C.** Mobitz II
- **D.** 3rd degree

**3.** PR is constant, then a QRS suddenly drops:
- **A.** Mobitz I
- **B.** Sinus pause
- **C.** 1st degree
- **D.** Mobitz II

**4.** P waves and QRS complexes have no relationship:
- **A.** AF
- **B.** Junctional
- **C.** Mobitz I
- **D.** Complete heart block

**5.** Narrow regular tachycardia at 180, stable, vagal fails:
- **A.** Defibrillate
- **B.** Amiodarone 300 mg
- **C.** Adenosine 6 mg rapid push
- **D.** Atropine

**6.** The monitor shows VF but the patient is talking. First step?
- **A.** Give amiodarone
- **B.** Check leads and the patient
- **C.** Start CPR
- **D.** Defibrillate

**7.** Which rhythm is never shocked?
- **A.** Pulseless VT
- **B.** VF
- **C.** Asystole
- **D.** Polymorphic VT

**8.** Twisting polymorphic VT with a long QT is treated first with:
- **A.** Magnesium
- **B.** Digoxin
- **C.** Diltiazem
- **D.** Adenosine

## Answers and rationales

| # | Ans | Why |
|---|---|---|
| 1 | **B** | Classic AF. |
| 2 | **A** | Wenckebach. |
| 3 | **D** | Mobitz II — higher risk. |
| 4 | **D** | 3rd-degree block — prepare for pacing. |
| 5 | **C** | Then 12 mg if needed. |
| 6 | **B** | Artifact mimics VF. |
| 7 | **C** | Asystole: CPR and epinephrine. |
| 8 | **A** | Torsades → magnesium. |

**★ ABOUT THE AUTHOR**
**Mary Veneman BSN RN CEN** is a Certified Emergency Nurse (CEN®) and critical care nurse with experience in med-surg, ICU, and ER nursing. She shares that experience with nurses who want to deepen their knowledge and become certified.

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# ABGs

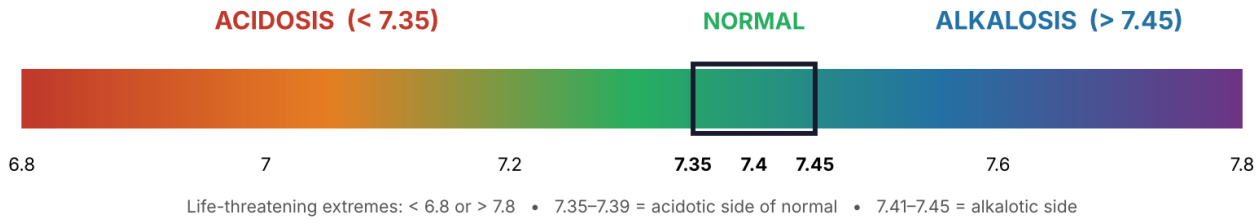
## Acid–Base Interpretation Study Guide

The four disorders, compensation, and a step-by-step method — with practice ABGs

**By Mary Veneman BSN RN CEN**

### Normal values

| pH | $PaCO_2$ | $HCO_3^-$ | $PaO_2$ | $SaO_2$ |
|---|---|---|---|---|
| 7.35 – 7.45 | 35 – 45 mmHg (the ACID — lungs) | 22 – 26 mEq/L (the BASE — kidneys) | 80 – 100 mmHg | 95 – 100% |




Life-threatening extremes: < 6.8 or > 7.8 • 7.35–7.39 = acidotic side of normal • 7.41–7.45 = alkalotic side

**★ THE KEY IDEA**

**$CO_2$ is an acid** (it forms carbonic acid) and is controlled by the **lungs** — fast, minutes. **$HCO_3^-$ is a base** and is controlled by the **kidneys** — slow, hours to days. **ROME**: **R**espiratory = **O**pposite (pH and $PaCO_2$ move in opposite directions) • **M**etabolic = **E**qual (pH and $HCO_3^-$ move in the same direction).

| LUNGS | LUNGS | KIDNEYS | KIDNEYS |
|---|---|---|---|
| ↓ $PaCO_2$ | ↑ $PaCO_2$ | ↑ $HCO_3^-$ | ↓ $HCO_3^-$ |
| Respiratory ALKALOSIS | Respiratory ACIDOSIS | Metabolic ALKALOSIS | Metabolic ACIDOSIS |

*Which organ, which value, which disorder.*

## 1 Respiratory Acidosis

### What it is

The lungs can't remove enough carbon dioxide, so $CO_2$ builds up in the blood. Because $CO_2$ forms carbonic acid, the excess drives the pH down.

### Key lab findings

- pH **< 7.35** (acidemia)
- $PaCO_2$ **> 45 mmHg** (elevated)
- $HCO_3^-$ normal, then **rises** as the kidneys compensate

### Body's compensation

The kidneys retain more bicarbonate and excrete more acid in the urine to buffer the blood — this takes hours to days.

### Common causes

- COPD or severe asthma exacerbation
- CNS depression from opioid or alcohol overdose, sedation (slow, shallow breathing — hypoventilation)
- Pneumonia, chest wall disorders, neuromuscular weakness (Guillain-Barré, myasthenia gravis)

**Nursing priority:** improve ventilation — airway, HOB up, deep breathing, reverse sedation (naloxone), BiPAP or intubation for rising $CO_2$ with ↓ LOC.

## 2 Respiratory Alkalosis

### What it is

Rapid or deep breathing (hyperventilation) "blows off" too much $CO_2$, lowering $CO_2$ and raising the pH.

### Key lab findings

- pH **> 7.45** (alkalemia)
- $PaCO_2$ **< 35 mmHg** (low)
- $HCO_3^-$ normal, then **falls** as the kidneys compensate

### Body's compensation

The kidneys excrete more bicarbonate to bring the pH back toward normal.

### Common causes

- Anxiety, panic attack, severe emotional distress
- Fever, pain, early sepsis
- Hypoxia — early PE, high altitude, early asthma attack
- Early salicylate (aspirin) toxicity
- Pregnancy; ventilator rate/tidal volume set too high

**Nursing priority:** treat the cause — coach slow breathing, treat pain/anxiety/fever, check $SpO_2$ (rule out hypoxia/PE), adjust ventilator settings. Watch for tingling, lightheadedness.

## 3 Metabolic Acidosis

### What it is

Too much non-volatile acid is produced or ingested, or bicarbonate is lost from the body.

### Key lab findings

- pH **< 7.35** (acidemia)
- $HCO_3^-$ **< 22 mEq/L** (low)
- $PaCO_2$ **falls** as the lungs compensate

### Body's compensation

The respiratory system responds within minutes with deep, rapid **Kussmaul respirations** to blow off $CO_2$ and raise the pH. An anion gap helps pinpoint the cause.

### Common causes

- **A**ccumulation of lactate (lactic acidosis from shock or sepsis)
- **C**hronic/severe diarrhea (direct loss of bicarbonate)
- **I**mpaired renal function (kidneys can't excrete hydrogen ions)
- **D**iabetic ketoacidosis (excess ketone acids)
- **S**alicylate or other toxin toxicity

**Mnemonic: ACIDS.** Watch for **hyperkalemia** — acidosis shifts $K^+$ out of cells. Treat the cause (fluids, insulin, antibiotics, dialysis).

# 4 Metabolic Alkalosis

### What it is
A primary gain of bicarbonate or a significant loss of body acids.

### Key lab findings
- pH **> 7.45** (alkalemia)
- $HCO_3^-$ **> 26 mEq/L** (high)
- $PaCO_2$ **rises slightly** as the lungs compensate (hypoventilation)

### Body's compensation
The lungs slow breathing to retain $CO_2$ and push the pH back down — limited, because the body still needs oxygen.

### Common causes
- Prolonged vomiting or NG/gastric suctioning (loss of stomach acid, HCl)
- Excessive loop or thiazide diuretics
- Excess bicarbonate/antacid intake, mineralocorticoid excess

**Watch for hypokalemia** (alkalosis shifts $K^+$ into cells) — weakness, dysrhythmias. Treat: replace fluids, chloride and potassium; stop the cause.

## Causes at a glance

### METABOLIC ACIDOSIS

**Increased anion gap — MUDPILES**
- Methanol
- Uremia (renal failure)
- DKA / ketoacidosis
- Paraldehyde / propylene glycol
- Iron, isoniazid
- Lactic acidosis
- Ethylene glycol
- Salicylates

**Normal anion gap**
- Diarrhea ($HCO_3^-$ loss)
- Renal tubular acidosis
- Large-volume normal saline

### METABOLIC ALKALOSIS

**Acid loss / $HCO_3^-$ gain**
- Vomiting, NG suction (↓ $H^+$)
- Loop & thiazide diuretics (↑ $HCO_3^-$)
- Hyperaldosteronism (↓ $H^+$)
- Excess antacids / bicarbonate
- Hypokalemia

### RESPIRATORY ACIDOSIS

**HYPOventilation**
- Brainstem respiratory center depressed: opioids, sedatives, alcohol, head injury
- Neuromuscular weakness: Guillain-Barré, myasthenia, high spinal cord injury
- Gas exchange / airway problems: COPD, severe asthma, pneumonia, pulmonary edema
- Chest wall: flail chest, obesity hypoventilation

### RESPIRATORY ALKALOSIS

**HYPERventilation**
- Respiratory center stimulated: early salicylates, fever, sepsis, pregnancy, CNS injury
- Hypoxemia: PE, high altitude, early asthma, pneumonia
- Distress: anxiety, panic, pain
- Ventilator rate / volume too high

## Summary comparison

| Disorder | Primary defect | pH | $PaCO_2$ | $HCO_3^-$ | Main compensation |
|---|---|---|---|---|---|
| **Respiratory acidosis** | $CO_2$ retention (hypoventilation) | ↓ < 7.35 | ↑ > 45 | Normal or ↑ (renal) | Kidneys retain $HCO_3^-$ |
| **Respiratory alkalosis** | $CO_2$ loss (hyperventilation) | ↑ > 7.45 | ↓ < 35 | Normal or ↓ (renal) | Kidneys excrete $HCO_3^-$ |
| **Metabolic acidosis** | Acid gain or $HCO_3^-$ loss | ↓ < 7.35 | ↓ (Kussmaul) | ↓ < 22 | Lungs blow off $CO_2$ |
| **Metabolic alkalosis** | Acid loss or $HCO_3^-$ gain | ↑ > 7.45 | ↑ (slight) | ↑ > 26 | Lungs retain $CO_2$ |

## Step-by-step interpretation

| | | |
|---|---|---|
| 1 | **Look at the pH** | < 7.35 acidosis • > 7.45 alkalosis • normal → check whether it's compensated |
| 2 | **Look at the $PaCO_2$** | > 45 = acid (respiratory acidosis direction) • < 35 = base |
| 3 | **Look at the $HCO_3^-$** | < 22 = acid (metabolic acidosis direction) • > 26 = base |
| 4 | **Match the pH** | Whichever value moves in the same direction as the pH is the primary problem (respiratory or metabolic) |
| 5 | **Check compensation** | Is the other value moving the opposite way? Is the pH back in range? (see below) |
| 6 | **Check oxygenation** | $PaO_2$ < 80 = hypoxemia; $SaO_2$ < 95% |

## Levels of compensation




**Fully compensated? Look at which side of 7.40 the pH sits on — that tells you the original problem.**

## The tic-tac-toe method

Place each value in the ACID, NORMAL, or BASE column. The value sharing a column with the pH is the cause.

pH 7.30 • $PaCO_2$ 55 • $HCO_3^-$ 24

| ACID | NORMAL | BASE |
|---|---|---|
| pH 7.30 | | |
| $PaCO_2$ 55 | | |
| | $HCO_3^-$ 24 | |

pH + $CO_2$ share a column → RESPIRATORY ACIDOSIS
$HCO_3^-$ normal → uncompensated

pH 7.28 • $PaCO_2$ 30 • $HCO_3^-$ 14

| ACID | NORMAL | BASE |
|---|---|---|
| pH 7.28 | | |
| | | $PaCO_2$ 30 |
| $HCO_3^-$ 14 | | |

pH + $HCO_3^-$ share a column → METABOLIC ACIDOSIS
$CO_2$ moving opposite, pH abnormal → partially compensated

# Going deeper

## Anion gap

- **Anion gap = $Na^+ - (Cl^- + HCO_3^-)$**; normal ≈ 8–12.
- **High-gap** metabolic acidosis (an unmeasured acid is added): lactic acidosis, ketoacidosis (DKA, alcohol, starvation), renal failure, toxins (salicylates, methanol, ethylene glycol).
- **Normal-gap** (hyperchloremic) — bicarbonate is lost: diarrhea, large volumes of normal saline, renal tubular acidosis.

## Mixed disorders & quick checks

- **Mixed acidosis**: pH low with $PaCO_2$ high AND $HCO_3^-$ low (e.g., cardiac arrest: hypoventilation + lactic acid).
- **Mixed alkalosis**: pH high with $PaCO_2$ low AND $HCO_3^-$ high (e.g., vomiting + anxiety).
- **Winter's formula** (metabolic acidosis): expected $PaCO_2 = 1.5 \times HCO_3^- + 8$ (± 2). Higher than expected = a respiratory acidosis is also present.
- **Potassium** moves opposite to pH shifts: acidosis → hyperkalemia; alkalosis → hypokalemia.

## Practice ABGs

Cover the answer column and interpret each one.

| # | pH | $PaCO_2$ | $HCO_3^-$ | Interpretation |
|---|---|---|---|---|
| 1 | 7.30 | 55 | 24 | Respiratory acidosis, uncompensated |
| 2 | 7.48 | 30 | 23 | Respiratory alkalosis, uncompensated |
| 3 | 7.28 | 30 | 14 | Metabolic acidosis, partially compensated |
| 4 | 7.50 | 48 | 34 | Metabolic alkalosis, partially compensated |
| 5 | 7.37 | 60 | 34 | Respiratory acidosis, fully compensated (pH on the acid side of 7.40 — classic COPD) |
| 6 | 7.44 | 30 | 20 | Respiratory alkalosis, fully compensated (pH on the alkaline side of 7.40) |
| 7 | 7.22 | 58 | 18 | Mixed respiratory and metabolic acidosis |
| 8 | 7.32 | 40 | 18 | Metabolic acidosis, uncompensated (check the anion gap) |

★ ABOUT THE AUTHOR

**Mary Veneman BSN RN CEN** is a Certified Emergency Nurse (CEN®) and critical care nurse with experience in med-surg, ICU, and ER nursing. She shares that experience with nurses who want to deepen their knowledge and become certified.

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# Sepsis

## Quick Guide

Updated for the 2026 Surviving Sepsis Campaign adult guidelines

**By Mary Veneman BSN RN CEN**

A quick guide to recognizing and treating sepsis and septic shock in adults, updated for the Surviving Sepsis Campaign 2026 international guidelines.

### Inside this guide

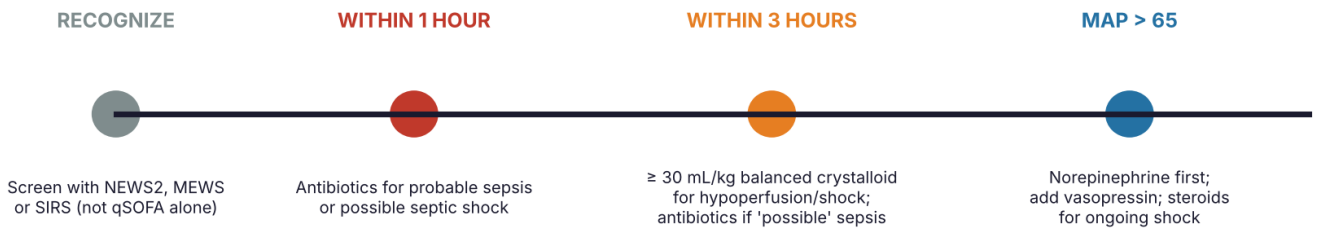

- Definitions and organ dysfunction clues
- The first hours: screening, antibiotics, fluids, MAP
- 2026 changes in one table
- Nursing priorities and special populations
- 8 practice questions


Quick-reference study guide by Mary Veneman BSN RN CEN.
Study aid only — verify against current references and your institution’s policies.

## Definitions

| Term | Meaning |
|---|---|
| **Sepsis** | Life-threatening organ dysfunction caused by a dysregulated response to infection |
| **Septic shock** | Sepsis needing vasopressors for MAP ≥ 65 with lactate > 2 mmol/L despite adequate fluids |
| **Organ dysfunction clues** | Confusion, low BP, fast breathing, low $SpO_2$, low urine output, rising creatinine or bilirubin, low platelets, high lactate |

## The first hours — 2026 Surviving Sepsis Campaign




| Topic | 2026 guidance (adults) |
|---|---|
| **Screening** | Use NEWS/NEWS2, MEWS or SIRS rather than qSOFA alone |
| **Antibiotics** | Within **1 hour** for probable/definite sepsis or possible septic shock. Possible sepsis without shock: rapid workup, antibiotics within **3 hours** if infection still likely |
| **Spectrum** | No routine anaerobic coverage unless risk factors (abdominal, gynecologic, head and neck, CNS abscess, necrotizing infection). De-escalate when results return. No routine empiric antifungals |
| **Fluids** | At least 30 mL/kg IV crystalloid in the first 3 hours for hypoperfusion or shock (adjusted/ideal weight if BMI > 30); **balanced crystalloids** preferred over saline |
| **Guide fluids** | Dynamic measures (passive leg raise, stroke volume change) over exam or static numbers |
| **MAP target** | > 65 mmHg initially; age 65+ — 60–65 is suggested |
| **Vasopressors** | **Norepinephrine first**; add vasopressin; add epinephrine if still low. Cardiac dysfunction: add dobutamine |
| **Steroids** | IV corticosteroids suggested for septic shock |
| **After resuscitation** | Active fluid removal (diuretics or dialysis) once stable |
| **Systems** | Code sepsis protocols or huddles; ICU within 6 hours if needed; plan for post-discharge recovery |

**★ NURSING TIP**
**Nursing priorities:** recognize early (new confusion, RR ≥ 22, SBP ≤ 100 are red flags), draw **blood cultures before antibiotics** without delaying them, repeat lactate if it was high, watch for fluid overload (crackles, falling $SpO_2$), and escalate quickly.

## Special populations

- **Older adults:** may have no fever — confusion, falls or weakness may be the only signs
- **Immunocompromised:** neutropenic fever is an emergency — antibiotics within 1 hour
- **Heart failure or kidney disease:** give fluids in smaller boluses with frequent reassessment
- **Pregnancy:** normal vital signs differ; involve OB early

## Practice questions

**1.** Which screening approach does SSC 2026 recommend?
- **A.** qSOFA alone
- **B.** NEWS2, MEWS or SIRS
- **C.** Lactate only
- **D.** Temperature only

**2.** Probable sepsis without shock: when should antibiotics be given?
- **A.** Within 1 hour
- **B.** Within 24 hours
- **C.** Within 6 hours
- **D.** After all cultures result

**3.** Initial fluid for septic shock (70 kg)?
- **A.** 1 L albumin
- **B.** 5 L
- **C.** At least 2,100 mL
- **D.** 500 mL

**4.** Which fluid type is preferred?
- **A.** Hetastarch
- **B.** D5W
- **C.** Balanced crystalloid (e.g., LR)
- **D.** 0.9% saline

**5.** First-line vasopressor?
- **A.** Phenylephrine
- **B.** Norepinephrine
- **C.** Dopamine
- **D.** Epinephrine

**6.** Initial MAP goal for most adults?
- **A.** > 65
- **B.** > 85
- **C.** > 55
- **D.** > 100

**7.** When should blood cultures be drawn?
- **A.** Next day
- **B.** Only if fever
- **C.** After antibiotics
- **D.** Before antibiotics, without delaying them

**8.** An 82-year-old with UTI is newly confused, afebrile, HR 112. Best action?
- **A.** Restrain
- **B.** Wait for fever
- **C.** Give sleep aid
- **D.** Screen for sepsis and escalate

## Answers and rationales

| # | Ans | Why |
|---|---|---|
| 1 | **B** | Not qSOFA as the single tool. |
| 2 | **A** | Ideally within 1 hour of recognition. |
| 3 | **C** | ≥ 30 mL/kg in the first 3 hours. |
| 4 | **C** | Balanced crystalloids suggested. |
| 5 | **B** | Norepinephrine. |
| 6 | **A** | > 65 mmHg. |
| 7 | **D** | Cultures first if it won’t delay therapy. |
| 8 | **D** | Older adults may lack fever. |

**★ ABOUT THE AUTHOR**
**Mary Veneman BSN RN CEN** is a Certified Emergency Nurse (CEN®) and critical care nurse with experience in med-surg, ICU, and ER nursing. She shares that experience with nurses who want to deepen their knowledge and become certified.

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# BLS

## Basic Life Support Study Guide

High-quality CPR • AED • rescue breathing • choking — adult, child, infant

**By Mary Veneman BSN RN CEN**

A visual, plain-language review of Basic Life Support for healthcare providers, updated for the 2025 AHA Guidelines. Use it before your BLS course or renewal and as a quick bedside refresher.

### Inside this guide


- The single chain of survival
- Adult BLS sequence and the high-quality CPR checklist
- Adult vs child vs infant compression comparison
- AED use and special situations
- Rescue breathing, opioid emergencies and naloxone
- Choking relief for every age
- Team roles, 10 practice questions with rationales


**★ HEADS UP**

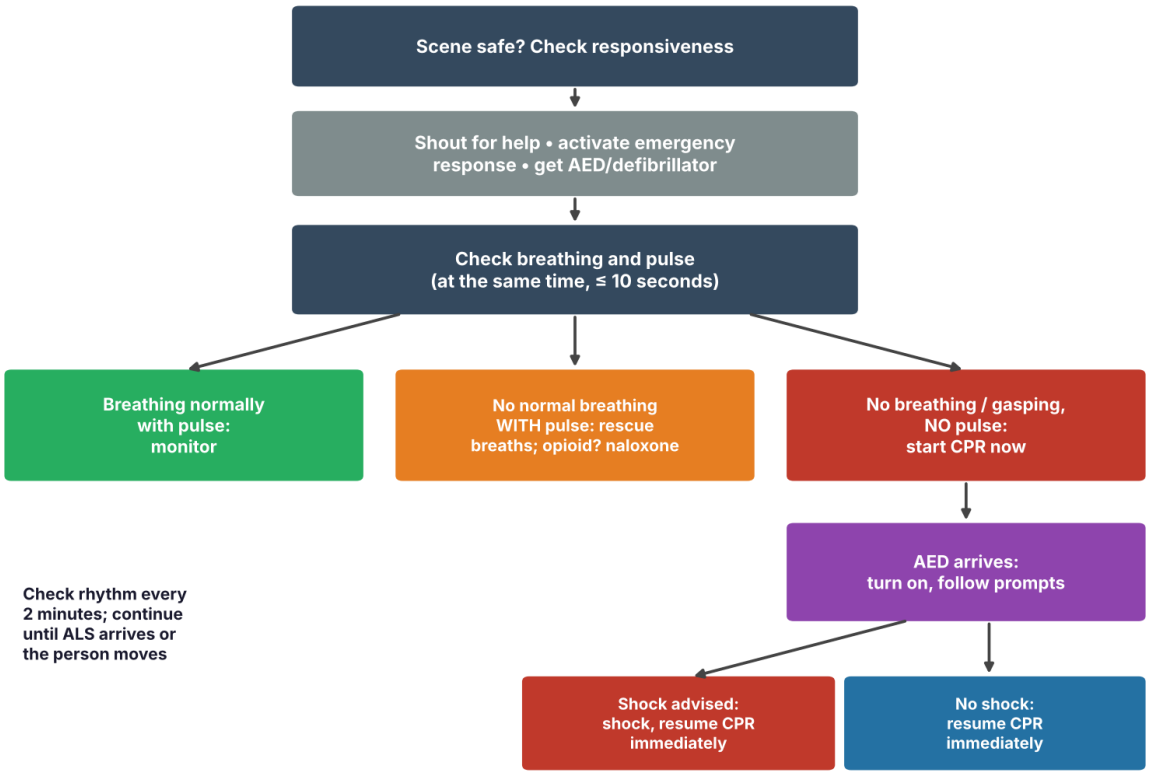
**What changed in 2025?** The AHA and American Academy of Pediatrics released the 2025 Guidelines for CPR and ECC in October 2025. This guide flags the changes that matter most for the provider course with a **NEW 2025** tag.

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Study aid only — use the current official AHA provider manual for course and exam preparation.

## The chain of survival

**NEW 2025 ▸** The 2025 Guidelines use **one chain of survival** for all ages and settings, in place of the separate in-hospital and out-of-hospital chains. The links: **recognize and call → early CPR → early defibrillation → advanced care → post-arrest care → recovery**.

## Adult BLS sequence (healthcare provider)




*Original summary of the provider sequence. Your course uses the official AHA algorithm.*

**★ EXAM PEARL**

**Agonal gasps are not breathing.** Treat an unresponsive person with gasping or no normal breathing as cardiac arrest. Take no more than **10 seconds** to check breathing and the carotid pulse together. Unsure about the pulse? Start CPR.

## High-quality CPR — the five checks

| Component | Target | Why it matters |
|---|---|---|
| **Rate** | 100–120 compressions/min | Too fast cuts depth and filling time |
| **Depth (adult)** | At least 2 in (5 cm), no more than 2.4 in (6 cm) | Shallow compressions produce little blood flow |
| **Recoil** | Let the chest rise fully; don't lean | Leaning stops the heart from refilling |
| **Interruptions** | Pauses under 10 seconds | Every pause drops coronary blood flow to near zero |
| **Ventilation** | Each breath over 1 s with visible chest rise; avoid too many breaths | Over-ventilation raises chest pressure and reduces return to the heart |


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## Adult, child and infant at a glance

| | ADULT | CHILD (1 yr–puberty) | INFANT (< 1 yr) |
|---|---|---|---|
| **Hand position** | Heel of 2 hands, lower half of sternum | 1 or 2 hands, lower half of sternum | 2-thumb encircling or heel of 1 hand (no 2 fingers) |
| **Depth** | 2–2.4 in (5–6 cm) | About 2 in (5 cm) ≈ 1/3 chest depth | About 1.5 in (4 cm) ≈ 1/3 chest depth |
| **Ratio — 1 rescuer** | 30:2 | 30:2 | 30:2 |
| **Ratio — 2 rescuers** | 30:2 | 15:2 | 15:2 |
| **Breaths with pulse, or advanced airway** | 1 breath every 6 s | 1 breath every 2–3 s | 1 breath every 2–3 s |

**All ages: rate 100–120/min • full recoil • pauses < 10 s • switch compressors about every 2 min**

**NEW 2025 ▸** For infants, use the **2-thumb encircling-hands** technique or the **heel of one hand**. The **2-finger technique is no longer recommended** because it often fails to reach the target depth.

**★ AGE RULES**

**Child** means 1 year old to puberty (breast development in girls, underarm hair in boys). Past puberty, use adult steps. For a child or infant, a lone rescuer who did **not** see the collapse gives about 2 minutes of CPR before leaving to call and get the AED — most pediatric arrests are caused by lack of oxygen.

## AED essentials

- Turn on the AED **as soon as it arrives**; follow the voice prompts.
- Pads: upper right chest and lower left side (or front and back).
- Clear everyone for rhythm analysis and shock.
- Resume compressions **right after** the shock — no pulse check first.
- Children under 8: pediatric pads or attenuator if available; adult pads are better than none.
- Infants: a manual defibrillator is preferred; then a pediatric-attenuated AED; then a standard AED.
- **Hairy chest:** shave or use a spare pad to pull off hair.
- **Water:** move the person out of water and wipe the chest dry.
- **Implanted pacemaker/ICD:** place pads away from the device lump.
- **Medication patch:** remove it and wipe the skin.
- **Pregnancy:** standard pad position; manual left uterine displacement during CPR.
- Don’t touch the person while the AED analyzes or shocks.

## Two-rescuer CPR and team roles

- One rescuer compresses; the other gives breaths with a bag-mask and runs the AED.
- Switch compressors about **every 2 minutes** (5 cycles), at the AED rhythm check — fatigue lowers quality within minutes.
- With an advanced airway: continuous compressions plus **1 breath every 6 seconds**.
- Use **closed-loop communication**: state the task, confirm it, report when done.
- Speak up if compressions are too slow or shallow — feedback devices help.



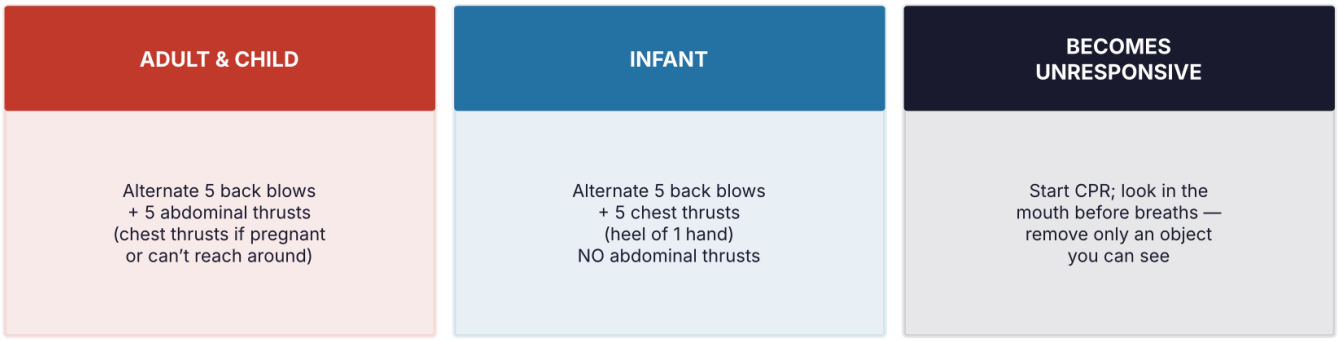
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### Rescue breathing and opioid emergencies

- Pulse present, breathing absent or only gasping: **1 breath every 6 seconds** for adults (every 2–3 seconds for infants and children).
- Recheck the pulse about every 2 minutes; start CPR if it is lost.
- Infant or child with a pulse under 60/min and poor perfusion despite breaths: **start CPR**.
- **NEW 2025 ▸ Naloxone** now appears in the adult BLS algorithm. For a suspected opioid emergency, give naloxone — but **CPR comes first** for anyone with no pulse.

## Choking (foreign-body airway obstruction)

**Mild obstruction** (can cough, speak, breathe): encourage coughing and stay with the person. **Severe obstruction** (can't speak or cough, silent or weak cough, universal choking sign): act right away.




**NEW 2025 ▸** For adults and children, the 2025 Guidelines recommend **alternating 5 back blows and 5 abdominal thrusts** until the object comes out or the person becomes unresponsive. Infants get 5 back blows and 5 chest thrusts; **never abdominal thrusts** for infants. Do not do blind finger sweeps.

**★ QUICK RECALL**
**Keys to remember:** 30:2 for any lone rescuer • 15:2 for two rescuers with a child or infant • 1 breath every 6 s for an adult with a pulse or an advanced airway • 1 breath every 2–3 s for a child or infant • pauses under 10 s • resume CPR immediately after a shock.


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## Practice questions

**1.** An unresponsive adult is gasping every 10 seconds. You can't clearly feel a pulse after 10 seconds. What next?
- **A.** Give 1 breath every 6 seconds
- **B.** Recheck the pulse for 10 more seconds
- **C.** Start chest compressions
- **D.** Place in recovery position

**2.** What is the correct compression rate for all ages?
- **A.** 80–100/min
- **B.** 100–120/min
- **C.** 120–140/min
- **D.** At least 140/min

**3.** What is the target compression depth for an adult?
- **A.** 1.5 in
- **B.** At least 2 in but not more than 2.4 in
- **C.** At least 3 in
- **D.** One-half of chest depth

**4.** Two rescuers are doing CPR on a 4-year-old. What is the ratio?
- **A.** 30:2
- **B.** 15:2
- **C.** 5:1
- **D.** 3:1

**5.** Which infant compression technique is no longer recommended in 2025?
- **A.** 2-thumb encircling hands
- **B.** Heel of one hand
- **C.** 2 fingers
- **D.** All are acceptable

**6.** An adult has a strong pulse but is not breathing. How often should you give breaths?
- **A.** Every 2–3 s
- **B.** Every 6 s
- **C.** Every 10 s
- **D.** Only with compressions

**7.** The AED delivers a shock. What should you do next?
- **A.** Check a pulse
- **B.** Check breathing
- **C.** Resume compressions right away
- **D.** Wait for the AED to reanalyze

**8.** A conscious adult is choking and can't speak or cough. What is the 2025-recommended sequence?
- **A.** Abdominal thrusts only
- **B.** Alternate 5 back blows and 5 abdominal thrusts
- **C.** Blind finger sweep, then thrusts
- **D.** Chest compressions

**9.** A choking infant is still responsive. What should you do?
- **A.** Abdominal thrusts
- **B.** 5 back blows + 5 chest thrusts
- **C.** Blind finger sweep
- **D.** Rescue breaths only


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**10.** A person with a suspected opioid overdose has no pulse. What is the priority?

**A.** Give naloxone first
**B.** Start CPR
**C.** Give rescue breaths only
**D.** Wait for EMS

## Answers and rationales

| # | Ans | Why |
|---|---|---|
| 1 | **C** | Gasping is not normal breathing, and an uncertain pulse means start CPR. |
| 2 | **B** | 100–120/min for adults, children and infants. |
| 3 | **B** | 2–2.4 in (5–6 cm). |
| 4 | **B** | Two rescuers use 15:2 for children and infants; a lone rescuer uses 30:2. |
| 5 | **C** | 2-finger compressions often don’t reach depth; use 2-thumb encircling or the heel of one hand. |
| 6 | **B** | Adult rescue breathing is 1 breath every 6 seconds. |
| 7 | **C** | Start CPR immediately; the AED rechecks in about 2 minutes. |
| 8 | **B** | 2025 guidance: alternate 5 back blows and 5 abdominal thrusts until relieved or unresponsive. |
| 9 | **B** | Infants get back blows plus chest thrusts; never abdominal thrusts. |
| 10 | **B** | Naloxone is in the algorithm, but CPR comes first for anyone without a pulse. |

**★ ABOUT THE AUTHOR**
**Mary Veneman BSN RN CEN** is a Certified Emergency Nurse (CEN®) and critical care nurse with experience in med-surg, ICU, and ER nursing. She shares that experience with nurses who want to deepen their knowledge and become certified.

*Study aid only. Based on the 2025 AHA Guidelines for CPR and ECC. Not affiliated with or endorsed by the American Heart Association. Course completion and certification require the official AHA provider course and manual. Verify doses against current references and your institution’s protocols. © 2026 Mary Veneman BSN RN CEN. Prepared with AI assistance.*

# Course Prep

## Planner

Two-week checklists for BLS, ACLS, PALS, NRP and ENPC

**By Mary Veneman BSN RN CEN**

Provider courses don’t need months of studying — they need the right two weeks. Each checklist below covers the pre-course work, what to memorize, and how to pass the skills test. Pair each one with the matching study guide in this series.

| Course | Who | Format | Card valid |
|---|---|---|---|
| **BLS** | All clinicians | Online + skills, or classroom; written test + skills | 2 years |
| **ACLS** | Adult acute care | Precourse self-assessment; megacode + written test | 2 years |
| **PALS** | Pediatric care | Precourse self-assessment; case scenarios + written test | 2 years |
| **NRP** | Delivery and newborn care | Online learning + exam, then instructor-led event | 2 years (check program) |
| **ENPC** | Emergency nurses | Pre-course modules; skills station + online open-book exam | 4 years |

*Confirm current requirements with your course provider — formats change.*

BLS, ACLS and PALS are AHA trademarks; NRP® is an AAP trademark; ENPC® is an ENA trademark. Not affiliated with or endorsed by these organizations. Use each course’s official provider manual.

## BLS — 2 weeks

| When | Do this | ✓ |
|---|---|---|
| **Week 1** | Finish the online portion (if blended) | ☐ |
| | Read the BLS guide: sequence, CPR quality, AED | ☐ |
| | Watch CPR videos; practice hand position on a pillow | ☐ |
| **Week 2** | Review 2025 changes: infant compressions, choking sequence, naloxone | ☐ |
| | Take the guide's 10 practice questions | ☐ |
| | Night before: ratios and rates once more | ☐ |

**Memorize:** rate 100–120 • adult depth 2–2.4 in • 30:2 / 15:2 • breaths every 6 s (adult) or 2–3 s (child)
**Guide:** BLS Study Guide

## ACLS — 2 weeks

| When | Do this | ✓ |
|---|---|---|
| **Week 1** | Complete the precourse self-assessment (passing score required by many courses) | ☐ |
| | Rhythm review: VF, VT, PEA, asystole, blocks, SVT, AF | ☐ |
| | Drug doses: epinephrine, amiodarone, lidocaine, atropine, adenosine | ☐ |
| **Week 2** | Walk through arrest, brady and tachy algorithms out loud | ☐ |
| | Practice being team leader: roles, closed-loop communication, H's & T's | ☐ |
| | Take the guide's practice questions; review post-arrest targets | ☐ |

**Memorize:** epi 1 mg every 3–5 min • amio 300 → 150 • adenosine 6 → 12 • atropine 1 mg (max 3) • MAP ≥ 65 **Guide:** ACLS Study Guide + Rhythm Strip Guide

## PALS — 2 weeks

| When | Do this | ✓ |
|---|---|---|
| **Week 1** | Complete the precourse self-assessment | ☐ |
| | Learn the evaluate–identify–intervene approach and PAT | ☐ |
| | Memorize vital signs by age and the hypotension formula | ☐ |
| **Week 2** | Weight-based doses and energies; practice math with a few weights | ☐ |
| | Run through respiratory, shock and arrest cases out loud | ☐ |
| | Take the guide's practice questions | ☐ |

**Memorize:** epi 0.01 mg/kg • shock 2 → 4 J/kg • bolus 10–20 mL/kg • SBP < 70 + 2×age **Guide:** PALS Study Guide

## NRP — 2 weeks

| When | Do this | ✓ |
|---|---|---|
| **Week 1** | Complete the online learning modules and exam (9th edition) | ☐ |
| | Read the 9th edition changes table | ☐ |
| | Learn the flow: cord plan → initial steps → ventilation → compressions | ☐ |
| **Week 2** | Practice MR SOPA and HR checks out loud | ☐ |
| | Memorize $SpO_2$ targets and initial oxygen by gestational age | ☐ |
| | Review epinephrine and volume doses | ☐ |

**Memorize:** defer clamping ≥ 60 s • ventilate 30–60/min • compressions 3:1 if HR < 60 • epi IV 0.02 mg/kg
**Guide:** NRP Study Guide

## ENPC — 2 weeks

| When | Do this | ✓ |
|---|---|---|
| **Week 1** | Read the provider manual chapters assigned; finish pre-course modules | ☐ |
| | Learn the assessment sequence word for word | ☐ |
| | Review high-yield presentations | ☐ |
| **Week 2** | Practice the skills station out loud on a family member or doll | ☐ |
| | Do weight-based fluid and drug math | ☐ |
| | Plan time for the open-book online exam after class | ☐ |

**Memorize:** PAT • A–I sequence • bolus 20 mL/kg • 4-2-1 rule • FLACC/FACES **Guide:** ENPC Study Guide + CPEN Study Guide

**★ ABOUT THE AUTHOR**
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