MEDICAL-SURGICAL NURSING II · STUDY GUIDE

Final Exam Study Guide

This guide covers the whole course. Each chapter gets a short review, its key diagram, the rules to lock in, one table, two worked cases, the traps and six new self-test items. Use it after you have worked through the seven exam guides: read a chapter, cover the answers, and test yourself. The cram sheet at the end gathers every rule and number from all fourteen chapters in one place.

WHAT THIS GUIDE COVERS

- Chapter 1 · Endocrine Disorders: Diabetes Mellitus
- Chapter 2 · Endocrine Disorders: Thyroid, Parathyroid, Adrenal and Pituitary
- Chapter 3 · Neurologic Disorders: Stroke and Increased Intracranial Pressure
- Chapter 4 · Neurologic Disorders: Seizures, Headache and CNS Infection
- Chapter 5 · Neurologic Disorders: Degenerative and Neuromuscular Disease
- Chapter 6 · Musculoskeletal Disorders and Orthopedic Trauma
- Chapter 7 · Integumentary Disorders and Burns
- Chapter 8 · Sensory Disorders: Eye and Ear
- Chapter 9 · Immune and Rheumatologic Disorders
- Chapter 10 · Infectious Disease and Antimicrobial Stewardship
- Chapter 11 · Reproductive and Sexual Health Disorders
- Chapter 12 · Care of the Older Adult
- Chapter 13 · Rehabilitation, Mobility and Chronic Illness
- Chapter 14 · End-of-Life Care, Ethics and Complex Decisions

CHAPTER 1

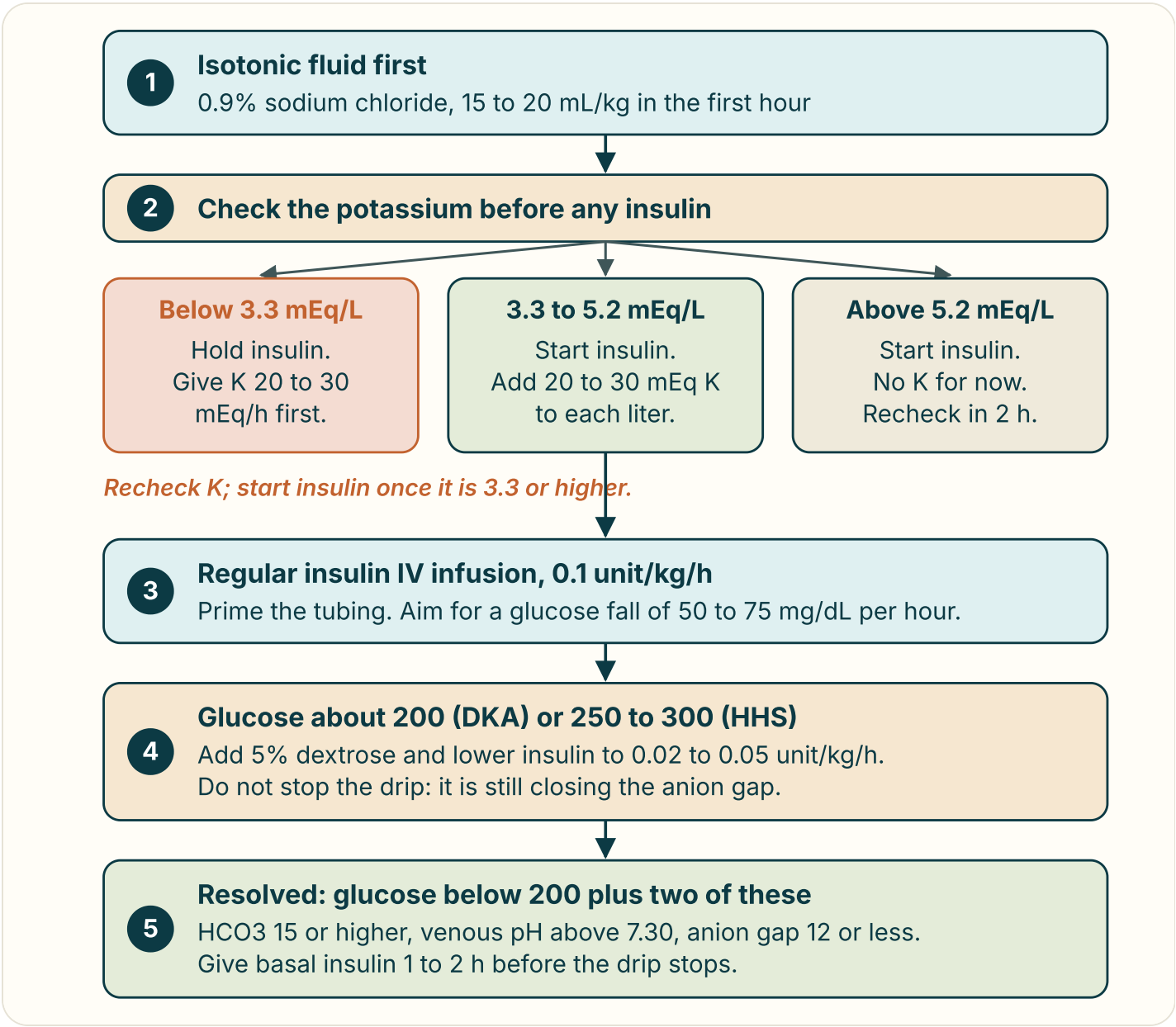
Endocrine Disorders: Diabetes Mellitus

Read it in full: **Chapter 1 in the textbook**. Practice it in the lab: **Two Ways the Pancreas Fails** and **DKA, HHS and the Order You Treat Them In**.

What to know

No insulin means ketones and acidosis (type 1, DKA); some insulin means no ketones but extreme dehydration and hyperosmolarity (type 2, HHS). Diabetes is an A1C of 6.5% or higher, fasting glucose 126 or higher, a 2-hour OGTT of 200 or higher, or a random 200 with symptoms. Insulin questions are timelines: know the peak and you know the low.

Treat the 40 before the 400: rule of 15 if the patient can swallow, IV dextrose or glucagon if not. DKA and HHS share one order: isotonic fluid, potassium before insulin (hold if below 3.3), a regular insulin drip at 0.1 unit/kg/h, then dextrose at about 200 mg/dL while the drip keeps closing the anion gap. Never stop insulin on a sick day; take the socks off at every assessment.



Fluids, potassium, insulin, dextrose. The potassium check is a gate: insulin does not start until potassium is at least 3.3 mEq/L. The drip keeps running after dextrose is added, until the anion gap closes.

LOCK THESE IN

- No insulin means ketones and acidosis (DKA). Some insulin means no ketones but profound dehydration and hyperosmolarity (HHS).
- Diagnosis: A1C 6.5% or higher, fasting 126 or higher, 2-hour OGTT 200 or higher, or random 200 or higher with symptoms.
- Hypoglycemia: level 1 below 70, level 2 below 54, level 3 any value needing another person's help.
- Rule of 15: 15 g fast carbohydrate, recheck in 15 minutes, repeat until above 70, then a snack if the meal is more than an hour away.
- Crisis order: fluids, potassium (hold insulin if K is below 3.3), insulin 0.1 unit/kg/h, dextrose at about 200 mg/dL.
- Anion gap = Na minus (Cl plus HCO3). Effective osmolality = 2 x Na plus glucose/18. Above 320 fits HHS.

Key terms and comparisons: insulin by timeline

Insulin	Onset	Peak	Duration	Nursing timing
Rapid: lispro, aspart, glulisine	10 to 30 min	30 min to 3 h	3 to 5 h	Give 0 to 15 min before eating; tray present
Short: regular	30 min to 1 h	2 to 4 h	5 to 8 h	30 min before the meal; the only insulin given IV
Intermediate: NPH	1 to 2 h	4 to 12 h	12 to 18 h	Cloudy; roll gently; classic nocturnal low window
Long: glargine U-100, detemir	2 to 4 h (detemir 1 to 3 h)	No pronounced peak	Up to 24 h	Same time daily; never mix
Ultra-long: degludec, glargine U-300	About 1 to 6 h	No peak	Beyond 24 h (degludec beyond 42 h)	Steady state takes 3 to 4 days

Worked cases

CASE 1.1 · READING A DKA PANEL

Mr. Delacroix, 26, with type 1 diabetes, has vomited for a day and ran out of insulin. Labs: sodium 132 mEq/L, chloride 96, bicarbonate 10, glucose 520 mg/dL, potassium 3.0 mEq/L, pH 7.14, beta-hydroxybutyrate 5.2 mmol/L.

STEP 1 · CALCULATE THE ANION GAP

132 minus (96 plus 10) = 26 mEq/L. That is well above 10 to 12, so ketoacids are piling up.

STEP 2 · CALCULATE EFFECTIVE OSMOLALITY

2 x 132 = 264, plus 520/18 = 28.9, total about 293 mOsm/kg. That is below 320, which fits DKA rather than HHS.

STEP 3 · CORRECT THE SODIUM

Add 1.6 for every 100 mg/dL of glucose above 100: (520 minus 100)/100 x 1.6 = 6.7. Corrected sodium is about 138.7, which is normal, so after the first resuscitation the fluid is usually switched to 0.45% sodium chloride.

STEP 4 · CHECK THE POTASSIUM GATE

Potassium is 3.0, below 3.3. Insulin would push potassium into cells and could cause a lethal rhythm. Hold the insulin, give fluid and potassium (about 20 to 30 mEq/h with urine output confirmed and the monitor on).

RULE

Fluids first, potassium before insulin. A normal serum potassium on arrival hides a large total-body deficit.

CASE 1.2 · SETTING UP THE INSULIN DRIP

After potassium rises to 3.8, the provider orders regular insulin at 0.1 unit/kg/h for Mr. Delacroix, who weighs 80 kg. Pharmacy sends 100 units of regular insulin in 100 mL (1 unit/mL). This is a worked calculation example only.

STEP 1 · FIND THE DOSE

0.1 unit/kg/h x 80 kg = 8 units/h.

STEP 2 · CONVERT TO A PUMP RATE

At 1 unit/mL, 8 units/h = 8 mL/h.

STEP 3 · PRIME THE TUBING

Run insulin solution through the tubing before connecting it, because insulin sticks to plastic.

STEP 4 · SET THE TARGET FALL

Aim for a glucose fall of 50 to 75 mg/dL per hour, with hourly fingersticks. A faster fall risks cerebral edema.

STEP 5 · PLAN FOR 200 MG/DL

When glucose reaches about 200, add 5% dextrose and reduce the drip to 0.02 to 0.05 unit/kg/h: 1.6 to 4 units/h for 80 kg. Do not stop it.

RULE

Give the subcutaneous basal dose 1 to 2 hours before stopping the drip. IV regular insulin lasts only minutes.

TRAPS PEOPLE FALL INTO

- **Starting insulin before checking potassium.** If potassium is below 3.3 mEq/L, insulin waits. Replace potassium first.
- **Stopping the drip when glucose hits 200.** Add dextrose and lower the rate. The drip keeps running until the gap closes.
- **Giving rapid-acting insulin before the tray arrives.** If the meal may not come, the dose does not go in. NPO means hold prandial, keep basal.

Chapter 1 self-test · six items

1. A patient with type 1 diabetes is made NPO for a procedure. What happens to her insulin?

A. All insulin is held until she eats again
B. Basal continues and mealtime insulin is held
C. Both doses are halved for the whole day
D. Mealtime insulin continues and basal is held

B. Basal continues and mealtime insulin is held Stopping basal insulin in type 1 diabetes leads to ketoacidosis even when glucose looks fine.

2. Which drug class is most likely to cause hypoglycemia when used alone?

A. A sulfonylurea such as glipizide
B. A DPP-4 inhibitor like sitagliptin
C. An SGLT2 inhibitor like empagliflozin
D. A biguanide such as metformin

A. A sulfonylurea such as glipizide Sulfonylureas force insulin release regardless of glucose.

3. A patient on a DKA drip has potassium 4.1 mEq/L and good urine output. What is expected?

A. Stop the insulin until potassium is 5.0
B. Hold all potassium until the drip ends
C. Add 20 to 30 mEq of potassium to each liter
D. Give a 40 mEq IV potassium push now

C. Add 20 to 30 mEq of potassium to each liter Between 3.3 and 5.2, run insulin and add potassium to fluids to keep it 4 to 5.

4. Which teaching about diabetic foot care is correct?

A. Cut away corns at home with a clean razor
B. Use a heating pad at night for cold feet
C. Soak the feet in warm water every evening
D. Inspect both feet daily, with a mirror for soles

D. Inspect both feet daily, with a mirror for soles Daily inspection prevents ulcers. Soaking, heat and razors cause injury.

5. A patient on empagliflozin has nausea and fast breathing with a glucose of 210. What should the nurse check?

A. Ketones and a venous gas
B. A repeat glucose in 4 hours
C. A urine culture and sensitivity
D. A lipid panel and an A1C

A. Ketones and a venous gas Euglycemic DKA occurs on SGLT2 inhibitors; glucose can look reassuring.

6. A resident in a care home is suddenly confused. What is checked first?

A. A full sleep study
B. A point-of-care glucose
C. A urine culture first
D. A head CT scan today

B. A point-of-care glucose Hypoglycemia is the most reversible cause of acute confusion and takes seconds to exclude.

CHAPTER 2

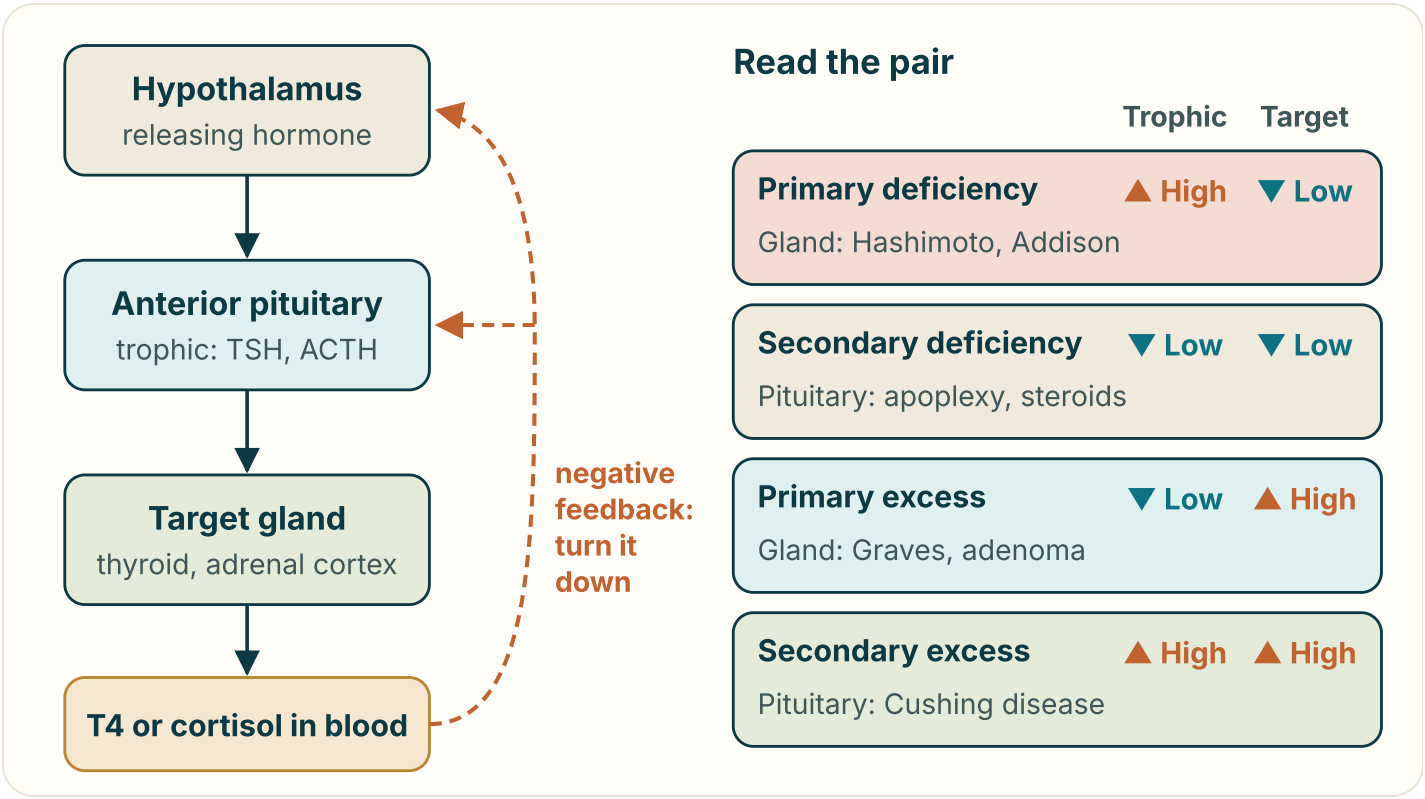
Endocrine Disorders: Thyroid, Parathyroid, Adrenal and Pituitary

Read it in full: **Chapter 2 in the textbook**. Practice it in the lab: **The Axis Decoder: Read the Pair, Find the Lesion** and **The Calcium Bench: Correct It, Pair It With PTH, Read the QT**.

What to know

Read endocrine labs as pairs. Primary disease moves the trophic and target hormones in opposite directions; secondary disease drops both. Levothyroxine starts low in older adults and heart disease. Thyroid storm is treated in order: beta blocker, thionamide, iodine an hour later, steroid, and never aspirin. After thyroidectomy watch the airway, the voice and the calcium.

Calcium and the QT move in opposite directions; low calcium brings tingling, Trousseau sign, laryngospasm and IV calcium gluconate. Adrenal crisis gets hydrocortisone 100 mg IV and saline before any test. Pheochromocytoma needs alpha blockade before beta blockade. SIADH holds water (low sodium, concentrated urine); diabetes insipidus dumps it (high sodium, specific gravity below 1.005). Raise chronic low sodium no more than about 8 mEq/L in 24 hours.



Always read the pair. If the target gland fails, the pituitary shouts louder, so the two hormones move in opposite directions. If the pituitary fails, both are low.

LOCK THESE IN

- Primary: trophic hormone and target hormone move in opposite directions. Secondary: both low.
- Levothyroxine: empty stomach, separate from calcium and iron by 4 hours, start low in elders and heart disease, recheck TSH in 6 to 8 weeks.
- Thyroid storm order: beta blocker, thionamide (PTU), iodine at least 1 hour later, hydrocortisone. No aspirin.
- After thyroidectomy: airway, voice, calcium. Neck tightness is an emergency; trach tray at the bedside.
- Calcium and QT go opposite ways. Low calcium: long QT, tetany, laryngospasm, IV calcium gluconate, check magnesium.
- Adrenal crisis: hydrocortisone 100 mg IV plus saline now. Never stop steroids; double or triple the dose on sick days.

Key terms and comparisons: reading the pair

Pattern	Trophic hormone	Target hormone	Lesion	Example
Primary deficiency	High	Low	Target gland	Hashimoto hypothyroidism; Addison disease
Secondary deficiency	Low or normal	Low	Pituitary or hypothalamus	Pituitary apoplexy; long-term steroids
Primary excess	Suppressed	High	Target gland	Graves disease; adrenal adenoma
Secondary excess	High or normal	High	Pituitary or ectopic tumor	Cushing disease; ectopic ACTH

Worked cases

CASE 2.1 · READING A THYROID PAIR

Mrs. Abernathy, 61, is tired and cold. Her free T4 is 0.4 ng/dL and her TSH is 0.8 mIU/L. The provider has written levothyroxine 25 mcg daily.

STEP 1 · READ THE TARGET HORMONE

Free T4 0.4 is below the 0.8 to 1.8 range, so she is hypothyroid.

STEP 2 · READ THE TROPHIC HORMONE

A failing thyroid would drive TSH high. A TSH of 0.8 is inappropriately normal, so the pituitary is not responding: secondary (central) hypothyroidism.

STEP 3 · THINK ABOUT THE OTHER AXES

A pituitary that cannot make TSH often cannot make ACTH. Thyroid hormone speeds cortisol clearance and could tip her into adrenal crisis.

STEP 4 · ACT

Before the first levothyroxine dose, clarify with the provider whether her cortisol has been checked and glucocorticoid started first.

RULE

Always ask for the partner hormone. Glucocorticoid before levothyroxine in central disease.

CASE 2.2 · TINGLING ON DAY ONE

Ms. Varga had a total thyroidectomy yesterday. At hour 22 she reports tingling around her mouth. Total calcium is 7.6 mg/dL and albumin 2.0 g/dL.

STEP 1 · CORRECT THE CALCIUM

7.6 plus 0.8 x (4.0 minus 2.0) = 7.6 plus 1.6 = 9.2 mg/dL. Corrected, the total looks normal.

STEP 2 · DO NOT STOP THERE

Her symptoms fit true hypocalcemia from parathyroid injury, which peaks at 24 to 72 hours. Request an ionized calcium, which is the active fraction, plus magnesium.

STEP 3 · ASSESS

Check Chvostek and Trousseau signs, reflexes, any stridor, and place her on a cardiac monitor for a long QT.

STEP 4 · PREPARE

Have IV calcium gluconate ready (1 to 2 g diluted, over 10 to 20 minutes, with monitoring) and report to the provider now.

RULE

Perioral tingling after neck surgery is the first rung of a ladder that ends in laryngospasm.

TRAPS PEOPLE FALL INTO

- **Giving iodine first in thyroid storm.** Iodine before a thionamide hands the gland raw material. Thionamide first, iodine at least an hour later.
- **Giving aspirin for the fever of storm.** Salicylates free up more thyroid hormone. Use acetaminophen and cooling.
- **Giving furosemide to a dry hypercalcemic patient.** Volume comes first. A loop diuretic belongs only after repletion and only for overload.

Chapter 2 self-test · six items

1. A patient takes levothyroxine with breakfast and a calcium tablet. What should the nurse teach?

A. Take it fasting and 4 hours apart from calcium
B. Take it with milk to improve absorption
C. Take it at bedtime with the calcium tablet
D. Take it with food to avoid stomach upset

A. Take it fasting and 4 hours apart from calcium Food and calcium block absorption. Empty stomach, separated from calcium and iron.

2. Why is aspirin avoided for fever in thyroid storm?

A. It causes bleeding during a thyroidectomy
B. It frees more thyroid hormone from binding
C. It raises the heart rate directly
D. It blocks the action of beta blockers

B. It frees more thyroid hormone from binding Salicylates displace hormone from thyroxine-binding globulin.

3. Which ECG change goes with a low calcium?

A. A delta wave on the QRS
B. A shortened QT interval
C. A prolonged QT interval
D. Peaked T waves only

C. A prolonged QT interval Low calcium lengthens the QT and can lead to torsades.

4. A patient has been on prednisone 20 mg daily for 2 months and needs surgery. What is the concern?

A. Hypercalcemia from bone breakdown
B. Hypothyroidism caused by the steroid
C. Diabetes insipidus after the surgery
D. Adrenal crisis without stress dosing

D. Adrenal crisis without stress dosing More than about 5 mg daily for over 3 weeks suppresses the axis.

5. Which finding fits diabetes insipidus?

A. Weight gain with dilute urine and sodium 128
B. Urine specific gravity 1.034 with sodium 124
C. Urine specific gravity 1.002 with sodium 150
D. Low urine output with a serum osm of 260

C. Urine specific gravity 1.002 with sodium 150 DI dumps dilute urine and raises serum sodium.

6. A patient with SIADH has a sodium of 116 and is seizing. What is expected?

A. Free water by mouth to dilute the sodium
B. Hypertonic 3% saline by a monitored line
C. A liter of D5W as a rapid IV bolus
D. Desmopressin to concentrate the urine

B. Hypertonic 3% saline by a monitored line Seizing patients get 3% saline; the 24-hour rise is still limited.

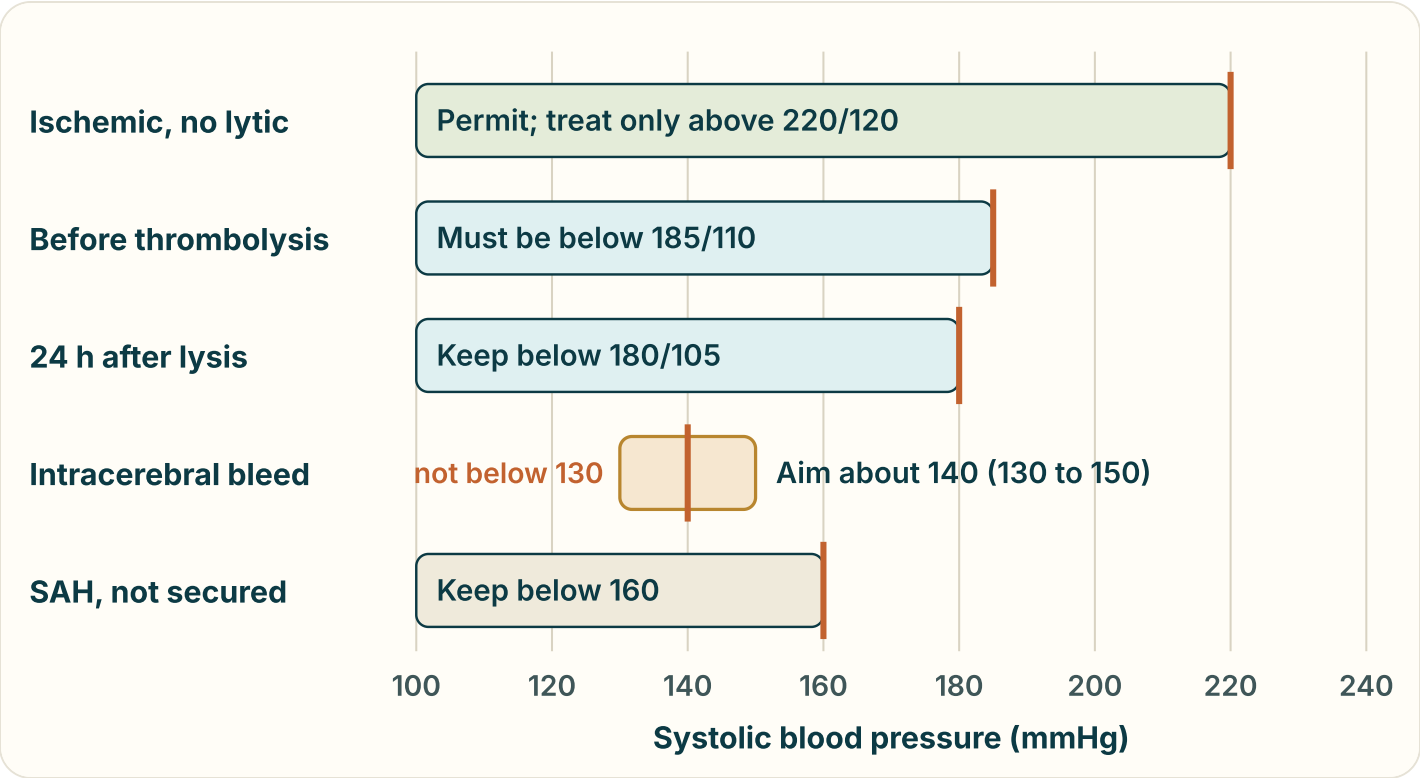
Neurologic Disorders: Stroke and Increased Intracranial Pressure

Read it in full: **Chapter 3 in the textbook**. Practice it in the lab: **Neuro Perfusion Bench: CPP, the Glasgow Coma Scale and the Territory** and **Thrombolysis Clock: Last Known Well, the Screen and the Dose**.

What to know

CPP = MAP minus ICP, and injured brain cannot autoregulate. Last known well starts the stroke clock; a non-contrast CT excludes blood. Alteplase is 0.9 mg/kg (max 90 mg) within 4.5 hours, with pressure below 185/110 before and below 180/105 for 24 hours after. Without a thrombolytic, ischemic stroke pressure is allowed up to 220/120.

Hemorrhage reverses the logic: systolic toward 140 in intracerebral bleeds, below 160 in an unsecured aneurysm, and immediate anticoagulant reversal. Nimodipine is enteral only, every 4 hours for 21 days. The earliest sign of rising ICP is a change in consciousness; the Cushing triad is herniation already happening. Keep every stroke patient NPO until the swallow screen is passed.



The same number means different things. An untreated ischemic stroke is allowed a high pressure to feed the penumbra; a bleed is driven down toward 140. Diastolic limits around lysis are 110 before and 105 after.

LOCK THESE IN

- CPP = MAP minus ICP. Target CPP 60 to 70. Normal ICP 5 to 15.
- GCS 3 to 15. Eight or less: severe, protect the airway.
- Last known well starts the clock. Non-contrast CT excludes blood; only glucose must be back first.
- Alteplase 0.9 mg/kg, maximum 90 mg, 10% bolus then 60-minute infusion, within 4.5 hours.
- BP: below 185/110 before lysis, below 180/105 for 24 h after; no lysis, treat only above 220/120; ICH about 140; SAH below 160 until secured.
- Sudden headache, vomiting or new deficit during lysis: stop the infusion, emergent CT, notify.

Key terms and comparisons: blood pressure targets

Situation	Target	Why
Ischemic stroke, no thrombolytic	Treat only above 220/120; lower about 15% in 24 h	Penumbra flow is pressure dependent
Before thrombolysis	Below 185/110	Higher pressure plus a fibrinolytic raises bleeding risk
24 h after thrombolysis	Below 180/105	Drug still active; tissue freshly reperfused
Intracerebral hemorrhage (SBP 150 to 220)	About 140 (130 to 150); not below 130	Limits hematoma expansion
SAH, aneurysm not secured	Systolic below 160	Rebleeding risk is highest in the first 24 h
SAH with vasospasm, aneurysm secured	Induced hypertension with euvolemia	Now the problem is too little flow

Worked cases

CASE 3.1 · THE PERFUSION ARITHMETIC

Mr. Thorne has an ICP monitor reading 24 mmHg. His blood pressure is 150/78. An hour later it is 96/60 with the same ICP.

STEP 1 · FIND THE MAP

78 plus (150 minus 78)/3 = 78 plus 24 = 102 mmHg.

STEP 2 · FIND THE CPP

102 minus 24 = 78 mmHg, above the 60 to 70 target, but the ICP of 24 is above the 20 to 22 treatment line.

STEP 3 · REPEAT FOR THE NEW PRESSURE

MAP = 60 plus (96 minus 60)/3 = 72. CPP = 72 minus 24 = 48 mmHg.

STEP 4 · INTERPRET

CPP 48 is well below 60. Injured brain cannot autoregulate, so it is now underperfused. Report at once; the team will raise the MAP and lower the ICP.

RULE

Every ICP intervention raises MAP or lowers ICP. Read the equation as a sentence.

CASE 3.2 · THE STROKE CLOCK

Mr. Ojukwu, 64, has right arm and face weakness and cannot find his words. His wife saw him well at 1900 and found him like this at 2130. It is now 2210. He weighs 72 kg.

STEP 1 · SET LAST KNOWN WELL

1900, not 2130. From 1900 to 2210 is 3 hours 10 minutes, inside the 4.5 hour window.

STEP 2 · LOCATE THE LESION

Right weakness with aphasia points to the left (dominant) hemisphere, middle cerebral artery territory.

STEP 3 · DO THE FIRST TESTS

Point-of-care glucose and an emergent non-contrast CT to exclude hemorrhage. Do not wait for other labs unless he takes an anticoagulant or has a bleeding history.

STEP 4 · COMPUTE THE DOSE

Alteplase 0.9 x 72 = 64.8 mg total. Bolus 10% = 6.48 mg over 1 minute; the remaining 58.32 mg over 60 minutes. (Worked calculation example only.)

STEP 5 · SET THE PRESSURE

Before the bolus his pressure must be below 185/110, then below 180/105 for 24 hours, with checks every 15 minutes for 2 hours, every 30 minutes for 6 hours, then hourly.

TRAPS PEOPLE FALL INTO

- **Lowering the pressure of an untreated ischemic stroke.** Permissive hypertension protects the penumbra. Treat only above 220/120, and gently.
- **Waiting for the Cushing triad to call.** A change in consciousness is the early sign. The triad means herniation is already happening.
- **Giving nimodipine IV.** IV use has caused cardiac arrest and death. Enteral syringe only; check pressure first.

Chapter 3 self-test · six items

1. A patient with an ICP monitor has a MAP of 90 and an ICP of 18. What is the CPP?

A. 72 mmHg
B. 18 mmHg
C. 5 mmHg
D. 108 mmHg

A. 72 mmHg CPP = MAP minus ICP = 90 minus 18 = 72.

2. Which GCS finding means the patient likely needs intubation?

A. Eyes open to voice only
B. A total score of 13 to 15
C. Confused conversation
D. A total score of 8 or less

D. A total score of 8 or less GCS 8 or below usually means the airway cannot be protected.

3. Which patient with a right hemisphere stroke is at highest risk?

A. One with a right visual field cut he notices
B. One with aphasia who is slow and careful
C. One with left neglect who tries to walk alone
D. One with right-sided weakness and depression

C. One with left neglect who tries to walk alone Right hemisphere strokes bring neglect and impulsivity: the highest fall risk.

4. How long are neuro checks done every 15 minutes after alteplase starts?

A. For 24 hours
B. For 2 hours
C. For 12 hours
D. For 30 minutes

B. For 2 hours Every 15 min for 2 h, every 30 min for 6 h, then hourly to 24 h.

5. Which fluid is avoided in a patient with high intracranial pressure?

A. 0.9% sodium chloride
B. Lactated Ringer's
C. 3% hypertonic saline
D. Dextrose 5% in water

D. Dextrose 5% in water Hypotonic fluid moves water into the brain.

6. An EVD is in place. What must the nurse do before repositioning the patient?

A. Remove the transducer until finished
B. Close the drain, then relevel and reopen it
C. Lower the drip chamber to the floor first
D. Open the drain fully to empty more fluid

B. Close the drain, then relevel and reopen it An unleveled or open drain can overdrain and cause bleeding.

CHAPTER 4

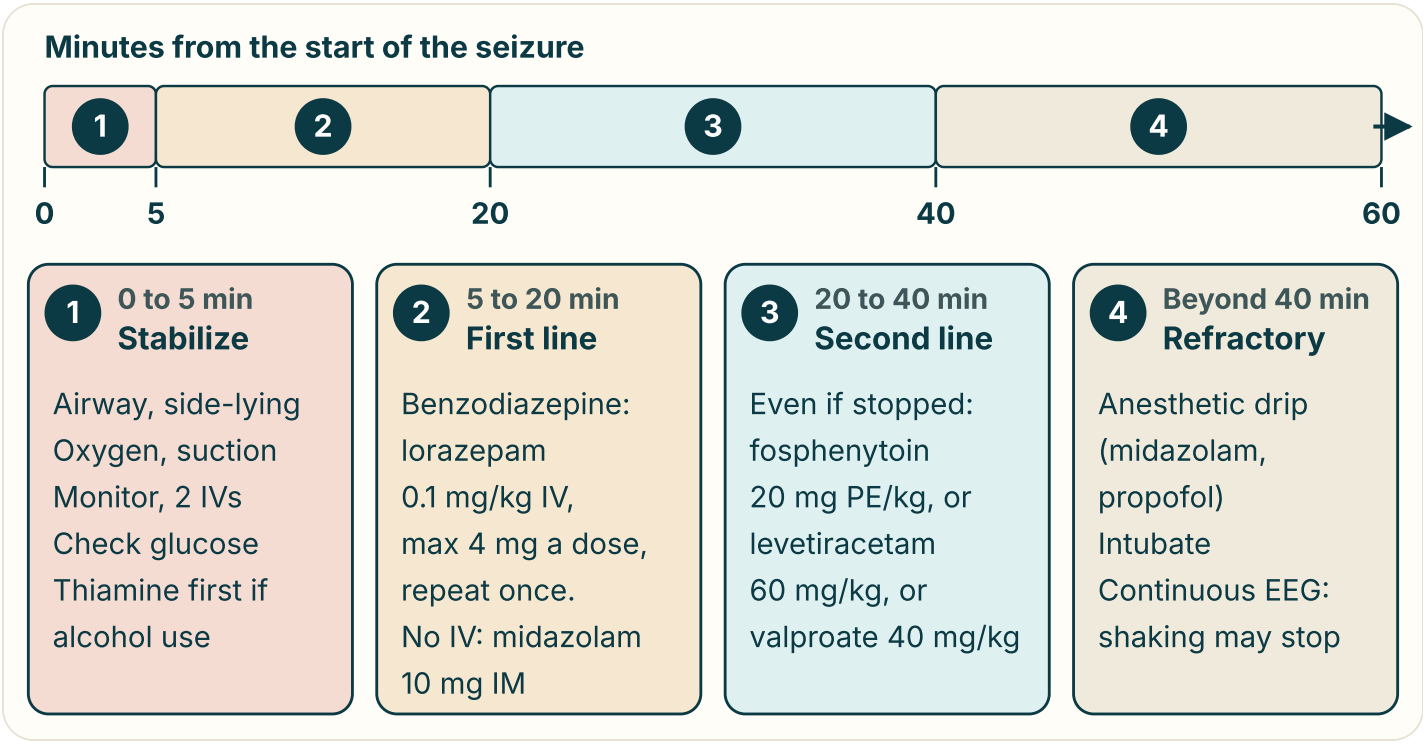
Neurologic Disorders: Seizures, Headache and CNS Infection

Read it in full: **Chapter 4 in the textbook**. Practice it in the lab: **Status Epilepticus Clock: Five Minutes, Twenty, Forty** and **Meningitis First Hour: Cultures, Steroid, Antibiotic, Then the Tap**.

What to know

During a seizure, time it, turn the patient to the side, protect the head, and never restrain or put anything in the mouth. Five minutes of seizing is status epilepticus: lorazepam 0.1 mg/kg (max 4 mg), then a second-line drug even if the seizure stopped. Phenytoin goes in saline only, no faster than 50 mg/min.

Screen headaches with SNOOP: thunderclap means subarachnoid hemorrhage; a new headache after 50 with jaw pain means giant cell arteritis and steroids before biopsy. In bacterial meningitis the order is cultures, dexamethasone, antibiotics (add ampicillin over 50), then CT and LP, with droplet precautions on suspicion. Acyclovir starts before the HSV PCR returns.



Five minutes makes it status. Each phase has a job and a deadline. A benzodiazepine that works at minute 4 may fail at minute 40, because its receptors are pulled inside the neuron as the seizure runs.

LOCK THESE IN

- During a seizure: time it, side-lying, protect the head, oxygen and suction. No restraint, nothing in the mouth.
- Glucose first in every seizure workup. Thiamine before glucose in alcohol use disorder.
- Status epilepticus: 5 minutes. Lorazepam 0.1 mg/kg (max 4 mg), then a second-line agent even if seizing stopped.
- Phenytoin: saline only, 50 mg/min maximum (25 in elders or heart disease), filter, monitor. Level 10 to 20 mcg/mL.
- Never stop an antiseizure drug abruptly. Any rash on lamotrigine or carbamazepine: hold and call.
- Thunderclap headache: SAH until proven otherwise; no triptan. Giant cell arteritis: steroids before biopsy.

Key terms and comparisons: antiseizure drugs

Drug	Level or monitoring	Signature toxicity and teaching
Phenytoin	Total 10 to 20 mcg/mL; free 1 to 2	Nystagmus near 20, ataxia above 30; gum overgrowth (oral care); enzyme inducer; teratogenic
Carbamazepine	4 to 12 mcg/mL; sodium; CBC	Hyponatremia (SIADH), agranulocytosis; SJS linked to HLA-B*15:02; no grapefruit
Valproate	50 to 100 mcg/mL; LFTs; ammonia	Liver injury, pancreatitis, high ammonia, low platelets; neural tube defects
Levetiracetam	Not routinely monitored	Irritability, aggression, depression; reduce dose in kidney disease
Lamotrigine	Not routinely monitored	Serious rash; titrate slowly; valproate doubles its level
Topiramate	Not routinely monitored	Word-finding trouble, kidney stones (fluids), acute angle-closure glaucoma

Worked cases

CASE 4.1 · THE SEIZURE THAT WILL NOT STOP

Mrs. Lindqvist, 58, with epilepsy on levetiracetam, had her doses held since midnight for a procedure. At 1012 she starts a generalized tonic-clonic seizure. She weighs 70 kg. Worked calculation example only.

STEP 1 · STABILIZE FROM 0 TO 5 MINUTES

Side-lying, oxygen by non-rebreather, suction, monitor, two IVs, capillary glucose (it is 96).

STEP 2 · CALL IT STATUS AT 1017

Five minutes of continuous seizing is status epilepticus. Escalate with SBAR.

STEP 3 · FIRST-LINE DOSE

Lorazepam 0.1 mg/kg x 70 = 7 mg, but the maximum is 4 mg per dose. Give 4 mg IV; repeat once in 3 to 5 minutes if seizing continues.

STEP 4 · SECOND-LINE DOSE

Even if she stops: levetiracetam 60 x 70 = 4200 mg (under the 4500 mg cap), or fosphenytoin 20 x 70 = 1400 mg PE at no more than 150 mg PE/min, so at least about 9.3 minutes, with cardiac monitoring.

STEP 5 · FIND THE CAUSE

Held doses were the trigger. Make sure future NPO orders include an IV equivalent.

CASE 4.2 · A PHENYTOIN ORDER WITH TWO ERRORS

Pharmacy sends phenytoin 1 g in 100 mL of dextrose 5%, labeled to run over 10 minutes, for Mr. Bhatt, 76.

STEP 1 · CHECK THE DILUENT

Phenytoin precipitates in dextrose. It must be in normal saline.

STEP 2 · CHECK THE RATE

1000 mg over 10 minutes = 100 mg/min. The adult maximum is 50 mg/min, and 25 mg/min for older adults.

STEP 3 · COMPUTE A SAFE TIME

At 25 mg/min, 1000 mg takes at least 40 minutes.

STEP 4 · ACT

Hold, call pharmacy and the prescriber, use a filter and cardiac monitoring when it is corrected.

TRAPS PEOPLE FALL INTO

- **Putting a padded tongue blade in the mouth.** Nothing goes in the mouth during a seizure. The tongue cannot be swallowed.
- **Stopping after the benzodiazepine.** A second-line agent is given even when the shaking has stopped.
- **Getting the lumbar puncture first.** Cultures, dexamethasone and antibiotics come first. The tap never delays the drug.

Chapter 4 self-test · six items

1. Which temperature route is used under seizure precautions?

A. Tympanic or axillary

B. Rectal in every patient

C. Oral with a digital probe

D. Oral with a glass probe

A. Tympanic or axillary No oral thermometers with seizure precautions.

2. A patient on valproate is drowsy and confused with normal LFTs. What lab is checked?

A. Serum troponin
B. Serum lipase
C. Serum ammonia
D. Serum sodium

C. Serum ammonia Valproate can cause hyperammonemia even with normal liver enzymes.

3. Which statement about cluster headache is true?

A. Attacks last for 4 to 72 hours
B. Oral NSAIDs work best for an attack
C. Patients prefer to lie still in the dark
D. High-flow oxygen often stops an attack

D. High-flow oxygen often stops an attack Oxygen at 12 to 15 L/min by non-rebreather aborts most attacks.

4. A student with suspected meningococcal meningitis is admitted. When can droplet precautions stop?

A. After the first negative blood culture
B. After 24 hours of effective antibiotics
C. When the lumbar puncture is complete
D. After the fever is gone for one hour

B. After 24 hours of effective antibiotics Droplet precautions continue for 24 hours of effective therapy.

5. Which close contact needs prophylaxis after meningococcal disease?

A. A roommate who shares the dorm room
B. A visitor who sat in the lobby
C. A cashier who served the patient
D. A nurse who handed over a chart

A. A roommate who shares the dorm room Household-type contacts and those exposed to oral secretions need prophylaxis.

6. Which drug must be infused slowly with hydration to protect the kidneys?

A. IV lorazepam
B. IV dexamethasone
C. IV acyclovir
D. IV ceftriaxone

C. IV acyclovir Acyclovir can crystallize in renal tubules.

CHAPTER 5

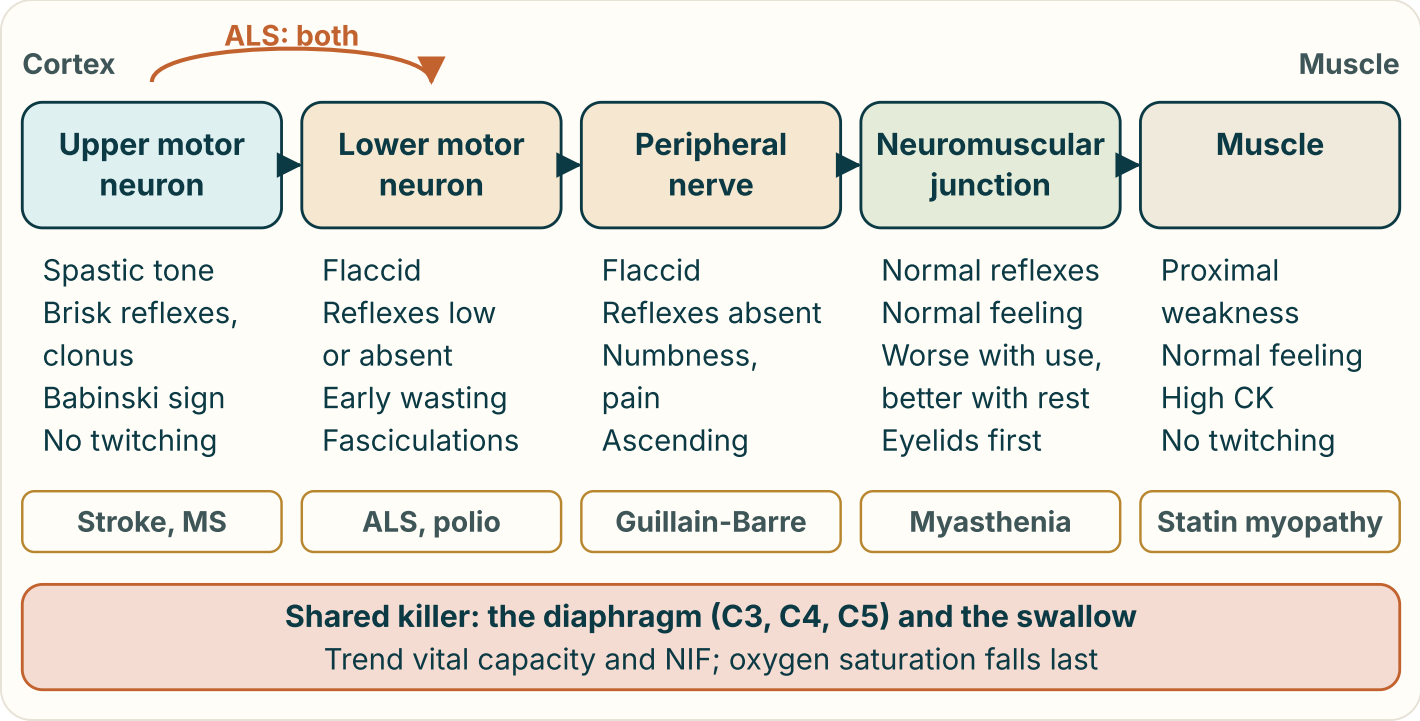
Neurologic Disorders: Degenerative and Neuromuscular Disease

Read it in full: **Chapter 5 in the textbook**. Practice it in the lab: **Localize the Failing Motor Unit, and Trend the Breath** and **Airway First, Label Second: Myasthenic, Cholinergic and Guillain-Barré**.

What to know

Localize weakness: upper motor neuron is spastic and brisk; lower motor neuron is flaccid with wasting and fasciculations; the neuromuscular junction is fatigable with normal reflexes and sensation. Every patient here can lose the diaphragm and the swallow; trend vital capacity and NIF (the 20/30/40 rule), not oxygen saturation.

Give levodopa on the home schedule and avoid dopamine blockers. Check temperature and urine before steroids for new MS weakness. In myasthenia, flag magnesium, aminoglycosides and fluoroquinolones, and support the airway before naming the crisis. Guillain-Barre gets IVIG or plasma exchange, not both and no steroids. In dementia, a sudden change is delirium until proven otherwise.



Where the relay breaks decides the findings. ALS is the one common disease that hits both the upper and lower motor neuron at once. Whatever the level, the patient dies of a weak diaphragm and a failing swallow.

LOCK THESE IN

- UMN: spastic, brisk, Babinski. LMN: flaccid, absent reflexes, wasting, fasciculations. NMJ: fatigable, normal reflexes and sensation.
- 20/30/40: VC below 20 mL/kg, NIF weaker than -30, MEP below 40 means impending failure. Oximetry is late.
- Levodopa: on the home schedule within about 30 minutes, before meals, never stopped abruptly.
- No metoclopramide, prochlorperazine, promethazine or haloperidol in Parkinson disease.
- New MS weakness: temperature and urinalysis before steroids.
- Myasthenia: airway first in any crisis; flag magnesium, aminoglycosides, fluoroquinolones, macrolides.

Key terms and comparisons: where is the lesion

Level	Tone and reflexes	Wasting and twitching	Sensation	Example
Upper motor neuron	Spastic; brisk, clonus, Babinski	Late disuse wasting; no fasciculations	Varies	Stroke, MS cord plaque
Lower motor neuron	Flaccid; reduced or absent	Early wasting; fasciculations	Intact if pure anterior horn	ALS, polio
Peripheral nerve	Low; absent, often distal first	Wasting over weeks	Numb, painful	Guillain-Barre, diabetic neuropathy
Neuromuscular junction	Normal; normal	None	Normal	Myasthenia gravis
Muscle	Normal or low; normal until severe	Proximal wasting; no fasciculations	Normal	Statin or inflammatory myopathy

Worked cases

CASE 5.1 · THE NUMBERS BEFORE THE CRASH

Mrs. Castellano, 60 kg, has generalized myasthenia and pneumonia. Levofloxacin was started last night. Her vital capacity was 1.9 L at 1000 and is 1.1 L at 1400. NIF is -22 cm H2O. Saturation is 95% on room air. Her voice has become nasal.

STEP 1 · CONVERT VC TO ML/KG

1900/60 = 31.7 mL/kg earlier; 1100/60 = 18.3 mL/kg now.

STEP 2 · APPLY 20/30/40

18.3 is below 20 mL/kg, and -22 is weaker than -30. Both say failure is near.

STEP 3 · IGNORE THE REASSURING NUMBER

95% saturation is a late, lying indicator in neuromuscular weakness.

STEP 4 · ACT

Raise the head of bed, stop oral intake, continuous monitoring, call the provider and rapid response, prepare for elective intubation.

STEP 5 · FIND THE TRIGGER

Fluoroquinolones carry a boxed warning for worsening myasthenia. Ask for a different antibiotic; expect IVIG or plasma exchange.

RULE

Airway first. Labeling myasthenic or cholinergic comes after the patient is safe.

CASE 5.2 · THE LEVODOPA SCHEDULE

Mr. Ferrante, 74, with Parkinson disease, takes carbidopa-levodopa at 0600, 1000, 1400 and 1800 at home. The unit's standard times are 0900 and 2100. Nausea is ordered as metoclopramide 10 mg IV as needed.

STEP 1 · RECONCILE THE SCHEDULE

Enter the home times and flag the drug as time critical: give within about 30 minutes of each time.

STEP 2 · TIME IT WITH MEALS

About 30 minutes before meals; protein competes for absorption.

STEP 3 · SCREEN THE ANTIEMETIC

Metoclopramide blocks central dopamine and can make him rigid within a day. Ask for ondansetron or trimethobenzamide instead.

STEP 4 · GUARD THE SWALLOW

Screen for coughing with meals, pocketing or a wet voice; sit fully upright and stay upright 30 to 60 minutes after eating.

TRAPS PEOPLE FALL INTO

- **Charting "respiratory status stable" because the saturation is 96%.** In neuromuscular weakness saturation falls last. Trend VC, NIF, cough and head lift.
- **Folding levodopa into the 0900 med pass.** It is time critical. A late dose can leave the patient rigid and unable to swallow.
- **Giving steroids for new MS weakness right away.** Rule out infection first. A pseudo-relapse from a UTI gets worse with steroids.

Chapter 5 self-test · six items

1. A patient has spastic legs, brisk reflexes and an upgoing toe. Where is the lesion?

A. Upper motor neuron
B. Neuromuscular junction
C. Peripheral nerve
D. Lower motor neuron

A. Upper motor neuron Spasticity, hyperreflexia and Babinski are upper motor neuron signs.

2. A patient with Bell palsy cannot close one eye. What is the priority?

A. Starting facial exercises right away
B. Applying ice packs to the face often
C. Restricting fluids for the next 48 hours
D. Protecting the cornea with drops and tape

D. Protecting the cornea with drops and tape An eye that cannot close will dry and ulcerate.

3. Which statement about pyridostigmine is correct?

A. Take it only at bedtime with a snack
B. Take it once a week on the same day
C. Take it 30 to 45 minutes before meals
D. Take it after meals to reduce cramps

C. Take it 30 to 45 minutes before meals Timing before meals supports chewing and swallowing.

4. A patient with Guillain-Barre has a heart rate that drops sharply during suctioning. Why?

A. An allergic reaction to the suction catheter
B. Autonomic instability with vagal stimulation
C. A normal response seen in all patients
D. Too much IVIG infused over a short time

B. Autonomic instability with vagal stimulation Autonomic swings make vagal stimuli dangerous.

5. What is the most common cause of death in Parkinson disease?

A. Aspiration pneumonia
B. A liver cirrhosis
C. A heart attack (MI)
D. Acute kidney failure

A. Aspiration pneumonia A silently failing swallow leads to aspiration.

6. Which test supports multiple sclerosis in the CSF?

A. Many neutrophils
B. Xanthochromia
C. Oligoclonal bands
D. High glucose

C. Oligoclonal bands Bands in CSF but not serum show antibody made in the CNS.

CHAPTER 6

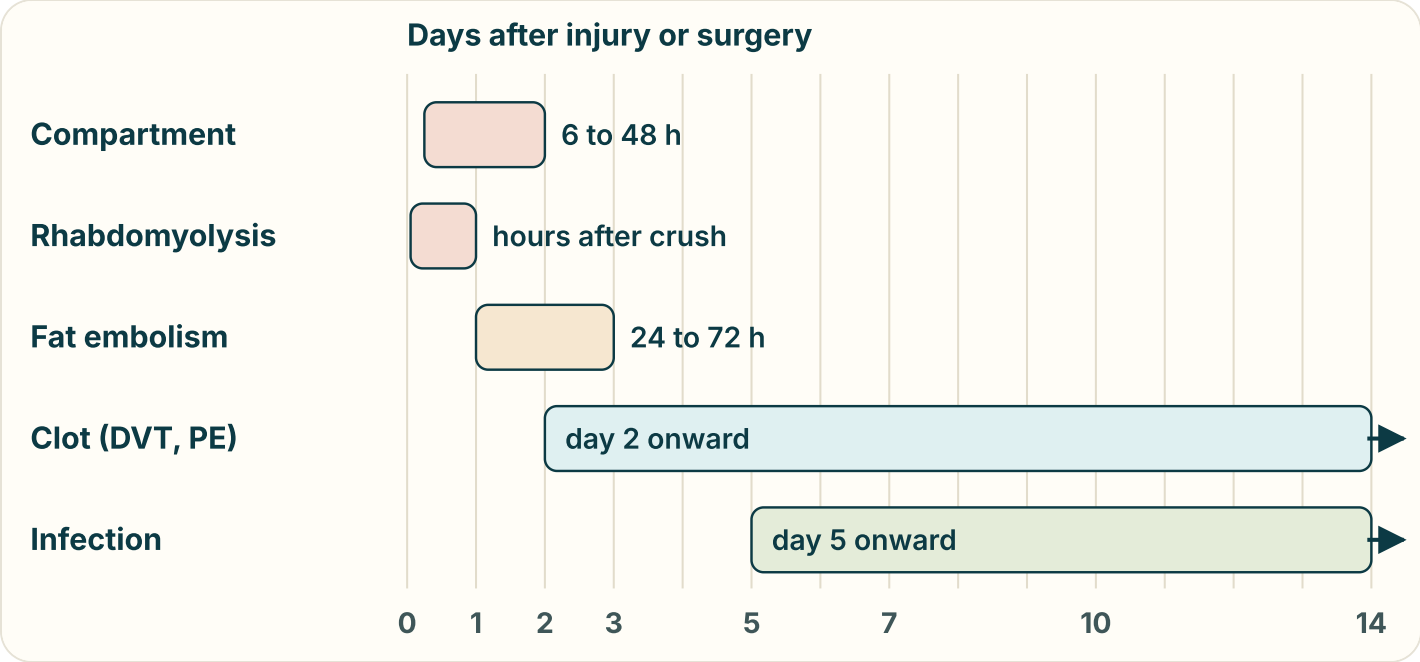
Musculoskeletal Disorders and Orthopedic Trauma

Read it in full: **Chapter 6 in the textbook**. Practice it in the lab: **The Six Ps: Early, Late and What You Chart** and **The Complication Calendar and the Call You Make**.

What to know

The six Ps protect the limb: pain out of proportion and pain on passive stretch are the earliest signs of compartment syndrome, and the pulse is lost last. Suspected compartment syndrome means loosen, limb at heart level, no ice, call the surgeon. Complications keep a calendar: compartment 6 to 48 hours, fat embolism 24 to 72 hours, VTE from day 2, infection from day 5.

Skeletal traction weights hang free and are never removed. After a posterior hip replacement avoid flexion past 90, crossing and internal rotation; after a knee replacement keep the knee straight. After amputation, prone lying prevents hip contracture. Osteoporosis has normal labs and a T-score of -2.5 or lower; alendronate is taken fasting with plain water, upright for 30 minutes.



Assess for what the calendar points at. Each complication has its window. On day 1 think compartment; on days 1 to 3 think fat embolism; from day 2 think clot; from day 5 think infection.

LOCK THESE IN

- Earliest sign of compartment syndrome: pain out of proportion and pain on passive stretch. Pulselessness is last.
- Suspected compartment syndrome: loosen, limb at heart level, remove ice, call the surgeon. Do not elevate.
- Calendar: compartment 6 to 48 h; fat embolism 24 to 72 h; VTE from day 2; infection from day 5.
- Skeletal traction weights hang free and are never removed.
- Posterior hip: no flexion past 90, no crossing, no internal rotation. Knee: no pillow under the knee.
- Amputation: tourniquet at bedside; elevate 24 h only; prone lying three or four times a day.

Key terms and comparisons: the complication calendar

Complication	Timing	Hallmark	First action
Compartment syndrome	6 to 48 h	Pain out of proportion; pain on passive stretch; tense	Release constriction, heart level, remove ice, call surgeon
Fat embolism syndrome	24 to 72 h	Hypoxemia, confusion, petechiae on chest and axillae	Oxygen, upright, rapid response, ABG
Deep vein thrombosis	Day 2 to 14 and beyond	Unilateral calf swelling, warmth, tenderness	Do not massage; notify; duplex ultrasound
Pulmonary embolism	Any time after surgery	Sudden dyspnea, pleuritic pain, tachycardia	Oxygen, upright, rapid response, CT angiography
Rhabdomyolysis	Hours after crush	Tea-colored urine, CK above about 5 x normal, high K	Isotonic fluids now; trend K, creatinine, output
Infection	Day 5 onward	Fever, rising pain, drainage, rising CRP	Culture before antibiotics; notify surgeon

Worked cases

CASE 6.1 · THE PINK FOOT THAT IS NOT FINE

Mr. Brannigan, 22, had a closed tibial fracture splinted six hours ago. Pain is 10 of 10 after two doses of IV morphine. He screams when his toes are passively extended and has numbness in the first web space. The dorsalis pedis pulse is palpable and the foot is pink. Blood pressure is 118/70; compartment pressure is measured at 48 mmHg.

STEP 1 · READ THE CUES

Pain out of proportion, pain on passive stretch and new paresthesia are the early signs of compartment syndrome. A pulse is expected early.

STEP 2 · COMPUTE THE DELTA PRESSURE

Diastolic 70 minus compartment 48 = 22 mmHg. Below 30 means fasciotomy is indicated; the absolute 48 is also above about 30.

STEP 3 · ACT IN ORDER

Loosen the splint wrap, place the leg at heart level, remove ice, call the surgeon now. Keep him NPO for possible fasciotomy.

STEP 4 · PLAN FOR THE MUSCLE

Watch CK, potassium, creatinine and urine color for rhabdomyolysis.

RULE

Do not elevate above the heart and do not medicate and recheck in an hour.

CASE 6.2 · TWO DAYS AFTER A FEMUR FRACTURE

Ms. Iwu, 26, had femoral fixation two days ago. She is restless and confused, respiratory rate 32, saturation 86% on room air, with fine petechiae on her chest and in her axillae.

STEP 1 · CHECK THE CALENDAR

24 to 72 hours after a long-bone fracture fits fat embolism syndrome.

STEP 2 · MATCH THE TRIAD

Hypoxemia, neurologic change and petechiae. The rash separates it from pulmonary embolism.

STEP 3 · ACT

Oxygen, sit upright, rapid response, ABG, prepare for possible ventilation. There is no specific antidote.

PREVENTION

Early immobilization and fixation within about 24 hours lower the risk.

TRAPS PEOPLE FALL INTO

- **Waiting for a lost pulse before calling.** Pulselessness is the latest sign. Pain on passive stretch is early.

- **Elevating a limb with suspected compartment syndrome.** Elevation lowers inflow to an ischemic compartment. Heart level only.
- **Lifting skeletal traction weights to boost a patient up in bed.** The pull is continuous. Reposition so the weights hang free.

Chapter 6 self-test · six items

1. A new plaster cast is in place. What should the nurse do in the first 24 to 48 hours?

A. Cover the cast with plastic to keep it clean

B. Press with fingertips to check the drying

C. Elevate the limb and handle the cast with palms

D. Hang the limb down to reduce pain

C. Elevate the limb and handle the cast with palms Elevate with ice; fingertips leave pressure dents.

2. What is the correct crutch fit?

A. Pads 2 to 3 finger widths below the armpit

B. Handgrips set at the height of the hip

C. Pads pressed firmly up into the armpit

D. Elbows held fully straight on the grips

A. Pads 2 to 3 finger widths below the armpit Weight goes on the hands; pressure in the axilla injures the nerve.

3. Two days after hip surgery, a patient has sudden chest pain, dyspnea and a heart rate of 124. What is first?

A. Ask the assistant to recheck vitals
B. Oxygen, sit upright and call rapid response
C. Massage the calf to check for a clot
D. Give the next scheduled pain medicine

B. Oxygen, sit upright and call rapid response Suspect pulmonary embolism. Never massage a suspected DVT.

4. What lab pattern fits Paget disease of bone?

A. Low calcium, low phosphate, high ALP
B. High calcium, low phosphate, high PTH
C. Normal labs with a T-score of -3.0
D. Very high ALP with normal calcium

D. Very high ALP with normal calcium Paget disease is a focal high-turnover state with markedly high ALP.

5. Which sign suggests fat embolism rather than pulmonary embolism?

A. Petechiae on chest and axillae
B. A fast heart rate over 110
C. Sharp pleuritic chest pain
D. Sudden shortness of breath

A. Petechiae on chest and axillae The petechial rash is close to diagnostic of fat embolism.

6. Which teaching belongs after lumbar fusion?

A. Lift up to 30 pounds right away
B. Sleep on a soft recliner
C. Twist gently to loosen the back
D. No bending, lifting or twisting

D. No bending, lifting or twisting The no BLT rule protects the fusion.

CHAPTER 7

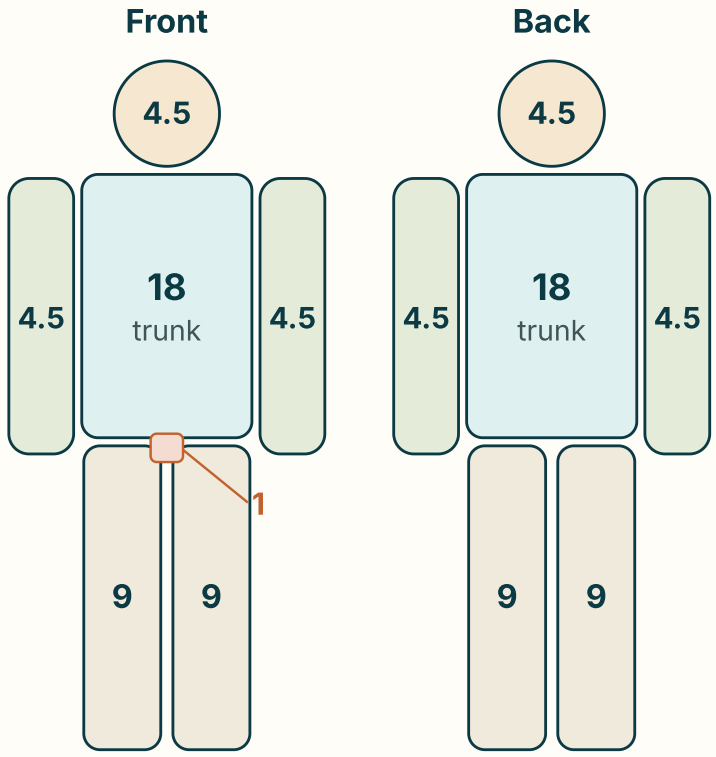
Integumentary Disorders and Burns

Read it in full: **Chapter 7 in the textbook**. Practice it in the lab: **The First 24 Hours: Map It, Calculate It, Titrate It** and **Stage It, Score It, Offload It**.

What to know

Necrotizing fasciitis is pain out of proportion and goes to the operating room; SJS and TEN mean stop the drug. Stage a pressure injury only when the base is visible, never reverse-stage, and float the heels. Check the ABI before compression; full compression needs an ABI above 0.8.

Burns: count partial and full thickness with the Rule of Nines, protect the airway before edema closes it, and give Parkland (4 mL x kg x %TBSA) with half in 8 hours from the time of injury, titrated to urine output of 0.5 mL/kg/h. Pulse oximetry misses carbon monoxide. After 72 hours the threats are infection and hypermetabolism; position against contracture.



Totals
Head 9, each arm 9, trunk 18 + 18, each leg 18, perineum 1

Palm rule
Palm with fingers is about 1%

Small child
Head about 18%, each leg about 13.5%

Parkland
4 mL x kg x %TBSA lactated Ringer's; half in 8 h from injury

Count only partial and full thickness. Each region is a multiple of 9 split front and back. Sunburn (superficial) is never counted, and the Parkland clock starts at the time of injury.

LOCK THESE IN

- Necrotizing fasciitis: pain out of proportion; surgery now, imaging never delays it.
- SJS or TEN: mucosa plus positive Nikolsky; stop the drug first.
- Stage only what you can see: slough or eschar means unstageable. Never reverse-stage.
- Braden 6 to 23; 18 or below at risk; 9 or below severe. Float heels; 30-degree tilt.
- ABI before compression: full compression only above 0.8. Never compress an arterial ulcer.
- Parkland 4 mL x kg x %TBSA; half in first 8 h from injury. Titrate to 0.5 mL/kg/h urine.

Key terms and comparisons: burn depth

Depth	Tissue	Looks and feels	Heals
Superficial	Epidermis	Dry, red, blanches, painful; no blisters	3 to 7 days; not counted in TBSA
Superficial partial	Epidermis and papillary dermis	Moist, blisters, brisk blanching, very painful	7 to 21 days, little scar
Deep partial	Into reticular dermis	Mottled red and waxy white, slow blanching, pressure painful	Over 21 days; usually grafted
Full thickness	Whole dermis	Dry leathery eschar, no blanching, insensate center	Needs grafting
Fourth degree	Fat, fascia, muscle, bone	Charred, deep structures exposed	Debridement, flaps, often amputation

Worked cases

CASE 7.1 · PARKLAND FROM THE TIME OF INJURY

Mr. Abernethy, 80 kg, has 45% TBSA partial and full thickness flame burns from 20:00. He arrives at 22:00. Worked calculation example only.

STEP 1 · TOTAL VOLUME

4 x 80 x 45 = 14,400 mL lactated Ringer's in 24 hours.

STEP 2 · FIRST HALF

7,200 mL is due within 8 hours of the injury, by 04:00.

STEP 3 · ADJUST FOR LOST TIME

Two hours are gone, so 7,200 mL runs over the remaining 6 hours: 7,200 / 6 = 1,200 mL/h.

STEP 4 · SECOND HALF

7,200 mL over the next 16 hours (04:00 to 20:00): 7,200 / 16 = 450 mL/h.

STEP 5 · COMPARE THE ABA START

2 x 80 x 45 = 7,200 mL total; 3,600 mL in 8 hours = 450 mL/h, then 225 mL/h.

STEP 6 · TITRATE

Target urine 0.5 x 80 = 40 mL/h. Low output with tachycardia: increase. Output far above target with swelling: back off.

CASE 7.2 · COUNTING THE BURN

Ms. Delmar, 70 kg, has partial thickness burns of the whole right arm, the front of her trunk and the front of her right leg, plus sunburn on her face. She was burned at 09:00 and arrives at 10:30.

STEP 1 · APPLY THE RULE OF NINES

Whole arm 9 + front trunk 18 + front of one leg 9 = 36%. Sunburn is superficial and not counted.

STEP 2 · TOTAL PARKLAND VOLUME

4 x 70 x 36 = 10,080 mL in 24 hours; first half 5,040 mL by 17:00.

STEP 3 · RATE NOW

1.5 hours have passed, so 5,040 mL over 6.5 hours = about 775 mL/h. (Worked calculation example only.)

STEP 4 · TARGET URINE

0.5 x 70 = 35 mL/h.

RULE

The formula is a start. Hourly urine output decides the rate.

TRAPS PEOPLE FALL INTO

- **Withholding analgesia because "third-degree burns do not hurt."** The center is numb, but the partial-thickness rim hurts badly.
- **Starting the Parkland clock at arrival.** The clock starts at the time of injury.
- **Putting ice on a burn.** Ice deepens the zone of stasis. Cool small burns briefly with room-temperature water only.

Chapter 7 self-test · six items

1. How long does the inflammatory phase of wound healing usually last?

A. About 1 to 2 hours
B. About 0 to 4 days
C. About 3 weeks to 2 years
D. About 4 to 21 days

B. About 0 to 4 days Redness and warmth in the first days are normal.

2. What Braden score signals severe risk?

A. 9 or below
B. 15 to 18
C. 19 to 23
D. 13 to 14

A. 9 or below Lower is worse; 9 or below is severe risk.

3. A patient has a burn of the whole left arm and the entire back. What is the TBSA?

A. 45%
B. 36%
C. 18%
D. 27%

D. 27% Arm 9 plus back 18 equals 27.

4. In the acute phase after a large burn, which electrolyte change is expected?

A. High potassium from cell injury
B. Low calcium from the dressings
C. Low potassium during diuresis
D. High sodium from fluid gain

C. Low potassium during diuresis After 48 to 72 hours fluid returns and potassium falls.

5. Which topical burn agent causes metabolic acidosis?

A. Bacitracin
B. Silver sulfadiazine
C. Silver nitrate
D. Mafenide acetate

D. Mafenide acetate Mafenide inhibits carbonic anhydrase; watch ABGs.

6. Which drug is the most important first step in SJS or TEN?

A. Giving a topical steroid cream
B. Starting high-dose antibiotics
C. Stopping the suspected drug
D. Giving IM epinephrine

C. Stopping the suspected drug Every hour of continued exposure raises mortality.

CHAPTER 8

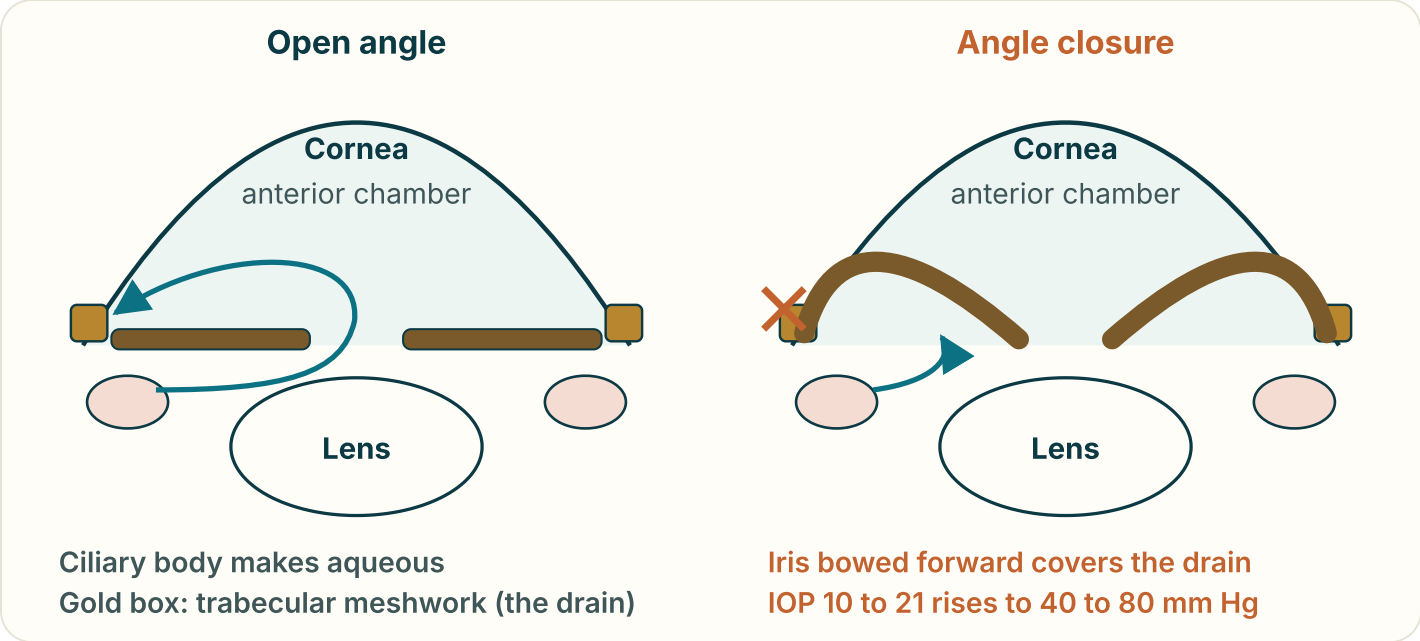
Sensory Disorders: Eye and Ear

Read it in full: **Chapter 8 in the textbook**. Practice it in the lab: **The Angle Bench: What Slams It Shut and What Opens It** and **The Bedside Sensory Bench: Acuity, Weber and Rinne**.

What to know

Acuity is the vital sign of the eye, except in a chemical splash, where irrigation comes first. Acute angle closure is a painful red eye with halos, vomiting, a fixed mid-dilated pupil and a hard globe: supine, lights on, hold anticholinergics, call now. A curtain is detachment, an instant blackout is artery occlusion, and headache with vision loss over 50 is giant cell arteritis.

Teach punctal occlusion, one drop per dose and 5 minutes between drops. In the ear, Weber goes toward a conductive loss and away from a sensorineural loss; sudden sensorineural loss needs steroids within 72 hours. Vertigo is sorted by duration: BPPV seconds, Meniere hours with hearing change, neuritis days without.



Production never stops; drainage can. In open-angle glaucoma the meshwork clogs slowly over years. In angle closure the iris slams the drain shut in hours, which is why anticholinergics and darkness are dangerous in a narrow-angle eye.

LOCK THESE IN

- Acuity is the vital sign of the eye. Chemical splash: irrigate first, then everything else.
- Angle closure: painful red eye, halos, vomiting, fixed mid-dilated pupil, hard globe. Supine, lights on, hold anticholinergics, call now.
- Punctal occlusion 1 to 2 minutes after drops; one drop is a dose; 5 minutes between drops; drops before ointment.
- Curtain = detachment; instant blackout = artery occlusion (stroke pathway); over 50 with headache = GCA, steroids first.
- Amsler grid daily for macular degeneration; AREDS2 has no beta-carotene.
- Pain plus worse vision plus discharge after eye surgery: endophthalmitis, today.

Key terms and comparisons: eye drops by mechanism

Class (example)	Mechanism	Watch and teach
Prostaglandin (latanoprost)	More uveoscleral outflow	Bedtime; iris darkening, longer lashes
Beta blocker (timolol)	Less aqueous made	Bradycardia, bronchospasm; check apical pulse; punctal occlusion
Alpha-2 agonist (brimonidine)	Less made, more outflow	Dry mouth, fatigue; not for infants or with MAOIs
Carbonic anhydrase inhibitor (dorzolamide; acetazolamide oral)	Less aqueous made	Sulfa allergy; oral form: potassium, acidosis, paresthesia
Miotic (pilocarpine)	Constricts pupil, opens angle	Brow ache, dim night vision; no night driving

Worked cases

CASE 8.1 · THE VOMITING PATIENT WITH A RED EYE

Mrs. Halvorsen, 68, is on the medical floor for gastroenteritis. Four hours ago she received promethazine. She now has severe right eye pain, headache, halos and vomiting. The right eye is red, the cornea hazy, the pupil mid-dilated and nonreactive.

STEP 1 · NAME IT

Acute angle-closure glaucoma. The anticholinergic drug mid-dilated the pupil and blocked the angle.

STEP 2 · CALL

Ophthalmology now; this is a same-hour emergency, not a migraine.

STEP 3 · POSITION AND ROOM

Supine, quiet room, lights on. Darkness would dilate the pupil further.

STEP 4 · DRUGS

Hold all anticholinergics; give ordered analgesia and a non-anticholinergic antiemetic, since vomiting raises pressure. NPO for possible IV mannitol or laser.

STEP 5 · EXPECT

Pressure-lowering drops (beta blocker, alpha-2 agonist, carbonic anhydrase inhibitor), mannitol, then pilocarpine once pressure starts to fall; laser iridotomy, both eyes.

CASE 8.2 · DRAIN CLEANER IN THE EYES

Mr. Kovalenko splashed drain cleaner into both eyes. He is in the department with his eyes clamped shut. Ophthalmology is five minutes away.

STEP 1 · IRRIGATE NOW

Before acuity, before history: normal saline or lactated Ringer's, lids held open, contacts out, fornices swept, at least 15 to 30 minutes, inner canthus outward.

STEP 2 · CHECK PH AFTER

Litmus in the lower fornix, target 7.0 to 7.4. Keep irrigating and recheck every 20 to 30 minutes if abnormal.

STEP 3 · NEVER NEUTRALIZE

Adding acid to a base causes heat and a thermal burn.

STEP 4 · READ THE WHITE EYE

Alkali penetrates deeply. A white, quiet eye afterward may mean limbal ischemia, not healing.

TRAPS PEOPLE FALL INTO

- **Dimming the lights for a patient with angle closure.** Darkness dilates the pupil and worsens the block. Leave the lights on.
- **Checking acuity before irrigating a chemical splash.** Irrigation comes first in a chemical injury.
- **Patching a contact lens wearer's painful red eye.** A patch incubates Pseudomonas. Shield, do not patch.

Chapter 8 self-test · six items

1. What does a visual acuity of 20/60 mean?

A. Is legally blind in that eye for driving
B. Has about 60 percent of normal vision left
C. Sees at 60 feet what a normal eye sees at 20
D. Sees at 20 feet what a normal eye sees at 60

D. Sees at 20 feet what a normal eye sees at 60 The bottom number is the distance a normal eye could read the line.

2. Which drug class can trigger acute angle closure?

A. Beta blocker eye drops such as timolol
B. Anticholinergics such as diphenhydramine
C. Prostaglandin drops such as latanoprost
D. Miotic drops such as pilocarpine

B. Anticholinergics such as diphenhydramine Anticholinergics mid-dilate the pupil and crowd the angle.

3. After cataract surgery, which instruction is correct?

A. Wear the eye shield at night
B. Bend at the waist to tie shoes
C. Rub the eye if it itches
D. Lift heavy groceries the next day

A. Wear the eye shield at night Protect the eye and avoid pressure-raising activity.

4. A patient on gentamicin reports ringing ears and unsteadiness. What does this suggest?

A. An ear infection needing drops
B. Low blood sugar from the drug
C. Ototoxicity from the aminoglycoside
D. A normal reaction that will pass

C. Ototoxicity from the aminoglycoside Report early; aminoglycoside ear damage is often permanent.

5. Which statement fits Meniere disease?

A. Spinning only along with a sudden severe headache
B. Attacks last hours with fullness and hearing loss
C. Spinning lasts seconds when rolling over in bed
D. Days of steady vertigo with normal hearing

B. Attacks last hours with fullness and hearing loss Endolymphatic hydrops causes hours-long attacks with hearing change.

6. How should ear drops be given to an adult?

A. Warm the bottle; pull the pinna up and back
B. Use the drops cold to reduce the swelling
C. Drop the liquid directly onto the eardrum
D. Pull the pinna down and back before dropping

A. Warm the bottle; pull the pinna up and back Warm drops avoid vertigo; adults need the pinna up and back.

CHAPTER 9

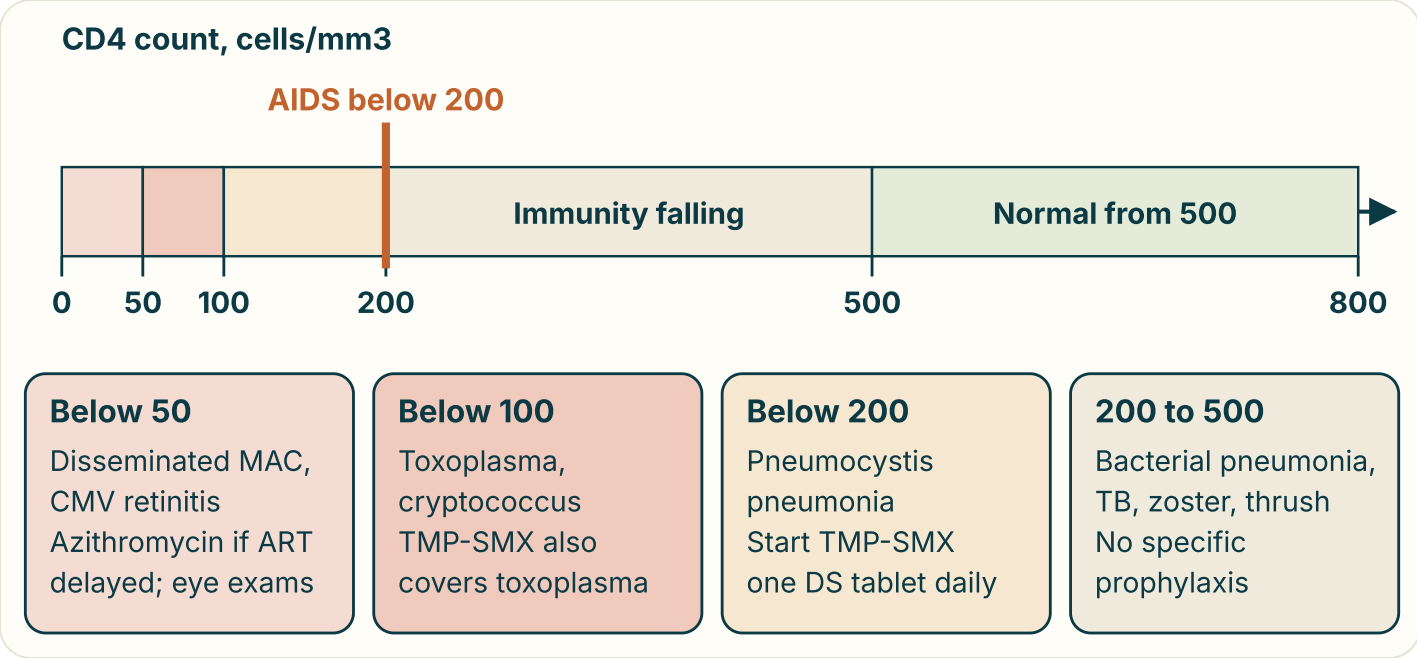
Immune and Rheumatologic Disorders

Read it in full: **Chapter 9 in the textbook**. Practice it in the lab: **The First Sixty Seconds: Hypersensitivity and Anaphylaxis** and **Two Numbers Run HIV Care: CD4 and Viral Load**.

What to know

Anaphylaxis gets epinephrine 0.3 to 0.5 mg IM in the anterolateral thigh first, the patient flat with legs raised, fluids, and observation for a biphasic reaction. A CD4 below 200 is AIDS and starts TMP-SMX; ART starts at any count. HLA-B*5701 comes before abacavir.

In lupus, a flare raises anti-dsDNA and lowers C3 and C4; fever on immunosuppression is infection until proven otherwise. Scleroderma renal crisis gets an ACE inhibitor. RA is symmetric with long morning stiffness; methotrexate is once weekly. A hot joint with fever is septic until tapped. Screen for TB and hepatitis before biologics.



The count predicts the infection. Below 200 is AIDS and starts TMP-SMX. Antiretroviral therapy starts at any count; the viral load, not the CD4, shows whether it is working.

LOCK THESE IN

- Anaphylaxis: epinephrine 0.3 to 0.5 mg IM anterolateral thigh first; repeat every 5 to 15 min.
- Supine with legs up, oxygen, 1 to 2 L fluid; glucagon if on a beta blocker; watch 4 to 6 h.
- AIDS: CD4 below 200 or an AIDS-defining illness. TMP-SMX below 200.
- HLA-B*5701 before abacavir; never rechallenge.
- Lupus flare: anti-dsDNA up, C3 and C4 down. Urinalysis catches nephritis.
- Scleroderma renal crisis: ACE inhibitor, avoid high-dose steroids.

Key terms and comparisons: hypersensitivity types

Type	Mechanism	Onset	Examples
I immediate	IgE on mast cells	Seconds to 30 min	Anaphylaxis, food and sting allergy, atopic asthma
II cytotoxic	IgG or IgM against cell surfaces	Minutes to hours	ABO transfusion reaction, ITP, HIT
III immune complex	Complexes deposit; complement consumed	Hours to weeks	Serum sickness, lupus nephritis
IV delayed	Sensitized T cells	24 to 72 h or more	TB skin test, contact dermatitis, rejection, SJS

Worked cases

CASE 9.1 · THE SECOND DOSE

Mr. Iyer, 70 kg, is 8 minutes into his second dose of IV cefazolin. He reports throat tightness, has stridor and a pressure of 82/44. He takes metoprolol.

STEP 1 · RECOGNIZE

Skin or mucosa plus airway plus low pressure after a likely allergen: anaphylaxis.

STEP 2 · STOP AND GIVE THE DRUG

Stop the infusion. Epinephrine 0.3 to 0.5 mg of 1 mg/mL IM into the anterolateral thigh now.

STEP 3 · SUPPORT

Call for help, high-flow oxygen, supine with legs up (unless breathing worsens), 1 to 2 L crystalloid bolus.

STEP 4 · IF REFRACTORY

Still hypotensive after repeat doses on a beta blocker: expect glucagon 1 to 5 mg IV over 5 minutes; have suction ready for vomiting.

STEP 5 · THEN ADJUNCTS

Diphenhydramine, famotidine, albuterol, methylprednisolone; observe 4 to 6 hours or more for a biphasic reaction.

CASE 9.2 · READING THE CD4

Ms. Calloway is newly diagnosed with HIV. CD4 is 165 cells/mm3; viral load 82,000 copies/mL. She asks when to start treatment.

STEP 1 · STAGE

A CD4 below 200 meets the definition of AIDS, and that label stays even if the count recovers.

STEP 2 · PROPHYLAX

Below 200: TMP-SMX one double-strength tablet daily for Pneumocystis.

STEP 3 · TREAT

ART as soon as possible, ideally the same day, at any CD4 count.

STEP 4 · TEACH

Near-perfect adherence; separate integrase inhibitors from antacids; undetectable equals untransmittable.

STEP 5 · WATCH

Weeks after starting, new fever or swelling may be IRIS, not failure.

TRAPS PEOPLE FALL INTO

- **Giving diphenhydramine first for anaphylaxis.** Antihistamines do not open the airway or raise pressure. Epinephrine IM first.
- **Sitting a hypotensive anaphylactic patient upright.** Sudden upright posture can empty the heart. Supine with legs raised.
- **Charting vancomycin flushing as an allergy.** It is a rate reaction. Slow the infusion.

Chapter 9 self-test · six items

1. Which patient needs an epinephrine autoinjector at discharge?

A. One with past anaphylaxis to peanuts

B. One with nausea after taking codeine

C. One with seasonal hay fever symptoms only

D. One with a rash from touching poison ivy

A. One with past anaphylaxis to peanuts True anaphylaxis needs two autoinjectors and teaching.

2. A patient with HIV has a CD4 of 40. Which risk is most specific to this level?

A. Oral herpes simplex outbreaks
B. Pneumococcal pneumonia only
C. Disseminated MAC and CMV retinitis
D. Seasonal influenza and the common cold

C. Disseminated MAC and CMV retinitis Below 50, MAC and CMV become likely.

3. A lupus patient is started on hydroxychloroquine. What screening is needed?

A. A yearly bone marrow biopsy
B. A baseline hearing test
C. A monthly chest X-ray
D. A baseline eye examination

D. A baseline eye examination Retinal toxicity is dose and duration dependent.

4. Which antibody points to drug-induced lupus?

A. Anticentromere
B. Anti-histone
C. Anti-Smith
D. Anti-CCP

B. Anti-histone Hydralazine, procainamide and isoniazid can cause it.

5. A patient on allopurinol is started on azathioprine. What is the concern?

A. Gout flares caused by the azathioprine
B. No concern, since they work well together
C. Low uric acid that causes kidney stones
D. Severe marrow toxicity unless the dose is cut

D. Severe marrow toxicity unless the dose is cut Allopurinol blocks azathioprine breakdown.

6. A patient on tocilizumab feels unwell but has a normal temperature and CRP. What should the nurse do?

A. Give the next dose early to treat the flare
B. Assess fully, since the drug hides fever and CRP
C. Hold all assessment until a fever appears
D. Reassure, since normal labs rule out infection

B. Assess fully, since the drug hides fever and CRP IL-6 inhibitors suppress fever and CRP.

CHAPTER 10

Infectious Disease and Antimicrobial Stewardship

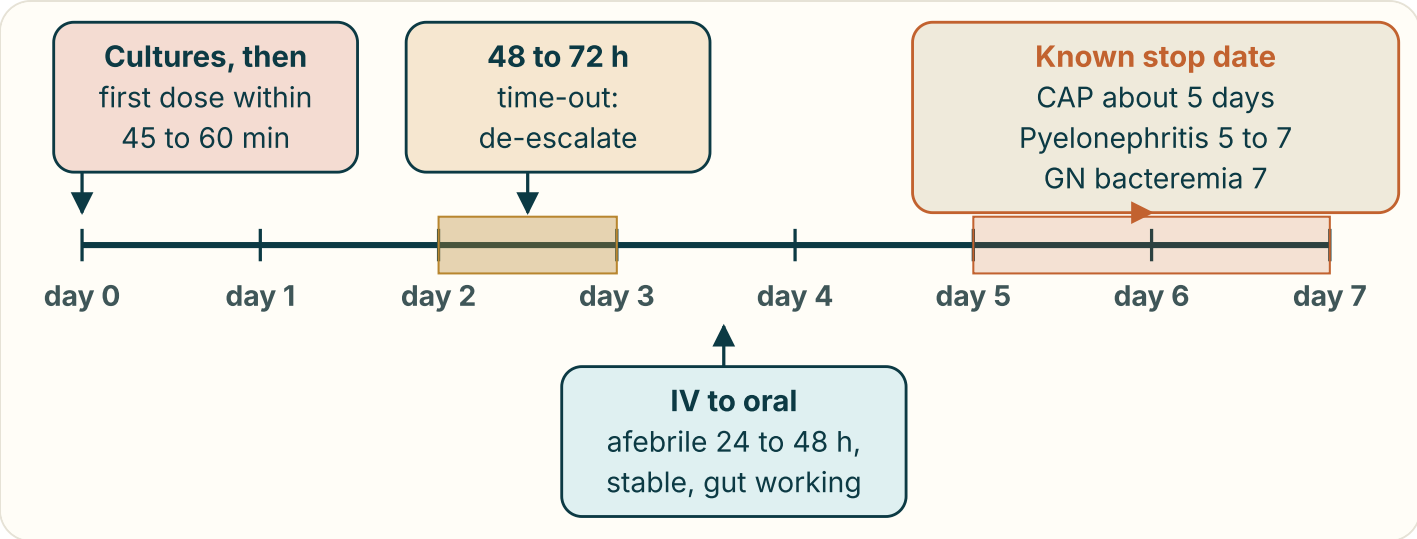
Read it in full: **Chapter 10 in the textbook**. Practice it in the lab: **The Infection Workup Bench** and **The Mechanism Names the Monitoring**.

What to know

Build the picture before the first dose: two culture sets from two sites, the right specimen, and markers you can read. Neutropenic fever needs antibiotics within an hour. Do not treat asymptomatic bacteriuria. Source control beats drug choice.

The mechanism names the monitoring: vancomycin creatinine and rate, daptomycin CK (never pneumonia), linezolid CBC and serotonin syndrome, aminoglycosides kidney and hearing. C.

difficile needs soap and water and bleach. Airborne precautions are for TB, measles, varicella and disseminated zoster. RIPE therapy brings orange fluids, B6 with isoniazid and vision checks with ethambutol.



Narrowest drug, shortest time. Every step on the line is a bedside nursing prompt: cultures first, dose on time, ask for the time-out, ask for the oral switch, and know the stop date.

LOCK THESE IN

- Two sets of blood cultures, two sites, before antibiotics; never delay the dose past 45 to 60 min in sepsis.
- Neutropenic fever: cultures and an antipseudomonal beta-lactam within 60 minutes.
- Do not treat asymptomatic bacteriuria (except pregnancy and before urologic procedures).
- Vancomycin no faster than 1 g/h; flushing is a rate reaction, not an allergy. Daptomycin never for pneumonia.
- Linezolid: weekly CBC; serotonin syndrome with SSRIs. Aminoglycosides: creatinine and hearing.
- C. difficile: soap and water, bleach, contact precautions; diarrhea stopping with a distended belly is toxic megacolon.

Key terms and comparisons: the mechanism names the monitoring

Class (example)	Mechanism	Monitor and teach
Beta-lactams (pip-tazo, cefepime)	Cell wall	Give on time; cefepime neurotoxicity in renal failure; allergy history
Glycopeptide (vancomycin)	Cell wall precursors	AUC or trough, creatinine; no faster than 1 g/h
Lipopeptide (daptomycin)	Membrane	Weekly CK; never for pneumonia
Oxazolidinone (linezolid)	50S ribosome	Weekly CBC; serotonin syndrome with SSRIs
Aminoglycoside (gentamicin)	30S ribosome	Levels, creatinine, hearing and balance
Fluoroquinolone (levofloxacin)	DNA gyrase	Tendons, QT, neuropathy, C. diff; separate from cations
Macrolide (azithromycin, clarithromycin)	50S ribosome	QT; clarithromycin and erythromycin inhibit CYP3A4
Sulfonamide (TMP-SMX)	Folate synthesis	Potassium, creatinine, CBC; warfarin interaction
Nitroimidazole (metronidazole)	DNA damage	No alcohol during and 3 days after

Worked cases

CASE 10.1 · IS THIS NEUTROPENIC FEVER

Mr. Pham, on chemotherapy, has an oral temperature of 38.4 C. WBC 2,400/mm3 with 15% segs and 5% bands. He looks well and his chest film is clear.

STEP 1 · COMPUTE THE ANC

2,400 x (15 + 5)/100 = 480 cells/mm3, below 500: severe neutropenia.

STEP 2 · APPLY THE RULE

A single 38.3 C or higher with ANC below 500 is neutropenic fever, an emergency even if he looks well.

STEP 3 · ACT

Two sets of blood cultures, then cefepime, piperacillin-tazobactam or meropenem within 60 minutes. Do not wait for a source.

STEP 4 · PROTECT

No rectal temperatures, suppositories or enemas; strict hand hygiene.

CASE 10.2 · THE ANTIBIOTIC TIME-OUT

Mrs. Ibarra has been on vancomycin plus piperacillin-tazobactam for pyelonephritis for 60 hours. Cultures grew E. coli sensitive to ceftriaxone. She has been afebrile 36 hours, is eating and stable.

STEP 1 · DE-ESCALATE

Prompt the team: narrow to the targeted agent and stop vancomycin. Vancomycin plus pip-tazo raises kidney injury risk.

STEP 2 · SWITCH THE ROUTE

Afebrile 24 to 48 hours, stable, working gut: ask about an oral agent.

STEP 3 · KNOW THE STOP DATE

Uncomplicated pyelonephritis usually runs 5 to 7 days.

RULE

Narrowest drug, shortest time, fewest devices.

TRAPS PEOPLE FALL INTO

- **Treating a positive urine culture in a confused older adult without symptoms.** Look for the real cause: dehydration, a new drug, hypoxia, pain, constipation.
- **Swabbing slough for a wound culture.** Swabs of surface slough grow colonizers. Culture cleansed viable tissue or pus.
- **Using alcohol rub after a C. difficile room.** Spores need soap, water and friction.

Chapter 10 self-test · six items

1. Which urine specimen is acceptable for culture?

A. From a bedpan that sat for about 2 hours
B. From the port of a freshly changed catheter
C. From the tubing that connects to the bag
D. From the drainage bag spout at the bottom

B. From the port of a freshly changed catheter Never culture urine from the bag.

2. A patient on cefepime with rising creatinine becomes confused. What is likely?

A. Cefepime neurotoxicity
B. Expected recovery now
C. A new stroke in all cases
D. Alcohol withdrawal state

A. Cefepime neurotoxicity Beta-lactams accumulate in kidney failure and cause encephalopathy.

3. Which statement about oral vancomycin is true?

A. It is absorbed very well into the bloodstream
B. It is the drug of choice for any pneumonia
C. It treats MRSA bacteremia well when given by mouth
D. It treats C. difficile because it stays in the gut

D. It treats C. difficile because it stays in the gut Poor absorption keeps it in the colon.

4. A patient needs a fluoroquinolone and takes calcium. How should they be spaced?

A. Take both together with a full meal
B. Take the calcium 30 minutes after the quinolone
C. Quinolone 2 h before or 6 h after the calcium
D. No spacing is needed, since calcium is safe

C. Quinolone 2 h before or 6 h after the calcium Cations chelate fluoroquinolones.

5. Which precaution is needed for disseminated zoster?

A. Droplet precautions only
B. Contact precautions only
C. Standard precautions only
D. Airborne plus contact

D. Airborne plus contact Disseminated zoster needs airborne and contact precautions.

6. A TB skin test in a healthcare worker shows 12 mm of induration. How is it read?

A. Negative, since the cutoff is 15 mm
B. Positive, since the cutoff is 10 mm
C. Invalid until read at 7 days
D. Positive only with redness present

B. Positive, since the cutoff is 10 mm Healthcare workers use the 10 mm cutoff.

CHAPTER 11

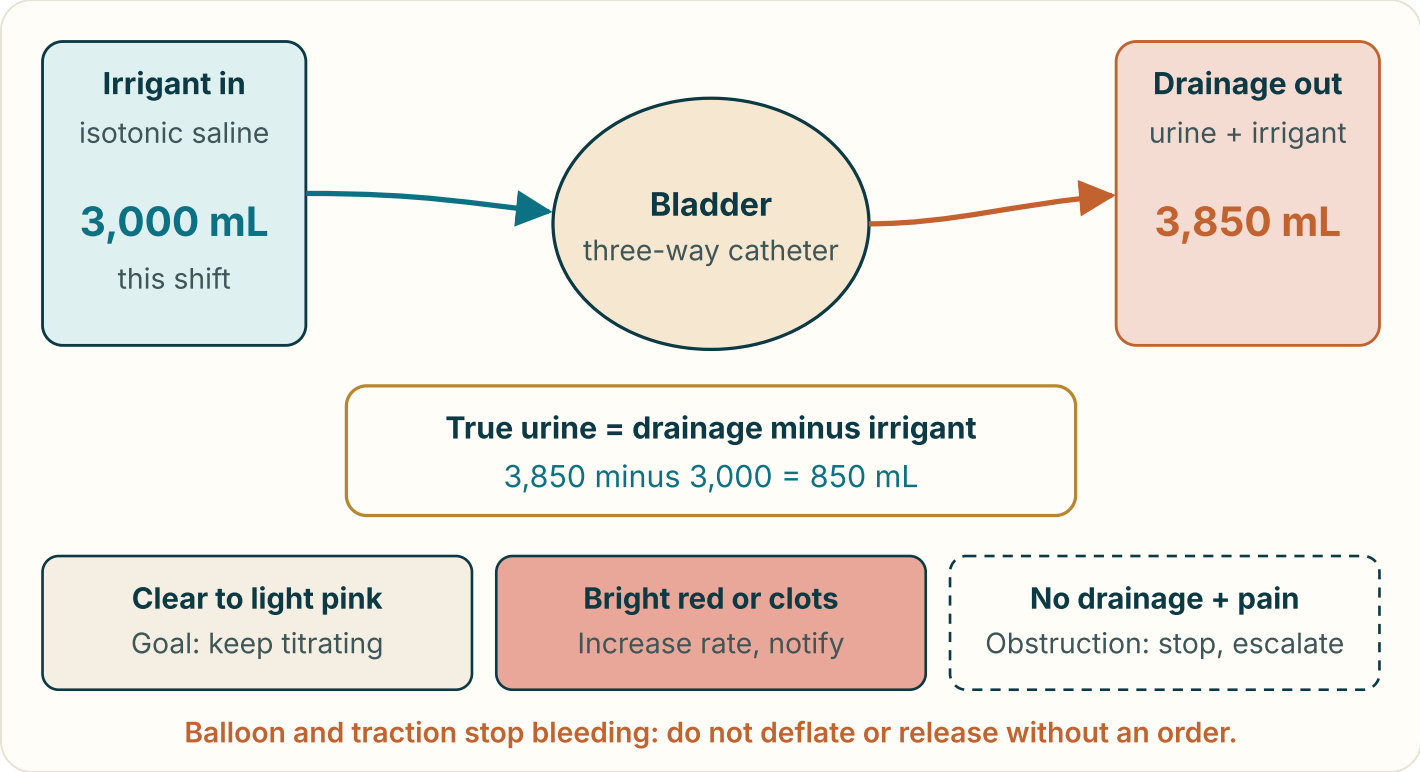
Reproductive and Sexual Health Disorders

Read it in full: **Chapter 11 in the textbook**. Practice it in the lab: **The Six-Hour Clock and the Irrigation Bench** and **The STI Decision Bench**.

What to know

Take a sexual history with the five Ps, in private, in plain words. Scan the bladder, check beta-hCG, and double PSA on finasteride. After TURP, true urine is drainage minus irrigant, and confusion with bradycardia and hypertension is TUR syndrome. Torsion has a six-hour window; escalate before imaging.

Postmenopausal bleeding is cancer until biopsy. Estrogen with a uterus needs a progestin. After mastectomy with node dissection, no cuff or needle on that arm. Brachytherapy needs time, distance and shielding. Benzathine penicillin is IM only; PID is treated empirically. No nitrates within 24 to 48 hours of a PDE5 inhibitor.



Subtract the irrigant, then read the color. Charting all drainage as urine hides oliguria. Light pink to clear is the goal; red with clots or no flow at all needs action now.

LOCK THESE IN

- Five Ps; private, permission, plain words, chaperone.
- Beta-hCG before CT, fluoroquinolones or methotrexate in anyone who could be pregnant.
- True urine on CBI = total drainage minus irrigant. Bright red or clots: increase rate, notify.
- TUR syndrome: confusion, bradycardia with hypertension, visual change, low sodium.
- Torsion: 6-hour window; escalate first; no waiting for imaging.
- No nitrate within 24 h of sildenafil or vardenafil, 48 h of tadalafil.

Key terms and comparisons: torsion versus epididymitis

Feature	Testicular torsion	Epididymitis
Onset	Sudden, often wakes from sleep	Over days
Associated	Nausea, vomiting	Dysuria, pyuria, often fever
Testis position	High-riding, horizontal	Normal
Cremasteric reflex	Absent on affected side	Present
Elevation (Prehn)	No relief (negative)	Relieves pain (positive)
Action	Escalate to urology now; OR within 6 h	Antibiotics, support, analgesia

Worked cases

CASE 11.1 · THE CBI MATH

Mr. Okonkwo is on continuous bladder irrigation after TURP. This shift 3,000 mL of irrigant ran in and the bag collected 3,850 mL. Drainage is light pink. At 0300 he becomes restless, heart rate 52, pressure 168/94, with nausea and blurred vision.

STEP 1 · COMPUTE TRUE OUTPUT

3,850 minus 3,000 = 850 mL of urine. Charting 3,850 as urine would hide oliguria.

STEP 2 · READ THE COLOR

Light pink to clear is the goal. Bright red or clots: increase the rate and notify.

STEP 3 · NAME THE NEW PICTURE

Confusion, bradycardia with hypertension, nausea and visual change: TUR syndrome from absorbed hypotonic irrigant.

STEP 4 · ACT

Notify the surgeon now, stat sodium (normal 135 to 145), slow or stop irrigation per order, protect the airway, seizure precautions.

CASE 11.2 · THE SCROTAL CLOCK

Mr. Lindgren, 19, woke at 0400 with sudden severe left scrotal pain and vomiting. It is now 0530. The testis is high and horizontal, the cremasteric reflex is absent, and elevation makes the pain worse. Ultrasound has a 90-minute wait.

STEP 1 · SORT

Sudden onset, vomiting, absent reflex, negative Prehn: torsion, not epididymitis.

STEP 2 · COUNT THE CLOCK

1.5 hours since onset. Salvage is above 90% within 6 hours and falls sharply by 12.

STEP 3 · ESCALATE FIRST

Call urology now; a classic exam goes to the OR without waiting for imaging.

STEP 4 · THEN

NPO, IV access, analgesia. Expect detorsion and fixation of both sides.

TRAPS PEOPLE FALL INTO

- **Charting all CBI drainage as urine.** Subtract the irrigant. True output can be dangerously low.
- **Waiting for an ultrasound in classic torsion.** Tissue dies while you wait. Escalate first.
- **Reassuring a woman about spotting after menopause.** It needs ultrasound and biopsy.

Chapter 11 self-test · six items

1. What is a normal post-void residual?

A. About 500 mL
B. Under 300 mL
C. Over 200 mL
D. Under 50 mL

D. Under 50 mL Over 200 mL is significant retention.

2. A patient starting tamsulosin should be taught what?

A. Take it on an empty stomach at bedtime only
B. Rise slowly; dizziness on standing can occur
C. Stop taking it before any dental cleaning
D. Expect the PSA level to rise within weeks

B. Rise slowly; dizziness on standing can occur Alpha blockers cause orthostatic hypotension.

3. Which finding needs evaluation for inflammatory breast cancer?

A. Tender, lumpy breasts in the week before menses
B. A mobile, rubbery lump in a woman of 25
C. Red, warm, thick skin not clearing on antibiotics
D. Clear, milky discharge from both nipples

C. Red, warm, thick skin not clearing on antibiotics Inflammatory breast cancer mimics infection.

4. A patient on tamoxifen should report which symptom?

A. Any vaginal bleeding
B. Mild hot flashes
C. Morning joint stiffness
D. A dry, sticky mouth

A. Any vaginal bleeding Tamoxifen raises the risk of endometrial cancer and VTE.

5. A woman with a vaginal cuff dehiscence has tissue protruding. What is first?

A. Push the protruding tissue back in gently
B. Cover it with saline gauze and call the surgeon
C. Pack the vagina tightly with dry gauze
D. Have her walk in the hall to ease pressure

B. Cover it with saline gauze and call the surgeon Moist sterile cover, supine with knees flexed, NPO, surgeon now.

6. Which teaching goes with metronidazole for trichomonas?

A. Only the patient needs any treatment
B. Take each dose with milk to avoid nausea
C. Avoid alcohol during and after the course
D. Stop the drug once the discharge clears

C. Avoid alcohol during and after the course Metronidazole causes a disulfiram-like reaction; treat partners.

CHAPTER 12

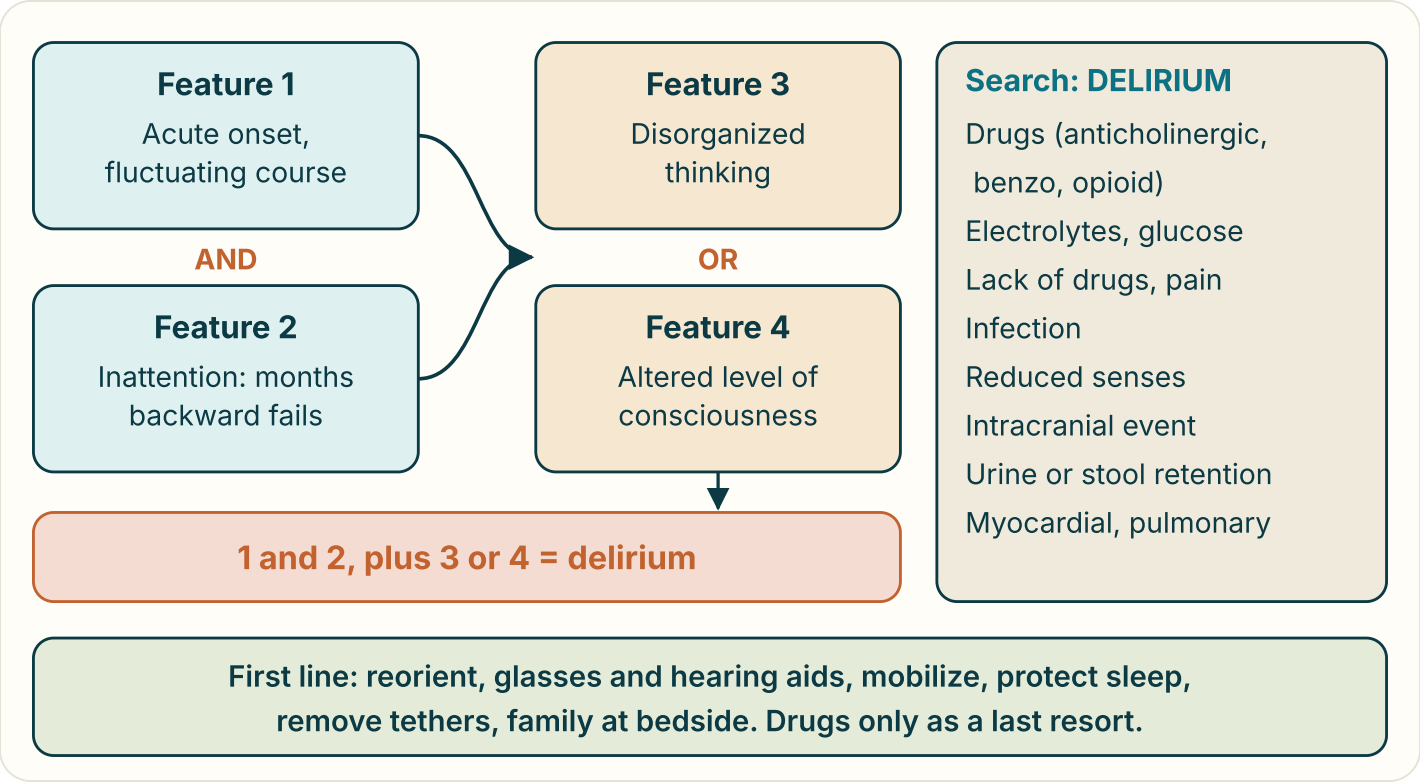
Care of the Older Adult

Read it in full: **Chapter 12 in the textbook**. Practice it in the lab: **Delirium, Dementia, Depression: The Discriminator** and **The Medication List Defuser**.

What to know

Aging takes reserve, so illness shows as confusion, a fall, incontinence or not eating. Delirium is acute inattention with a cause: screen with the CAM, look for drugs, hypoxia, infection, retention and pain, and treat with reorientation, sensory aids, mobility and sleep rather than sedation.

Estimate clearance with Cockcroft-Gault; a normal creatinine can hide a clearance near 30. Treat each new symptom as a drug effect first and use the Beers list. A previous fall is the best predictor of the next, and restraints do not prevent falls. Interview suspected mistreatment victims alone and report on reasonable suspicion.



Inattention is the hallmark. A positive CAM is a medical emergency with a cause. The quiet, drowsy patient counts; screen everyone, not only those who are agitated.

LOCK THESE IN

- Aging takes reserve; illness shows as confusion, a fall, incontinence or not eating.
- Orthostatic: drop of 20 systolic or 10 diastolic within 3 minutes of standing.
- CAM: 1 and 2, plus 3 or 4. Inattention is the hallmark. Quiet patients can be delirious.
- Delirium care: find the cause; reorient, sensory aids, mobility, sleep; no benzodiazepines except withdrawal.
- Cockcroft-Gault before dosing renally cleared drugs; a normal creatinine can hide low clearance.
- New symptom = drug effect until proven otherwise. Beers list; anticholinergic burden.

Key terms and comparisons: the three Ds

Feature	Delirium	Dementia	Depression
Onset	Hours to days	Months to years	Weeks to months
Course	Fluctuates, worse at night	Progressive or stepwise	Persistent low mood
Attention	Impaired (hallmark)	Normal until late	Intact; poor concentration
Consciousness	Altered	Normal	Normal
Memory testing	Cannot engage	Minimizes or confabulates	Distressed, "I don't know"
Reversible	Usually, if cause found	No	Highly treatable
First action	Search for the cause	Support function, safety	Screen, ask about suicide

Worked cases

CASE 12.1 · THE NORMAL CREATININE

Mrs. Pritchard, 87, weighs 48 kg and has a serum creatinine of 1.0 mg/dL. A standard dose of a renally cleared antibiotic is about to be ordered.

STEP 1 · SET UP COCKCROFT-GAULT

(140 minus 87) x 48 / (72 x 1.0) = 53 x 48 / 72 = 35.3.

STEP 2 · APPLY THE FEMALE FACTOR

35.3 x 0.85 = about 30 mL/min.

STEP 3 · INTERPRET

A "normal" creatinine hides a clearance near 30, because she has little muscle.

STEP 4 · ACT

Ask for renal dose adjustment before the first dose. The same applies to DOACs, metformin and gabapentin.

CASE 12.2 · THE QUIET PATIENT

Mr. Abernathy, 84, two days after hip repair, was "pleasant, no problems" in report. He is now sleepy and slow to answer. He got oxycodone at 1400 and diphenhydramine at 1600. SpO2 90%, bladder scan 700 mL, glucose 84.

STEP 1 · SCREEN

He cannot say the months backward (inattention), and this is new since yesterday (acute, fluctuating). He is drowsy (altered consciousness). CAM positive: hypoactive delirium.

STEP 2 · ABC FIRST

Oxygen for the low saturation; full vital signs.

STEP 3 · FIND CAUSES

Retention (700 mL), a new anticholinergic (diphenhydramine), an opioid, and possible hypoxia or infection after surgery.

STEP 4 · ACT AND ESCALATE

SBAR: ask for catheterization, chest film, labs, and stopping diphenhydramine. Then non-drug delirium care.

TRAPS PEOPLE FALL INTO

- **Writing "pleasantly confused, baseline."** New confusion is never normal aging. Screen with the CAM.
- **Giving lorazepam for agitated delirium.** Benzodiazepines cause and prolong delirium, except in withdrawal.
- **Dosing from creatinine alone in a small older adult.** Estimate clearance with Cockcroft-Gault.

Chapter 12 self-test · six items

1. Which finding is normal aging rather than disease?

A. Any new loss of urine with coughing
B. Slower recall of names that comes with time
C. New confusion that started over two days
D. A hemoglobin of 10.5 g/dL on routine labs

B. Slower recall of names that comes with time Slow is normal; wrong is not.

2. Which benzodiazepine is least risky in older adults when one is needed?

A. Diazepam
B. Chlordiazepoxide
C. Lorazepam
D. Flurazepam

C. Lorazepam Lorazepam uses phase II metabolism, which is preserved.

3. A patient starts sertraline. What lab is checked in 2 to 4 weeks?

A. Serum lithium
B. Serum amylase
C. Serum potassium
D. Serum sodium

D. Serum sodium SSRIs can cause SIADH and low sodium in older adults.

4. Which fall-prevention step has the best evidence?

A. Strength and balance training
B. All four side rails up
C. Non-skid socks at all times
D. A bed alarm on every bed

A. Strength and balance training Physical therapy for strength and balance works best.

5. Which finding best shows dehydration in an older adult?

A. Tiredness after lunch
B. A 1 kg weight loss overnight
C. Poor skin turgor on the hand
D. A dry feeling in the mouth

B. A 1 kg weight loss overnight Weight is the most reliable; 1 kg is about 1 L.

6. What is the safest way to teach a patient with presbycusis?

A. Stand behind her so she is not distracted
B. Shout so she can hear every single word
C. Speak quickly so she keeps her attention
D. Face her and lower the pitch of your voice

D. Face her and lower the pitch of your voice High frequencies are lost first.

CHAPTER 13

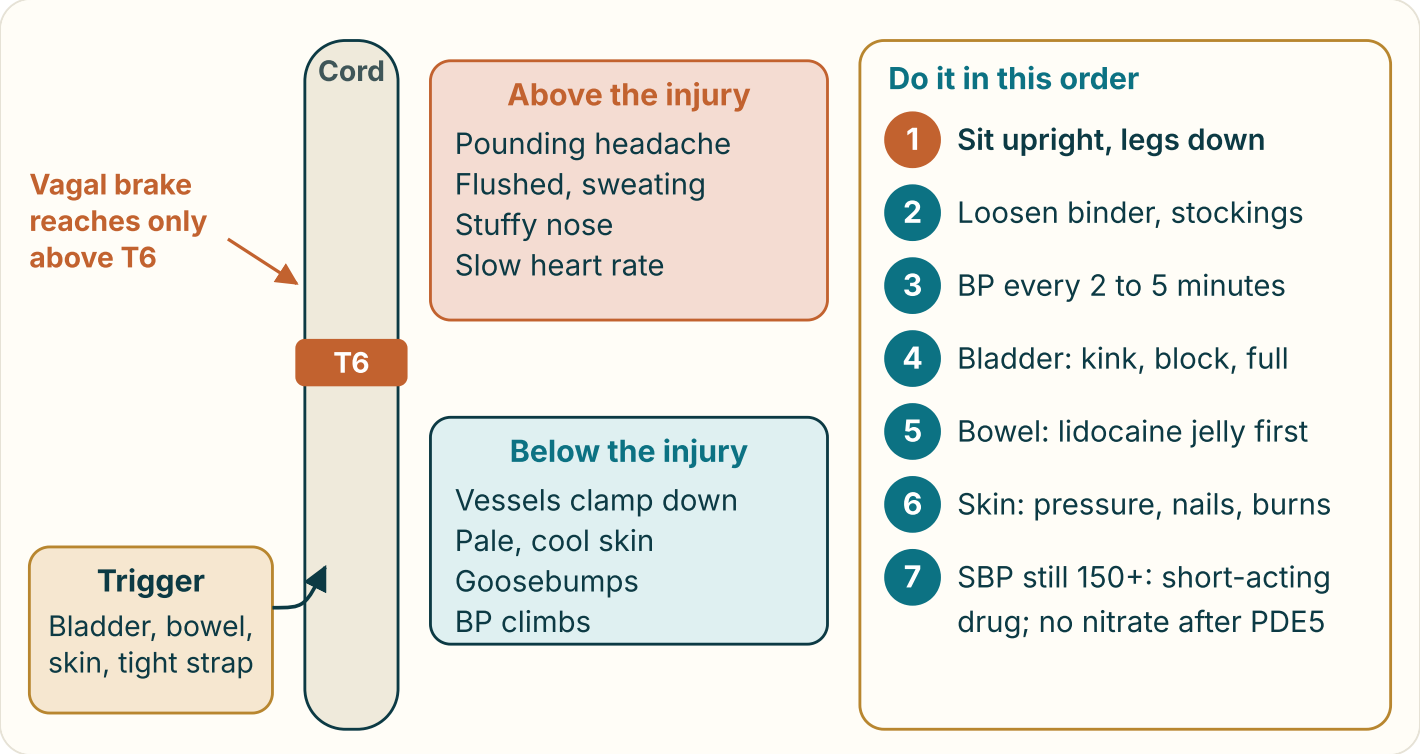
Rehabilitation, Mobility and Chronic Illness

Read it in full: **Chapter 13 in the textbook**. Practice it in the lab: **Autonomic Dysreflexia: Sit Him Up First** and **Before the First Step: Transfers, Fitting and Gait**.

What to know

Rehabilitation measures function: FIM 1 to 7 per item, TUG 12 seconds or more for fall risk. Use a gait belt at the waist and never lift under the arms. The cane goes opposite the weak leg; three-point gait protects a non-weight-bearing leg; stairs are up with the good, down with the bad.

Neurogenic shock is low blood pressure with a slow pulse and warm skin; rule out bleeding. C7 is the independence level. Autonomic dysreflexia (T6 and above) means sit up first, loosen everything, then check bladder, bowel and skin. Keep catheter volumes under about 400 to 500 mL.



Sit up first, then hunt the trigger. The blood pressure is judged against the patient's own low baseline. Bladder first, bowel second, skin third.

LOCK THESE IN

- IRF needs about 3 h of therapy a day, 5 days a week. SNF about 1 to 2 h.
- FIM 1 to 7 per item, 18 to 126 total; 5 = supervision, 4 = minimal assist.
- Gait belt at the waist; never lift by the axillae; manual limit about 35 lb.
- Cane opposite the weak leg; walker never on stairs; crutch pads 2 to 3 fingers below the axilla.
- Stairs: up with the good, down with the bad.
- Neurogenic shock: low BP, slow pulse, warm dry skin. Hemorrhage: low BP, fast pulse, cold clammy skin.

Key terms and comparisons: retained function by level

Level	Key muscle	Practical function
C1 to C3	Neck muscles only	Ventilator dependent; sip-and-puff chair; total assist
C4	Diaphragm, trapezius	May wean from ventilator; head control; power chair
C5	Deltoid, biceps	Feeds with mobile arm support; dependent for transfers
C6	Wrist extensors	Tenodesis grasp; slide-board transfers with assist; hand-control driving
C7 to C8	Triceps, finger flexors	Independent transfers, manual chair, most ADLs
T1 to T6	Full arms and hands	Independent self-care; autonomic dysreflexia risk
T7 to T12	Abdominals, trunk	Good trunk control and cough
L1 to L4	Hip flexors, quadriceps	Braces and crutches; functional walking by L3 to L4
S2 to S4	Bowel, bladder, sexual reflexes	Walking preserved; flaccid bowel and bladder

Worked cases

CASE 13.1 · THE C5 PATIENT WITH A HEADACHE

Mr. Achterberg, C5 ASIA A, has a pounding headache, BP 202/112 (baseline 94/58), heart rate 44, flushed sweating face and goosebumps on his legs. His indwelling catheter has drained nothing for four hours.

STEP 1 · NAME IT

Autonomic dysreflexia: a rise of about 108 systolic over his own baseline, with bradycardia and the split body.

STEP 2 · POSITION

Sit him bolt upright with legs down. Gravity is the fastest antihypertensive.

STEP 3 · LOOSEN

Remove the abdominal binder, stockings and leg-bag straps; recheck BP every 2 to 5 minutes; call for help.

STEP 4 · BLADDER FIRST

Check the tubing for kinks; irrigate gently with 10 to 15 mL warm saline or replace the blocked catheter; drain slowly.

STEP 5 · IF BP STAYS HIGH

If systolic stays at or above about 150, a short-acting agent per order; ask about PDE5 inhibitors before any nitrate. Monitor 2 hours after resolution.

CASE 13.2 · FITTING AND TEACHING CRUTCHES

Ms. Varga had ORIF of the right ankle and is non-weight-bearing on the right. She will go home to a house with four front steps.

STEP 1 · FIT

Axillary pads 2 to 3 finger widths (1.5 to 2 inches) below the axilla; handgrips at the wrist crease (20 to 30 degrees of elbow flexion); tips about 6 inches to the side and 6 inches forward.

STEP 2 · CHOOSE THE GAIT

Three-point: both crutches and the right leg forward together, then the left leg swings through. The right foot never touches.

STEP 3 · TEACH STAIRS UP

Strong left leg steps up first, then crutches with the right leg.

STEP 4 · TEACH STAIRS DOWN

Crutches with the right leg go down first, then the strong left leg.

STEP 5 · WARN

Weight through the hands, never the armpits, or crutch palsy follows.

TRAPS PEOPLE FALL INTO

- **Laying a patient flat during autonomic dysreflexia.** It worsens the hypertension. Sit them up first.

- **Lifting a hemiplegic patient under the arms.** It injures the brachial plexus and the shoulder. Use a gait belt or a lift.
- **Holding the cane on the weak side.** The cane goes in the hand opposite the weak leg.

Chapter 13 self-test · six items

1. Which FIM score means supervision or set-up only?

A. 3
B. 7
C. 5
D. 4

C. 5 5 is hands-off help; 4 is minimal hands-on assistance.

2. A patient with a C6 injury has which useful hand function?

A. Tenodesis grasp from wrist extension
B. Full finger strength and a firm grip
C. No movement of either arm at all
D. Normal triceps for full push-ups

A. Tenodesis grasp from wrist extension Wrist extension passively closes the fingers.

3. Which spinal cord syndrome causes weakness worse in the arms than the legs?

A. Brown-Sequard syndrome
B. Central cord syndrome
C. Cauda equina syndrome
D. Anterior cord syndrome

B. Central cord syndrome Common after hyperextension in older adults with spondylosis.

4. Before a bowel program in a T4 patient, what should the nurse use?

A. Ice water by mouth to trigger peristalsis
B. A cold pack placed on the abdomen
C. An enema given every single day
D. Lidocaine jelly to lower dysreflexia risk

D. Lidocaine jelly to lower dysreflexia risk Digital stimulation can trigger dysreflexia at T6 and above.

5. Which vasopressor is avoided in neurogenic shock?

A. Dopamine
B. Norepinephrine
C. Phenylephrine
D. Atropine

C. Phenylephrine Pure alpha agonists cause reflex bradycardia.

6. A patient fell during therapy. What is the first step?

A. Lift them back to the chair now
B. Call the family before assessing
C. Complete the incident report first
D. Assess on the floor before moving them

D. Assess on the floor before moving them Assess ABC, head strike, spine and fractures before moving.

CHAPTER 14

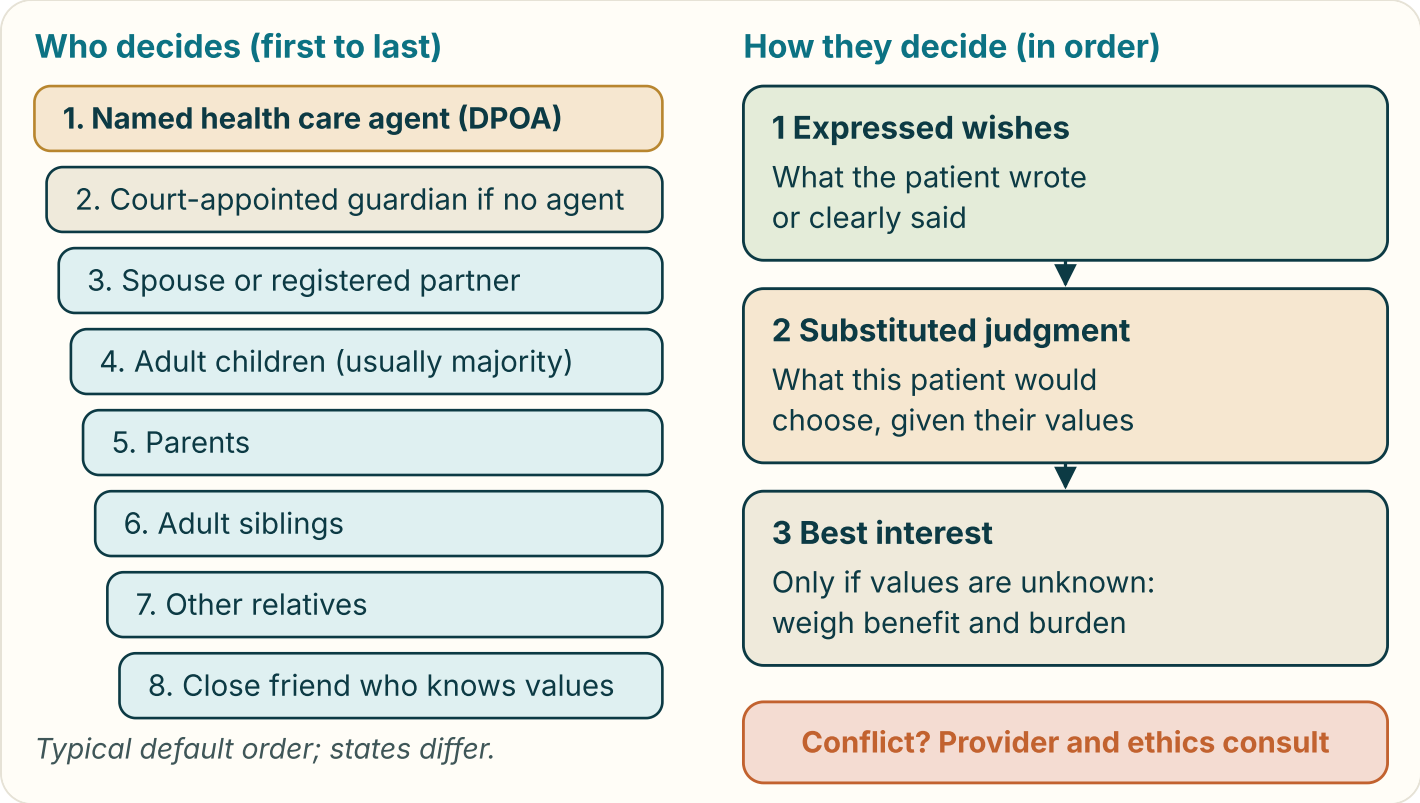
End-of-Life Care, Ethics and Complex Decisions

Read it in full: **Chapter 14 in the textbook**. Practice it in the lab: **Capacity, Surrogates and the Three Standards** and **The Directive Desk: Which Document Governs**.

What to know

Capacity is decision specific: understand, appreciate, reason, choose. Surrogates use the patient's wishes, then substituted judgment, then best interest. A POLST is an order EMS can follow; a living will is a statement of wishes. Withholding and withdrawing are equivalent, and DNR means only no CPR.

Titrate opioids to the symptom; a fan and a low-dose opioid relieve dyspnea. Glycopyrrolate and repositioning ease secretions. Double effect protects proportionate dosing. Hospice needs a 6-month prognosis. Brain death is legal death confirmed by an apnea test; refer to the OPO early and decouple the request.



The surrogate speaks for the patient, not for themselves. Ask the family "what would she say if she could hear all this?" State default orders vary, and disputes go to the ethics committee rather than being settled at the bedside.

LOCK THESE IN

- Capacity: understand, appreciate, reason, express a stable choice. Unwise is not incapacity.
- Surrogate order: named agent, then statutory hierarchy. Standards: wishes, substituted judgment, best interest.
- Living will = wishes; POLST = portable order EMS can follow. DNR means no CPR, not no care.
- Withholding = withdrawing. Time-limited trials need endpoints and a date.
- PO morphine 30 = IV morphine 10 = PO oxycodone 20 = PO hydromorphone 7.5 = IV hydromorphone 1.5.
- Dyspnea: opioid plus fan; oxygen only if hypoxemic. Secretions: glycopyrrolate, reposition; no deep suction.

Key terms and comparisons: the three documents

Feature	Living will	DPOA for health care	POLST / MOLST
What it is	Statement of wishes	Appointment of an agent	Signed portable medical orders
Who it is for	Every adult	Every adult	Seriously ill or frail (prognosis about a year)
Takes effect	After capacity is lost and conditions are met	After capacity is lost	Immediately, in every setting
EMS can act on it	No	No	Yes
Travels with patient	Rarely	Rarely	Yes

Worked cases

CASE 14.1 · ROTATING AN OPIOID

Mrs. Delacourt takes oral morphine 120 mg a day for cancer pain. She can no longer swallow and has worsening kidney function. The team plans IV hydromorphone. Worked calculation example only.

STEP 1 · FIND THE EQUIVALENT

Oral morphine 30 mg = IV hydromorphone 1.5 mg. 120 / 30 x 1.5 = 6 mg IV hydromorphone a day.

STEP 2 · REDUCE FOR CROSS-TOLERANCE

Cut 25 to 50%: 3 to 4.5 mg a day, about 0.125 to 0.19 mg per hour by infusion.

STEP 3 · PLAN BREAKTHROUGH

10 to 15% of the 24-hour dose, offered every 1 to 2 hours as needed, then titrate to the symptom.

STEP 4 · WHY ROTATE

Morphine metabolites build up in renal failure and cause sedation, myoclonus and pain sensitivity.

STEP 5 · MONITOR

Symptom score, sedation, breathing pattern, myoclonus, bowels.

CASE 14.2 · WHO DECIDES

Mr. Ibanez, 80, has advanced dementia and pneumonia. He has no named agent. His wife died; his two adult sons disagree about a feeding tube. A neighbor says he "never wanted machines."

STEP 1 · CONFIRM INCAPACITY

The provider makes and documents the formal determination.

STEP 2 · FIND THE SURROGATE

No agent, no spouse: adult children decide, usually by majority. The neighbor is not first in line.

STEP 3 · APPLY THE STANDARD

Ask what their father would have chosen (substituted judgment). The neighbor's report is useful evidence of his values.

STEP 4 · SHARE THE EVIDENCE

In advanced dementia, tube feeding does not prolong life or prevent aspiration. Offer careful hand feeding and mouth care.

STEP 5 · ESCALATE THE CONFLICT

Disagreement goes to the provider and an ethics consult, not to a bedside ruling.

TRAPS PEOPLE FALL INTO

- **Treating DNR as "do not treat."** DNR covers compressions and defibrillation only. Antibiotics, surgery and rapid response still apply.
- **Believing withdrawing is worse than withholding.** They are equivalent; this is what makes time-limited trials possible.
- **Putting oxygen on a dyspneic, non-hypoxemic dying patient.** A fan and a low-dose opioid help; oxygen helps only with hypoxemia.

Chapter 14 self-test · six items

1. Which statement about capacity is correct?

A. It is lost as soon as any dementia begins
B. It is the same for every kind of decision
C. It is decided by a court in every case
D. It is specific to a decision and can change

D. It is specific to a decision and can change Capacity is clinical, decision specific and time specific.

2. A family asks for CPR on a patient with a DNR. Which statement is accurate about DNR?

A. It means no compressions or shocks, not no care
B. It means no antibiotics or IV fluids are given
C. It means no pain medicine may be given at all
D. It means all treatment must stop right now

A. It means no compressions or shocks, not no care DNR covers CPR only.

3. How long can inpatient respite care last under hospice?

A. Up to 30 days
B. Up to 90 days
C. Up to 5 days
D. Up to 13 months

C. Up to 5 days Respite relieves the caregiver for up to five days.

4. Which statement about tube feeding in advanced dementia is supported?

A. It is required by law near the end of life
B. It does not prolong life or prevent aspiration
C. It prevents aspiration pneumonia in most
D. It heals pressure injuries much faster

B. It does not prolong life or prevent aspiration Careful hand feeding is preferred.

5. In a medical examiner case, what should the nurse do with lines and tubes?

A. Leave all of them in place
B. Remove them and wash the body
C. Remove only the IV lines
D. Remove only the urinary catheter

A. Leave all of them in place Do not disturb devices or wash the body.

6. A nurse feels sick after a code that went against a POLST. What is this called?

A. Burnout
B. Moral distress
C. Prolonged grief
D. Compassion fatigue

B. Moral distress Knowing the right action and being blocked from it.

ONE PAGE

Cram sheet

Every rule and number from the course, two tables per exam unit. Cover the right column and say each rule out loud.

Diabetes

Item	Rule or value
Diagnosis	A1C 6.5% or higher; fasting 126 or higher; 2-hour OGTT 200 or higher; random 200 or higher with symptoms
Prediabetes	A1C 5.7 to 6.4%; fasting 100 to 125; 2-hour 140 to 199
Targets	Most adults A1C below 7%; premeal 80 to 130; peak below 180; inpatient 140 to 180; time in range above 70%
Hypoglycemia	Below 70 level 1; below 54 level 2; rule of 15; D50 25 to 50 mL IV or glucagon 1 mg IM/SC or 3 mg intranasal
Crisis order	Fluids (15 to 20 mL/kg first hour), K (hold insulin below 3.3), regular insulin 0.1 unit/kg/h, D5 at about 200 (DKA) or 250 to 300 (HHS)
Formulas	Gap = Na minus (Cl plus HCO3); osm = 2 x Na plus glucose/18; corrected Na adds 1.6 per 100 glucose above 100
DKA resolved	Glucose below 200 plus two of: HCO3 15 or higher, pH above 7.30, gap 12 or less
Mixing	Air into NPH, air into regular, draw regular first: clear before cloudy
Sick day	Never stop insulin; glucose and ketones every 3 to 4 hours; call for vomiting beyond 4 hours or ketones with glucose above 240
Feet	Inspect daily, no soaking, no barefoot, monofilament yearly

Thyroid, calcium, adrenal and pituitary

Item	Rule or value
Pairs	Primary: opposite directions. Secondary: both low
Myxedema coma	Airway, passive rewarming, hydrocortisone before or with IV levothyroxine
Thyroid storm	Beta blocker, PTU, iodine 1 hour later, hydrocortisone; no aspirin
After thyroidectomy	Airway, voice, calcium at 24 to 72 hours; trach tray, suction, oxygen at bedside
Calcium	High: saline, calcitonin, bisphosphonate. Low: calcium gluconate, magnesium, monitor
Adrenal crisis	Hydrocortisone 100 mg IV, saline (D5NS if low glucose), monitor potassium
Pheochromocytoma	Alpha blocker 10 to 14 days before beta blocker
SIADH	Fluid restriction 800 to 1000 mL; 3% saline if seizing; raise Na no more than about 8 in 24 h
DI	Report output above 200 to 250 mL/h for 2 hours; desmopressin for central; thiazide for nephrogenic
Triphasic response	DI days 1 to 3, SIADH days 5 to 10, then possible permanent DI

Stroke and ICP

Item	Rule or value
Perfusion	MAP = diastolic plus one third of pulse pressure; CPP = MAP minus ICP; target 60 to 70; ICP normal 5 to 15, treat above 20 to 22
GCS	Eyes 4, verbal 5, motor 6; 13 to 15 mild, 9 to 12 moderate, 8 or less severe
Thrombolysis	Within 4.5 h of last known well; alteplase 0.9 mg/kg (max 90), 10% bolus; tenecteplase 0.25 mg/kg (max 25)
Checks after lysis	Every 15 min for 2 h, every 30 min for 6 h, hourly to 24 h; no antithrombotic for 24 h
BP targets	Before lysis below 185/110; after below 180/105; no lysis treat above 220/120; ICH about 140; SAH below 160
Thrombectomy	Large-vessel occlusion; within 6 h, selected out to 24 h
SAH	Nimodipine 60 mg enteral every 4 h for 21 days; vasospasm days 4 to 14; no fluid restriction
ICP care	HOB 30, midline, no Valsalva, suction 10 s or less, space care, isotonic fluid, CO2 35 to 45
Mannitol	0.25 to 1 g/kg over 15 to 30 min, filter, hold if osm above about 320
Swallow	NPO until screen passed; upright 90 degrees for meals and 30 min after

Seizures, headache and CNS infection

Item	Rule or value
Status epilepticus	5 minutes; lorazepam 0.1 mg/kg (max 4) or midazolam 10 mg IM; then fosphenytoin 20 mg PE/kg, levetiracetam 60 mg/kg or valproate 40 mg/kg
Phenytoin	Saline only, 50 mg/min max (25 in elders); level 10 to 20 mcg/mL
Seizure precautions	Bed low, rails padded, suction and oxygen at bedside, IV access, no oral thermometer
Cluster headache	Oxygen 12 to 15 L/min non-rebreather 15 to 20 min plus SC sumatriptan 6 mg
Triptan no	Coronary disease, uncontrolled hypertension, stroke, ergot within 24 h
SNOOP	Systemic, Neurologic, Onset sudden, Older than 50, Pattern change and more
Meningitis order	Cultures, dexamethasone 0.15 mg/kg, vancomycin plus ceftriaxone (plus ampicillin if over 50), then CT and LP
Droplet	On suspicion until 24 h of effective antibiotics; contact prophylaxis within 24 h
Encephalitis	Acyclovir 10 mg/kg every 8 h before PCR; hydrate, watch creatinine

Neuromuscular disease

Item	Rule or value
Localize	UMN spastic and brisk; LMN flaccid, wasting, fasciculations; NMJ fatigable with normal reflexes
Breathing	VC normal 60 to 70 mL/kg; warning VC below 20, NIF weaker than -30, MEP below 40
Parkinson	Levodopa on time, before meals; no dopamine blockers; screen swallow; orthostatic drop 20/10
MS	Relapse over 24 h without fever; rule out UTI; methylprednisolone 1 g IV daily 3 to 5 days
Myasthenia	Pyridostigmine 30 to 45 min before meals; flag magnesium, aminoglycosides, quinolones, macrolides
Crisis	Airway first; cholinergic has miosis and SLUDGE; myasthenic treated with IVIG or plasma exchange
Guillain-Barre	Ascending, areflexic; CSF high protein, normal cells; IVIG 0.4 g/kg x 5 days or plasma exchange; no steroids
ALS	UMN plus LMN, sensation intact; NIV and gastrostomy before FVC below 50%; riluzole
Bell palsy	Whole half face; prednisone within 72 h; protect the cornea
Dementia	Sudden change is delirium; no restraints; antipsychotics last resort

Musculoskeletal

Item	Rule or value
Six Ps	Pain and paresthesia early; pallor, pulselessness, paralysis late; cap refill under 3 s
Compartment	Pressure above about 30, or diastolic minus pressure below 30: fasciotomy; heart level, no ice
Calendar	Compartment 6 to 48 h; FES 24 to 72 h; VTE day 2 on; infection day 5 on
Open fracture	IV antibiotics within 1 h, tetanus, sterile moist cover, surgery
Traction	Skin 5 to 10 lb; skeletal 15 to 30 lb; weights hang free, never removed
Hip and knee	Posterior hip: no flexion past 90, no crossing, no internal rotation; knee kept in extension
Amputation	Tourniquet at bedside; elevate 24 h only; prone 20 to 30 min three or four times daily
Crutches	Elbows flexed 20 to 30 degrees; 2 to 3 finger widths below axilla; cane on the strong side
Bone foundation	Calcium 1,000 to 1,200 mg (500 to 600 per dose); vitamin D 800 to 1,000 IU
CK	Normal 30 to 170 U/L; rhabdo above about 5 x normal; above 5,000 high kidney risk

Skin, wounds and burns

Item	Rule or value
Wound note	L x W x D in cm; tunneling by clock, 12 toward the head; % granulation, slough, eschar
Necrotizing fasciitis	Pain out of proportion, bullae, numbness; surgery plus clindamycin-containing regimen
SJS / TEN	Under 10% / over 30% detachment; stop the drug; burn-unit care; eye consult
Stages	1 non-blanchable; 2 partial; 3 full, fat; 4 bone or tendon; unstageable; DTI
Braden	6 to 23; 18 or below at risk; 13 to 14 moderate; 10 to 12 high; 9 or below severe
ABI	0.91 to 1.30 normal; 0.90 or below arterial; 0.40 or below severe; above 1.30 unreliable
Rule of Nines	Head 9, arm 9, front 18, back 18, leg 18, perineum 1; palm about 1%
Parkland	4 x kg x %TBSA LR; half in 8 h from injury; ABA starts at 2 mL
Urine target	0.5 mL/kg/h adult; 1 mL/kg/h child under 30 kg; 75 to 100 mL/h with pigment
CO	SpO2 falsely normal; COHb by co-oximetry; 100% oxygen
Acute phase	Infection and hypermetabolism; protein 1.5 to 2 g/kg/day; contracture positioning

Eye and ear

Item	Rule or value
IOP	Normal 10 to 21 mm Hg; angle closure can reach 40 to 80
Acuity	Snellen 20 ft; legal blindness 20/200 or worse in the better eye
Angle closure	Supine, lights on, hold anticholinergics, drops, mannitol, then pilocarpine, laser
Sudden vision loss	CRAO: stroke path; detachment: rest, NPO; GCA: steroids first
AREDS2	Vit C 500 mg, vit E 400 IU, zinc 80 mg, copper 2 mg, lutein 10 mg, zeaxanthin 2 mg
Chemical splash	Irrigate 15 to 30 min or more; pH 7.0 to 7.4; no neutralizing
Globe rupture	Shield, no pressure, no drops, no removal, NPO, head up
Hearing	Normal 0 to 25 dB; sudden SNHL 30 dB in 72 h, steroids
Ototoxic	Aminoglycosides, loop diuretics (furosemide about 4 mg/min IV), cisplatin, salicylates
Vertigo	BPPV seconds (Epley); Meniere 20 min to 12 h (Na 1500 to 2000 mg); neuritis days

Immune and rheumatologic

Item	Rule or value
Anaphylaxis	Epi 0.3 to 0.5 mg (1 mg/mL) IM thigh every 5 to 15 min; child 0.01 mg/kg, max 0.3 mg
Adjuncts	Fluids 1 to 2 L, diphenhydramine 25 to 50 mg, famotidine 20 mg, methylpred 125 mg, glucagon 1 to 5 mg if beta blocked
Observe	4 to 6 h at least; biphasic 1 to 8 h (up to 72 h)
HIV	CD4 normal 500 to 1,600; AIDS below 200; VL goal under 20 to 50 copies/mL
Prophylaxis	Below 200 TMP-SMX; below 100 toxo cover; below 50 MAC, CMV eye exams
Neutropenic fever	38.3 C once or 38.0 C for 1 h with ANC below 500; antibiotics within 1 h
Lupus	ANA screen; anti-dsDNA activity; anti-Smith specific; C3, C4 fall in flare
Hydroxychloroquine	5 mg/kg/day or less; baseline eye exam; yearly after 5 years
GCA	ESR often above 50; prednisone 40 to 60 mg; IV methylpred 500 to 1,000 mg if vision threatened
Methotrexate	7.5 to 25 mg once weekly; folic acid 1 mg daily; CBC, LFTs, creatinine
Gout	Urate solubility about 6.8; colchicine 1.2 mg then 0.6 mg; allopurinol to urate below 6.0

Infection and stewardship

Item	Rule or value
Older adult fever	Above 37.8 C once, above 37.2 C repeated, or 1.1 C over baseline
Markers	WBC 4,500 to 11,000; bands under 5%; lactate under 2.0; procalcitonin under 0.25 low
ANC	WBC x (segs + bands)/100; below 500 severe
Vancomycin	AUC 400 to 600; trough 15 to 20 before 4th dose; 1 g/h max
Separations	Fluoroquinolone 2 h before or 6 h after cations
C. difficile	Oral vanc 125 mg QID x 10 days or fidaxomicin 200 mg BID x 10 days
Durations	CAP 5 days; uncomplicated gram-negative bacteremia 7; pyelonephritis 5 to 7
TST cutoffs	5 mm HIV, contacts, immunosuppressed; 10 mm high-risk groups; 15 mm no risk
TB isolation off	Improving plus 3 negative smears 8 to 24 h apart
Needlestick risk	HBV up to 30%, HCV about 1.8%, HIV about 0.3%; PEP within 72 h for 28 days

Reproductive and sexual health

Item	Rule or value
Five Ps	Partners, Practices, Protection, Past STIs, Pregnancy intention
Labs	Beta-hCG under 5 non-pregnant; PSA under 4 (double on finasteride); CA-125 under 35; PVR under 50
Retention	Scan, catheterize, watch post-obstructive diuresis above 200 mL/h
CBI	Light pink to clear; urine = drainage minus irrigant; do not deflate balloon
TUR syndrome	Confusion, bradycardia, hypertension, visual change, Na below 135
Torsion	Salvage above 90% within 6 h; escalate before imaging
PDE5 and nitrates	24 h after sildenafil or vardenafil; 48 h after tadalafil
Bleeding	Pad an hour for 2 h or more is acute; postmenopausal: stripe over 4 mm, biopsy
Mastectomy	Drain out under 30 mL/24 h x 2 days; no cuff or needle on that arm
Brachytherapy	Time, distance, shielding; forceps and lead container; no pregnant staff
STIs	Doxy 7 days; ceftriaxone 500 mg IM; benzathine PCN IM only; PEP 72 h, 28 days

Older adult

Item	Rule or value
Orthostatic	Drop of 20 systolic or 10 diastolic within 3 min
Temperature	Baseline 36.0 to 36.5 C; rise of 1.1 C counts
Anemia	Hgb under 13 men, under 12 women is never age
CAM	1 + 2, plus 3 or 4
Haloperidol	0.25 to 0.5 mg if essential; hold if QTc above 500
Cockcroft-Gault	(140 minus age) x kg / (72 x Cr), x 0.85 women
Digoxin	0.5 to 2.0 ng/mL (HF 0.5 to 0.9); K 3.5 to 5.0
Apixaban AF	2.5 mg BID if 2 of: age 80+, 60 kg or less, Cr 1.5+
Falls	TUG 12 s or more; hourly rounding; no restraints
Protein	1.0 to 1.2 g/kg/day; 1.2 to 1.5 when ill
Mistreatment	Interview alone; report on reasonable suspicion to APS

Rehabilitation and spinal cord injury

Item	Rule or value
Settings	IRF about 3 h/day x 5 days, 2+ disciplines; SNF about 1 to 2 h/day
FIM	1 to 7 per item; 18 to 126; 7 independent, 4 minimal (75%+), 3 moderate (50 to 74%), 1 total
TUG and Berg	TUG 12 s or more fall risk; Berg under about 45 fall risk
Transfers	Gait belt at waist, 2 fingers slack; never axillae; manual lift limit about 35 lb
Devices	Wrist crease, 20 to 30 degrees elbow flexion; crutch pads 1.5 to 2 in below axilla
Gaits	Four-point stable; three-point for NWB leg; up with the good, down with the bad
Shock	Neurogenic: low BP, low HR, warm dry skin; MAP 85 to 90 first week; no phenylephrine
Levels	C3 to C5 diaphragm; C6 tenodesis; C7 independence; T6+ dysreflexia
Dysreflexia	Sit up, loosen, BP every 2 to 5 min, bladder, bowel, skin; drug if SBP stays 150+
Bladder	CIC every 4 to 6 h, volumes under 400 to 500 mL, fluid about 2 L/day
Bowel	UMN: suppository plus digital stimulation 20 to 30 min after a meal; LMN: manual removal

End of life

Item	Rule or value
Capacity	Understand, appreciate, reason, express choice; decision and time specific
Surrogates	Agent, then spouse, adult children, parents, siblings; wishes, substituted judgment, best interest
Documents	Living will (wishes); DPOA (person); POLST (orders EMS follows)
Opioids	PO morphine 30 = IV 10 = PO oxy 20 = PO HM 7.5 = IV HM 1.5; cut 25 to 50% on rotation
Breakthrough	10 to 15% of 24-h dose every 1 to 2 h
Secretions	Glycopyrrolate 0.2 mg SC; reposition; no deep suction
Hospice	Prognosis 6 months or less; 90, 90, then 60-day periods; respite up to 5 days; bereavement 13 months
Brain death	Temp 36 C+, SBP 100+, no sedatives; apnea PaCO2 60 or +20 with no effort
Donation	Notify OPO early; decouple; trained requestor asks
ME case	Leave lines, tubes and devices in; do not wash

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