MEDICAL-SURGICAL NURSING I · STUDY GUIDE

Final Exam Study Guide

The final covers all fourteen chapters. Each chapter here is shorter than in the exam guides: three paragraphs of what to know, the points to lock in, one table, two worked cases, the main traps and six new self-test items. If a chapter feels shaky, go back to its exam guide for the full treatment. The long cram sheet at the end pulls every number and priority rule in the course into one place. Work two chapters a day and the whole course fits into a week.

WHAT THIS GUIDE COVERS

- Foundations: chapters 1 and 2 (clinical judgment, priority and delegation; fluids, electrolytes and ABGs).
- Surgery and comfort: chapters 3 and 4 (perioperative care; pain, opioid safety and palliative care).
- Infection and breathing: chapters 5, 6 and 7 (sepsis and immunosuppression; obstructive disease; pneumonia, PE, chest trauma and failure).
- The heart and blood: chapters 8, 9 and 10 (ACS and heart failure; rhythms, valves and vessels; anemia, clotting, transfusion and oncology).
- Digestion and metabolism: chapters 11 and 12 (GI disorders; liver, biliary tree and pancreas).
- The last line: chapters 13 and 14 (renal and urinary disorders; shock, trauma and emergency care).
- Every chapter carries what to know, a labeled diagram, a table, two worked cases, the traps and a six-item self-test, and the cram sheet holds all the numbers.

CHAPTER 1

The Medical-Surgical Nurse and Clinical Judgment

Read it in full: **Chapter 1 in the textbook**. Practice it in the lab: **What Do You Do First? A Priority Sorter** and **Deterioration Watch: Trends, Labs and the SBAR Call**.

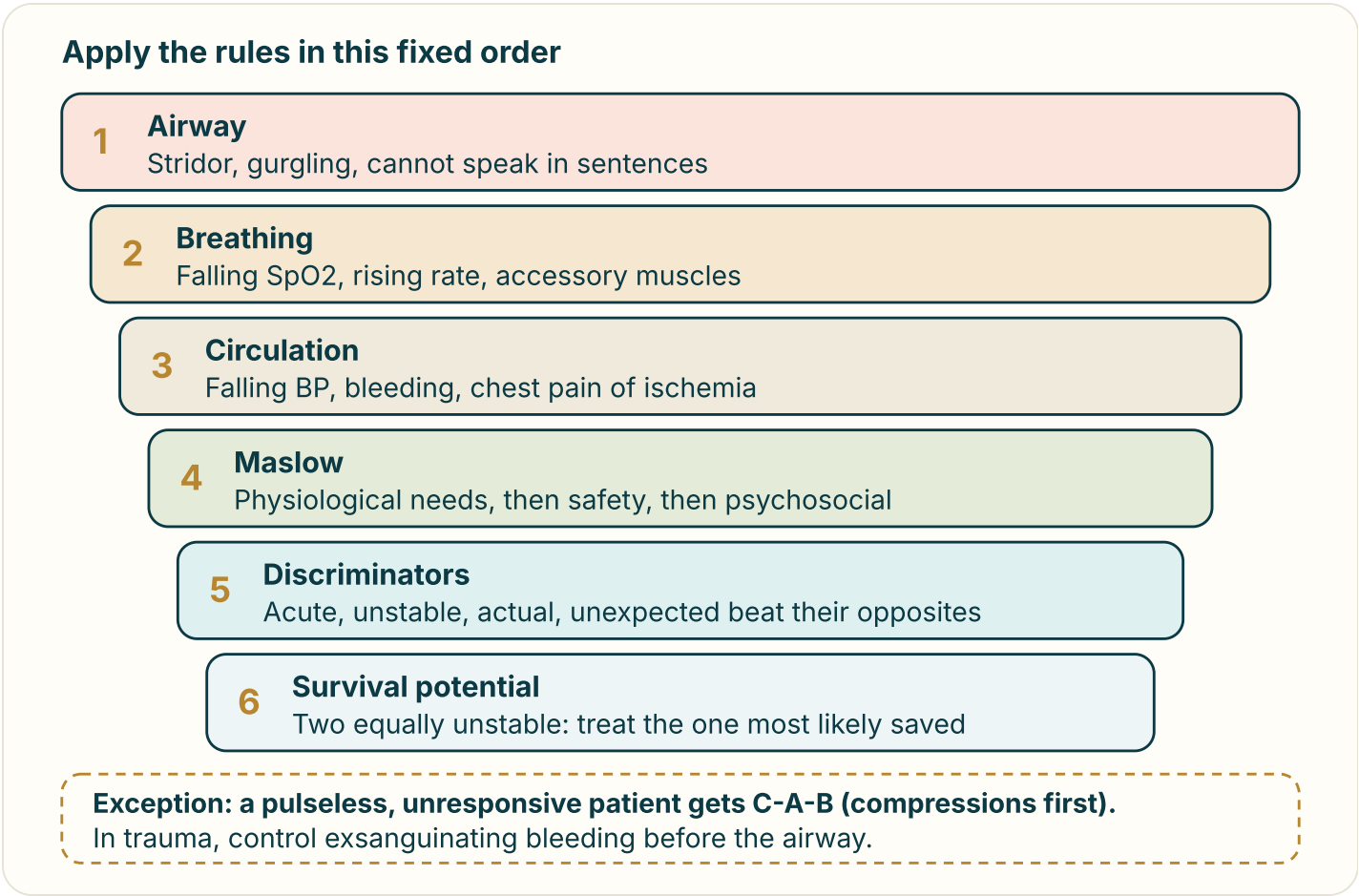
What to know

The med-surg nurse watches four to six changing adults and is the hospital’s surveillance system; failure to rescue, not failure to diagnose, drives preventable deaths, and most arrests follow six to

eight hours of abnormal vital signs. ADPIE belongs entirely to the RN.

The six CJMM steps are recognize cues, analyze cues, prioritize hypotheses, generate solutions, take action and evaluate outcomes. Judge each cue against diagnosis, timeline and baseline: abnormal is not always unexpected. Prioritize ABC (C-A-B in arrest), then Maslow, then acute, unstable, actual and unexpected over their opposites.

Escalate trends with a full SBAR. Treat new confusion in an older adult as hypoxia or hypoglycemia until proven otherwise. Never delegate assessment, teaching, evaluation, care planning or an unstable patient, and never push potassium chloride.



The priority ladder. Climb down only when the rung above is safe. Most exam stems are decided on the first three rungs or by a change from baseline.

LOCK THESE IN

- Failure to rescue: the sign was charted but not acted on. Arrests follow 6 to 8 hours of abnormal vital signs.
- CJMM: recognize cues, analyze cues, prioritize hypotheses, generate solutions, take action, evaluate outcomes.
- Priority order: ABC, then Maslow, then acute over chronic, unstable over stable, actual over potential, unexpected over expected.
- C-A-B for the pulseless, unresponsive patient. Control exsanguinating bleeding before the airway in trauma.
- The patient who has changed from baseline beats the one with the most abnormal single number.
- SBAR ends with a specific Recommendation. “The nurse is worried” is a valid rapid response trigger.
- Never delegated: assessment, nursing diagnosis, care planning, initial teaching, evaluation, unstable patients.
- Two identifiers, never the room number. Apical pulse a full minute before digoxin; hold if under 60.

Chapter 1 at a glance

Parameter	Normal	Escalate when
Heart rate	60 to 100/min	Under 40 or over 130, or a new symptomatic dysrhythmia
Respiratory rate	12 to 20/min	Under 8 or over 28, or a rising trend with accessory muscle use
Blood pressure	Systolic 90 to 120, diastolic 60 to 80 mm Hg	Systolic under 90, or a fall of more than 40 from baseline
MAP	70 to 100 mm Hg	Under 65 (organ perfusion threshold)
SpO_2	95 to 100% on room air (88 to 92% target in chronic CO_2 retention)	Under 90% despite oxygen, or a 4 point fall from baseline
Temperature	36.5 to 37.5 °C	Over 38.3 °C or under 36 °C
Urine output	At least 0.5 mL/kg/hr (about 30 mL/hr)	Under 30 mL/hr for two hours in a row
Mentation	Alert, oriented x4	Any acute change, new confusion, hard to rouse

Worked cases

CASE 1.1 · WHICH OF FOUR PATIENTS FIRST

At 0715 you receive four patients: (A) a post-op day two patient asking for pain medication, 7 of 10; (B) a patient with COPD whose SpO_2 has fallen from 91% to 84% and who is now using accessory muscles; (C) a patient with chronic back pain resting at 8 of 10; (D) a patient going home today who is anxious about discharge. Who do you see first?

STEP 1 · APPLY ABC

Only patient B has a breathing problem. A and C have pain, which is not an ABC problem unless it signals one. D is psychosocial.

STEP 2 · LOOK FOR CHANGE

An SpO_2 of 89 to 91% may be this patient's normal, since the target in chronic CO_2 retention is 88 to 92%. The fall to 84% with new accessory muscle use is a change from baseline.

STEP 3 · ACT, THEN NOTIFY

See **patient B** first: sit the patient up, apply oxygen as ordered and assess, then escalate with SBAR.

WHY NOT THE PAIN

Pain must be treated soon, and A comes next. But the trajectory in B is the threat. The number alone is rarely the answer; the trend is.

CASE 1.2 · AN SBAR CALL WITH THE NUMBERS CHECKED

Mr. Okafor, 66, is post-op day two after a bowel resection. Over three hours his respiratory rate rose from 18 to 30, his heart rate is 122 and his blood pressure is 96/58. His SpO_2 is 88% on 4 L. His right calf is swollen and tender. Build the call.

STEP 1 · FIND THE MAP

MAP = (systolic + 2 x diastolic) ÷ 3 = (96 + 116) ÷ 3 = **70.7 mm Hg**. Still above 65, but the trend is down.

STEP 2 · SITUATION

Name, unit, patient and room. His respiratory rate has climbed from 18 to 30 over three hours and SpO_2 is 88% on 4 L.

STEP 3 · BACKGROUND

Post-op day two, bowel resection, anticoagulant held for a procedure.

STEP 4 · ASSESSMENT

Tachycardic, softening blood pressure, calf swollen and tender. "I am concerned about a pulmonary embolism."

STEP 5 · RECOMMENDATION

“I am asking you to come now and order a stat CT pulmonary angiogram and blood gas. I have raised the head of the bed and increased his oxygen.”

CHECK IT

If the pressure falls to 84/50, the MAP becomes (84 + 100) ÷ 3 = 61.3, under 65. That crosses the perfusion threshold and calls for a rapid response.

TRAPS PEOPLE FALL INTO

- **Calling the provider first.** If an independent nursing action can stabilize the patient (raise the head of the bed, apply oxygen, stop the infusion), do that, then notify.
- **Picking the worst single number.** A COPD SpO_2 of 89% may be baseline. The patient whose numbers are changing is the priority.
- **Treating pain as an ABC problem.** Pain is real work but not first unless it signals ischemia, perforation, compartment syndrome or a clot.
- **Calling day-one fever an infection.** A low-grade fever in the first 24 to 48 hours is the inflammatory response to surgery. Atelectasis is common but does not cause the fever.
- **Ignoring expected abnormals.** A low potassium on furosemide is expected and still needs replacing.

Chapter 1 self-test · six items

1. Which item stays with the RN no matter how busy the unit is?

A. Evaluating a patient’s response
B. Ambulating a stable patient
C. Recording intake and output
D. Collecting a clean urine specimen

A. Evaluating a patient’s response Evaluation is part of the nursing process and is never delegated.

2. Which CJMM step asks, “Did it work?”

A. Take action
B. Evaluate outcomes
C. Prioritize hypotheses
D. Recognize cues

B. Evaluate outcomes Evaluating outcomes judges whether the patient is better, unchanged or worse.

3. A post-op patient on day four has a temperature of 38.6 °C and purulent drainage. How should the nurse read this?

A. Expected inflammatory response
B. Normal for a surgical patient
C. Unexpected; it needs escalation
D. A sign of healing granulation

C. Unexpected; it needs escalation Day-one low-grade fever is expected. A spiking fever with pus on day four is an unexpected cluster.

4. A blood pressure of 84/50 gives which MAP?

A. About 67 mm Hg
B. About 73 mm Hg
C. About 56 mm Hg
D. About 61 mm Hg

D. About 61 mm Hg MAP = (84 + 100) ÷ 3 = 61.3, under the 65 threshold.

5. Which is a safe way to delegate vital signs?

A. “Go check on the man in 412”
B. “Report systolic under 100 to me now”
C. “Take them whenever you have time”
D. “Chart them; I will look later”

B. “Report systolic under 100 to me now” A safe delegation names the task, the timing and the reporting parameter.

6. What is never a patient identifier?

A. The full name
B. The date of birth
C. The record number
D. The room number

D. The room number Use two person-specific identifiers. The room number is never one.

CHAPTER 2

Fluid, Electrolyte and Acid-Base Balance

Read it in full: **Chapter 2 in the textbook**. Practice it in the lab: **Ninety-Second ABG: ROME and the Tic-Tac-Toe Grid** and **Sodium and Potassium Console: Interpret, then Prioritize**.

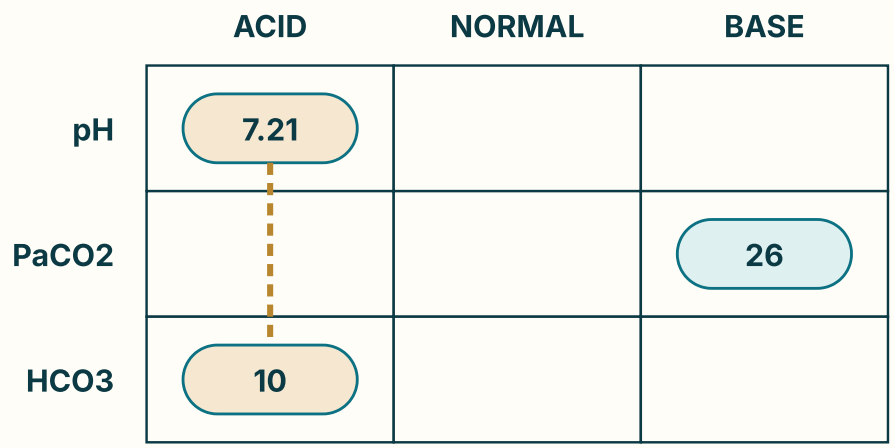
What to know

Water follows sodium. Deficit shows tachycardia first, then orthostatic drops and oliguria; excess shows weight gain and crackles; third spacing looks wet but is dry inside the vessels. One kilogram is one liter.

Sodium disorders are brain problems corrected slowly (no more than 8 to 10 mEq/L up in 24 hours). Potassium disorders are heart problems treated now: calcium gluconate protects, insulin

and dextrose shift, binders, diuretics or dialysis remove. Low calcium and magnesium cause irritability; high magnesium removes reflexes, then breathing.

Read gases with ROME and grade compensation. Isotonic fluid fills the vessels, hypotonic hydrates cells, hypertonic pulls water in. Potassium is never pushed.



Read it
pH and HCO3 share the ACID column: metabolic acidosis. PaCO2 sits in the opposite column: the lung is compensating. pH still abnormal: **partially compensated.**

Cut points
pH: acid below 7.35, base above 7.45.
PaCO2: acid above 45, base below 35 (CO2 is an acid).
HCO3: acid below 22, base above 26 (bicarbonate is a base).

ROME: Respiratory Opposite, Metabolic Equal.

Tic-tac-toe for a gas. Put each value in its own column. The value that lines up with the pH names the disorder; a value in the opposite column is compensating.

LOCK THESE IN

- Water follows sodium. Osmolality 275 to 295 mOsm/kg. 1 kg = 1 L = 2.2 lb.
- Deficit: tachycardia first, BUN:creatinine above 20:1, urine specific gravity above 1.030. Excess: crackles matter most.
- Na 135 to 145, K 3.5 to 5.0, Ca 8.5 to 10.5, Mg 1.5 to 2.5 mEq/L, Phos 2.5 to 4.5 (Chapter 2 values).
- Hyponatremia correction: no more than 8 to 10 mEq/L in 24 h (osmotic demyelination).
- Hyperkalemia: calcium gluconate protects, insulin plus dextrose shifts, binder or dialysis removes.
- Refractory hypokalemia means check the magnesium. Phosphate binders go with meals.
- ROME: Respiratory Opposite, Metabolic Equal. Anion gap = Na minus (Cl + HCO_3), normal 8 to 12.
- Potassium: never IV push, always on a pump, 10 mEq/hr peripheral limit, confirm urine output first.

Chapter 2 at a glance

Electrolyte	Range	Low	High
Sodium	135 to 145 mEq/L	Confusion, seizure, weak reflexes	Thirst, agitation, dry furrowed tongue
Potassium	3.5 to 5.0 mEq/L	Weakness, ileus, flat T, U wave	Peaked T, wide QRS, diarrhea, weakness
Calcium (total)	8.5 to 10.5 mg/dL	Tetany, Chvostek, Trousseau, long QT	Stones, bones, groans, lethargy, short QT
Magnesium	1.5 to 2.5 mEq/L	Tremor, hyperreflexia, torsades	Lost reflexes, respiratory depression
Phosphorus	2.5 to 4.5 mg/dL	Muscle and diaphragm weakness	Few signs; tetany from low calcium

Worked cases

CASE 2.1 · ROME IN THREE STEPS

Mr. Tran, 71, has COPD and is drowsy. ABG: pH 7.30, $PaCO_2$ 62, HCO_3 30. Two days later: pH 7.37, $PaCO_2$ 60, HCO_3 34.

STEP 1 · READ THE PH

7.30 is below 7.35: acidosis.

STEP 2 · FIND THE MATCH

$PaCO_2$ 62 is high, and high CO_2 is acid. It moves opposite to the pH, so the problem is **respiratory**.

STEP 3 · GRADE COMPENSATION

HCO_3 30 has risen in the compensating direction, but the pH is still low: **partially compensated respiratory acidosis**.

STEP 4 · READ THE SECOND GAS

pH 7.37 is normal, but both other values are abnormal: full compensation. 7.37 sits on the acid side of 7.40, so the primary problem is still respiratory acidosis.

SAFETY

Priority is ventilation: sit him up and support breathing. Bicarbonate is not the answer; the lung is.

CASE 2.2 · AN ANION GAP

Ms. Ruiz has pH 7.28, $PaCO_2$ 30, HCO_3 12, Na 140, Cl 104. Name the disorder and the gap.

STEP 1 · READ THE GAS

pH 7.28 is acidosis. HCO_3 12 is low and moves the same way: **metabolic acidosis**. $PaCO_2$ 30 is low, the lung compensating, but the pH is still abnormal: partially compensated.

STEP 2 · COMPUTE THE GAP

Anion gap = 140 minus (104 + 12) = 140 minus 116 = **24 mEq/L**.

STEP 3 · INTERPRET

24 is well above 8 to 12, so acid has been added: ketones, lactate, uremic acids or a toxin, not bicarbonate lost to diarrhea.

SAFETY

Watch the potassium. Acidosis pushes potassium out of cells, so the serum level can fall sharply as the acidosis is corrected.

TRAPS PEOPLE FALL INTO

- **Giving D5W for low blood pressure.** It acts as free water once the dextrose is used. Only about a twelfth stays in the vessels.
- **Thinking calcium gluconate lowers potassium.** It protects the heart for 30 to 60 minutes. Shifting and removal still have to follow.
- **Correcting sodium fast because it is very low.** Speed causes osmotic demyelination. Seizures get small-volume 3% saline and close sodium checks.
- **Replacing potassium again and again.** If it will not rise, check and replace the magnesium.
- **Giving phosphate binders between meals.** They bind dietary phosphorus, so they go with food.

Chapter 2 self-test · six items

1. Which fluid may be hung with a blood product?

A. 0.9% sodium chloride
B. Lactated Ringer’s
C. D5W
D. 0.45% sodium chloride

A. 0.9% sodium chloride Only 0.9% saline is given with blood.

2. A burn patient is edematous but tachycardic and oliguric. What does this suggest?

A. True fluid volume excess from IV fluids
B. Third spacing with low vascular volume
C. Hypernatremia from free water loss
D. The expected recovery phase of burns

B. Third spacing with low vascular volume The patient looks wet but is dry inside the vessels. Treat the intravascular deficit.

3. Which finding is the classic early ECG sign of hyperkalemia?

A. Prominent U waves
B. Shortened QT interval
C. Flattened T waves
D. Tall peaked T waves

D. Tall peaked T waves Peaked T waves come first, then PR prolongation, P loss and a wide QRS.

4. Interpret pH 7.36, $PaCO_2$ 58, HCO_3 32.

A. Compensated metabolic alkalosis
B. Uncompensated respiratory acidosis
C. Compensated respiratory acidosis
D. A normal arterial gas

C. Compensated respiratory acidosis Both values abnormal with a normal pH is full compensation. 7.36 is on the acid side, and high CO_2 is the acid.

5. Before hanging IV potassium, what should the nurse confirm?

A. A normal blood glucose level
B. Urine output of at least 30 mL/hr
C. A recent chest x-ray result
D. An oxygen saturation above 95% now

B. Urine output of at least 30 mL/hr The kidney is the only real exit for potassium.

6. A patient gets IV fluids and develops new crackles and dyspnea. What comes first?

A. Stop and remove the IV
B. Increase the rate
C. Slow to keep-vein-open
D. Give an oral diuretic

C. Slow to keep-vein-open Slow the infusion but keep the access, then sit the patient up, give oxygen and notify.

CHAPTER 3

Perioperative Nursing

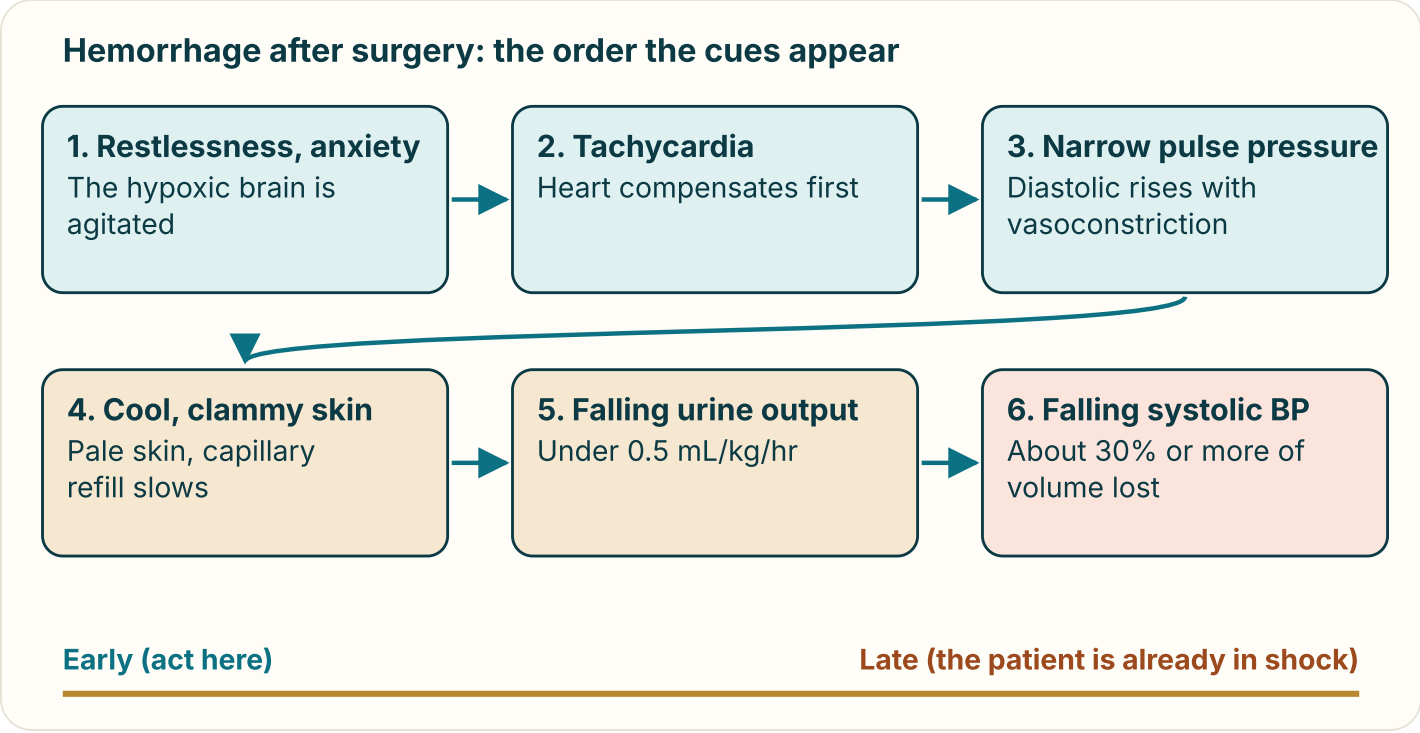
Read it in full: **Chapter 3 in the textbook**. Practice it in the lab: **The Recovery Bay: Two Hours, One Patient at a Time** and **Postoperative Floor Rounds: Name It, Then Escalate It**.

What to know

Surgery triggers a stress response: high glucose, low urine output for 24 to 48 hours, third spacing that returns on day two or three, and a clotting tendency. Stratify risk with ASA class, METs, STOP-BANG and nutrition, and reconcile every drug: continue beta blockers, hold ACE inhibitors, metformin and SGLT2 inhibitors as ordered, time anticoagulant holds.

The surgeon obtains consent; the nurse witnesses and stops the process if understanding is missing. Clear liquids are allowed up to 2 hours before. In the OR, the time out, counts, normothermia and antibiotic timing protect the patient; rising end-tidal CO_2 means malignant hyperthermia and dantrolene.

PACU: airway first with a jaw thrust, then breathing and circulation; restlessness is hypoxia or bleeding until proven otherwise. On the unit, spirometry, prophylaxis and walking prevent the big killers, and evisceration gets moist sterile saline gauze and low Fowler.



Vital signs lie until they do not. A young patient compensates. By the time the systolic pressure falls, about a third of the blood volume may be gone, so act on restlessness and a rising heart rate.

LOCK THESE IN

- Stress response: glucose 180 to 220, low urine output for 24 to 48 h, fluid returns day 2 to 3.
- STOP-BANG 3 or more: continuous oximetry, cautious opioids, CPAP at the bedside.
- Continue beta blockers and statins; hold ACE inhibitors (morning), metformin (day of), SGLT2 inhibitors (3 to 4 days).
- The nurse witnesses consent. No understanding: stop, hold sedation, call the surgeon.
- Fasting: clears 2 h, light meal 6 h, fatty meal 8 h.
- Malignant hyperthermia: rising end-tidal CO_2 first; dantrolene 2.5 mg/kg.
- PACU: jaw thrust before oxygen. Aldrete 9 or more to leave Phase I.
- Evisceration: low Fowler, knees bent, sterile saline gauze, NPO, call the surgeon.

Chapter 3 at a glance

Drug class	Plan	Reason
Beta blockers, statins	Continue, including the morning dose	Rebound tachycardia and ischemia; plaque stability
ACE inhibitors, ARBs	Commonly held the morning of surgery	Refractory intraoperative hypotension
Warfarin	Hold about 5 days; INR under 1.5	Effect takes days to clear
DOACs	Hold 24 to 96 h by drug, bleeding risk and CrCl	Dabigatran is the most renally cleared
Clopidogrel, prasugrel, ticagrelor	Hold 5 to 7 days, with cardiology input if stented	Stent thrombosis if stopped too soon
Metformin	Hold the day of surgery	Lactic acidosis if kidney perfusion falls
SGLT2 inhibitors	Hold 3 to 4 days	Euglycemic DKA
Insulin	Basal reduced to about 50 to 80%; hold mealtime insulin while NPO	Correction insulin keeps glucose 140 to 180
Chronic steroids	Continue; stress dose may be ordered	Adrenal crisis and hypotension
Garlic, ginkgo, ginseng, fish oil, vitamin E	Hold 1 to 2 weeks	Platelet inhibition

Worked cases

CASE 3.1 · A CONSENT THAT IS NOT READY

Mrs. Hollis, 74, is to have a hip repair. As you witness her signature she says, “My son told me to sign. I am not sure what they are doing.” Midazolam is ordered on call to the OR.

STEP 1 · RECOGNIZE THE CUE

She does not understand the procedure. Consent requires understanding, voluntariness and competence.

STEP 2 · ACT

Stop. Do not witness the signature, and hold the midazolam, because a consent signed after sedation is not valid.

STEP 3 · ESCALATE

Notify the surgeon, who is responsible for explaining the procedure, risks, alternatives and refusal. Document what she said and what you did.

SCOPE CHECK

Do not explain the surgery yourself. That does not fix the consent and is outside the nurse's role.

CASE 3.2 · MALIGNANT HYPERTHERMIA BY THE NUMBERS

Mr. Hartigan, 84 kg, is under sevoflurane. His end-tidal CO_2 keeps rising despite more ventilation, his heart rate is 128 and his jaw is rigid. Temperature is 37.8 °C.

STEP 1 · NAME IT

Rising end-tidal CO_2, tachycardia and masseter rigidity are the early signs. The temperature is not high yet because fever is late.

STEP 2 · STOP THE TRIGGER

Stop the volatile agent and succinylcholine; ventilate with 100% oxygen at high flow; call for the MH cart and help.

STEP 3 · DOSE DANTROLENE

2.5 mg/kg x 84 kg = **210 mg** IV push, repeated as needed toward a usual maximum of about 10 mg/kg (840 mg).

STEP 4 · SUPPORT

Cool with cold saline and ice packs and stop cooling near 38 °C. Treat high potassium. Keep urine output 1 to 2 mL/kg/hr. Monitor in ICU for at least 24 hours for recrudescence.

TRAPS PEOPLE FALL INTO

- **Giving oxygen before opening the airway.** In snoring or see-saw breathing, the tongue is blocking. Jaw thrust or chin lift comes first.
- **Waiting for fever to call malignant hyperthermia.** A rising end-tidal CO_2 is the early sign; high fever is late.
- **Explaining the surgery to fix a consent.** The surgeon explains. The nurse stops and notifies.
- **Reading normal BP as no bleeding.** Healthy patients compensate. Restlessness, tachycardia and a narrow pulse pressure come first.
- **Sedating restlessness in recovery.** Restlessness is hypoxia or hemorrhage until proven otherwise.

Chapter 3 self-test · six items

1. Who is legally responsible for obtaining informed consent?

A. The circulating nurse
B. The surgeon
C. The charge nurse
D. The anesthetist only

B. The surgeon The person doing the procedure explains and obtains consent; the nurse witnesses.

2. Why is hypothermia avoided during surgery?

A. It speeds drug metabolism too much
B. It lowers end-tidal CO_2 levels
C. It causes malignant hyperthermia
D. It raises infection and bleeding risk

D. It raises infection and bleeding risk Cold impairs clotting, lowers wound oxygen and roughly triples infection risk.

3. A patient with an epidural reports new back pain and leg numbness. What is suspected?

A. Post-dural headache
B. Expected motor block
C. Epidural hematoma
D. Local muscle spasm

C. Epidural hematoma This is a surgical emergency needing immediate notification and urgent MRI.

4. What Aldrete total do most units require for Phase I discharge?

A. 9 or more
B. 6 or more
C. 10 exactly
D. 7 or more

A. 9 or more Most facilities require 9 or greater with stable vital signs.

5. A day-four patient has sudden dyspnea, pleuritic pain and a sense of doom. What first?

A. Ambulate to the chair
B. Massage the sore calf
C. Recheck in one hour
D. High Fowler and oxygen

D. High Fowler and oxygen Treat as pulmonary embolism: position, oxygen, stay, rapid response.

6. When is dehiscence most likely?

A. Days 5 to 10
B. Hours 1 to 6
C. Days 1 to 2
D. Week 4 or later

A. Days 5 to 10 Sutures lose strength before collagen gains it, classically days 5 to 10.

CHAPTER 4

Pain, Comfort and Palliative Care

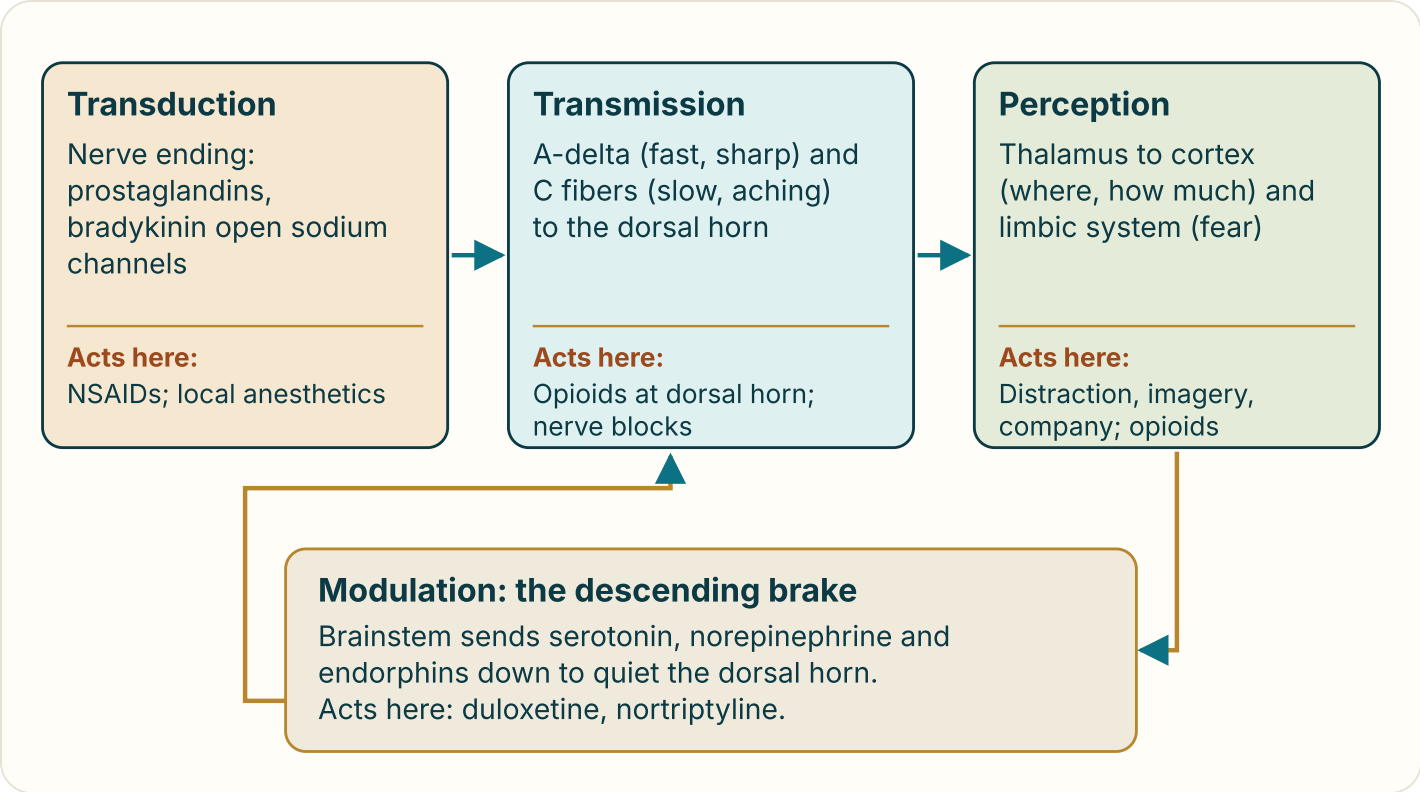
Read it in full: **Chapter 4 in the textbook**. Practice it in the lab: **Sedation Watch: The Night Shift That Goes Wrong** and **The Multimodal Analgesia Bench**.

What to know

Pain travels transduction, transmission, perception and modulation; match the drug to the step and the type. Neuropathic pain needs gabapentinoids, SNRIs or tricyclics, not more opioid. Self-report is the standard, normal vital signs never rule pain out, and the scale must fit the patient.

Build on scheduled acetaminophen (4 g ceiling, less in older or liver patients) and an NSAID if safe, add adjuvants and regional blocks, and use opioids as the smallest part. Score sedation with every dose: hold at POSS 3, give dilute titrated naloxone at 4 and expect re-sedation. Start a bowel regimen with the first dose.

Palliative care can run with cure; hospice is for six months or less. A DNR limits CPR only. Dyspnea gets low-dose opioid and a fan; secretions get repositioning and oral suction.



Four steps, four targets. Multimodal analgesia hits several steps with small doses instead of one step with a large dose.

LOCK THESE IN

- Four steps: transduction, transmission, perception, modulation.
- Neuropathic: burning, shooting, allodynia; gabapentinoid, SNRI, TCA, lidocaine patch.
- Normal vital signs never rule out pain. Self-report is the standard.
- Reassess 15 to 30 min after IV opioid, 60 min after oral.
- Acetaminophen 4 g/day maximum; 2 to 3 g in older adults and liver disease.
- POSS 3: hold and notify. POSS 4: stop, stay, oxygen, dilute naloxone, rapid response.
- Naloxone 0.4 mg in 9 mL = 0.04 mg/mL; give 0.5 to 1 mL every 1 to 2 min.
- Hospice: prognosis six months or less. DNR means no CPR, not no care.

Chapter 4 at a glance

Tool	Population	Range	Act at
NRS	Alert adults	0 to 10	Mild 1 to 3, moderate 4 to 6, severe 7 to 10
Faces (FPS-R, Wong-Baker)	Children over 3, literacy or language barrier	0 to 10	Same bands as NRS
FLACC	2 months to 7 years; nonverbal	0 to 10	4 or more is moderate
CPOT	Critically ill, intubated or sedated	0 to 8	Greater than 2
BPS	Intubated, sedated adults	3 to 12	Greater than 5
PAINAD	Advanced dementia	0 to 10	2 or more: analgesic trial

Worked cases

CASE 4.1 · COUNTING THE ACETAMINOPHEN

Mr. Pike, 78, has acetaminophen 650 mg every 6 hours scheduled. He also has oxycodone/acetaminophen 5/325, two tablets every 6 hours as needed, and took it three times today.

STEP 1 · ADD THE SCHEDULED DOSE

650 x 4 = 2,600 mg.

STEP 2 · ADD THE COMBINATION PRODUCT

325 x 2 tablets x 3 doses = 1,950 mg.

STEP 3 · TOTAL

2,600 + 1,950 = **4,550 mg**.

STEP 4 · COMPARE

That is over the 4 g adult ceiling, and he is 78, so his ceiling should be lower still, 2 to 3 g. Hold further acetaminophen and contact the prescriber.

CHECK IT

With only one combination dose the total would be 2,600 + 650 = 3,250 mg, still above a 3 g limit for an older adult.

CASE 4.2 · DILUTE NALOXONE

Ms. Lowe, opioid-naive, is POSS 4 with a respiratory rate of 6 after IV hydromorphone.

STEP 1 · ACT FIRST

Stop the opioid, stay with her, stimulate, apply oxygen and call rapid response.

STEP 2 · MIX

0.4 mg naloxone (1 mL) plus 9 mL saline = 10 mL. Concentration = 0.4 ÷ 10 = **0.04 mg/mL**.

STEP 3 · GIVE

0.5 to 1 mL (0.02 to 0.04 mg) IV every 1 to 2 minutes, titrated to breathing and arousal.

WHY DILUTE

A full 0.4 mg ampoule in a patient on therapeutic opioids can cause severe pain, vomiting, hypertension and pulmonary edema.

SAFETY

Naloxone lasts 30 to 90 minutes, shorter than most opioids. Monitor continuously for re-sedation.

TRAPS PEOPLE FALL INTO

- **Doubting pain because vital signs are normal.** Chronic pain loses the sympathetic signs.
- **Escalating opioids for burning pain.** Neuropathic pain needs a different drug class, not a bigger dose.
- **Watching only the respiratory rate.** Sedation comes first. Score the POSS every time.
- **Pushing a full ampoule of naloxone.** Dilute and titrate in a patient on therapeutic opioids.

- **Forgetting hidden acetaminophen.** Combination products and home cold remedies add up.

Chapter 4 self-test · six items

1. A patient with dementia is newly combative during baths. What is a reasonable step?

A. Scheduled acetaminophen trial
B. An antipsychotic at bedtime
C. Soft wrist restraints
D. Skip bathing for a week

A. Scheduled acetaminophen trial Pain often shows as behavior change in dementia. An analgesic trial is evidence-supported.

2. Which is true of celecoxib?

A. It spares the kidneys
B. It spares platelets
C. It is safe in sulfa allergy
D. It has no heart risk

B. It spares platelets COX-2 selectivity spares platelets and the stomach but keeps renal and cardiovascular risks.

3. What concentration does 0.4 mg naloxone in 9 mL of saline give?

A. 0.4 mg/mL
B. 0.004 mg/mL
C. 0.09 mg/mL
D. 0.04 mg/mL

D. 0.04 mg/mL 0.4 mg in 10 mL total is 0.04 mg/mL.

4. Which pairing is the most lethal on the medical floor?

A. Opioid plus acetaminophen
B. NSAID plus acetaminophen
C. Opioid plus benzodiazepine
D. Opioid plus senna

C. Opioid plus benzodiazepine Combined sedatives multiply respiratory depression.

5. A patient on buprenorphine maintenance breaks a hip. What is the plan?

A. Stop it until after discharge
B. Give no opioid at all for pain
C. Switch it to meperidine instead
D. Continue it and add analgesia

D. Continue it and add analgesia The maintenance dose treats the disorder; acute pain needs its own analgesia.

6. What best relieves thirst in a dying patient?

A. An IV fluid bolus
B. A feeding tube
C. Frequent mouth care
D. Deep suctioning

C. Frequent mouth care Moist swabs and lip balm relieve thirst better than IV fluids at end of life.

CHAPTER 5

Infection, Sepsis and the Immunocompromised Patient

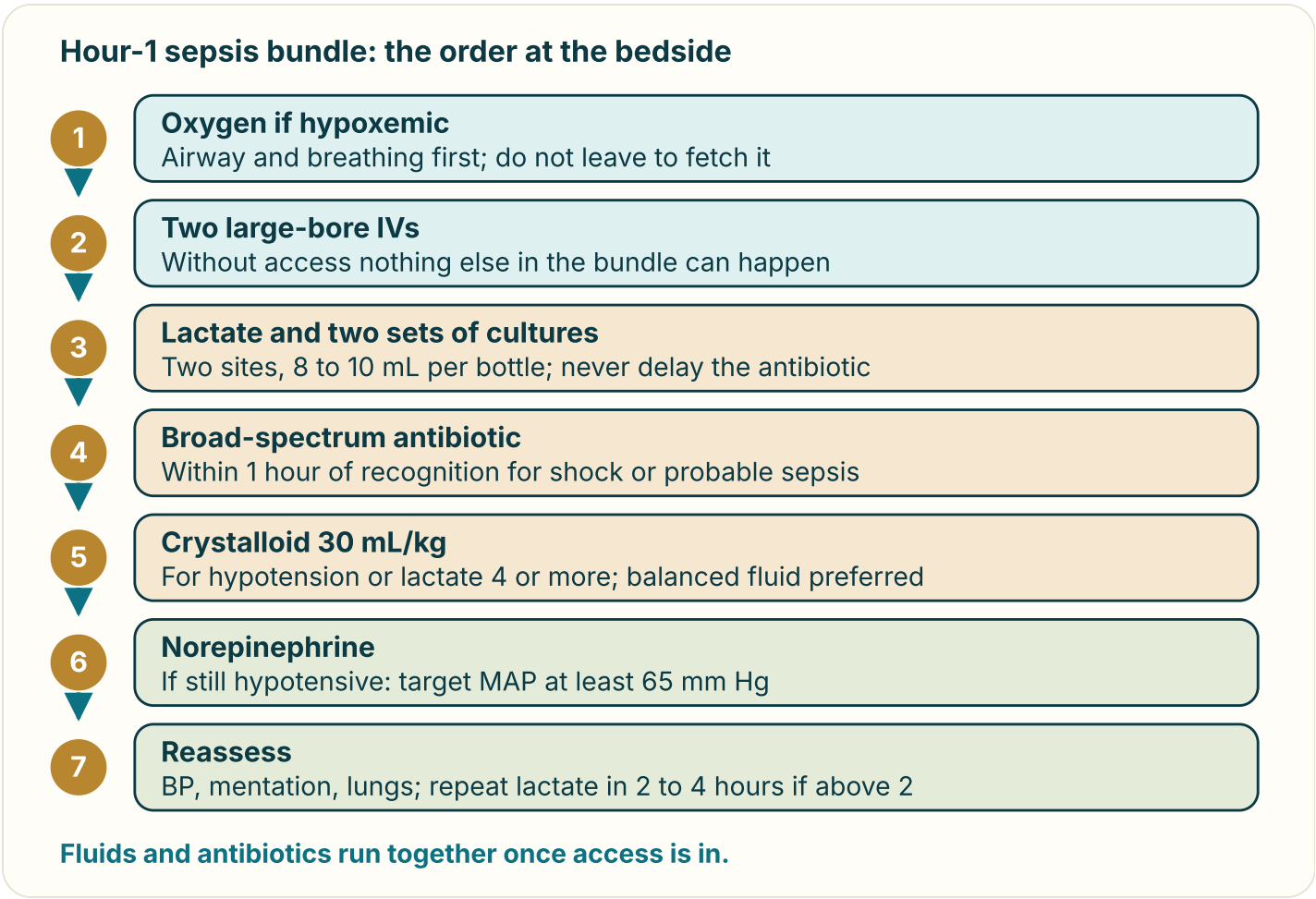
Read it in full: **Chapter 5 in the textbook**. Practice it in the lab: **The First Hour: Sequence the Sepsis Bundle** and **ANC Bench and the Neutropenic Fever Clock**.

What to know

Infection signs are the host response: a reset thermostat and leaky, dilated vessels. Hand hygiene breaks transmission; soap and water for spores; remove lines and catheters early. Choose contact, droplet or airborne precautions by how the organism travels.

Sepsis is organ dysfunction from a dysregulated response. Watch trends in respiratory rate and mentation, a left shift and a lactate above 2. In the first hour: oxygen and access, lactate and two sets of cultures, a broad antibiotic, 30 mL/kg crystalloid and norepinephrine to a MAP of 65.

Each antimicrobial class has its own monitoring. Calculate the ANC yourself; fever with an ANC under 500 is a one-hour emergency, and the rectal route and live vaccines are off the table.



The first hour of sepsis. Cultures come before antibiotics only because they are quick. If access is hard, the antibiotic wins.

LOCK THESE IN

- Chain of infection: agent, reservoir, exit, transmission, entry, host. Hand hygiene breaks transmission.
- Soap and water for C. difficile and visible soil. Alcohol does not kill spores.
- Airborne: negative pressure plus N95 (TB, measles, varicella). Droplet: surgical mask.
- Bands over 10% is a left shift. Lactate above 2 is a warning; 4 or more is hypoperfusion.
- Two sets of cultures, two sites, before antibiotics, but never delaying them.
- Hour-1: lactate, cultures, antibiotic, 30 mL/kg crystalloid, norepinephrine to MAP 65.
- Vancomycin flushing is a rate reaction, not an allergy. Infuse 1 g over at least 60 min.
- ANC = WBC x (% segs + % bands). Fever with ANC under 500: antibiotic within 60 min.

Chapter 5 at a glance

Type	Room	PPE	Examples
Contact	Private or cohort; dedicated equipment	Gown and gloves	MRSA, VRE, ESBL, scabies, RSV
Contact plus (enteric)	Private; bleach cleaning	Gown, gloves; soap and water	C. difficile, norovirus
Droplet	Private; door may stay open	Surgical mask within about 6 ft	Influenza, pertussis, meningococcus
Airborne	Negative pressure, door closed	Fit-tested N95	TB, measles, varicella, disseminated zoster
Protective environment	Positive pressure, HEPA	Standard; mask patient outside	Allogeneic stem cell transplant

Worked cases

CASE 5.1 · A SEPTIC PATIENT IN THE FIRST HOUR

Mrs. Patel, 72 kg, is post-op day three. T 38.7 °C, HR 118, RR 26, BP 88/46, new confusion, lactate 4.4. Her incision drains pus.

STEP 1 · FIND THE MAP

(88 + 2 x 46) ÷ 3 = (88 + 92) ÷ 3 = **60 mm Hg**, under 65.

STEP 2 · NAME IT

Suspected infection with hypotension, confusion and a lactate of 4.4: sepsis, likely progressing to shock.

STEP 3 · ORDER YOUR ACTIONS

Oxygen if hypoxemic, two large-bore IVs, lactate and two sets of cultures, the broad-spectrum antibiotic within the hour.

STEP 4 · COMPUTE THE BOLUS

30 mL/kg x 72 kg = **2,160 mL** of balanced crystalloid, reassessing lungs and mentation between liters.

STEP 5 · NEXT

If the MAP stays under 65, expect norepinephrine. Repeat the lactate in 2 to 4 hours. Call the provider with SBAR and ask for surgical review for source control.

CASE 5.2 · AN ANC AND A NEUTROPENIC FEVER

Mr. Kim is on day 10 after chemotherapy. WBC 1,800 with 20% segs and 6% bands. His temperature is 38.4 °C.

STEP 1 · COMPUTE THE ANC

1,800 x (0.20 + 0.06) = 1,800 x 0.26 = **468/mm^3**.

STEP 2 · CLASSIFY

Under 500 is severe neutropenia. One reading of 38.3 or higher meets the fever definition.

STEP 3 · ACT

Notify the provider now, draw cultures from every lumen of his central line and one peripheral set, and give an antipseudomonal beta-lactam (cefepime, piperacillin-tazobactam or meropenem) within 60 minutes.

SAFETY

Do not give acetaminophen before the provider has seen the fever, and take no rectal temperature.

TRAPS PEOPLE FALL INTO

- **Using alcohol rub for C. difficile.** Alcohol does not kill spores. Use soap and water.
- **Putting TB on droplet precautions.** TB is airborne: negative pressure and an N95.
- **Holding the antibiotic until cultures are drawn.** Cultures come first only if they are quick. In shock, the antibiotic wins.
- **Collecting urine from the drainage bag.** Use the sampling port after cleaning it.
- **Giving IV vancomycin for C. difficile colitis.** Only oral vancomycin reaches the colon.

Chapter 5 self-test · six items

1. Which room does a stem cell transplant recipient need?

A. Positive pressure with HEPA
B. Negative pressure, door closed
C. Any private room with a sink
D. A shared ward near the desk

A. Positive pressure with HEPA Positive pressure pushes filtered air out to protect the patient.

2. A patient with sepsis has a lactate that climbs from 2.6 to 4.8 despite fluids. What is the right action?

A. Recheck tomorrow
B. Chart and continue
C. Slow the fluids
D. Call the provider

D. Call the provider A rising lactate despite resuscitation is a call whether or not the BP has moved.

3. Which vaccine is contraindicated in significant immunosuppression?

A. Inactivated flu
B. MMR
C. Tdap
D. Pneumococcal

B. MMR MMR is live attenuated. Inactivated vaccines are safe and encouraged.

4. Which drug causes a disulfiram-like reaction with alcohol?

A. Ceftriaxone
B. Azithromycin
C. Metronidazole
D. Vancomycin

C. Metronidazole Patients avoid alcohol during and for 3 days after metronidazole.

5. Which older adult finding most suggests infection?

A. New confusion today
B. Temp 36.4 °C stable
C. Chronic knee pain
D. Usual mild forgetfulness

A. New confusion today Infection in older adults often shows as delirium without fever.

6. When should antibiotics start for neutropenic fever?

A. Within 6 hours
B. After the x-ray
C. After the WBC
D. Within 60 minutes

D. Within 60 minutes It is a one-hour emergency, like sepsis.

CHAPTER 6

Respiratory Disorders: Airway and Obstructive Disease

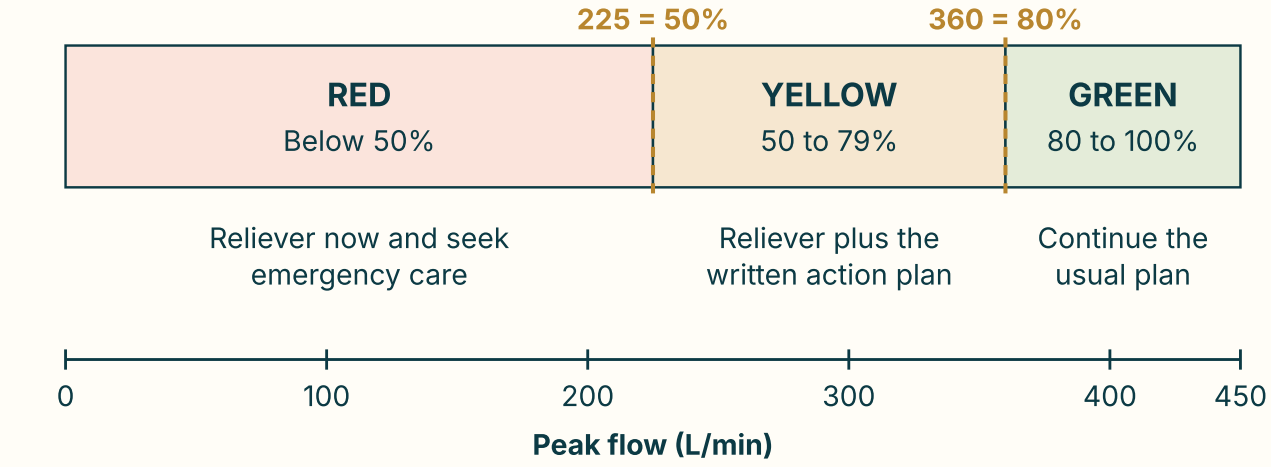
Read it in full: **Chapter 6 in the textbook**. Practice it in the lab: **Status Asthmaticus: The Escalation Clock** and **Sequence Is a Nursing Intervention**.

What to know

Obstruction traps air on the way out, causing hyperinflation, accessory muscle use and rising CO_2. A silent chest or a normalizing $PaCO_2$ in a struggling asthmatic is exhaustion, not improvement. FEV1/FVC below 0.70 confirms COPD; a 12% and 200 mL bronchodilator response supports asthma.

Asthma: SABA rescues, ICS controls, LABA never alone. COPD: LAMA maintenance, oxygen target 88 to 92% in retainers, BiPAP for hypercapnic acidosis, and only cessation, long-term oxygen and selected surgery prolong life.

CF sequence: bronchodilator, mucolytic, clearance, antibiotic. Sleep apnea plus opioids is a danger. Suction by indication, keep trach cuff pressure 20 to 25 and never put a speaking valve on an inflated cuff.



Zones are percentages of the patient's own best. For a best of 450, the yellow line is 360 and the red line is 225. Teach the numbers, not just the colors.

LOCK THESE IN

- Obstruction = failed exhalation and air trapping. Tripod position is compensation.
- Silent chest or normal $PaCO_2$ in a struggling asthmatic: impending failure.
- FEV1/FVC below 0.70 = COPD. Bronchodilator rise of 12% and 200 mL = asthma pattern.
- Peak flow: green 80 to 100%, yellow 50 to 79%, red below 50%.
- SABA is rescue; ICS has no acute effect; LABA never alone in asthma.
- COPD SpO_2 target 88 to 92%; oxygen at least 15 h/day for survival benefit.
- CF order: bronchodilator, mucolytic, clearance, inhaled antibiotic.
- Suction: preoxygenate, 80 to 120 mm Hg, 10 to 15 s, no saline.

Chapter 6 at a glance

Feature	Asthma	COPD
Onset	Childhood or young adult	Usually after 40, after exposure
Reversibility	Largely reversible	Persistent; ratio stays below 0.70
Pattern	Episodic, nocturnal	Progressive, daily, worse mornings
Oxygen target	93 to 95%	88 to 92% if chronically hypercapnic
Cornerstone drug	Inhaled corticosteroid	LAMA and/or LABA

Worked cases

CASE 6.1 · STAGING COPD FROM SPIROMETRY

Mr. Tolliver, 64, smoked 1.5 packs a day for 30 years. After bronchodilator: FEV1 1.8 L, FVC 3.2 L, predicted FEV1 3.6 L.

STEP 1 · PACK-YEARS

1.5 x 30 = **45 pack-years**.

THE RATIO

FEV1/FVC = 1.8 ÷ 3.2 = 0.56, below 0.70: persistent obstruction, COPD.

THE GRADE

FEV1 percent predicted = 1.8 ÷ 3.6 = 50%, which is GOLD 2 (50 to 79%).

TEACH

Smoking cessation is the only intervention that slows his yearly FEV1 loss. Offer it every admission without lecturing.

CASE 6.2 · A BRONCHODILATOR RESPONSE

Ms. Akers, 23, has an FEV1 of 2.10 L before albuterol and 2.42 L fifteen minutes after.

STEP 1 · CHANGE IN VOLUME

2.42 minus 2.10 = 0.32 L = **320 mL**.

STEP 2 · PERCENT CHANGE

0.32 ÷ 2.10 = **15.2%**.

STEP 3 · INTERPRET

Both thresholds are met (at least 12% and at least 200 mL): a significant response that supports asthma.

TRAPS PEOPLE FALL INTO

- **Charting a silent chest as clear lungs.** No sound may mean no airflow.
- **Relaxing at a normal $PaCO_2$ in a tachypneic asthmatic.** It signals fatigue and coming failure.
- **Turning up oxygen for a comfortable COPD patient at 89%.** That may be baseline. Mental status and work of breathing matter more.
- **Withholding oxygen from a hypoxemic COPD patient.** Give what is needed, then titrate down and watch.
- **Using tiotropium or an ICS as a rescue inhaler.** Only a short-acting reliever rescues.

Chapter 6 self-test · six items

1. Why are systemic steroids given in asthma even after the patient improves?

A. To raise the potassium
B. To speed the early phase
C. To replace albuterol
D. To block the late phase

D. To block the late phase The late inflammatory phase arrives 4 to 12 hours later and does not respond to bronchodilators.

2. Which COPD treatment is shown to prolong survival?

A. Inhaled corticosteroid daily
B. Daily albuterol by nebulizer
C. Long-term oxygen for hypoxemia
D. Roflumilast for exacerbations

C. Long-term oxygen for hypoxemia Cessation, long-term oxygen for resting hypoxemia and selected surgery prolong survival.

3. Which device gives the most precise FiO_2?

A. Nasal cannula
B. Venturi mask
C. Simple mask
D. Non-rebreather

B. Venturi mask The color-coded adapter sets an exact FiO_2.

4. What is the target trach cuff pressure?

A. 20 to 25 cm H_2O
B. 30 to 40 cm H_2O
C. 5 to 10 cm H_2O
D. 45 to 50 cm H_2O

A. 20 to 25 cm H_2O Higher pressure causes ischemia and stenosis; lower allows aspiration.

5. How does dry-powder inhaler technique differ from an MDI?

A. Shake it well before use
B. Exhale into the device
C. Inhale slowly for 5 seconds
D. Inhale quickly and forcefully

D. Inhale quickly and forcefully The patient's own fast inhalation breaks up the powder.

6. What sweat chloride value diagnoses cystic fibrosis?

A. 30 to 59 mmol/L
B. 60 mmol/L or more
C. Below 30 mmol/L
D. 20 mmol/L or more

B. 60 mmol/L or more 60 or more is diagnostic; 30 to 59 needs more testing.

CHAPTER 7

Respiratory Disorders: Infection, Trauma and Failure

Read it in full: **Chapter 7 in the textbook**. Practice it in the lab: **Read the Chambers, Make the First Move** and **Type I, Type II and Everything After the Tube**.

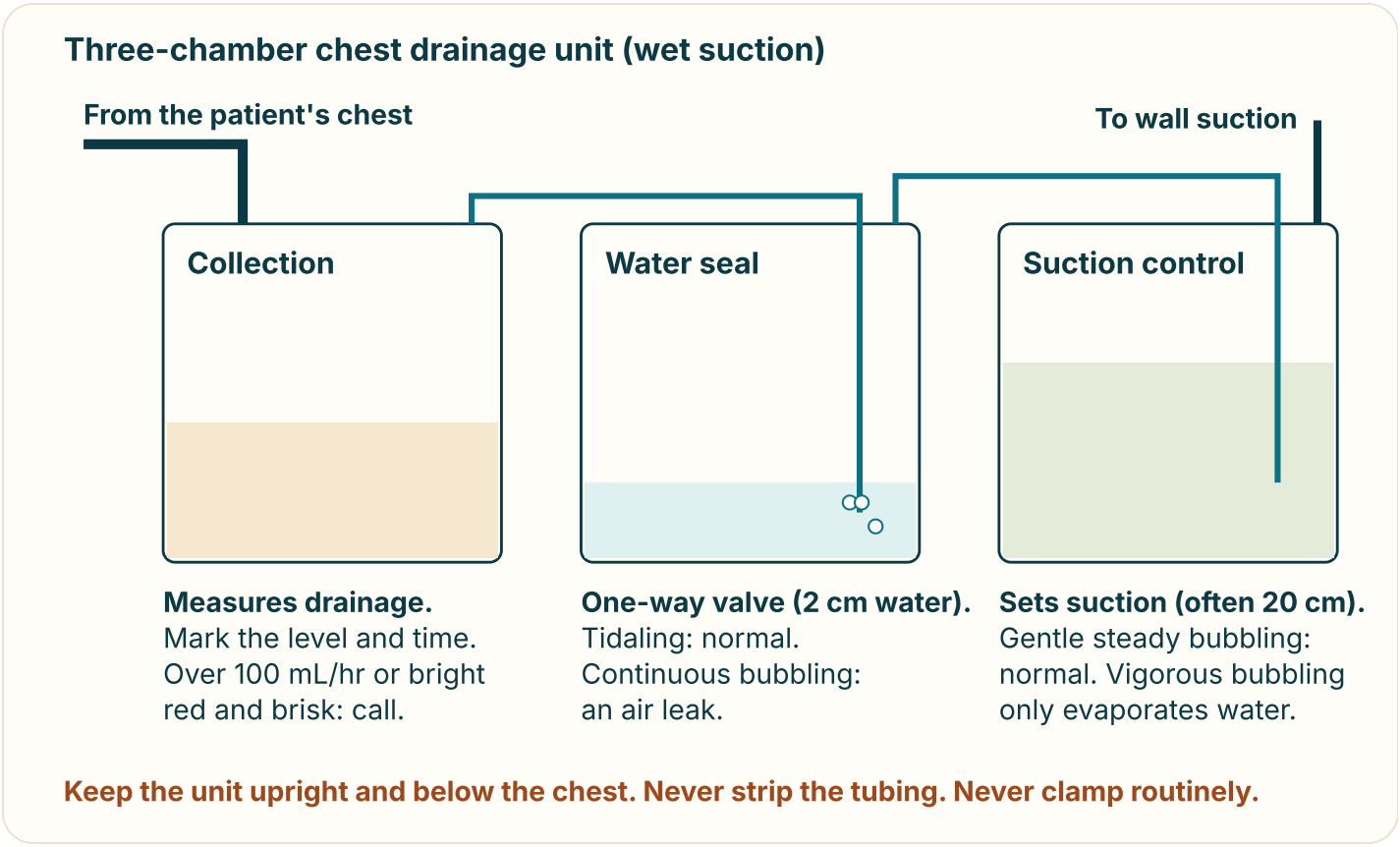
What to know

Pneumonia fills the alveolus and creates a shunt that resists oxygen; score it with CURB-65 and do not let cultures delay the antibiotic. Tuberculosis needs a negative-pressure room, an N95 for staff, a surgical mask for the patient in transport and months of RIPE therapy with drug-specific monitoring.

Pulmonary embolism creates dead space: sudden dyspnea, hypoxemia with a low $PaCO_2$. Anticoagulate on suspicion and know each antidote. Tension pneumothorax needs needle

decompression now. In a chest drain, tidaling is normal and continuous water-seal bubbling is a leak.

Type I failure is a PaO_2 under 60; type II is a $PaCO_2$ over 50 with acidosis. ARDS is graded by the P/F ratio and treated with small breaths, higher PEEP and proning.



Read the chambers left to right. Tidaling in the water seal means the tube is patent. Continuous bubbling there means a leak: check the patient and dressing first, then the tubing.

LOCK THESE IN

- CURB-65: 0 to 1 home, 2 floor, 3 to 5 consider ICU.
- TB: N95 on staff, surgical mask on the patient. Ethambutol: vision; INH: B6.
- PE gas: low PaO_2, low $PaCO_2$, high pH. Unexplained tachypnea is the clue.
- Antidotes: protamine (heparin), vitamin K (warfarin), idarucizumab (dabigatran), four-factor PCC (Xa inhibitors; andexanet was withdrawn in December 2025).
- Tension pneumothorax: trachea away, absent sounds, JVD, hypotension; decompress now.
- Chest tube out: occlusive dressing taped on three sides. Disconnected: end in sterile water.
- Type I: PaO_2 under 60. Type II: $PaCO_2$ over 50 and pH under 7.35.
- ARDS: P/F 300 or less; 6 mL/kg, plateau 30 or less, PEEP, prone.

Chapter 7 at a glance

Item (1 point each)	Threshold
Confusion	New disorientation
Urea (BUN)	Greater than 19 mg/dL
Respiratory rate	30/min or higher
Blood pressure	SBP under 90 or DBP 60 or less
Age	65 or older
Score meaning	0 to 1 outpatient; 2 admit to floor; 3 to 5 assess for ICU

Worked cases

CASE 7.1 · SCORING CURB-65

Mr. Shaw, 78, has pneumonia. He is newly confused, BUN 28, RR 32, BP 108/68.

STEP 1 · SCORE EACH ITEM

Confusion 1. BUN 28 over 19: 1. RR 32: 1. BP: SBP 108 is not under 90 and DBP 68 is not 60 or less: 0. Age 78: 1.

STEP 2 · ADD

1 + 1 + 1 + 0 + 1 = **4**.

STEP 3 · DECIDE

A score of 3 to 5 means assess for ICU. Count his respirations yourself and escalate.

CASE 7.2 · GRADING ARDS WITH THE P/F RATIO

Ms. Lee is on the ventilator with PEEP 10. Day 1: PaO_2 120 on FiO_2 0.50. Day 2: PaO_2 70 on FiO_2 0.70.

STEP 1 · DAY 1

120 ÷ 0.50 = **240**: mild ARDS (201 to 300).

STEP 2 · DAY 2

70 ÷ 0.70 = **100**: severe ARDS (100 or less).

WHAT IT MEANS

More oxygen produced a lower ratio: refractory hypoxemia. Expect lung-protective settings, higher PEEP and prone positioning.

TRAPS PEOPLE FALL INTO

- **Putting the N95 on the TB patient.** The N95 protects staff. The patient wears a surgical mask for transport.
- **Reading TST erythema.** Measure induration only.
- **Waiting for a chest x-ray for tension pneumothorax.** It is a clinical diagnosis. Decompress now.
- **Clamping a chest tube that is still leaking air.** That can create a tension pneumothorax.
- **Stripping or milking chest tubing.** The negative pressure damages tissue.

Chapter 7 self-test · six items

1. Where does aspiration pneumonia most often settle in an upright patient?

A. Left upper lobe
B. Right lower lobe
C. Right upper lobe
D. Left lingula

B. Right lower lobe The right mainstem bronchus is wider and more vertical.

2. How much fluid is the usual limit for one thoracentesis?

A. About 3,000 to 4,000 mL
B. About 100 to 200 mL
C. About 1,000 to 1,500 mL
D. No limit applies

C. About 1,000 to 1,500 mL More risks re-expansion pulmonary edema.

3. Heparin-induced thrombocytopenia most often causes what?

A. Thrombosis
B. Hemorrhage only
C. Fever only
D. Hyperkalemia

A. Thrombosis HIT paradoxically causes clotting; stop all heparin.

4. Which defines type II respiratory failure?

A. PaO_2 under 60 with low CO_2
B. SpO_2 88 to 92% at rest
C. A P/F ratio under 300 on PEEP
D. $PaCO_2$ over 50 and pH under 7.35

D. $PaCO_2$ over 50 and pH under 7.35 Type II is ventilatory failure.

5. What is part of the VAP bundle?

A. Head of bed 30 to 45 degrees
B. Saline before suctioning
C. Suction every hour
D. Flat supine position at night

A. Head of bed 30 to 45 degrees Elevation, oral care and daily sedation interruption prevent VAP.

6. What RSBI favors successful weaning?

A. Over 105
B. Over 150
C. Exactly 200
D. Under 105

D. Under 105 RR divided by tidal volume in liters below 105 is favorable.

CHAPTER 8

Cardiac Disorders: Coronary Artery Disease and Heart Failure

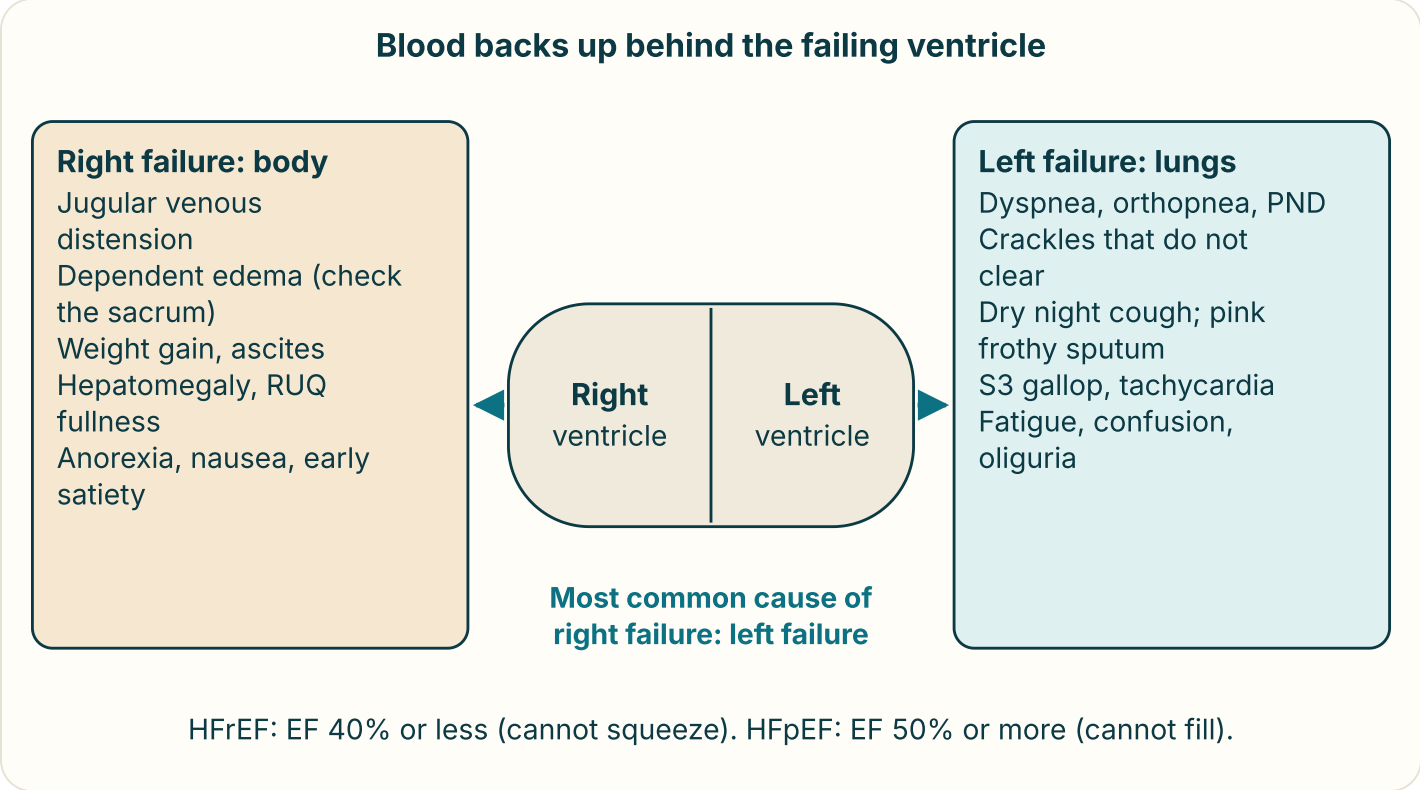
Read it in full: **Chapter 8 in the textbook**. Practice it in the lab: **What Do You Do FIRST: The ACS Priority Sorter** and **The Heart Failure Morning Med Pass**.

What to know

The heart cannot extract more oxygen, so ischemia is a flow problem, and tachycardia cuts the diastolic time the coronaries need. A thin-capped plaque ruptures and clots into unstable angina, NSTEMI or STEMI. Get the 12-lead within 10 minutes; ST elevation, not troponin, sends the patient to reperfusion.

Aspirin chewed first, oxygen only under 90%, nitroglycerin never with PDE5 inhibitors or right ventricular infarction. Door to device 90 minutes, door to needle 30. Serial troponins are mandatory. A new murmur after MI is an emergency.

Left failure floods the lungs, right failure the body; half of patients have a preserved EF. Four drug classes save lives; diuretics only relieve symptoms. Daily weights with a call at 2 to 3 lb a day or 5 lb a week prevent readmission.



Name the failing side, predict the findings. Left failure floods the lungs; right failure floods the body. Most hospitalized patients show both.

LOCK THESE IN

- Coronaries fill in diastole. Tachycardia raises demand and cuts supply.
- Unstable angina: normal troponin. NSTEMI: elevated troponin, no ST elevation.
- 12-lead within 10 min. Inferior STEMI: get V4R; hold nitrates in RV infarct.
- Troponin rises 3 to 6 h, peaks 12 to 24 h, lasts 7 to 14 days.
- Aspirin 162 to 325 mg chewed first. O_2 only if SpO_2 under 90%.
- Door to device 90 min; door to needle 30 min.
- HFrEF EF 40% or less; HFpEF 50% or more. BNP under 100 makes HF unlikely.
- Call for weight gain of 2 to 3 lb in a day or 5 lb in a week.

Chapter 8 at a glance

Territory	Leads	Artery	Anticipate
Septal	V1, V2	LAD	Bundle branch block
Anterior	V3, V4	LAD	Pump failure, shock
Lateral	I, aVL, V5, V6	Circumflex	Often with anterior
Inferior	II, III, aVF	RCA	Bradycardia, AV block, RV involvement
Right ventricle	V4R	Proximal RCA	Hypotension with nitrates
Posterior	Tall R and ST depression V1, V2	Circumflex or RCA	Easily missed; confirm V7 to V9

Worked cases

CASE 8.1 · CHEST PAIN IN THE FIRST TEN MINUTES

Mrs. Nolan, 68, with diabetes, reports nausea and jaw ache at rest. SpO_2 96%, BP 142/84, HR 96. She took tadalafil yesterday evening for pulmonary hypertension.

STEP 1 · START TOGETHER

Stay, call for help, cardiac monitor, 12-lead ECG within 10 minutes, IV access, troponin.

STEP 2 · ASPIRIN

Give 162 to 325 mg chewed unless allergic or bleeding.

STEP 3 · OXYGEN

SpO_2 96% and not dyspneic: no routine oxygen.

STEP 4 · NITROGLYCERIN

Tadalafil within 48 hours is an absolute contraindication. Hold the nitrate and tell the provider.

WHY HER SYMPTOMS COUNT

Women and people with diabetes often present without chest pain. Do not wait for classic pain to obtain the ECG.

CASE 8.2 · AN INFERIOR MI THAT DROPS ITS PRESSURE

Mr. Alvarez has ST elevation in II, III and aVF. After one SL nitroglycerin his BP falls from 112/70 to 82/50 and his HR is 48.

STEP 1 · SUSPECT

Inferior MI with right ventricular involvement. The RV depends on preload, and the nitrate removed it.

STEP 2 · ACT

Stop the nitrate, lay him flat, raise the legs and open the IV fluids as ordered.

STEP 3 · CONFIRM

Obtain a right-sided lead (V4R).

STEP 4 · CALL

SBAR: new hypotension and bradycardia after nitroglycerin in an inferior STEMI; request the provider now and ask about the cath lab.

TRAPS PEOPLE FALL INTO

- **Giving oxygen to every chest pain patient.** Only for SpO_2 under 90% or distress; extra oxygen can constrict coronaries.
- **Waiting for troponin in a STEMI.** The ECG triggers reperfusion.
- **Trusting one early negative troponin.** Draw serial values.
- **Giving nitroglycerin in a right ventricular infarct.** Preload loss causes profound hypotension.
- **Forgetting to ask about PDE5 inhibitors.** Ask every patient, privately.

Chapter 8 self-test · six items

1. Which ECG leads show an inferior MI?

A. V1, V2
B. I, aVL, V5, V6
C. II, III, aVF
D. V3, V4

C. II, III, aVF Inferior changes come from the RCA territory.

2. What is the first-medical-contact-to-device goal for primary PCI?

A. 30 minutes
B. 3 hours
C. 12 hours
D. 90 minutes

D. 90 minutes The goal is 90 minutes, or 120 with transfer.

3. What is the first action for flash pulmonary edema?

A. Lay flat with legs raised
B. Sit up with legs dependent
C. Give an IV fluid bolus
D. Start a beta blocker

B. Sit up with legs dependent Upright with legs down reduces preload at once.

4. Why is a 36-hour washout needed before sacubitril/valsartan?

A. To prevent angioedema
B. To prevent bradycardia
C. To prevent hypokalemia
D. To prevent bleeding

A. To prevent angioedema Combining it with an ACE inhibitor risks angioedema.

5. A new loud holosystolic murmur appears on day 4 after an inferior MI. What is suspected?

A. Dressler syndrome onset
B. Normal scar formation
C. Stable exertional angina
D. Papillary muscle rupture

D. Papillary muscle rupture Acute mitral regurgitation from papillary rupture is an emergency.

6. What sodium limit is taught in heart failure?

A. About 6 to 8 g per day
B. No limit needed
C. About 2 to 3 g per day
D. Under 0.5 g per day

C. About 2 to 3 g per day The book teaches roughly 2 to 3 grams a day.

CHAPTER 9

Cardiac Disorders: Dysrhythmias, Valves and Vascular Disease

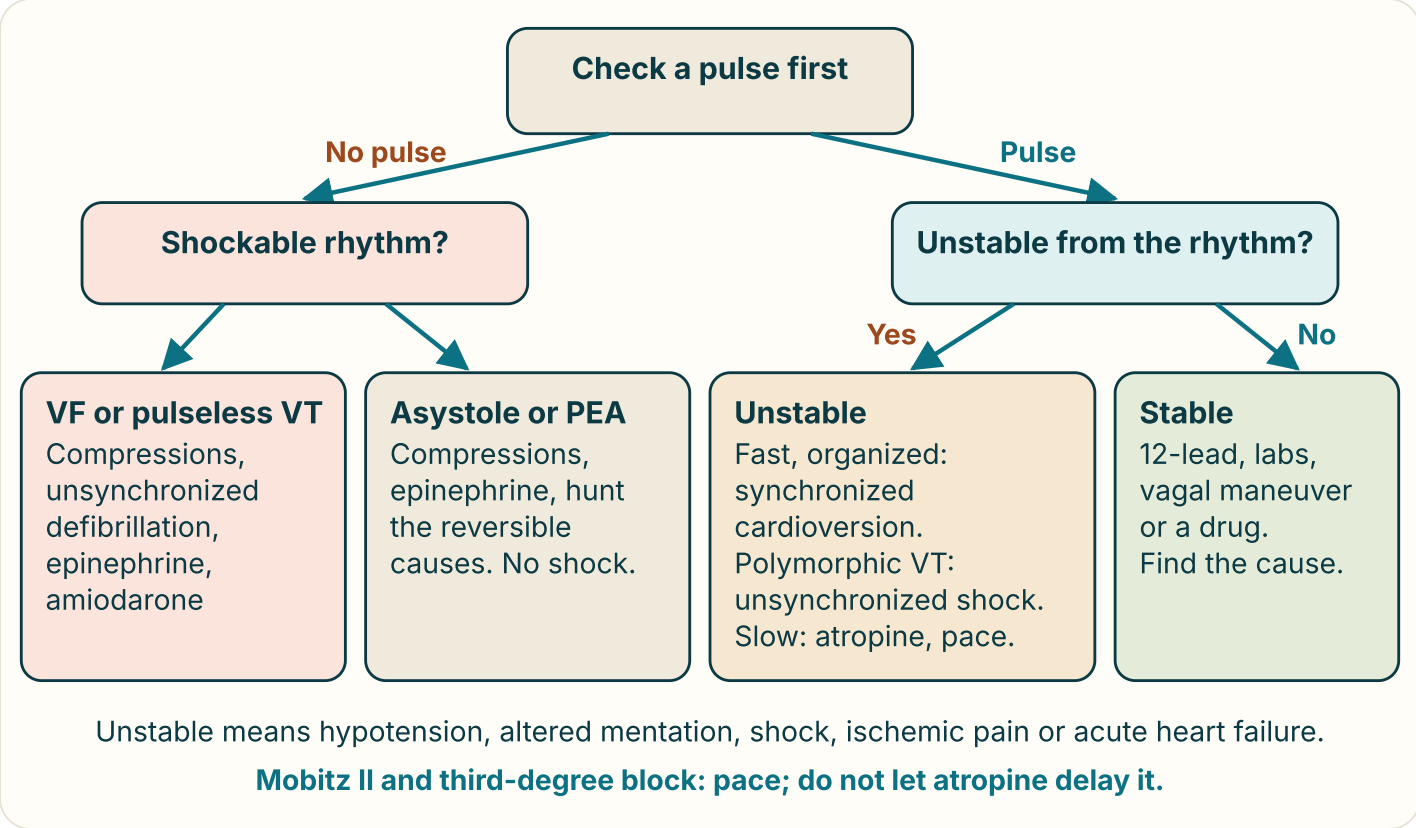
Read it in full: **Chapter 9 in the textbook**. Practice it in the lab: **The Six-Step Strip Bench** and **The Atrial Fibrillation Decision Bench**.

What to know

Analyze every strip in six steps, then ask whether the patient is unstable because of the rhythm. Pulseless VF and VT get unsynchronized defibrillation; unstable organized rhythms with a pulse get synchronized cardioversion; Mobitz II and complete block get pacing.

AF steals the atrial kick and makes clot: rate control, rhythm control and anticoagulation, and no conversion after 48 hours without three weeks of anticoagulation or a clean TEE. Stenosis loads pressure, regurgitation loads volume; protect preload in aortic stenosis.

Arterial legs stay down and are never heated; venous legs are elevated and compressed after an ABI. Stop all heparin for HIT, give a beta blocker before a vasodilator in dissection, and lower a hypertensive emergency by about 25% in the first hour.



Two questions, in order. The rhythm name matters less than whether there is a pulse and whether the rhythm is causing instability.

LOCK THESE IN

- PR 0.12 to 0.20 s; QRS 0.06 to 0.10 s; QTc over 0.50 s is dangerous.
- Six steps: rate, rhythm, P, P to QRS, PR, QRS. Then stable or unstable.
- AF over 48 h: no conversion without 3 weeks anticoagulation or a clean TEE.
- CHA2DS2-VASc: 2 or more (men), 3 or more (women) means anticoagulate.
- Adenosine 6 mg rapid push with a 20 mL flush, then 12 mg.
- No pulse: VF/pVT shock unsynchronized; asystole and PEA are not shocked.
- Mobitz I: atropine helps. Mobitz II and third degree: pace.
- Arterial leg: dependent, no heat. Venous leg: elevate, compress after ABI.

Chapter 9 at a glance

Feature	Normal	Abnormal suggests
Rate	60 to 100/min	QRS in 6 s x 10, or 300 ÷ large boxes
PR interval	0.12 to 0.20 s	Long in first-degree block; varies in third degree
QRS	0.06 to 0.10 s (up to 0.12)	Wide: ventricular origin, bundle block, paced, high K
QTc	Under 0.44 s men, 0.46 s women	Over 0.50 s: torsades risk; hold the drug and call
ST segment	Isoelectric	Elevation injury; depression ischemia or digoxin

Worked cases

CASE 9.1 · READING A STRIP IN SIX STEPS

A six-second strip on Mr. Hale shows 8 QRS complexes. R to R is regular at 4 large boxes. P waves are upright, one before each QRS; PR 0.28 s and constant; QRS 0.08 s.

STEP 1 · RATE

8 x 10 = 80, and 300 ÷ 4 = 75. Both put him in the 60 to 100 range.

STEP 2 · RHYTHM AND P WAVES

Regular, with one upright P for every QRS.

STEP 3 · PR

0.28 s is over 0.20 s and constant: first-degree AV block.

STEP 4 · QRS

0.08 s is narrow: supraventricular origin.

STEP 5 · ACT

Usually benign. Review his AV nodal blocking drugs and monitor.

CASE 9.2 · SCORING STROKE RISK IN AF

Mrs. Ortega, 78, has new AF, hypertension and diabetes. No heart failure, stroke or vascular disease.

STEP 1 · ADD POINTS

Age 75 or older: 2. Female: 1. Hypertension: 1. Diabetes: 1.

STEP 2 · TOTAL

2 + 1 + 1 + 1 = **5**.

STEP 3 · DECIDE

5 is well above the 3 point line for women: long-term oral anticoagulation. Aspirin alone is not adequate.

STEP 4 · RATE DRUG

If diltiazem 0.25 mg/kg is ordered and she weighs 80 kg: 0.25 x 80 = **20 mg** over two minutes, with pulse and BP before and after.

SAFETY

Onset time unknown: no cardioversion until three weeks of anticoagulation or a clot-free TEE.

TRAPS PEOPLE FALL INTO

- **Treating the monitor instead of the patient.** Check a pulse and a pressure. Loose leads make scary artifact.
- **Suppressing an escape rhythm.** Remove it and you are left with asystole.
- **Cardioverting AF of unknown duration.** It can fire a clot into the brain.
- **Pushing adenosine slowly.** Its half-life is under 10 seconds; push fast with a flush.
- **Shocking asystole.** Compressions, epinephrine and reversible causes.

Chapter 9 self-test · six items

1. Why take an apical pulse for a full minute in AF?

A. Some beats do not reach the wrist
B. The radial pulse is always too fast
C. Automated cuffs overcount beats
D. It raises the patient heart rate

A. Some beats do not reach the wrist Weak beats cause a pulse deficit.

2. Which drug treats torsades de pointes?

A. Adenosine push
B. Diltiazem drip
C. Digoxin load
D. Magnesium sulfate

D. Magnesium sulfate Magnesium 1 to 2 g IV plus removing QT prolongers.

3. Which INR goal fits a mechanical mitral valve?

A. 1.0 to 1.5
B. 2.0 to 3.0
C. 2.5 to 3.5
D. 3.5 to 4.5

C. 2.5 to 3.5 Mechanical mitral valves need a higher range.

4. Which finding is a Janeway lesion?

A. Painful nodule on a finger
B. Painless macule on the palm
C. Retinal hemorrhage spot
D. Clubbing of the nails

B. Painless macule on the palm Osler nodes hurt; Janeway lesions do not.

5. A patient’s platelets fall from 220,000 to 90,000 on day 7 of heparin. What first?

A. Give platelets
B. Start warfarin
C. Recheck tomorrow
D. Stop all heparin

D. Stop all heparin Suspect HIT; stop every source including flushes.

6. How fast is the MAP lowered in a hypertensive emergency?

A. To normal within 1 hour
B. About 50% within the first 10 minutes
C. About 25% in the first hour
D. Not lowered at all

C. About 25% in the first hour Faster drops can infarct autoregulated organs.

CHAPTER 10

Hematologic and Oncologic Disorders

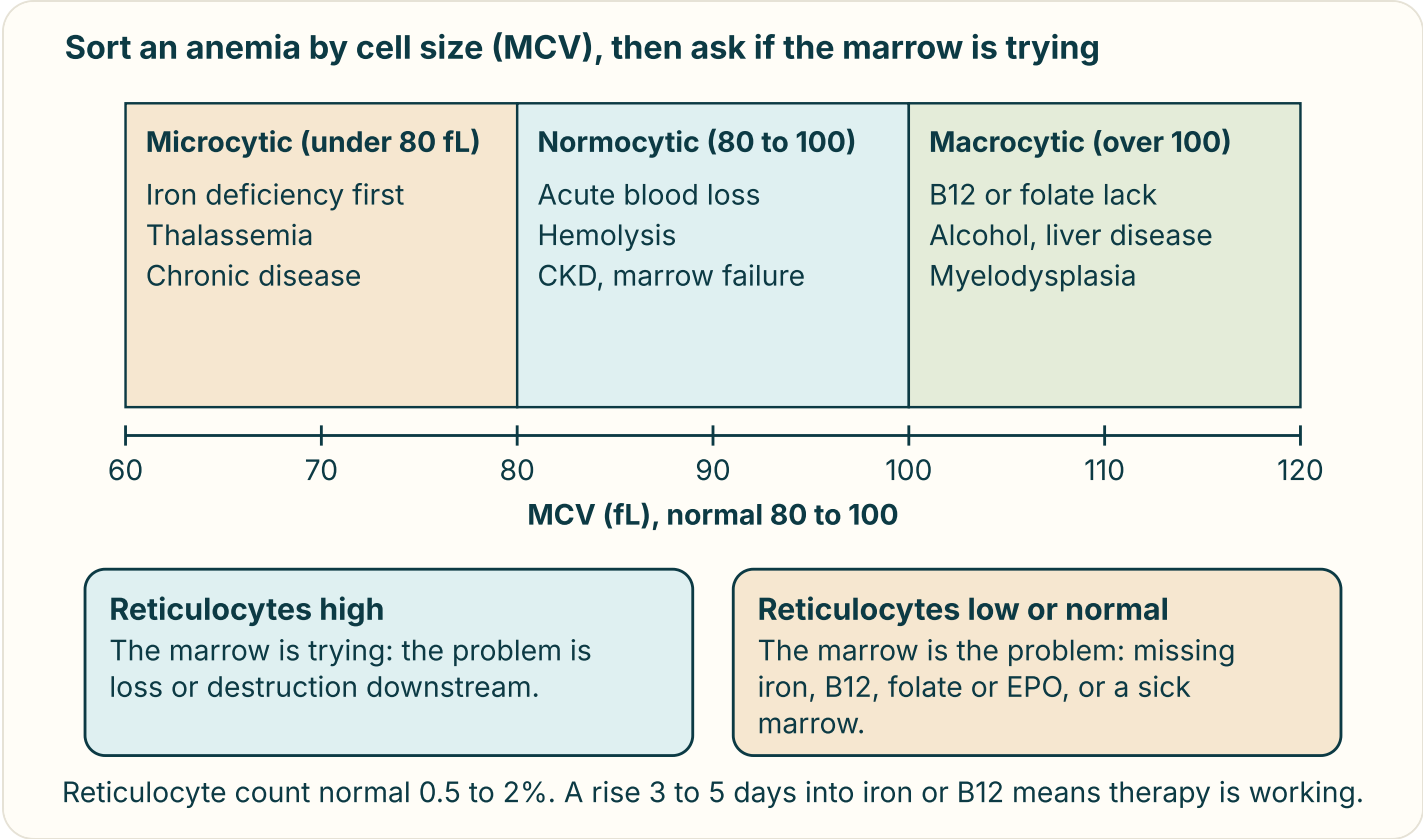
Read it in full: **Chapter 10 in the textbook**. Practice it in the lab: **The Anemia Workup: Name the Bucket, Not Just the Number** and **Stop the Line: A Transfusion Reaction Simulator**.

What to know

Sort anemia as loss, destruction or failed production with MCV and the reticulocyte count. Teach oral iron with vitamin C and away from calcium and coffee. Treat sickle cell pain aggressively with warmth and fluids, and transfuse most adults below 7 g/dL.

Platelet problems bleed into skin, factor problems into joints. HIT clots: stop every heparin. Match each anticoagulant to its test and antidote. For transfusions, use saline only, verify with two people, stay 15 minutes and stop at the first sign of reaction.

Calculate the ANC; fever with an ANC under 500 needs antibiotics within 60 minutes. Know each chemotherapy signature toxicity and act on the first quiet sign of tumor lysis, cord compression, SVC syndrome or hypercalcemia.



Size, then response. MCV names the likely cause; the reticulocyte count says whether the marrow is answering.

LOCK THESE IN

- Buckets: loss, destruction, failed production. MCV under 80 iron; over 100 B12 or folate.
- Reticulocytes high: marrow trying. Low: marrow is the problem.
- Transfuse below 7 g/dL (8 with heart disease). One unit raises Hgb about 1 g/dL.
- Platelets: skin and mucosa. Factors: joints and muscle.
- HIT: platelets fall over 50% at 5 to 10 days; stop all heparin; no platelets.
- Blood: saline only, two-person check, stay 15 min, finish in 4 h.
- Any reaction: stop, saline through new tubing, notify, send the bag.
- Febrile neutropenia: antibiotics within 60 min; no antipyretic before cultures.

Chapter 10 at a glance

Type	Signature labs	Nursing focus
Iron deficiency	MCV under 80, ferritin under 30, TIBC high	Find the bleed; teach oral iron
B12 / pernicious	MCV over 100, B12 under 200	Fall precautions; lifelong IM B12
Folate deficiency	MCV over 100, folate under 3; no neuro signs	Check B12 before treating
CKD	Normocytic, low retics	Iron first; Hgb target 10 to 11
Aplastic	Pancytopenia, low retics	Infection and bleeding precautions
Sickle cell	Hgb 6 to 9, retics, LDH, bilirubin high	Analgesia, fluids, warmth, watch acute chest

Worked cases

CASE 10.1 · A FEBRILE NEUTROPENIC PATIENT

Ms. Ford is on day 11 after chemotherapy. WBC 1,600 with 25% segs and 5% bands. Temperature 38.4 °C. She feels fine.

STEP 1 · COMPUTE THE ANC

1,600 x (0.25 + 0.05) = 1,600 x 0.30 = **480**.

STEP 2 · CLASSIFY

Under 500 with one temperature of 38.3 or more: febrile neutropenia, an emergency.

STEP 3 · SEQUENCE

Vital signs, notify, cultures peripheral and from every lumen, broad antibiotics within 60 minutes.

SAFETY

No acetaminophen before cultures, no rectal temperature. Her feeling fine is not reassurance; she cannot mount the usual signs.

CASE 10.2 · TWO UNITS AND A RECHECK

Mr. Dent has Hgb 6.8 g/dL with dizziness and tachycardia. Two units of red cells are ordered.

STEP 1 · IS IT INDICATED

Below 7 and symptomatic: yes.

STEP 2 · PREDICT THE RESULT

About 1 g/dL per unit: 6.8 + 2 = about **8.8 g/dL**. A much lower result suggests ongoing loss or hemolysis.

STEP 3 · FIRST 15 MINUTES

At about 2 mL/min, the first 15 minutes delivers about **30 mL**; stay at the bedside.

THE RATE

If a 300 mL unit must run over 3 hours: 300 ÷ 3 = **100 mL/hr**, inside the 4 hour limit.

TRAPS PEOPLE FALL INTO

- **Transfusing a sickle cell patient toward a normal Hgb.** Baseline is often 6 to 9.
- **Applying ice to sickle cell pain.** Cold promotes sickling; use warmth.
- **Giving platelets in HIT or TTP.** They fuel clotting.
- **Starting warfarin in acute HIT.** Wait for platelets to recover.
- **Hanging blood with D5W or lactated Ringer's.** Only 0.9% saline.

Chapter 10 self-test · six items

1. What does a high reticulocyte count in anemia suggest?

A. Iron deficiency
B. Loss or destruction
C. Aplastic anemia of marrow
D. B12 deficiency

B. Loss or destruction The marrow is answering; the problem is downstream.

2. What is the antidote for warfarin?

A. Vitamin K
B. Protamine
C. Andexanet alfa
D. Idarucizumab

A. Vitamin K Vitamin K, with PCC for serious bleeding.

3. Within what time must a unit of red cells finish?

A. 1 hour
B. 8 hours
C. 4 hours
D. 12 hours

C. 4 hours Bacterial growth risk rises at room temperature.

4. Which drug lowers uric acid already in the blood in tumor lysis?

A. Allopurinol
B. Calcitonin
C. Mesna
D. Rasburicase

D. Rasburicase Allopurinol only prevents new uric acid; check G6PD before rasburicase.

5. Facial swelling worse in the morning and distended neck veins in lung cancer suggest what?

A. Tumor lysis
B. Hypercalcemia
C. SVC syndrome
D. SIADH

C. SVC syndrome Avoid IVs and BPs in the arms; raise the head.

6. What is the first treatment for hypercalcemia of malignancy?

A. IV calcium gluconate
B. Isotonic saline hydration
C. Strict fluid restriction
D. A loop diuretic alone

B. Isotonic saline hydration Saline first, then calcitonin and a bone agent.

CHAPTER 11

Gastrointestinal Disorders

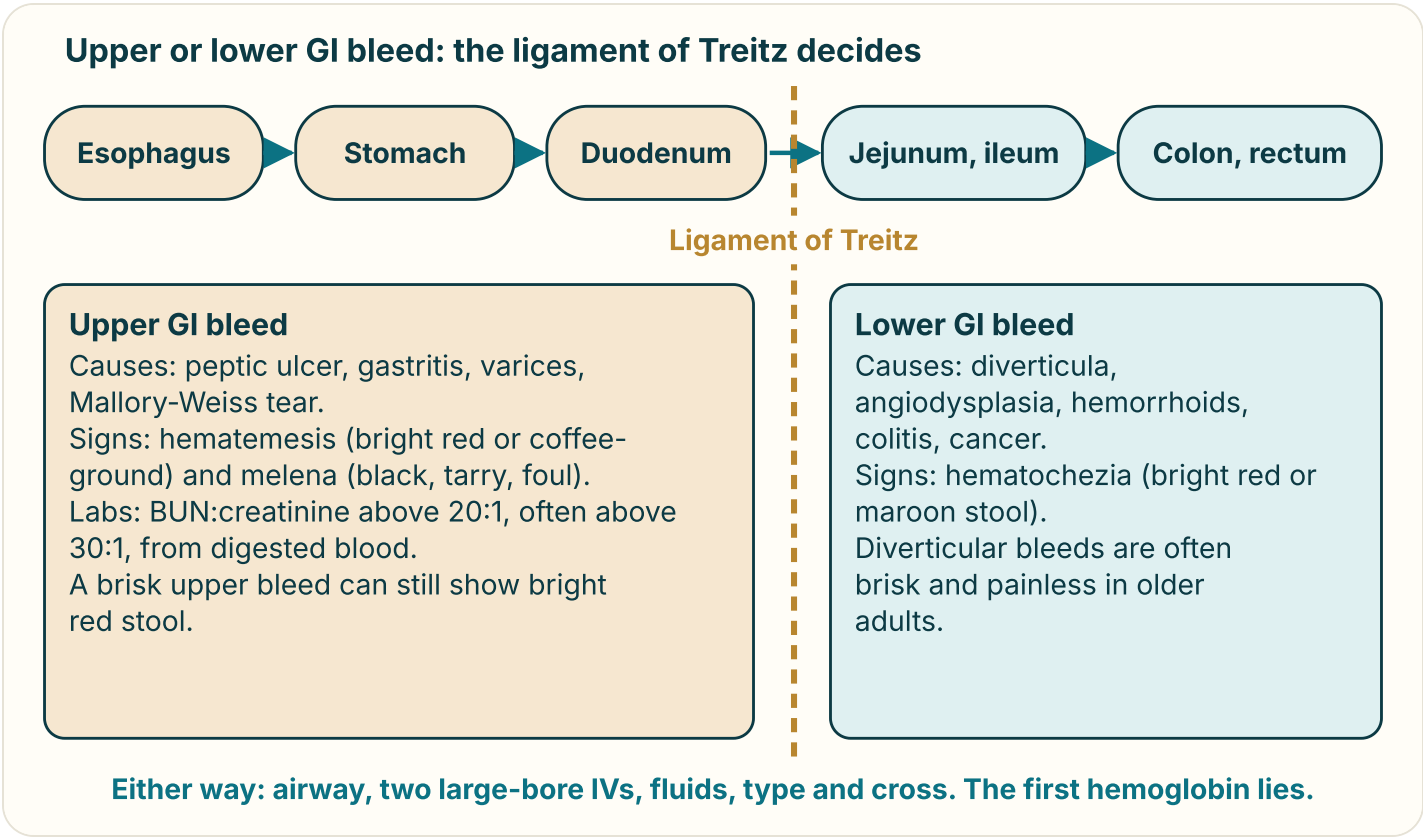
Read it in full: **Chapter 11 in the textbook**. Practice it in the lab: **GI Bleed Command: What Comes First** and **The Blocked Bowel: Pattern, Acid-Base and the Call**.

What to know

Inspect, auscultate, percuss, palpate. Upper bleeds give hematemesis, melena and a high BUN to creatinine ratio; in any bleed, airway, two large-bore IVs, fluids and type and cross come before diagnosis, and the first hemoglobin lies.

GERD and ulcers are failures of mucosal defense; eradicate H. pylori and stop NSAIDs, and watch for the rigid abdomen of perforation. Appendicitis migrates to the right lower quadrant; diverticulitis sits left; Crohn is transmural with skip lesions, UC continuous from the rectum; toxic megacolon is distention with fewer stools.

Obstruction is decompressed, replaced and watched; constant pain and fever mean strangulation. A stoma must stay pink and moist. Confirm feeding tubes by x-ray first and refeed malnourished patients slowly.



Where the bleed starts changes the stool. Acid turns blood to coffee grounds and the gut turns it black and tarry; bleeding past the ligament of Treitz stays red or maroon.

LOCK THESE IN

- Abdomen: inspect, auscultate, percuss, palpate. Listen 5 min per quadrant before charting absent.
- Upper GI bleed: coffee grounds, melena, BUN:creatinine above 20:1.
- Bleed first actions: airway, oxygen, two 18 g IVs, fluids, type and cross, NPO.
- Duodenal ulcer: pain 2 to 3 h after meals, food helps. Gastric: food worsens, biopsy.
- Appendicitis: no heat, no enemas; sudden pain relief may mean rupture.
- Crohn: transmural, skip lesions, fistulas. UC: rectum up, continuous, bloody.
- Healthy stoma pink and moist; dusky or black is ischemia.
- New blind feeding tube: x-ray before first use. Refeeding: thiamine, start slow.

Chapter 11 at a glance

Feature	Crohn disease	Ulcerative colitis
Location	Mouth to anus, skip lesions; terminal ileum	Rectum upward, continuous; colon only
Depth	Transmural; cobblestone	Mucosa and submucosa
Stool	3 to 5 loose, usually no gross blood	10 to 20 liquid with blood and mucus
Complications	Fistula, abscess, stricture; B12 loss	Toxic megacolon, hemorrhage; cancer risk
Surgery	Not curative	Proctocolectomy is curative

Worked cases

CASE 11.1 · A COFFEE-GROUND EMESIS

Mr. Dorsey, 70, takes ibuprofen and apixaban. He vomits 400 mL of coffee grounds. HR 118 (was 78), BP 104/86, BUN 48, creatinine 1.2, Hgb 11.8.

STEP 1 · READ THE VITALS

HR rose 40 points while the BP is still in the 100s, and the pulse pressure is narrow (18): he is compensating.

STEP 2 · READ THE LABS

BUN:creatinine = 48 ÷ 1.2 = **40**, above 20:1: upper source. The Hgb of 11.8 lies early.

STEP 3 · ACT IN ORDER

Side-lying or upright with suction, oxygen, two 18 gauge IVs, isotonic fluid, type and cross, NPO, monitor.

STEP 4 · URINE GOAL

At 80 kg: 0.5 x 80 = **40 mL/hr**.

STEP 5 · CALL

SBAR, requesting IV pantoprazole, transfusion parameters, apixaban reversal (four-factor PCC, not vitamin K) and urgent endoscopy.

CASE 11.2 · APPENDICITIS THAT SUDDENLY FEELS BETTER

Ms. Pena, 22, has right lower quadrant pain, WBC 15,000 and a low fever. While awaiting surgery she says the pain is suddenly gone.

STEP 1 · RECOGNIZE

Sudden relief can mean the appendix ruptured and released the pressure.

STEP 2 · ASSESS

Vital signs, abdomen for rigidity and rebound, temperature.

STEP 3 · ACT

Keep her NPO, no heat, no laxatives or enemas, and notify the surgeon now.

WHY IT MATTERS

A brief calm is followed by peritonitis: diffuse pain, rigidity, fever and tachycardia.

TRAPS PEOPLE FALL INTO

- **Palpating before listening.** Touch changes what you hear.
- **Trusting an early normal hemoglobin.** Whole blood is lost; the ratio has not changed yet.
- **Giving vitamin K for an apixaban bleed.** Vitamin K does nothing for Xa inhibitors; four-factor PCC is the usual choice now that andexanet alfa has been withdrawn.
- **Teaching extra pillows for reflux.** Blocks under the head of the bed; pillows bend the trunk.
- **Mixing up reflux and dumping teaching.** Upright after meals for reflux; lie down after meals for dumping.

Chapter 11 self-test · six items

1. Pain that starts vague near the navel and becomes sharp and focal means what?

A. Inflammation reached the peritoneum
B. The bowel is now healing
C. The pain is now referred to the skin
D. An opioid is wearing off

A. Inflammation reached the peritoneum Visceral pain turning parietal is inflammation reaching the parietal peritoneum.

2. When is diverticulitis imaged?

A. Colonoscopy now
B. Barium enema now
C. CT with contrast now
D. No imaging is needed at all

C. CT with contrast now Colonoscopy waits 6 to 8 weeks.

3. What must be checked before starting infliximab?

A. Serum amylase and lipase
B. Latent TB and hepatitis B
C. Stool guaiac for blood
D. Urine culture and stain

B. Latent TB and hepatitis B Biologics reactivate TB and hepatitis B.

4. Which acid-base change fits a proximal small-bowel obstruction with vomiting?

A. Metabolic acidosis
B. Respiratory acidosis
C. No change
D. Metabolic alkalosis

D. Metabolic alkalosis Vomiting gastric acid loses hydrogen and chloride.

5. When does colorectal screening begin for average-risk adults?

A. Age 30
B. Age 45
C. Age 60
D. Age 70

B. Age 45 Screening runs from 45 to 75.

6. Which is given first to prevent refeeding syndrome?

A. Thiamine
B. Potassium bolus
C. High-calorie feed
D. Insulin

A. Thiamine Give thiamine, then start feeds slowly and check electrolytes daily.

CHAPTER 12

Hepatobiliary and Pancreatic Disorders

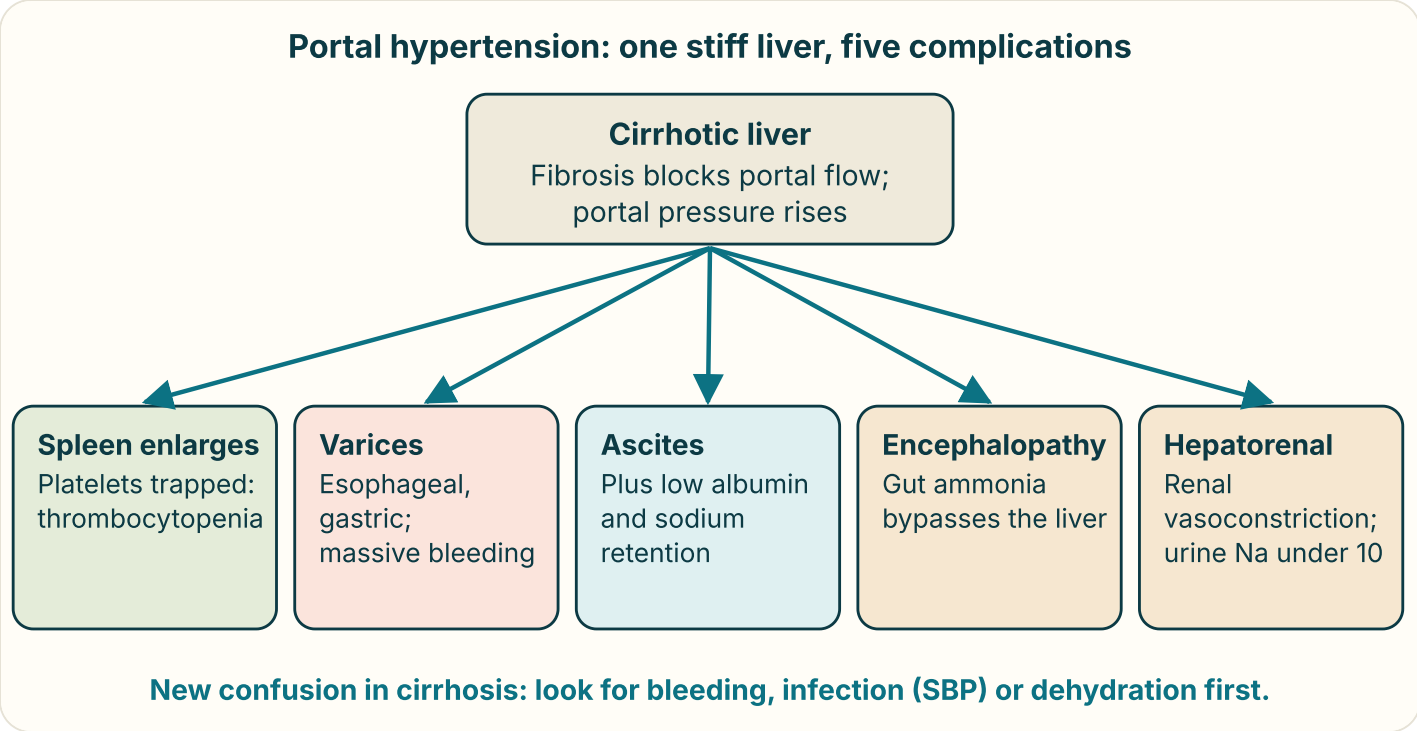
Read it in full: **Chapter 12 in the textbook**. Practice it in the lab: **Liver Panel Decoder: Damage or Function** and **Pancreatitis Watch: When Do You Escalate**.

What to know

The liver synthesizes, metabolizes, excretes and stores, so failure brings ascites, a rising INR, confusion and jaundice. Enzymes show damage; albumin, INR and bilirubin show function. Hepatitis A and E are fecal-oral and acute; B, C and D are blood-borne and can be chronic. Acetaminophen is the top cause of acute liver failure, and NAC works best within 8 hours.

Portal hypertension drives ascites, SBP, varices, encephalopathy and hepatorenal syndrome. A bleeding varix is an airway problem first. New confusion means check for bleeding, infection or dehydration before more lactulose.

Charcot triad is cholangitis, and cholangitis is sepsis. Acute pancreatitis kills through third spacing and organ failure, not the lipase number: goal-directed fluids, pain control, early feeding, and watch for ARDS and low calcium.



Trace the pressure. Every major complication of cirrhosis follows blood that cannot get through the liver.

LOCK THESE IN

- Damage: ALT, AST, ALP, GGT. Function: albumin, INR, bilirubin.
- Obstructive jaundice: yellow skin, dark urine, clay stool.
- HBsAg infected; anti-HBs immune; anti-HBc exposed. Vaccine gives anti-HBs only.
- Acetaminophen max 4 g; 2 g or less with liver disease. NAC within 8 h.
- Ascites: Na 2,000 mg; spironolactone:furosemide 100:40; albumin if over 5 L tapped.
- Varices: airway, IVs, octreotide, ceftriaxone, banding; nonselective beta blocker to prevent.
- Lactulose to 2 to 3 soft stools; do not restrict protein.
- Pancreatitis: lipase 3 x normal; LR to urine 0.5 mL/kg/h; watch ARDS and calcium.

Chapter 12 at a glance

Test	Range	Meaning
ALT	7 to 56 U/L	Hepatocyte injury; most liver specific
AST	10 to 40 U/L	Also heart and muscle; AST:ALT over 2:1 suggests alcohol
ALP / GGT	30 to 120 / 8 to 60 U/L	Both up: biliary; ALP alone: bone
Total bilirubin	0.3 to 1.2 mg/dL	Jaundice visible over 2 to 3
Albumin	3.5 to 5.0 g/dL	Synthesis over weeks
INR / PT	0.8 to 1.1 / 11 to 12.5 s	Fastest marker of decline
Ammonia	15 to 45 mcg/dL	Correlates poorly with mental status

Worked cases

CASE 12.1 · A PARACENTESIS AND THE ALBUMIN DOSE

Mr. Cole, cirrhosis, has 6 L of ascites drained.

STEP 1 · BEFORE

Have him void, sit him upright, weigh him and measure girth at the marked line.

STEP 2 · ALBUMIN RULE

More than 5 L removed: 6 to 8 g of albumin per liter.

STEP 3 · COMPUTE

6 x 6 = 36 g to 6 x 8 = **48 g** of IV albumin.

STEP 4 · AFTER

Watch blood pressure, recheck weight and girth, and inspect the site.

CASE 12.2 · SBP THAT SHOWS UP AS CONFUSION

Mrs. Ruiz, 70 kg, has cirrhotic ascites. She is newly confused, afebrile, and her creatinine has risen. Ascitic PMN count is 310.

STEP 1 · ASK THREE QUESTIONS

Is she bleeding, infected or dry? Here the ascitic PMN of 310 (250 or more) answers it: SBP.

STEP 2 · ANTIBIOTIC

Cefotaxime or ceftriaxone as ordered.

STEP 3 · ALBUMIN

1.5 g/kg on day 1 = **105 g**; 1 g/kg on day 3 = **70 g**.

WHY ALBUMIN

It protects the kidneys from hepatorenal syndrome.

TRAPS PEOPLE FALL INTO

- **Reading falling enzymes as recovery.** A rising INR with falling enzymes means the liver is running out of cells.
- **Restricting protein in encephalopathy.** These patients need 1.2 to 1.5 g/kg.
- **Reaching for lactulose first.** Look for bleeding, infection and dehydration first.
- **Hanging octreotide before the airway.** A vomiting, confused patient will aspirate.
- **Using metoprolol for variceal prevention.** Only nonselective beta blockers lower portal pressure.

Chapter 12 self-test · six items

1. Where does a patient lie after a liver biopsy?

A. On the left side
B. Prone
C. Trendelenburg
D. On the right side

D. On the right side Lying on the puncture site helps tamponade it.

2. Which fluid restriction rule applies to cirrhotic ascites?

A. Always 1 L per day for every patient
B. Only when sodium falls below about 125
C. Never; fluids are never restricted
D. Only after each paracentesis is done

B. Only when sodium falls below about 125 Sodium restriction comes first; fluid restriction for low sodium.

3. Which finding defines SBP?

A. Ascitic PMN 250 or more
B. Serum WBC of 12,000
C. Fever over 39 °C always
D. SAAG under 1.1 g/dL

A. Ascitic PMN 250 or more Many patients have no fever or pain.

4. Which finding suggests hypocalcemia in pancreatitis?

A. Positive Murphy sign
B. Flapping asterixis
C. Positive Chvostek sign
D. Positive Rovsing sign

C. Positive Chvostek sign Fat necrosis binds calcium.

5. Which fluid is preferred early in acute pancreatitis?

A. Lactated Ringer’s
B. D5W solution
C. 3% saline
D. 0.45% saline infusion

A. Lactated Ringer’s Goal-directed LR, titrated to urine output.

6. Painless progressive jaundice with weight loss suggests what?

A. Simple biliary colic
B. Acute hepatitis A
C. Gilbert syndrome flare
D. Pancreatic head cancer

D. Pancreatic head cancer The tumor compresses the common bile duct.

CHAPTER 13

Renal and Urinary Disorders

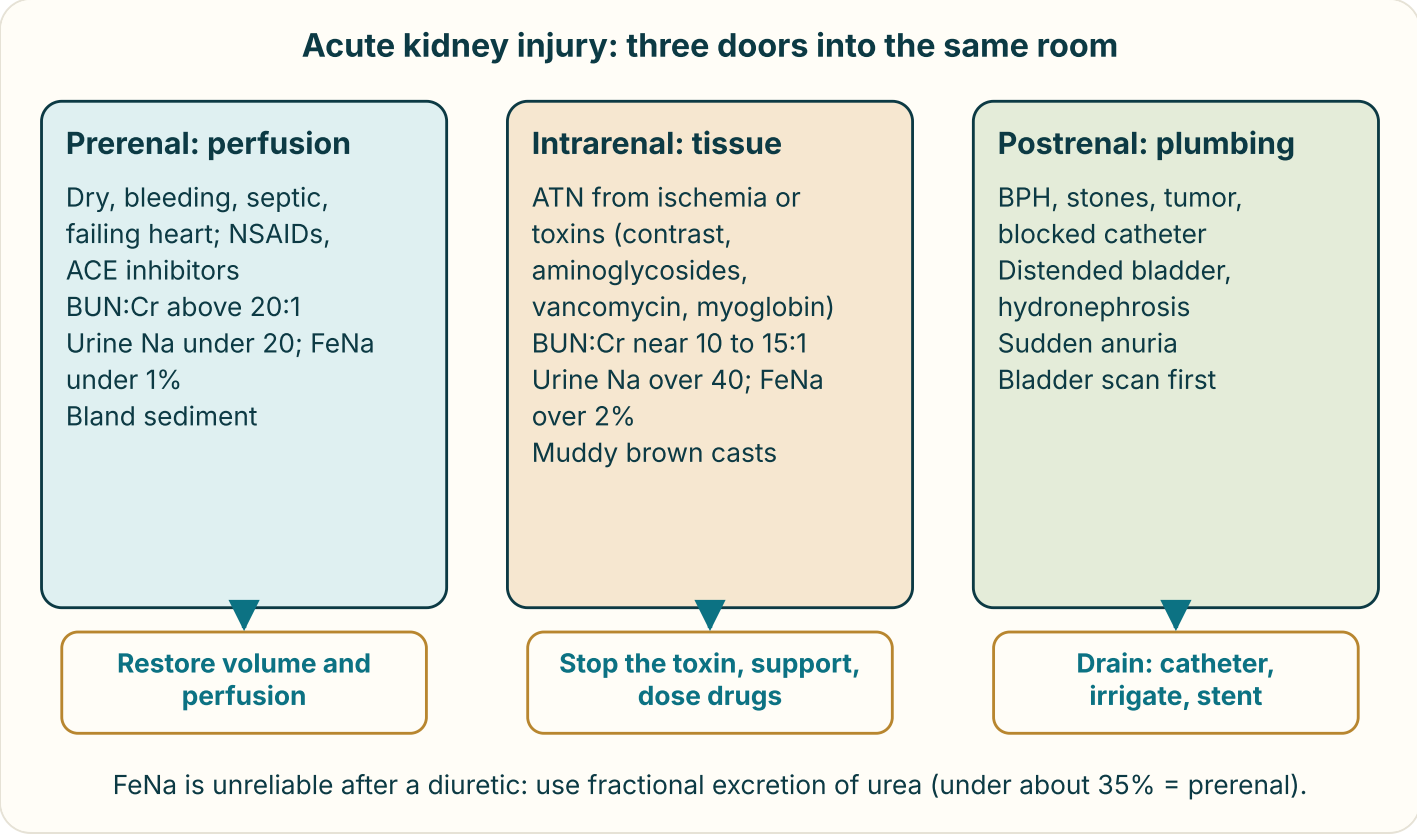
Read it in full: **Chapter 13 in the textbook**. Practice it in the lab: **AKI Triage Bench: Three Doors and the Potassium Clock** and **Access Safety Bench: Fistula Rounds and the Dialysis Call**.

What to know

Judge the kidney by the creatinine trend, the eGFR and urine output against 0.5 mL/kg/hr, not one value. AKI comes through three doors: perfusion, tissue and plumbing, and the door sets the treatment.

In hyperkalemia, calcium protects, insulin with dextrose and albuterol shift, and only diuretics, binders or dialysis remove. CKD is staged by eGFR and albuminuria; give binders with meals, iron before ESAs, and do not chase a normal hemoglobin.

Protect the fistula: thrill and bruit every shift, no BP or sticks in that arm. Cloudy PD effluent is peritonitis. Culture before antibiotics, scan before catheterizing, remove catheters early and treat painless hematuria as cancer until proven otherwise.



Perfusion, parenchyma or plumbing. The door decides the treatment: give volume, remove the toxin or drain the obstruction.

LOCK THESE IN

- Urine output at least 0.5 mL/kg/hr; oliguria under 400 mL/day; anuria under 100.
- AKI: creatinine up 0.3 in 48 h, or 1.5 x baseline in 7 days, or low urine for 6 h.
- Prerenal: BUN:Cr over 20:1, FeNa under 1% (not valid after a diuretic).
- Muddy brown casts = ATN; RBC casts = glomerulonephritis; WBC casts = pyelonephritis.
- Hyperkalemia: calcium, then insulin plus dextrose and albuterol, then remove.
- Phosphate binders with meals; ESA to Hgb 10 to 11 only.
- Fistula: thrill and bruit every shift; nothing on that arm.
- Scan before cath; culture before antibiotics; strain every urine with stones.

Chapter 13 at a glance

Finding	Prerenal	Intrarenal (ATN)	Postrenal
BUN:creatinine	Over 20:1	Near 10 to 15:1	Variable
Urine sodium	Under 20	Over 40	Variable
FeNa (no diuretic)	Under 1%	Over 2%	Variable
Urine osmolality	Over 500	Under 350	Variable
Sediment	Bland, hyaline	Muddy brown casts	Bland, crystals
First move	Restore volume	Stop toxin, support	Drain

Worked cases

CASE 13.1 · WHICH DOOR IS IT

Mr. Boyd, 70 kg, is post-op day two after bowel resection on lisinopril and ketorolac. Creatinine 0.9 two days ago, now 1.3; BUN 52. Urine 150 mL in 6 hours. No diuretic given.

STEP 1 · AKI CRITERIA

Rise = 1.3 minus 0.9 = **0.4** in 48 hours (at least 0.3). Urine goal 0.5 x 70 = 35 mL/hr, or 210 mL in 6 hours; he made 150. Both criteria met.

THE RATIO

BUN:creatinine = 52 ÷ 1.3 = **40**, over 20:1: prerenal pattern.

THE CAUSE

A dry post-op patient on an ACE inhibitor and an NSAID: the drugs cut renal perfusion.

STEP 4 · ACT

Check the bladder and catheter, then call: hold lisinopril and ketorolac, expect isotonic fluid, review all renally cleared doses.

CASE 13.2 · HYPERKALEMIA WITH PEAKED T WAVES

Mrs. Lane, CKD G4, missed dialysis. K 6.8 with peaked T waves.

STEP 1 · FIRST

Continuous monitor and 12-lead; stop every potassium source; notify.

STEP 2 · PROTECT

Calcium gluconate 1 g IV over 2 to 3 minutes. It does not lower potassium.

STEP 3 · SHIFT

Regular insulin 10 units with 25 g dextrose; glucose check at 30 minutes and hourly. Albuterol nebulized as ordered.

STEP 4 · REMOVE

She makes little urine, so dialysis is the definitive step. Recheck potassium after.

TRAPS PEOPLE FALL INTO

- **Calling a creatinine of 1.1 normal in a frail older adult.** Look at the eGFR.
- **Reading FeNa after furosemide.** Diuretics force sodium out; use fractional excretion of urea.
- **Hanging fluid for sudden anuria before scanning.** Rule out obstruction first.
- **Thinking calcium lowers potassium.** It protects the heart only.
- **Giving binders between meals.** They must meet the food.

Chapter 13 self-test · six items

1. Which teaching fits a patient starting finasteride?

A. It relieves symptoms within days
B. It will raise the PSA level
C. Pregnant people must not handle it
D. Take it with grapefruit juice

C. Pregnant people must not handle it It is teratogenic and takes months; it halves PSA.

2. Which diet change applies once hemodialysis starts?

A. Protein goes down
B. Protein goes up
C. Fluid becomes unlimited
D. Potassium becomes unlimited

B. Protein goes up Amino acids are lost into the dialysate.

3. A transplant patient has falling urine, fever and a tender graft. What is suspected?

A. Normal recovery
B. Dehydration only
C. Stone passage
D. Rejection

D. Rejection Call the transplant team.

4. Which is the strongest CAUTI prevention?

A. Remove the catheter early
B. Irrigate it daily
C. Change bags hourly
D. Raise the bag on the bed

A. Remove the catheter early Duration is the strongest predictor of infection.

5. Painless gross hematuria in a 60-year-old smoker suggests what?

A. Simple cystitis
B. Normal aging
C. Bladder cancer
D. Dehydration

C. Bladder cancer Cystoscopy is needed even if it stops.

6. Which incontinence is treated with a commode and call light?

A. Stress
B. Functional
C. Urge
D. Overflow

B. Functional The tract works; the patient cannot reach the toilet.

CHAPTER 14

Shock, Trauma and Emergency Care

Read it in full: **Chapter 14 in the textbook**. Practice it in the lab: **Shock Stage & Hemodynamic Fingerprint Lab** and **Trauma Bay: Primary Survey & Neuro Watch**.

What to know

Shock is cellular oxygen failure; lactate is the marker and the compensatory stage (tachycardia, narrow pulse pressure, cool skin, low urine, restlessness, normal BP) is the window to act. Hypovolemic, cardiogenic and obstructive shock run cold; distributive shock runs warm.

Fill the empty tank, revascularize the failed pump, decompress the obstruction, and in sepsis give cultures, antibiotics within the hour, 30 mL/kg crystalloid and norepinephrine to a MAP of 65. Anaphylaxis gets IM epinephrine in the thigh first. Neurogenic shock pairs hypotension with bradycardia.

Run ABCDE in order every time, then AMPLE and head to toe, and keep the patient warm against the lethal triad. Routine triage treats the sickest first; disaster triage treats the most salvageable first.

Shock fingerprints: preload, pump and pipes

Shock type	Preload	Cardiac output	SVR	Skin
Hypovolemic	Low	Low	High	Cold
Cardiogenic	High	Low	High	Cold, JVD
Obstructive	High	Low	High	Cold, JVD
Septic (early)	Low/normal	High/normal	Very low	Warm
Anaphylactic	Low	Variable	Very low	Hives
Neurogenic	Low	Low	Very low	Warm, dry

Three run cold with high resistance; distributive shock runs warm with low resistance.
Neurogenic shock is the one with hypotension and bradycardia together.

Warm or cold first. Look at the neck veins and lungs before a fluid bolus: full veins and crackles mean the pump or an obstruction, not an empty tank.

LOCK THESE IN

- Compensatory shock: tachycardia, narrow pulse pressure, cool skin, low urine, restlessness, normal BP.
- Cold shocks: hypovolemic, cardiogenic, obstructive. Warm: distributive.
- TXA within 3 h of injury: 1 g over 10 min, then 1 g over 8 h.
- Cardiogenic or obstructive: no fluid bolus into full neck veins and crackles.
- Sepsis Hour-1: lactate, cultures, antibiotics, 30 mL/kg, pressors to MAP 65.
- Anaphylaxis: epinephrine 0.3 to 0.5 mg IM in the thigh, first.
- Neurogenic shock: hypotension plus bradycardia plus warm dry skin.
- ABCDE; GCS 8 or less, intubate; CPP = MAP minus ICP, goal 60 to 70.

Chapter 14 at a glance

Stage	What you see	Focus
Initial	Normal vitals; lactate may exceed 2	Suspect from the mechanism; draw lactate
Compensatory	Tachycardia, narrow pulse pressure, cool skin, urine under 0.5 mL/kg/hr, restlessness	Recognize and escalate now
Progressive	Hypotension, acidosis, crackles, anuria, DIC	ICU, vasoactive support
Refractory	No response to fluids or pressors	Comfort, goals of care

Worked cases

CASE 14.1 · COMPENSATED SHOCK WITH A NORMAL PRESSURE

Mr. Salcedo, 24, fell from a ladder. BP 112/94, HR 128, cool and clammy, restless, urine 20 mL last hour.

STEP 1 · PULSE PRESSURE

112 minus 94 = **18**: narrowed as the diastolic rises with vasoconstriction.

STEP 2 · STAGE

Tachycardia, narrow pulse pressure, cool skin, low urine and restlessness with a normal SBP: compensatory shock.

STEP 3 · ACT

Two 16 gauge or wider IVs, warmed fluid, type and cross, look for the bleeding source (FAST), and escalate now.

WHY NOW

This is the reversible window. Waiting for hypotension means waiting for about 30% blood loss.

CASE 14.2 · A SEPSIS BUNDLE BY THE NUMBERS

Mr. Cole, 70 kg, is post-op day two: BP 84/48, HR 124, warm and flushed, newly confused, urine 15 mL/hr, lactate 4.8.

STEP 1 · MAP

(84 + 96) ÷ 3 = **60**, under 65.

STEP 2 · BOLUS

30 mL/kg x 70 kg = **2,100 mL** of crystalloid.

STEP 3 · ORDER

Cultures from two sites, then broad-spectrum antibiotics within the hour, while fluids run; pressors if still hypotensive.

STEP 4 · LACTATE CLEARANCE

Repeat lactate 3.6: (4.8 minus 3.6) ÷ 4.8 = **25%** clearance, a good sign (10 to 20% or more predicts survival).

TRAPS PEOPLE FALL INTO

- **Waiting for hypotension to call shock.** BP is a late sign.
- **Bolusing fluid into a congested patient.** Check neck veins and lungs first.
- **Waiting for an x-ray in tension pneumothorax.** Decompress now.
- **Giving an antihistamine before epinephrine.** Epinephrine IM is first-line.
- **Using phenylephrine in neurogenic shock.** Pure alpha worsens bradycardia; norepinephrine is preferred.

Chapter 14 self-test · six items

1. Within what time after injury is tranexamic acid given?

A. 12 hours
B. 24 hours
C. 3 hours
D. 48 hours

C. 3 hours After 3 hours it may increase harm.

2. Which BP target applies in traumatic brain injury?

A. SBP 80 to 90 mm Hg
B. SBP under 70 mm Hg
C. No target is needed here
D. SBP 100 to 110 or more

D. SBP 100 to 110 or more One episode of hypotension doubles mortality.

3. What is the antidote for norepinephrine extravasation?

A. Protamine
B. Phentolamine
C. Naloxone
D. Glucagon IV

B. Phentolamine Infiltrate locally per order.

4. What is Cushing triad a sign of?

A. Impending herniation
B. Early septic shock
C. Hypovolemic shock
D. Anaphylactic shock

A. Impending herniation Wide pulse pressure hypertension, bradycardia, irregular breathing.

5. What makes up the lethal triad of trauma?

A. Fever, alkalosis, anemia
B. Hypoxia, sepsis, pain
C. Hypothermia, acidosis, coagulopathy
D. Bradycardia, hypotension and fever

C. Hypothermia, acidosis, coagulopathy Each worsens the other two.

6. When is active cooling stopped in heat stroke?

A. About 38.9 °C
B. About 36.0 °C
C. About 40.5 °C
D. About 37.0 °C

A. About 38.9 °C Stopping near 38.9 avoids overshoot.

ONE PAGE

Cram sheet

Every number and rule in the course, grouped by exam. Cover the right columns and rebuild each row from memory.

Chapters 1 and 2: Judgment, fluids and electrolytes

Item	Value	Note
Pre-arrest window	6 to 8 hours of abnormal vital signs	Failure to rescue lives here
Rapid response triggers	HR under 40 or over 130; RR under 8 or over 28; SBP under 90	Plus “the nurse is worried”
MAP	70 to 100; act under 65	(SBP + 2 x DBP) ÷ 3
Urine output	At least 0.5 mL/kg/hr (about 30 mL/hr)	Under 30 for two hours: escalate
SpO_2 target in CO_2 retention	88 to 92%	A change from baseline is what matters
Body water	60% male, 50 to 55% female	Two thirds intracellular; plasma about a quarter of ECF
Osmolality	275 to 295 mOsm/kg	2 x Na + glucose ÷ 18 + BUN ÷ 2.8
Electrolytes	Na 135 to 145; K 3.5 to 5.0; Ca 8.5 to 10.5; Mg 1.5 to 2.5 mEq/L; Phos 2.5 to 4.5	Chapter 1 table lists Ca 8.6 to 10.2, Mg 1.6 to 2.6 mg/dL
ABG	pH 7.35 to 7.45; $PaCO_2$ 35 to 45; HCO_3 22 to 26; PaO_2 80 to 100	Anion gap 8 to 12
Sodium correction	Up no more than 8 to 10 mEq/L in 24 h	Down no more than 10 to 12 in 24 h
IV potassium	Peripheral up to 10 mEq/100 mL and 10 mEq/hr	Central up to 20 mEq/hr with ECG monitoring
Daily weight	1 kg = 1 L = 2.2 lb	Call for 2 to 3 lb in a day or 5 lb in a week

Chapters 3 and 4: Surgery and pain

Item	Value	Note
Post-op glucose	180 to 220 mg/dL possible; target 140 to 180	Stress hormones cause insulin resistance
Stents	Bare-metal 30 days; drug-eluting ideally 6 months	Before elective surgery
Fasting	Clears 2 h; breast milk 4 h; light meal 6 h; fatty meal 8 h	Full stomach rules override the clock
Antibiotic timing	Within 60 min before incision	Vancomycin and fluoroquinolones within 120 min
Normothermia	Core at or above 36 °C	Hypothermia roughly triples infection risk
Dantrolene	2.5 mg/kg, up to about 10 mg/kg	Stop cooling near 38 °C
Aldrete	9 or more to leave Phase I	Five items, 0 to 2 each
Urine output	At least 0.5 mL/kg/hr	Void within 6 to 8 h after surgery
Ketorolac	15 to 30 mg IV every 6 h; 15 mg if over 65, under 50 kg or renal	Five days total
Acetaminophen	4 g/day; 2 to 3 g in older adults, alcohol, liver disease	Count combination products
Reassess	15 to 30 min after IV; 60 min after oral	30 to 60 min after a non-drug measure
Naloxone	0.04 mg/mL; 0.5 to 1 mL every 1 to 2 min	Lasts 30 to 90 min
Breakthrough dose	10 to 20% of the 24 h total	End-of-life scheduled dosing
Hospice	Prognosis of 6 months or less	Two physicians certify

Chapters 5 and 6: Infection and airway disease

Item	Value	Note
Fever	38.3 °C once or 38.0 °C for 1 h	Older adults: over 37.2 oral or 1.1 °C above baseline
Lactate	Over 2 warning; 4 or more hypoperfusion	Repeat in 2 to 4 h if over 2
Bands	Over 10% is a left shift	Can occur with a normal WBC
ANC	Under 1,500 neutropenia; under 500 severe; under 100 profound	WBC x (% segs + % bands)
Sepsis bundle	Antibiotic within 1 h; 30 mL/kg crystalloid; MAP 65	Hgb transfusion threshold 7; glucose 180 or less
Cultures	2 sets, 2 sites, 8 to 10 mL per bottle	Do not delay antibiotics past about 45 min
Hub scrub	At least 15 seconds	Transparent dressing every 7 days
ABG	pH 7.35 to 7.45; $PaCO_2$ 35 to 45; HCO_3 22 to 26; PaO_2 80 to 100	$EtCO_2$ 35 to 45
Spirometry	COPD ratio below 0.70; asthma response 12% and 200 mL	GOLD by FEV1 % predicted
Peak flow	Green 80 to 100; yellow 50 to 79; red under 50%	Of personal best
Oxygen targets	Asthma 93 to 95%; COPD retainer 88 to 92%	LTOT at least 15 h/day
Magnesium in status asthmaticus	2 g IV over 20 min	Watch BP and reflexes
Suction	80 to 120 mm Hg; 10 to 15 s; 2 to 3 passes	Catheter no more than half the airway diameter
Trach cuff	20 to 25 cm H_2O	Speaking valve only with cuff deflated

Chapters 7 and 8: Lung failure and the heart

Item	Value	Note
CAP vs HAP vs VAP	Before 48 h; 48 h or more after admission; 48 h or more after intubation	HAP and VAP skew to Pseudomonas, MRSA
TST cut-offs	5 mm, 10 mm, 15 mm by risk	Read at 48 to 72 h; induration only
TB isolation ends	2 weeks therapy, improving, 3 negative smears	Smears 8 h apart, one early morning
D-dimer	Under about 500; age x 10 over 50	Rules out only low-probability PE
Heparin	aPTT 1.5 to 2.5 x control; anti-Xa 0.3 to 0.7	HIT: platelets fall over 50%
Hemothorax surgery trigger	Over 1,500 mL at once or about 200 mL/h for 2 to 4 h	Chest tube over 100 mL/h: call
Respiratory failure	Type I PaO_2 under 60; type II $PaCO_2$ over 50, pH under 7.35	Restlessness is the earliest sign of hypoxia
ARDS	P/F 300 or less; mild 201 to 300, moderate 101 to 200, severe 100 or less	6 mL/kg; plateau 30 or less
Weaning	FiO_2 0.40 or less, PEEP 5 to 8, RSBI under 105	Stop for RR over 35, SpO_2 under 90%
ETT cuff	20 to 30 cm H_2O	Confirm with waveform capnography
Troponin	Rises 3 to 6 h, peaks 12 to 24 h, lasts 7 to 14 days	hs-troponin rises in 1 to 3 h
ACS clocks	ECG 10 min; device 90 min (120 transfer); needle 30 min	Fibrinolysis best within 12 h
Nitroglycerin	0.4 mg SL every 5 min, up to 3	Hold SBP under 90, HR under 50 or over 100
EF	Normal 55 to 70%; HFrEF 40 or less; HFpEF 50 or more	41 to 49% mildly reduced

Item	Value	Note
BNP	Under 100 unlikely; over 400 likely	NT-proBNP under 300 rules out
Digoxin	0.5 to 2.0 ng/mL; 0.5 to 0.9 in HF	Hold apical pulse under 60
HF teaching	Call for 2 to 3 lb/day or 5 lb/week; Na 2 to 3 g	Fluid 1.5 to 2 L if ordered

Chapters 9 and 10: Rhythm, vessels and blood

Item	Value	Note
Intervals	PR 0.12 to 0.20 s; QRS 0.06 to 0.10 s	QTc over 0.50 s: hold the drug, call
Escape rates	Junctional 40 to 60; ventricular 20 to 40	Never suppress
Atropine	1 mg every 3 to 5 min, max 3 mg	Then pace or infusion
Adenosine	6 mg, then 12 mg rapid push	20 mL flush
Cardioversion energy	AF 120 to 200 J; flutter and SVT 50 to 100 J; VT with pulse 100 J	Synchronized
Arrest drugs	Epinephrine 1 mg every 3 to 5 min; amiodarone 300 then 150 mg	Compressions 100 to 120/min, 2 to 2.4 in
AF rules	Over 48 h: 3 weeks anticoagulation or TEE; 4 weeks after	CHA2DS2-VASc 2 men, 3 women
Warfarin INR	2 to 3; mechanical mitral 2.5 to 3.5	Antidote vitamin K
ABI	Normal 1.00 to 1.40; PAD 0.90 or less; severe 0.40 or less	Over 1.40 unreliable
AAA repair	About 5.5 cm or growth over 0.5 cm in 6 months	Do not palpate deeply
Hypertensive emergency	Over 180/120 with organ damage	Lower MAP about 25% in first hour
Hemoglobin	M 14 to 18; F 12 to 16 g/dL	Transfuse under 7 (8 with heart disease)
MCV / retics	80 to 100 fL / 0.5 to 2%	Ferritin under 30 = iron deficiency
Platelets	150,000 to 400,000	Precautions 50,000; strict 20,000; ICH risk 10,000
PT / INR / aPTT	11 to 12.5 s / 0.8 to 1.1 / 30 to 40 s	Heparin aPTT 1.5 to 2.5 x control
Transfusion	Start within 30 min; 2 mL/min for 15 min; finish within 4 h	One unit raises Hgb about 1 g/dL

Item	Value	Note
ANC	Under 500 severe	Antibiotics within 60 min of fever
Tumor lysis	K over 5.0, Phos over 4.5, uric acid over 7.0, Ca low	12 to 72 h after therapy

Chapters 11 and 12: Gut, liver and pancreas

Item	Value	Note
Bowel sounds	5 to 30 per minute	Listen 5 min per quadrant before absent
Upper bleed ratio	BUN:creatinine over 20:1 (often over 30:1)	Digested blood absorbed as protein
Transfusion	Hgb under 7; under 8 with coronary disease	One unit raises about 1 g/dL
Urine output	At least 0.5 mL/kg/hr	About 30 mL/hr
Reflux	Head of bed up 6 to 8 in on blocks	No food 3 h before lying down
H. pylori therapy	14 days bismuth quadruple	Hold PPI 2 weeks before testing
Dumping	Early 15 to 30 min; late 1.5 to 3 h	Late is hypoglycemia
Appendicitis WBC	10,000 to 18,000; over 20,000 suggests perforation	McBurney point
Fiber	25 to 35 g a day	After diverticulitis recovers
Colorectal screening	Start at 45; colonoscopy every 10 y or FIT yearly	Positive test needs colonoscopy
Stoma	Barrier 1/8 in larger; empty at 1/3 to 1/2 full	Ileostomy 500 to 1,000 mL/day early
Feeding tube	pH 5.5 or less gastric; HOB 30 to 45°; 30 mL flushes	Residual over 500 with symptoms: hold
Liver panel	ALT 7 to 56; AST 10 to 40; ALP 30 to 120; bili 0.3 to 1.2	Albumin 3.5 to 5.0; INR 0.8 to 1.1
Acetaminophen	4 g max; 2 g or less with liver disease or alcohol	NAC best within 8 h
Ascites	Na 2,000 mg; lose 0.5 kg/day (1 kg with edema)	Albumin 6 to 8 g/L if over 5 L tapped
SBP	Ascitic PMN 250 or more	Albumin 1.5 g/kg day 1, 1 g/kg day 3

Item	Value	Note
Varices	Octreotide 50 mcg then 50 mcg/hr; band within 12 h	Beta blocker to HR 55 to 60
Pancreatitis	Lipase 3 x normal; LR 5 to 10 mL/kg/hr	Triglycerides over 1,000 can cause it

Chapters 13 and 14: Kidney, shock and trauma

Item	Value	Note
Creatinine / BUN / eGFR	0.6 to 1.2 / 10 to 20 / over 90	Trend beats value
Urine output	At least 0.5 mL/kg/hr; oliguria under 400 mL/day; anuria under 100	Specific gravity 1.005 to 1.030
AKI	Creatinine up 0.3 in 48 h or 1.5 x in 7 days	Or under 0.5 mL/kg/hr for 6 h
Albuminuria	A1 under 30; A2 30 to 300; A3 over 300 mg/g	Staged with eGFR
CKD diet	Na under 2 g; K 2 to 3 g; phos 800 to 1,000 mg	Fluid about 1,000 mL plus urine
Protein	0.6 to 0.8 g/kg before dialysis; 1.0 to 1.2 on HD	Reverses on dialysis
ESA target	Hgb 10 to 11 g/dL	Iron first
Fistula	Matures 6 weeks to 3 months	Graft 2 to 3 weeks
Retention	Post-void residual over 150 to 200 mL	Scan before cath
Hemodynamics	CVP 2 to 8; CO 4 to 8 L/min; SvO_2 60 to 80%	MAP at least 65
Sepsis	Lactate over 2; 30 mL/kg; vasopressin 0.03 units/min	Hydrocortisone 200 mg/day if pressors persist
TXA	1 g over 10 min, then 1 g over 8 h	Within 3 h of injury
Anaphylaxis	Epinephrine 0.3 to 0.5 mg IM thigh	Repeat every 5 to 15 min; watch 4 to 8 h
Neurogenic shock	MAP 85 to 90 for 7 days	Atropine 1 mg, max 3 mg
GCS	13 to 15 mild; 9 to 12 moderate; 8 or less severe	CPP 60 to 70
CPR	100 to 120/min; 2 to 2.4 in; 30:2	Epinephrine 1 mg every 3 to 5 min

Item	Value	Note
Rapid response	RR under 8 or over 28; HR under 40 or over 130; SBP under 90	Or the nurse is worried
Heat stroke	Core over 40 °C with CNS change	Stop cooling near 38.9 °C

Key terms and comparisons

Term	Meaning
Abnormal vs unexpected	Abnormal compares to the textbook; unexpected compares to this patient, diagnosis and timeline
Hyponatremia vs hypernatremia	Water excess, brain swells, reflexes down; water deficit, brain shrinks, agitation and hyperreflexia
Hypokalemia vs hyperkalemia	Flat T, U wave, ileus, digoxin toxicity; peaked T, wide QRS, diarrhea, arrest
Chvostek vs Trousseau	Facial twitch on tapping; carpopedal spasm under a cuff (more specific)
Infiltration vs extravasation	Non-vesicant leak; vesicant leak with tissue necrosis
Isotonic vs hypotonic vs hypertonic	Fills vessels; hydrates cells; pulls water into vessels
Witness vs obtain consent	The nurse witnesses signature, voluntariness and competence; the surgeon obtains consent
Ileus vs obstruction	Absent or hypoactive sounds and no flatus; high-pitched sounds and colicky pain early
Dehiscence vs evisceration	Wound layers separate; organs protrude (an emergency)
Nociceptive vs neuropathic	Tissue damage, aching or cramping; nerve damage, burning or shooting
Tolerance vs dependence vs OUD	Needing more; withdrawal on stopping; compulsive use despite harm
Palliative vs hospice	Any stage with cure; prognosis 6 months or less, comfort focus
Living will vs POLST	Patient-made document; clinician-signed portable medical order
Sepsis vs septic shock	Organ dysfunction from infection; plus pressors for MAP 65 and lactate over 2 after fluids
Colonization vs infection	Presence; presence plus host response

Term	Meaning
Allergy vs intolerance	Hives, wheeze, angioedema, hypotension; nausea or a predictable side effect
Negative vs positive pressure	Protects the unit from the patient; protects the patient from the unit
Emphysema vs chronic bronchitis	Destroyed walls and recoil; mucus, early hypoxemia, cor pulmonale
Wheeze vs rhonchi vs crackles	Narrow airway; secretions that clear with cough; fluid or opening alveoli
MDI vs DPI	Shake, slow deep breath; no shake, fast forceful breath
Shunt vs dead space	Perfused, not ventilated (pneumonia); ventilated, not perfused (PE)
Simple vs tension pneumothorax	Diminished sounds, trachea midline; absent sounds, trachea away, JVD, hypotension
Pneumothorax vs hemothorax	Hyperresonant; dull with signs of shock
Type 1 vs type 2 MI	Plaque rupture; supply-demand mismatch
Ischemia, injury, infarction	ST depression or T inversion; ST elevation; Q wave
HFrEF vs HFpEF	Cannot squeeze; cannot fill
Left vs right failure	Lungs: crackles, orthopnea; body: JVD, edema, hepatomegaly
Defibrillation vs cardioversion	Unsynchronized for no pulse; synchronized to the R wave for unstable rhythms with a pulse
Mobitz I vs Mobitz II	PR lengthens then drops (atropine works); PR fixed then drops (pace)
Stenosis vs regurgitation	Will not open, pressure load, hypertrophy; will not close, volume load, dilation
Arterial vs venous leg	Cool, pulseless, dependent; warm, edematous, elevated and compressed
Platelet vs factor bleeding	Skin and mucosa; joints and muscle
TACO vs TRALI	High BP, full veins, diuretic helps; low BP, flat veins, no diuretic
Allopurinol vs rasburicase	Prevents new uric acid; breaks down existing uric acid

Term	Meaning
Visceral vs parietal pain	Dull, midline, hollow organ stretch; sharp, focal, peritoneum
Melena vs hematochezia	Black tarry upper bleed; bright red or maroon lower bleed
Duodenal vs gastric ulcer	Food helps, night pain; food worsens, biopsy for cancer
Ileus vs obstruction	No movement, absent sounds; blockage, high-pitched sounds early
Damage vs function tests	ALT, AST, ALP, GGT; albumin, INR, bilirubin
Colic vs cholecystitis vs cholangitis	Episodic; constant with fever and Murphy; fever, jaundice, rigors
Early vs late dumping	Osmotic fluid shift 15 to 30 min after eating; hypoglycemia 1.5 to 3 h after
Prerenal vs intrarenal vs postrenal	Perfusion; tissue damage; obstruction
Shift vs remove potassium	Insulin, albuterol hide K in cells; diuretic, binder, dialysis remove it
Hemodialysis vs peritoneal dialysis	Machine and access, 3 times a week; own peritoneum, daily, cloudy fluid means peritonitis
Stress vs urge vs overflow vs functional	Leak with cough; sudden urge; dribbling full bladder; cannot reach toilet
Cold vs warm shock	Hypovolemic, cardiogenic, obstructive; distributive
Neurogenic vs spinal shock	Hemodynamic: hypotension and bradycardia; neurological: flaccid areflexia
ESI vs START	Sickest first; most salvageable first

Priority and safety rules

Topic	The rule
Priority	ABC, then Maslow, then acute, unstable, actual, unexpected. C-A-B in arrest.
First action	A stabilizing nursing action comes before the phone call.
Stop the infusion	Transfusion reaction or air embolism: stop, keep the line open with saline on new tubing. Air: clamp, left side, Trendelenburg.
Delegation	Never assessment, teaching, evaluation, care planning or an unstable patient.
Hyperkalemia order	Protect (calcium), shift (insulin and dextrose, albuterol), remove (diuretic, binder, dialysis).
ROME	Respiratory Opposite, Metabolic Equal; split a normal pH at 7.40.
Potassium	Never IV push, IM or subcutaneous. Pump, dilute, check urine output and magnesium.
Older adult	New confusion: check SpO_2 and glucose, then a metabolic panel, not a sedative.
PACU priority	Airway, breathing, circulation, comfort. Jaw thrust before oxygen.
Hemorrhage order	Restlessness, tachycardia, narrow pulse pressure, cool skin, low urine, then falling systolic.
Malignant hyperthermia	Stop trigger, 100% O_2, dantrolene, cool, treat K, ICU 24 h.
Compartment syndrome	Heart level, no ice, loosen cast, call now.
Evisceration	Stay, low Fowler with knees bent, sterile saline gauze, NPO, surgeon.
Opioid safety	Sedation before respiratory depression; oxygen can mask hypoventilation.
Delegation	UAP may reposition, apply ordered heat or cold and report; RN assesses and evaluates.
Older adult	Check SpO_2, glucose, BP, pain and bladder before sedating confusion.
Hour-1 order	Oxygen, access, lactate and cultures, antibiotic, fluids, pressor, reassess.

Topic	The rule
Neutropenic fever	Notify, culture every lumen, antipseudomonal beta-lactam within 60 min; no rectal route.
C. difficile	Contact plus, soap and water, bleach, oral vancomycin or fidaxomicin, no loperamide.
Status asthmaticus	Upright, O_2, continuous albuterol plus ipratropium, steroids early, stay; no sedatives or beta blockers.
COPD exacerbation	Bronchodilators, 5 days steroids, antibiotics when indicated, controlled O_2, BiPAP for hypercapnia.
Inhaler order	Bronchodilator, wait 5 min, then steroid, then rinse.
Respiratory priority	Stridor beats a silent chest, which beats loud wheezing, which beats a routine inhaler.
Delegation	UAP measures and reports SpO_2; RN assesses, teaches, titrates oxygen.
TB masks	N95 on staff; surgical mask on the patient for transport.
PE first actions	Stay, high Fowler, oxygen, monitor, IV, call; no leg massage.
Chest tube	Upright, below the chest, no stripping, no routine clamping.
Vent alarm	Cannot fix it fast: bag on 100% and call.
Chest pain order	Monitor, ECG, IV, aspirin chewed; oxygen only if needed; nitrate after screening.
RV infarct hypotension	Stop nitrate, flat, legs up, fluids, call.
Post-cath	Leg straight, check pulses; back pain plus shock is a retroperitoneal bleed.
Delegation	UAP weighs and records I&O; RN assesses, teaches, titrates drips.
Rhythm emergency	Pulse first, then stability, then the rhythm.
Dissection	Beta blocker before vasodilator; opioids for pain.
Acute limb ischemia	Six P's; keep dependent, no heat or massage, NPO, call.
HIT	Stop all heparin including flushes; non-heparin anticoagulant; no platelets.

Topic	The rule
Transfusion reaction	Stop, saline through new tubing, notify, send bag and samples.
Extravasation	Stop, do not flush, aspirate; cold for anthracyclines, warm for vinca alkaloids.
Oncology priority	Airway first, then high K from tumor lysis, then neutropenic fever, then cord compression.
Delegation	UAP takes vitals during a stable transfusion and reports changes; RN initiates and evaluates.
GI bleed	Airway, oxygen, two large IVs, fluids, type and cross, NPO, then call.
Perforation	NPO, keep still, vitals, call the surgeon.
Appendicitis	NPO, no heat, no enemas; sudden relief is a red flag.
Toxic megacolon	Stop antidiarrheals and opioids, NPO, call.
Varix bleed	Airway first, then volume, octreotide, ceftriaxone, banding.
Cirrhosis confusion	Bleeding, infection, dehydration, constipation before blaming protein.
Cholangitis	Charcot triad; cultures, antibiotics, fluids, ERCP.
Delegation	UAP empties and measures pouches and drains; RN assesses stoma, abdomen and tube placement.
AKI	Ask what care did to the kidney; scan the bladder; hold nephrotoxins.
Hyperkalemia	Monitor, hold K sources, calcium, shift, remove, recheck.
Fistula arm	No BP, sticks, IVs, restraints or tight clothing.
Urine culture	From the sampling port, before the first antibiotic.
Shock basics	Oxygen, two large IVs, MAP 65, hourly urine, lactate trend, warmth.
Fluid check	Flat veins and clear lungs: volume. JVD and crackles: no bolus.
Trauma	ABCDE in order, then AMPLE and head to toe; ask about anticoagulants early.
Delegation	UAP may do vitals on stable patients, compressions if trained, warming blankets; RN assesses, triages, titrates.

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