DAY 02 · NCLEX-RN PHARM MASTERY

Diabetes & *Endocrine* Medications

Insulin pharmacokinetics, oral & injectable antihyperglycemics, thyroid replacement & suppression, corticosteroids, and pituitary/adrenal agents — engineered for the 2026 NCLEX-RN test plan with NCJMM clinical judgment and Application-level rigor.

20 Advanced Flashcards | 5 Must-Not-Miss Safety Rules | 5 Dosage Calculations | 5 NGN Items | 1 Unfolding Case | Client Need · Pharm & Parenteral

01 Advanced Flashcards

TAP ANY CARD TO REVEAL · 20 DRUGS

Insulins · 5 | Oral antihyperglycemics · 5 | Injectable non-insulin · 2 | Thyroid · 3 | Corticosteroids · 1 | Pituitary/adrenal · 2 | Emergency rescue · 2

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CARD · 01

Rapid-acting Insulin

lispro (Humalog) · aspart (NovoLog) · glulisine (Apidra)

HIGH RISK · LOOK-ALIKE/SOUND-ALIKE

1. MECHANISM (SIMPLE)

Synthetic insulin that quickly pushes glucose into cells to lower blood sugar at meals.

2. WHY GIVEN

Mealtime (prandial/bolus) coverage in T1DM and T2DM; carbohydrate coverage in correction scales.

3. ONSET · PEAK · DURATION

Onset **10–15 min** · Peak **1 hr** · Duration **3–4 hr**.

4. MUST-ASSESS BEFORE GIVING

- Bedside glucose within 30 min of dose
- Meal tray actually **in the room** and client able to eat

CARD · 02

Regular Insulin

Humulin R · Novolin R · the only IV insulin

EMERGENCY · DKA DRUG

1. MECHANISM (SIMPLE)

Short-acting insulin. The only insulin that can be given IV — used to safely correct DKA & HHS.

2. WHY GIVEN

SQ: prandial coverage. IV: DKA, HHS, hyperkalemia (with dextrose), perioperative glucose control.

3. ONSET · PEAK · DURATION

SQ: Onset **30 min** · Peak **2–4 hr** · Duration **5–8 hr**.
IV: Onset **15 min**, half-life ~9 min.

4. MUST-ASSESS

- Glucose, K^+, pH/bicarb, anion gap (DKA)

- Verify dose with 2nd RN (high-alert)
- Recent K^+ (insulin drives K^+ into cells)
- Allergies/recent hypoglycemia episodes

5. KEY MONITORING

Glucose pre-meal & 1 hr post; HbA1c quarterly; K^+ if IV; signs of hypoglycemia.

6. MOST DANGEROUS ADVERSE EFFECT

Severe hypoglycemia + hypokalemia → seizure, dysrhythmia, coma.

7. COMMON SIDE EFFECTS

Lipohypertrophy at injection sites, weight gain, mild local reactions.

8. HOLD/NOTIFY PARAMETERS

Hold if glucose < 70 mg/dL or NPO without correction order; notify if recurrent hypoglycemia.

9. ANTIDOTE

Conscious: 15 g fast carbs (4 oz juice). Unconscious: IV D50 25 g OR glucagon 1 mg IM.

10. PATIENT TEACHING

Inject **≤15 min before** food. Rotate sites within one anatomic area. Always carry a fast carb. Don't dose if meal is delayed.

11. NURSING ACTION

Two-RN verification, scan barcode, abdomen preferred for fastest absorption, no aspiration, never massage site.

12. NGN CLINICAL JUDGMENT CUE

Nurse gives lispro 8 units at 0700, breakfast tray is delayed until 0800 → expect hypoglycemia around 0800.

13. PRIORITY QUESTION

A nurse administers lispro 6 units subcutaneously. Which action takes priority?
A. Recheck glucose in 4 hours
B. **Ensure the meal tray is at the bedside and the client begins eating within 15 minutes**
C. Administer 4 oz of orange juice now
D. Document the dose in the eMAR

14. RATIONALE

B is correct. Rapid-acting insulins begin working in 10–15 min and peak in 1 hr. The most lethal mismatch is insulin without food → hypoglycemia. **A** — glucose is rechecked around 1 hr (peak), not 4. **C** — juice without hypoglycemia

- Mental status, urine output
- IV patency for IV drip
- Confirm **U-100** vial; appearance must be **clear**

5. KEY MONITORING

Hourly glucose during DKA infusion · K^+ q2–4h · anion gap closure · neuro checks · I&O.

6. MOST DANGEROUS ADVERSE EFFECT

Hypokalemia + cerebral edema if glucose drops too fast (>100 mg/dL/hr).

7. COMMON SIDE EFFECTS

Hypoglycemia, injection-site reaction.

8. HOLD/NOTIFY

Hold IV insulin if K^+ < 3.3 mEq/L — replace potassium first. Notify provider when glucose ≤ 200 mg/dL in DKA → add dextrose, don't stop insulin.

9. ANTIDOTE

D50 IV push 25 g; glucagon if no IV access.

10. PATIENT TEACHING

Take SQ 30 min before meal. Clear vial. Sick-day rules — never stop insulin.

11. NURSING ACTION

Drip via dedicated pump line, prime tubing (insulin binds plastic), titrate per protocol, never bolus from premix bag.

12. NGN CUE

DKA pt on insulin drip 0.1 units/kg/hr; K^+ falls from 4.2 → 3.1 → stop insulin, replace K^+ before resuming.

13. PRIORITY QUESTION

A client in DKA is on an IV regular insulin drip. Lab returns: K^+ 3.2 mEq/L, glucose 240 mg/dL. Which action is the priority?
A. Continue current rate
B. Decrease insulin rate by 50%
C. **Hold the insulin infusion and notify the provider to replace potassium**
D. Add D5 ½NS to maintenance fluids

14. RATIONALE

C is correct. Insulin drives K^+ into cells → worsens hypokalemia → fatal dysrhythmias. ADA standard: hold insulin when K^+ < 3.3 until replaced. **A & B** continue the drive into cells. **D** dextrose addition only occurs around 200 mg/dL once K^+ is safe.

causes hyperglycemia. **D** — documentation matters but is not the priority once the dose is given.

15. TEST-TAKING TIP

> *If the option mentions "NovoLog, Humalog, Apidra, or lispro/aspart", the answer almost always involves the meal being present. "**No food = no rapid insulin.**"*

15. TEST-TAKING TIP

> *Regular insulin is the only insulin you can put in an **IV bag**. If the stem says "NPH IV" or "glargine IV" — that's the wrong answer.*

CARD · 03

NPH (Isophane) Insulin

Humulin N · Novolin N · cloudy intermediate-acting

HIGH RISK · PEAK HAZARD

1. MECHANISM

Insulin suspended with protamine to delay release; gives intermediate background coverage.

2. WHY GIVEN

Basal coverage when long-acting analogs aren't used; often paired BID with regular insulin or as 70/30.

3. ONSET · PEAK · DURATION

Onset **1–2 hr** · Peak 4–12 hr · Duration **14–24 hr**.

4. MUST-ASSESS

- Glucose at peak time
- Meal & snack pattern (peak demands food)
- Vial appearance — **roll, don't shake**, must be uniform cloudy
- Always draw **clear before cloudy** when mixing

5. KEY MONITORING

Fasting glucose; bedtime glucose (NPH given AM peaks at dinner; PM dose peaks 0200–0400).

6. MOST DANGEROUS ADVERSE EFFECT

Nocturnal hypoglycemia 4–12 hours after PM dose — client may be unaware.

7. COMMON SIDE EFFECTS

Weight gain, lipohypertrophy.

8. HOLD/NOTIFY

Hold if hypoglycemic; notify for repeated lows at peak window.

9. ANTIDOTE

CARD · 04

Long-acting (Basal) Insulin

glargine (Lantus, Toujeo) · detemir (Levemir) · degludec (Tresiba)

TEACHING-HEAVY · PEAKLESS

1. MECHANISM

Slowly released depot insulin → flat, steady basal level. Mimics endogenous basal pancreas output.

2. WHY GIVEN

Once-daily background coverage in T1DM and T2DM.

3. ONSET · PEAK · DURATION

Onset **1–2 hr** · **No peak** · Duration **24 hr** (degludec up to 42 hr).

4. MUST-ASSESS

Glucose pattern, recent A1C, kidney function, dose history.

5. KEY MONITORING

Fasting glucose (the main glucose it controls).

6. MOST DANGEROUS ADVERSE EFFECT

Severe hypoglycemia if mistakenly drawn into a rapid-insulin syringe or stacked with another basal.

7. COMMON SIDE EFFECTS

Injection site irritation, mild hypoglycemia.

8. HOLD/NOTIFY

Hold for hypoglycemia; notify for recurrent fasting hypoglycemia (dose too high) or hyperglycemia (dose too low).

9. ANTIDOTE

15 g carbs / D50 / glucagon (effects may persist).

10. PATIENT TEACHING

Never mix with any other insulin. Inject same time daily. Vial is **clear**. Don't take if NPO unless ordered.

15 g fast carbs / D50 / glucagon — followed by complex carb because peak persists.

10. PATIENT TEACHING

Eat a **bedtime snack** if NPH at dinner. Roll vial 10×. Identify peak as the highest hypoglycemia risk window.

11. NURSING ACTION

If mixing with regular: *Air N, Air R, Draw R, Draw N* (RN = Regular before NPH). Never mix with glargine.

12. NGN CUE

NPH given at 0700; client found diaphoretic, tremulous, BG 58 at 1500 → peak-window hypoglycemia.

13. PRIORITY QUESTION

A nurse administers NPH 20 units subQ at 0800. Which time should the nurse anticipate the greatest risk for hypoglycemia?
A. 0830–0900
B. 1000–1100
C. **1200–2000**
D. 0200–0400 the following day

14. RATIONALE

C is correct. NPH peaks 4–12 hours after administration; 0800 + 4–12 hr = 1200–2000. **A & B** are onset window (1–2 hr). **D** would be the peak window for an evening NPH dose, not the 0800 dose.

15. TEST-TAKING TIP

*NPH = "N for Not clear" — only cloudy insulin you can mix. **Clear before cloudy** when drawing up.*

CARD · 05

Premixed (Mixed) Insulin

70/30 (NPH/regular) · 75/25 (lispro protamine/lispro) · 70/30 NovoLog Mix

COMMONLY TESTED

1. MECHANISM

Combination of intermediate + short/rapid insulin in one vial — convenience for stable patients.

2. WHY GIVEN

Twice-daily dosing for clients who can keep consistent meal/exercise routines.

11. NURSING ACTION

Dedicated syringe. Don't substitute U-300 (Toujeo) for U-100 unit-for-unit.

12. NGN CUE

Client states "I'll just add my Lantus to my Humalog syringe to save time" → teach: never mix.

13. PRIORITY QUESTION

The nurse is teaching a newly diagnosed client about insulin glargine. Which statement requires further teaching?
A. "I will take this once a day at the same time."
B. "I should not stop this when I am sick."
C. **"I will mix this with my Humalog before injecting."**
D. "I will rotate injection sites."

14. RATIONALE

C is correct (needs correction). Glargine has an acidic pH that precipitates when mixed and changes onset/peak — never mix with another insulin. Other statements are accurate.

15. TEST-TAKING TIP

"Glargine" → "L for Long, L for Lone (don't mix), L for Lantus." Peakless basal = once daily, never NPO without orders.

CARD · 06

Glucagon

GlucaGen · Baqsimi (nasal) · Gvoke (auto-injector)

EMERGENCY RESCUE

1. MECHANISM

Counter-regulatory hormone that triggers **hepatic glycogenolysis** → glucose release.

2. WHY GIVEN

Severe hypoglycemia when client cannot swallow or has no IV access; also beta-blocker overdose.

3. ONSET · PEAK · DURATION

70/30 (NPH/R): Onset **30 min** · Peak **2–12 hr (dual)** · Duration **up to 24 hr**.

4. MUST-ASSESS

Meal schedule, glucose pattern, ability to recognize hypoglycemia.

5. KEY MONITORING

Pre-meal & pre-bedtime BG; HbA1c.

6. MOST DANGEROUS ADVERSE EFFECT

Hypoglycemia with two overlapping peaks if meals are missed.

7. COMMON SIDE EFFECTS

Weight gain, hypoglycemia, lipodystrophy.

8. HOLD/NOTIFY

Hold for NPO; notify if meal pattern changes significantly.

9. ANTIDOTE

Carbs / D50 / glucagon.

10. PATIENT TEACHING

Roll vial; eat consistent meals; inject 15–30 min before meals depending on rapid vs regular component.

11. NURSING ACTION

Never mix premixed with other insulins.

12. NGN CUE

Client on 70/30 BID skips lunch → mid-afternoon BG 52 with diaphoresis = peak hypoglycemia.

13. PRIORITY QUESTION

Which client is the best candidate for 70/30 insulin?
A. New T1DM with variable shift work
B. **T2DM with consistent meal times and stable activity**
C. Pregnant client requiring tight control
D. ICU client on insulin drip

14. RATIONALE

B is correct. Premixed insulin demands a predictable schedule. **A** shift work = variable meals = dangerous. **C** pregnancy requires fine-tuned basal/bolus. **D** ICU titration requires IV regular only.

15. TEST-TAKING TIP

3. DOSE / ROUTE

1 mg IM/SQ adult; pediatric 0.5 mg if < 25 kg; nasal 3 mg one spray; repeat ×1 if no response in 15 min.

4. MUST-ASSESS

Airway, level of consciousness, glucose, last meal, available glycogen stores (alcoholics, anorexia → glucagon may fail).

5. MONITORING

BG q15min until stable; vital signs; mental status; vomiting risk.

6. MOST DANGEROUS ADVERSE EFFECT

Aspiration from vomiting upon awakening.

7. COMMON SIDE EFFECTS

Nausea, vomiting, rebound hyperglycemia, headache.

8. HOLD/NOTIFY

Doesn't work in starvation/liver disease — give IV D50 instead.

9. ANTIDOTE

N/A — glucagon IS the rescue.

10. TEACHING

Family training is essential. **Side-lying recovery position**. Follow with complex carb when alert.

11. NURSING ACTION

Reconstitute, inject IM/SQ, place client side-lying, recheck BG in 15 min, give complex carb after recovery.

12. NGN CUE

Unresponsive client, BG 32, no IV → give IM glucagon, position side-lying.

13. PRIORITY QUESTION

A nurse responds to a home health client unresponsive with BG 28 mg/dL. There is no IV access. The family has glucagon. What is the priority?
A. Call 911 then administer glucagon
B. **Administer 1 mg IM glucagon, position side-lying, then call 911**
C. Place oral glucose gel between cheek and gum
D. Wait for paramedics to start an IV

14. RATIONALE

B is correct. Severe hypoglycemia is time-sensitive; treat first, call simultaneously. **A** delays treatment. **C** oral

> *"70/30 = 70% slower / 30% faster." If the patient's life is chaotic, premixed is wrong.*

> glucose in an unresponsive client = aspiration. **D** waiting can be fatal.

15. TEST-TAKING TIP

> *Glucagon: "Unconscious + no IV = IM glucagon." Always position side-lying. Always follow with food.*

CARD · 07

IV Dextrose 50% (D50)

Concentrated glucose for severe hypoglycemia

EMERGENCY · VESICANT

1. MECHANISM

Rapidly raises serum glucose by direct infusion.

2. WHY GIVEN

Unresponsive severe hypoglycemia with IV access; also added to insulin drip when BG reaches 200 in DKA.

3. DOSE

25 g (50 mL of 50%) IV push slowly through a **large patent vein**; pediatric D25 0.5–1 g/kg.

4. MUST-ASSESS

IV patency (extravasation = tissue necrosis), BG, mental status, K^+.

5. MONITORING

BG q15min; signs of infiltration; reassess mental status.

6. MOST DANGEROUS ADVERSE EFFECT

Tissue necrosis from extravasation; rebound hypoglycemia if no follow-up food.

7. COMMON SIDE EFFECTS

Local irritation, hyperglycemia, hypokalemia, fluid shifts.

8. HOLD/NOTIFY

Don't give without confirmed IV patency. Notify if no improvement after 1 dose.

9. ANTIDOTE

N/A.

10. TEACHING

After alertness — provide complex carb + protein (cheese & crackers).

11. NURSING ACTION

CARD · 08

Metformin

Biguanide · Glucophage · first-line T2DM

HIGH RISK · CONTRAST/RENAL

1. MECHANISM

Decreases hepatic glucose production, increases insulin sensitivity, decreases intestinal glucose absorption. Does *not* stimulate insulin release.

2. WHY GIVEN

First-line T2DM, prediabetes, PCOS-related insulin resistance.

3. DOSE

Start 500 mg PO with meals; titrate to max 2000–2550 mg/day.

4. MUST-ASSESS

- **eGFR ≥ 30 mL/min** (contraindicated < 30; reduce dose 30–45)
- Liver function
- Alcohol use
- Upcoming **iodinated contrast** imaging
- Heart failure, sepsis, hypoxia (lactic acidosis risk)

5. MONITORING

eGFR/creatinine annually; B12 yearly (deficiency over time); lactate if symptomatic.

6. MOST DANGEROUS ADVERSE EFFECT

Lactic acidosis — muscle aches, weakness, abdominal pain, hyperventilation, drowsiness.

7. COMMON SIDE EFFECTS

GI upset, diarrhea, metallic taste, decreased B12, weight neutral/loss.

8. HOLD/NOTIFY

Use 18–20G IV in antecubital ideally; flush before & after; reassess BG q15min; recurrent hypoglycemia → maintenance D10 infusion.

12. NGN CUE

Post D50 push, site becomes pale, swollen, painful → infiltration → stop, elevate, warm compress.

13. PRIORITY QUESTION

A nurse administers D50 25 g IV push for hypoglycemia. The IV site becomes pale and swollen. What action is the priority?
A. **Stop the infusion, leave the catheter, and notify provider**
B. Continue the push slowly
C. Flush vigorously with saline
D. Remove the IV and apply ice

14. RATIONALE

A is correct. Stop infusion immediately. Leave catheter in place for possible antidote infusion (e.g., hyaluronidase). **B** worsens injury. **C** flushing pushes the irritant into tissue. **D** ice causes vasoconstriction in non-vesicant extravasations; for dextrose, leave catheter for assessment first.

15. TEST-TAKING TIP

D50 = "conscious AND IV = D50. Unconscious, no IV = glucagon."

Hold 48 hr before & 48 hr after iodinated contrast, resume only after kidney function confirmed; hold for sepsis, hypoxia, surgery, dehydration.

9. ANTIDOTE

No specific antidote; severe lactic acidosis → hemodialysis.

10. TEACHING

Take **with food**. Limit alcohol. Report unusual fatigue/muscle pain. Doesn't cause hypoglycemia alone.

11. NURSING ACTION

Verify renal function and contrast schedule before each dose in hospital.

12. NGN CUE

T2DM client to receive CT with contrast tomorrow → hold metformin starting today.

13. PRIORITY QUESTION

A client taking metformin reports muscle aches, deep rapid breathing, and abdominal pain. Which lab should the nurse review first?
A. HbA1c
B. CBC
C. **Serum lactate and bicarbonate**
D. Liver enzymes

14. RATIONALE

C is correct. Symptoms suggest lactic acidosis; lactate >5 with low pH/bicarb confirms. **A** reflects long-term control. **B** doesn't show lactic acidosis. **D** is monitored but not first.

15. TEST-TAKING TIP

"Metformin + contrast = Mistake." Anything that causes hypoxia, hypoperfusion, or kidney injury increases lactic acidosis risk → hold.

CARD · 09

Sulfonylureas

glipizide · glyburide · glimepiride

HIGH RISK · HYPOGLYCEMIA

1. MECHANISM

Stimulate pancreatic beta cells to release more insulin.

CARD · 10

GLP-1 Receptor Agonists

semaglutide (Ozempic, Wegovy) · liraglutide (Victoza, Saxenda) · dulaglutide · tirzepatide

TEACHING-HEAVY · COMMON

1. MECHANISM

2. WHY GIVEN

T2DM add-on or alternative to metformin.

3. DOSE

Glipizide 5 mg PO daily 30 min before breakfast; glyburide 2.5–5 mg.

4. MUST-ASSESS

Sulfa allergy, kidney/liver function, age (avoid glyburide in elderly), alcohol use.

5. MONITORING

BG, especially fasting; HbA1c; weight.

6. MOST DANGEROUS ADVERSE EFFECT

Prolonged hypoglycemia — can last 24–48 hr; hospitalize for severe cases.

7. COMMON SIDE EFFECTS

Weight gain, hypoglycemia, GI upset, photosensitivity.

8. HOLD/NOTIFY

Hold if hypoglycemic, NPO, or with sulfa allergy.

9. ANTIDOTE

Glucose; octreotide for refractory sulfonylurea-induced hypoglycemia.

10. TEACHING

Take 30 min before breakfast. Don't skip meals. Avoid alcohol (disulfiram-like reaction). Sun protection.

11. NURSING ACTION

Monitor BG carefully; especially after dose increase or renal decline.

12. NGN CUE

85-yr-old on glyburide with new AKI, BG 48 → admit; hypoglycemia may persist 24+ hr.

13. PRIORITY QUESTION

An older adult on glyburide presents with BG 42 mg/dL. After initial glucose, the nurse should anticipate which action?
A. Discharge home after BG > 70 mg/dL
B. Resume glyburide with next meal
C. **Admit for observation due to prolonged drug half-life and risk of recurrent hypoglycemia**
D. Switch to insulin glargine immediately

14. RATIONALE

Mimic GLP-1 incretin: ↑ glucose-dependent insulin release, ↓ glucagon, slows gastric emptying, increases satiety.

2. WHY GIVEN

T2DM, weight loss, cardiovascular & renal protection.

3. DOSE

Semaglutide 0.25 mg SQ weekly, titrated up; liraglutide daily.

4. MUST-ASSESS

- Personal/family history of **medullary thyroid carcinoma or MEN2** (contraindicated)
- Pancreatitis history
- Gastroparesis
- Pregnancy status

5. MONITORING

HbA1c, weight, renal function, GI tolerance.

6. MOST DANGEROUS ADVERSE EFFECT

Acute pancreatitis — severe persistent abdominal pain radiating to back; medullary thyroid carcinoma (black box).

7. COMMON SIDE EFFECTS

Nausea, vomiting, diarrhea, decreased appetite, injection site reaction, gallstones.

8. HOLD/NOTIFY

Hold for severe abdominal pain, persistent vomiting, suspected pancreatitis, or surgery (aspiration risk from gastric retention).

9. ANTIDOTE

No reversal — supportive care.

10. TEACHING

Inject same day each week (semaglutide). Eat smaller meals to limit nausea. Report severe abdominal pain. **NPO 1 week pre-procedure may be required**.

11. NURSING ACTION

Verify no thyroid CA history; teach injection technique.

12. NGN CUE

Pt on semaglutide presents with epigastric pain to back, lipase 800 → pancreatitis → discontinue.

13. PRIORITY QUESTION

Which finding is a contraindication to starting liraglutide?
A. BMI 32
B. **Family history of medullary thyroid carcinoma**

C is correct. Sulfonylurea hypoglycemia recurs for 24–48 hr; admission is standard, especially in older adults. **A & B** are unsafe. **D** is a long-term decision.

15. TEST-TAKING TIP

"Sul-FUN-yl-urea" → it's not fun in old, dehydrated, or renally impaired patients. Long hypoglycemia = admit.

C. HbA1c 8.2%
D. eGFR 75

14. RATIONALE

B is correct. Black-box warning for medullary thyroid carcinoma and MEN2 — contraindicated. Others are indications or not contraindications.

15. TEST-TAKING TIP

GLP-1 end in "-tide" or "-glutide." Think: "thyroid + pancreas + slow stomach."

CARD · 11

SGLT2 Inhibitors

empagliflozin (Jardiance) · dapagliflozin (Farxiga) · canagliflozin

HIGH RISK · EUGLYCEMIC DKA

1. MECHANISM

Block kidney's sodium-glucose cotransporter-2 → glucose dumped into urine.

2. WHY GIVEN

T2DM, heart failure (with or without DM), CKD.

3. DOSE

Empagliflozin 10–25 mg PO once daily.

4. MUST-ASSESS

- eGFR (varies by drug, often ≥ 20–30)
- Volume status
- UTI/genital infection history
- Hold for surgery/illness (DKA risk)

5. MONITORING

Renal function, BP, K^+, weight, signs of infection.

6. MOST DANGEROUS ADVERSE EFFECT

Euglycemic DKA (BG can be normal) and Fournier gangrene (perineal necrotizing fasciitis).

7. COMMON SIDE EFFECTS

UTIs, genital yeast, polyuria, hypotension, hypovolemia, hypoglycemia (when combined).

8. HOLD/NOTIFY

Hold 3 days before surgery; hold during severe illness, fasting, or volume depletion.

CARD · 12

DPP-4 Inhibitors

sitagliptin (Januvia) · saxagliptin · linagliptin

COMMONLY TESTED

1. MECHANISM

Inhibit DPP-4 enzyme that breaks down incretins → ↑ insulin release, ↓ glucagon (glucose-dependent).

2. WHY GIVEN

T2DM add-on.

3. DOSE

Sitagliptin 100 mg PO daily; reduce with renal impairment.

4. MUST-ASSESS

Renal function; pancreatitis history; heart failure (saxagliptin); joint pain.

5. MONITORING

HbA1c, renal function.

6. MOST DANGEROUS ADVERSE EFFECT

Pancreatitis; severe joint pain.

7. COMMON SIDE EFFECTS

Headache, URI symptoms, mild GI upset.

8. HOLD/NOTIFY

Severe abdominal pain → hold and notify.

9. ANTIDOTE

N/A.

10. TEACHING

9. ANTIDOTE

DKA: IV fluids + insulin even if BG is normal.

10. TEACHING

Drink adequate fluids. Perineal hygiene. Report fruity breath, nausea, abdominal pain even with normal BG. Watch for genital pain/swelling (Fournier).

11. NURSING ACTION

Monitor orthostatic BP; verify holds on surgical admission orders.

12. NGN CUE

Post-op T2DM client on empagliflozin: BG 145, lethargic, Kussmaul respirations, ketones in urine → euglycemic DKA.

13. PRIORITY QUESTION

A client on dapagliflozin reports perineal swelling, severe pain, and fever. Which action is the priority?
A. Administer acetaminophen
B. Apply warm compresses
C. **Notify the provider immediately and prepare for surgical consult**
D. Recommend better hygiene

14. RATIONALE

C is correct. Fournier gangrene is a surgical emergency; mortality is high without prompt debridement. Other options delay care.

15. TEST-TAKING TIP

SGLT2 end in "-flozin" → "flow-zin" = makes glucose flow out. Sugar in urine = bug food = UTIs/yeast.

Report severe abdominal pain. Weight-neutral. Low hypoglycemia risk alone.

11. NURSING ACTION

Adjust dose for renal function.

12. NGN CUE

Persistent epigastric pain on sitagliptin → check lipase.

13. PRIORITY QUESTION

Which medication class has the lowest risk of hypoglycemia when used as monotherapy?
A. Sulfonylureas
B. **DPP-4 inhibitors**
C. Rapid-acting insulin
D. Meglitinides

14. RATIONALE

B is correct. DPP-4 inhibitors are glucose-dependent, so they don't drive hypoglycemia. Sulfonylureas and meglitinides force insulin release; insulin itself can drop BG.

15. TEST-TAKING TIP

"-gliptin" = grip the enzyme that grips incretins. Weight-neutral. Pancreatitis is the cue.

CARD · 13

Thiazolidinediones (TZDs)

pioglitazone (Actos) · rosiglitazone (Avandia)

HIGH RISK · HF/BLADDER CA

1. MECHANISM

↑ Insulin sensitivity in muscle and fat by activating PPAR-γ.

2. WHY GIVEN

T2DM add-on, especially with insulin resistance/NAFLD.

3. DOSE

CARD · 14

Levothyroxine

Synthroid · Levoxyl · synthetic T4

TEACHING-HEAVY · LIFELONG

1. MECHANISM

Synthetic T4 → converts to T3 → restores metabolic rate.

2. WHY GIVEN

Hypothyroidism (Hashimoto's, post-thyroidectomy, congenital), myxedema coma.

Pioglitazone 15–45 mg PO daily.

4. MUST-ASSESS

LFTs, weight, edema, signs of HF, bladder cancer history, fracture risk in women.

5. MONITORING

LFTs at baseline; weight; signs of HF; HbA1c.

6. MOST DANGEROUS ADVERSE EFFECT

Heart failure exacerbation; bladder cancer (pioglitazone); fractures.

7. COMMON SIDE EFFECTS

Weight gain, edema, fluid retention, URI.

8. HOLD/NOTIFY

Hold for NYHA Class III/IV HF, rapid weight gain, edema, hematuria.

9. ANTIDOTE

N/A.

10. TEACHING

Daily weights; report >3 lb gain in a week; SOB; hematuria.

11. NURSING ACTION

Cardiovascular risk screen.

12. NGN CUE

Client on pioglitazone with 6 lb wt gain, crackles in lungs → suspect HF.

13. PRIORITY QUESTION

Which client should NOT receive pioglitazone?
A. T2DM with HbA1c 8.5%
B. **Client with NYHA Class III heart failure**
C. Client with NAFLD
D. Client with sulfa allergy

14. RATIONALE

B is correct. TZDs cause fluid retention → contraindicated in moderate-severe HF. **A** is the indication. **C** they may even help. **D** isn't a sulfa drug.

15. TEST-TAKING TIP

"-glitazone" = "gly-TANK-zone" → fluid TANK → HF risk.

3. DOSE

Average 1.6 mcg/kg PO daily; start low in elderly/cardiac (25–50 mcg).

4. MUST-ASSESS

- TSH, free T4 baseline
- Cardiac history (atrial fibrillation, angina)
- Bone density
- Pregnancy (dose needs increase)
- Concurrent meds (separate 4 hr from antacids, iron, calcium, PPIs)

5. MONITORING

TSH every 6–8 weeks until stable, then every 6–12 months.

6. MOST DANGEROUS ADVERSE EFFECT

Thyrotoxicosis / cardiac event if overdosed in elderly/CAD.

7. COMMON SIDE EFFECTS

Palpitations, weight loss, heat intolerance, insomnia (overdose); decreased bone density long-term.

8. HOLD/NOTIFY

HR > 100 sustained, chest pain → hold and notify.

9. ANTIDOTE

For overdose: beta-blocker for symptoms; supportive.

10. TEACHING

Same time each morning, 30–60 min before breakfast on empty stomach. Don't switch brands. Lifelong therapy. Don't stop suddenly. Increase dose in pregnancy.

11. NURSING ACTION

Take HR; assess for chest pain in cardiac patients; verify timing of dose with other meds.

12. NGN CUE

After dose increase, client has HR 118, tremor, weight loss, anxiety → over-replacement → notify provider, recheck TSH.

13. PRIORITY QUESTION

A 78-year-old client newly prescribed levothyroxine 100 mcg daily reports chest tightness and HR 122. Which is the priority?
A. Encourage hydration
B. **Hold the next dose and notify the provider**
C. Administer the dose and reassess in 1 hour
D. Recheck TSH next month

14. RATIONALE

B is correct. Elderly with CAD risk should start low and go slow. Symptoms = excessive cardiac demand. **A & D** don't address acute risk. **C** worsens the problem.

15. TEST-TAKING TIP

> *"Levo at sunrise, empty stomach." If patient is hyper-symptomatic, dose is too high. If hypo, dose is too low.*

CARD · 15

Methimazole

Tapazole · antithyroid (thionamide)

HIGH RISK · AGRANULOCYTOSIS

1. MECHANISM

Blocks thyroid peroxidase → ↓ T3/T4 synthesis.

2. WHY GIVEN

Hyperthyroidism (Graves'), pre-thyroidectomy preparation.

3. DOSE

5–20 mg PO TID initial; taper to maintenance.

4. MUST-ASSESS

Baseline CBC, LFTs, pregnancy (contraindicated 1st trimester — use PTU).

5. MONITORING

CBC with diff every 1–3 months; LFTs; TSH, free T4.

6. MOST DANGEROUS ADVERSE EFFECT

Agranulocytosis (sore throat, fever); hepatotoxicity.

7. COMMON SIDE EFFECTS

Rash, GI upset, hair loss, joint pain.

8. HOLD/NOTIFY

Hold for fever, sore throat, jaundice — STAT CBC and LFTs.

9. ANTIDOTE

G-CSF for severe agranulocytosis; supportive.

10. TEACHING

Report sore throat, fever, mouth ulcers, jaundice, dark urine immediately. Don't stop abruptly.

11. NURSING ACTION

Place agranulocytotic patient on neutropenic precautions.

CARD · 16

Propylthiouracil (PTU)

Antithyroid · thyroid storm · 1st trimester pregnancy

HIGH RISK · HEPATOTOXICITY

1. MECHANISM

Blocks T3/T4 synthesis AND blocks peripheral conversion of T4→T3 (unique vs methimazole).

2. WHY GIVEN

Thyroid storm, 1st trimester hyperthyroidism, methimazole intolerance.

3. DOSE

50–150 mg PO q8h.

4. MUST-ASSESS

LFTs, CBC, pregnancy trimester, symptoms of thyroid storm (fever, tachycardia, agitation).

5. MONITORING

LFTs (PTU has higher hepatotoxicity than methimazole) — black-box; CBC; thyroid panel.

6. MOST DANGEROUS ADVERSE EFFECT

Fulminant hepatic failure; agranulocytosis.

7. COMMON SIDE EFFECTS

Rash, GI upset, hair loss, taste changes.

8. HOLD/NOTIFY

Hold for jaundice, dark urine, RUQ pain, sore throat, fever.

9. ANTIDOTE

Supportive; possible liver transplant.

10. TEACHING

Report jaundice, dark urine, fatigue, RUQ pain, sore throat. Take with food.

11. NURSING ACTION

12. NGN CUE

Graves' pt on methimazole 2 weeks, presents with fever 101.5°F and sore throat → STAT CBC.

13. PRIORITY QUESTION

A client on methimazole calls reporting sore throat and fever for 2 days. The priority instruction is:
A. Take acetaminophen and rest
B. Stop methimazole and continue with primary care visit next week
C. **Hold methimazole and come to the clinic today for a CBC**
D. Take an extra dose of methimazole

14. RATIONALE

C is correct. Sore throat + fever on a thionamide = possible agranulocytosis (ANC < 500), a life-threatening complication. Same-day CBC required.

15. TEST-TAKING TIP

"METHimazole = METHod of mouth/throat warning." Always teach the sore-throat rule.

In thyroid storm: give PTU, then beta-blocker, then iodine (1 hr after PTU to block synthesis first).

12. NGN CUE

Pregnant 1st trimester pt newly switched to PTU → counsel about hepatotoxicity signs.

13. PRIORITY QUESTION

A pregnant client at 9 weeks gestation is started on PTU for Graves' disease. Which teaching point is most critical?
A. "Take with antacids."
B. **"Report yellowing of skin, dark urine, or right-upper abdominal pain immediately."**
C. "Avoid leafy greens."
D. "Take only when you feel symptomatic."

14. RATIONALE

B is correct. PTU's black-box warning is hepatotoxicity; pregnancy already alters liver. **A** antacids don't interact significantly. **C** no diet restriction. **D** would not control hyperthyroidism.

15. TEST-TAKING TIP

"PTU = Pregnant Trimester One." Methimazole everyone else (except 1st trimester or thyroid storm).

CARD · 17

Systemic Corticosteroids

prednisone · methylprednisolone · hydrocortisone · dexamethasone

HIGH RISK · MULTI-SYSTEM

1. MECHANISM

Suppress inflammation and immune response; replace cortisol; ↑ gluconeogenesis.

2. WHY GIVEN

Asthma/COPD exacerbations, autoimmune disease, transplant, allergic reactions, adrenal insufficiency, cerebral edema.

3. DOSE

Variable. Prednisone 40–60 mg/day burst for asthma; hydrocortisone 100 mg IV stress dose.

4. MUST-ASSESS

CARD · 18

Desmopressin (DDAVP)

Synthetic ADH/vasopressin

HIGH RISK · HYPONATREMIA

1. MECHANISM

Synthetic vasopressin → kidney reabsorbs water → ↓ urine output, ↑ urine osmolality.

2. WHY GIVEN

Central diabetes insipidus, nocturnal enuresis, von Willebrand's/mild hemophilia A.

3. DOSE

Intranasal/PO/IV, variable.

4. MUST-ASSESS

Baseline Na^+ (must be normal), fluid intake pattern, cardiac/HF status, urine output and specific gravity.

- Active infection (TB, fungal)
- Glucose (will rise)
- BP (will rise)
- Electrolytes (low K^+, high Na^+)
- Mood/psych history
- Bone density

5. MONITORING

BG, BP, weight, mood, signs of infection, bone density, eye exams, GI bleed signs.

6. MOST DANGEROUS ADVERSE EFFECT

Adrenal crisis if abruptly stopped; immunosuppression masking infection; GI bleed.

7. COMMON SIDE EFFECTS

Cushingoid (moon face, buffalo hump, central obesity), hyperglycemia, mood changes, insomnia, peptic ulcer, osteoporosis, weight gain, thinning skin, edema.

8. HOLD/NOTIFY

Never abruptly stop after > 1–2 weeks of use — taper. Notify for signs of infection, GI bleed, severe mood.

9. ANTIDOTE

N/A — taper to allow HPA axis recovery.

10. TEACHING

Take with food; medical alert ID; **don't stop suddenly**; stress-dose during illness/surgery; calcium + vitamin D; flu/pneumococcal vaccines.

11. NURSING ACTION

Check glucose, BP, weight; provide GI prophylaxis (PPI/H2); avoid live vaccines.

12. NGN CUE

Pt on chronic prednisone stops abruptly → hypotension, fatigue, hyponatremia → adrenal crisis.

13. PRIORITY QUESTION

A nurse is teaching a client about prednisone for autoimmune disease. Which statement requires further teaching?
A. "I will take this with breakfast."
B. "I will report black stools."
C. **"If I feel better, I will stop the medication."**
D. "I will get a flu shot, but not the live nasal one."

14. RATIONALE

5. MONITORING

Na^+ daily, urine output q1–4h, weight, mental status.

6. MOST DANGEROUS ADVERSE EFFECT

Severe hyponatremia → seizures.

7. COMMON SIDE EFFECTS

Headache, nausea, water retention, hypertension, flushing.

8. HOLD/NOTIFY

Hold for Na^+ < 135 or signs of fluid overload.

9. ANTIDOTE

Stop drug, restrict fluids, hypertonic saline for symptomatic hyponatremia.

10. TEACHING

Limit fluid intake as prescribed (especially at night for enuresis). Report headache, confusion, seizures. Avoid extra OTC NSAIDs.

11. NURSING ACTION

Strict I&O; daily weight; monitor Na^+.

12. NGN CUE

Child on DDAVP nasal: now has headache, nausea, irritability, Na^+ 128 → hyponatremia → hold.

13. PRIORITY QUESTION

A client newly prescribed desmopressin reports headache, nausea, and confusion. The priority assessment is:
A. Pain scale
B. Pupillary response
C. **Serum sodium**
D. Liver function

14. RATIONALE

C is correct. Desmopressin holds water → dilutional hyponatremia → cerebral edema → headache, confusion, seizures.

15. TEST-TAKING TIP

"DDAVP = Don't Drink A Vast Pitcher." Hyponatremia is the killer.

C is correct (needs correction). Stopping suddenly causes adrenal crisis. Taper required. Other statements are accurate.

15. TEST-TAKING TIP

Steroid effects = "Cushings on the inside, Addisons if you stop." Glucose up, K^+ down, mood up & down.

CARD · 19

Fludrocortisone (Florinef)

Mineralocorticoid · Addison's disease

COMMONLY TESTED

1. MECHANISM

Synthetic mineralocorticoid → ↑ Na^+ retention, ↑ K^+ excretion, ↑ water retention.

2. WHY GIVEN

Primary adrenal insufficiency (Addison's), orthostatic hypotension.

3. DOSE

0.05–0.2 mg PO daily.

4. MUST-ASSESS

BP supine and standing, edema, weight, electrolytes, HF status.

5. MONITORING

Na^+, K^+, BP, weight, edema.

6. MOST DANGEROUS ADVERSE EFFECT

Severe hypokalemia, HF exacerbation.

7. COMMON SIDE EFFECTS

Edema, hypertension, headache, weakness.

8. HOLD/NOTIFY

Hold for severe edema, HF, hypokalemia.

9. ANTIDOTE

Diuretic; K^+ replacement.

10. TEACHING

Daily weight; report >3 lb in a week. Salt liberalization in some Addison's patients. Wear medical alert.

11. NURSING ACTION

CARD · 20

Octreotide

Sandostatin · synthetic somatostatin

COMMONLY TESTED · MULTI-USE

1. MECHANISM

Mimics somatostatin → suppresses GH, glucagon, insulin, gastrin, splanchnic blood flow.

2. WHY GIVEN

Acromegaly, carcinoid syndrome, severe diarrhea, esophageal variceal bleeding, sulfonylurea-induced hypoglycemia.

3. DOSE

Variable; 50–500 mcg SQ/IV depending on indication; LAR depot monthly.

4. MUST-ASSESS

Baseline BG (can swing either way), gallbladder status, HR, vitals, GI status.

5. MONITORING

BG, electrolytes, gallbladder ultrasound long-term, GH/IGF-1 in acromegaly.

6. MOST DANGEROUS ADVERSE EFFECT

Gallstones, bradycardia, hyperglycemia or hypoglycemia.

7. COMMON SIDE EFFECTS

Nausea, abdominal pain, diarrhea, steatorrhea, injection site pain.

8. HOLD/NOTIFY

Hold for RUQ pain, severe bradycardia.

9. ANTIDOTE

Supportive.

10. TEACHING

Often combined with hydrocortisone in Addison's; check K^+ regularly.

12. NGN CUE

Client on fludrocortisone with BP 160/96, +2 pitting edema, K^+ 3.1 → too much med.

13. PRIORITY QUESTION

Which lab change suggests appropriate response to fludrocortisone?
A. Na^+ 128, K^+ 5.4
B. **Na^+ 138, K^+ 4.0**
C. Na^+ 152, K^+ 2.8
D. Na^+ 132, K^+ 5.9

14. RATIONALE

B is correct. Normalized Na^+ and K^+ = effective. **A & D** show under-treatment. **C** shows over-treatment.

15. TEST-TAKING TIP

"Fludrocortisone = 'flood' the body with Na & water. K^+ goes out the door."

Rotate SQ sites. Report RUQ pain (gallstones). Monitor BG.

11. NURSING ACTION

Bring to room temperature before SQ injection to reduce pain.

12. NGN CUE

Variceal bleeder on octreotide drip: HR drops to 48, BP stable → notify provider.

13. PRIORITY QUESTION

A client on octreotide for esophageal variceal bleed reports RUQ pain and nausea. The priority is:
A. Reduce dose
B. **Notify provider and assess for gallstones**
C. Administer antiemetic
D. Add acetaminophen

14. RATIONALE

B is correct. Octreotide reduces gallbladder motility → cholelithiasis. RUQ pain warrants imaging.

15. TEST-TAKING TIP

"Octreotide = Octopus of hormones — grabs them all." Slow gut, slow gallbladder, slow GH/insulin/glucagon."

02 Must-Not-Miss Safety Rules

PRINT THESE ON THE BACK OF YOUR BADGE

RULE 01

No food = No rapid insulin

Never give lispro/aspart/glulisine without the meal tray at the bedside. Onset is 10–15 min — hypoglycemia follows fast.

RULE 02

Hold insulin drip if $K^+ < 3.3$

Insulin shifts K^+ into cells. Replace potassium before resuming the drip in DKA. Dysrhythmias kill faster than DKA.

RULE 03

Hold metformin for contrast & sepsis

Hold 48 hr before/after iodinated contrast; hold for any state of hypoperfusion (sepsis, dehydration, surgery, HF, AKI). Lactic acidosis is the killer.

RULE 04

Never stop steroids abruptly

After > 1–2 weeks of systemic corticosteroids, taper to prevent adrenal crisis. Stress-dose during illness, surgery, or trauma.

RULE 05

Sore throat + thionamide = STAT CBC

Methimazole or PTU + fever/sore throat = possible agranulocytosis. Hold drug and obtain CBC the same day.

03 Medication Calculations

5 HIGH-YIELD SAFETY CALCULATIONS

CALC · 01 · INSULIN DRIP TITRATION

A DKA client weighs 70 kg. The provider orders regular insulin IV at 0.1 units/kg/hr from a bag of 100 units in 100 mL NS. What rate (mL/hr) will the nurse set on the pump?

```
Dose: 0.1 units/kg/hr × 70 kg = 7 units/hr
Concentration: 100 units / 100 mL = 1 unit/mL
Rate: 7 units/hr ÷ 1 unit/mL = 7 mL/hr
```

Answer: 7 mL/hr

Safety: Verify weight, dedicated IV line, prime tubing (insulin binds plastic), recheck BG q1h.

CALC · 02 · INSULIN DOSE FROM SLIDING SCALE

A client has BG 312 mg/dL pre-meal. Sliding scale states: BG 200–250 = 2 units, 251–300 = 4 units, 301–350 = 6 units, 351–400 = 8 units, > 400 = call provider. Standing dose is lispro 6 units. What total mealtime dose will the nurse give?

```
Sliding scale 301–350: 6 units
Standing meal dose: 6 units
Total: 6 + 6 = 12 units
```

Answer: 12 units lispro SQ

Safety: Verify dose with second RN; confirm meal at bedside; recheck BG 1 hr post-dose.

CALC · 03 · LEVOTHYROXINE WEIGHT-BASED DOSING

A 60 kg client with newly diagnosed hypothyroidism is to receive levothyroxine 1.6 mcg/kg/day. The drug is supplied as 100 mcg tablets. How many tablets per day?

```
Dose: 1.6 mcg/kg × 60 kg = 96 mcg/day
Rounded to available strength: 100 mcg
Tablets: 100 mcg ÷ 100 mcg/tab = 1 tablet
```

Answer: 1 tablet of 100 mcg PO daily

Safety: In elderly or cardiac patients, start at 25–50 mcg and titrate up; same time each morning on empty stomach.

CALC · 04 · HYDROCORTISONE STRESS DOSE

A client with adrenal insufficiency in septic shock is ordered hydrocortisone 50 mg IV q6h. The vial contains 100 mg/2 mL. How many mL per dose?

```
Available: 100 mg / 2 mL = 50 mg/mL
Dose: 50 mg ÷ 50 mg/mL = 1 mL
```

Answer: 1 mL IV every 6 hours

Safety: Check BG (will rise), assess BP response, daily weight, look for infection masking.

CALC · 05 · PEDIATRIC GLUCAGON

An unresponsive 6-year-old (weight 22 kg) has BG 28 mg/dL with no IV access. Order: glucagon 0.5 mg IM if < 25 kg; 1 mg IM if > 25 kg. Vial reconstitutes to 1 mg/mL. How many mL will the nurse administer?

```
Child weighs 22 kg (< 25 kg)
Dose: 0.5 mg
Concentration: 1 mg/mL
Volume: 0.5 mg ÷ 1 mg/mL = 0.5 mL
```

Answer: 0.5 mL IM

Safety: Place child side-lying (vomiting risk), recheck BG in 15 min, give complex carb when alert.

04 NGN-Style Items

MATRIX · BOW-TIE · SATA · PRIORITIZATION · CLOZE

MATRIX · MULTI-SPECIFIC

Scenario: A 58-year-old client with T2DM was admitted yesterday for pyelonephritis. Current medications: metformin 1000 mg PO BID, lisinopril 20 mg daily, atorvastatin 40 mg HS. Vitals: T 101.8°F, HR 112, BP 92/56, RR 22. Labs: WBC 18,000; creatinine 2.4 (baseline 1.0); BG 198; lactate 4.2. The provider has ordered a CT abdomen with contrast and IV antibiotics.

For each medication, determine whether the nurse should continue or hold today:

Medication	Continue	Hold
Metformin 1000 mg PO BID	○	●
Lisinopril 20 mg PO daily	○	●
Atorvastatin 40 mg HS	●	○
IV antibiotics	●	○
IV fluids (NS bolus)	●	○

Rationale: Hold metformin — sepsis, AKI (creatinine doubled), elevated lactate, and pending contrast all stack lactic acidosis risk. Hold lisinopril — ACE inhibitor + AKI + hypotension worsens kidney injury. Continue atorvastatin (no acute contraindication). Continue antibiotics and fluids (treat the cause).

BOW-TIE · HYPOTHESIS → ACTIONS/MONITORS

Scenario: A 16-year-old with T1DM is brought to the ED with nausea, vomiting, fruity breath, Kussmaul respirations, and BG 462 mg/dL. ABG: pH 7.18, HCO_3^- 12. Potassium 5.8 mEq/L. The nurse identifies the priority concern.

ACTIONS TO TAKE

- Start NS bolus 1 L
- Initiate regular insulin IV drip 0.1 unit/kg/hr
- Continuous cardiac monitoring
- Strict I&O / Foley

PRIORITY CONDITION

Diabetic Ketoacidosis with hyperkalemia and metabolic acidosis

PARAMETERS TO MONITOR

- BG q1h
- K^+ q2–4h (will fall fast)
- Anion gap closure
- Mental status / cerebral edema signs

Rationale: DKA management is fluids first, then insulin, with constant electrolyte vigilance. K^+ appears high but total body K^+ is depleted — once insulin shifts it intracellularly, hypokalemia is rapid. Cerebral edema is the deadliest pediatric DKA complication; lower BG no faster than 50–75 mg/dL/hr.

SELECT ALL THAT APPLY (SATA)

Question: A nurse is preparing to teach a client with newly diagnosed T2DM about empagliflozin (Jardiance). Which statements should the nurse include? *Select all that apply.*

- "You may notice you urinate more frequently."
- "Drink plenty of water during the day."
- "Call your provider if you have severe pain or swelling in your genital area."
- "You may need to stop this medication a few hours before your dental cleaning."
- "If you become ill or stop eating, call us before continuing this medication."
- "This medication will likely cause low blood sugar episodes."
- "Report nausea, vomiting, or unusual fatigue, even if your blood sugar is normal."

Rationale: SGLT2 inhibitors cause glucosuria → polyuria, UTIs, and Fournier gangrene risk. Hold during illness or fasting (euglycemic DKA). Skipping for dental cleaning is unnecessary; surgery requires holding 3 days. Hypoglycemia alone is uncommon (only with combo therapy).

PRIORITIZATION / ORDERED RESPONSE

Question: A client with adrenal crisis presents with BP 78/40, HR 132, lethargy, Na^+ 122, K^+ 6.1, glucose 52. **Place the following nursing actions in priority order (1 = first):**

1. Establish IV access with large-bore catheter
2. Administer hydrocortisone 100 mg IV push
3. Begin 0.9% NaCl with D5 fluid bolus

4. Place client on continuous cardiac monitor
5. Obtain cortisol and ACTH levels (after stabilization)

Rationale: Airway is stable; the killer here is circulatory collapse + hyperkalemia. IV access first → hydrocortisone replaces missing cortisol (treats the cause) → fluids with dextrose correct volume, Na^+, and BG → cardiac monitor for hyperkalemia → labs after stabilization. Hydrocortisone is given before lab draws if crisis is suspected (don't delay treatment for diagnostics).

CLOZE · DROP-DOWN

Scenario: A 78-year-old woman is admitted with confusion and a sodium of 121 mEq/L. She has recently been taking *(intranasal desmopressin)* for nocturnal enuresis. Complete the following statement by selecting the most appropriate options.

The client is most likely experiencing **[dilutional hyponatremia]** related to **[water retention from desmopressin]**. The priority intervention is to **[hold desmopressin and restrict fluids]**, and the nurse should monitor for **[seizures, headache, and changes in mental status]**.

Rationale: Desmopressin (synthetic ADH) makes the kidneys reabsorb water → dilutes serum Na^+. In elderly clients this drops sodium rapidly. Treatment: hold drug, restrict fluids; symptomatic hyponatremia (seizure, severe confusion) may require hypertonic 3% saline cautiously — correct no faster than 8–10 mEq/L in 24 hr to prevent osmotic demyelination.

05 Unfolding Case Study · NCJMM

ALL 6 CLINICAL JUDGMENT STEPS

0700 · Med-Surg Unit. Marlon Reyes, 64, T2DM × 14 years, admitted yesterday for community-acquired pneumonia. Home meds: **metformin 1000 mg BID, glipizide 10 mg daily, lisinopril 10 mg daily, atorvastatin 40 mg HS**. On admission: WBC 16.2, creatinine 1.8 (baseline 1.0), lactate 2.2, BG 142, A1C 7.6%. Started on IV ceftriaxone + azithromycin. Held home metformin per admit order. Continued home glipizide. NPO since 2200 last night for a possible CT later this morning.

0715 vitals: T 100.4°F · HR 104 · BP 96/58 · RR 22 · SpO_2 93% on 2 L NC · BG 48 mg/dL, capillary stick. Pt drowsy, diaphoretic, complains of shakiness, "feels off."

1 RECOGNIZE CUES

What is the nurse noticing?

- BG 48 mg/dL = severe hypoglycemia
- NPO + standing glipizide given = setup for hypoglycemia
- Drowsy, diaphoretic, shaky (sympathetic + neuroglycopenic signs)

2 ANALYZE CUES

Connecting the dots

Sulfonylureas (glipizide) stimulate insulin release for 12–24+ hr. With NPO status, AKI (reduced drug clearance), and infection-related stress, the dose is now disproportionate. Metformin was correctly held — now glipizide should be held

• Sepsis features: HR 104, BP 96/58, creatinine 1.8, low SpO_2, lactate slightly up

too. Sepsis + AKI also raises the question: is metformin still appropriate after this admission?

3 PRIORITIZE HYPOTHESES

Which problem first?

Severe hypoglycemia is the urgent threat — risk of seizure, fall, cardiac event. Sepsis is the underlying driver but treating BG comes first because hypoglycemia kills in minutes; sepsis is being treated. *Maslow: physiologic, airway-circulation tier; ABC after BG correction.*

4 GENERATE SOLUTIONS

Best options

If alert with swallow: 15 g fast carbs (4 oz juice or 3–4 glucose tabs) — but pt is NPO.
IV access present: D50 25 g IV push slowly through patent line.
No IV: Glucagon 1 mg IM, side-lying.
Then: hold glipizide, notify provider, ↑ frequency of BG checks, request orders for D10 maintenance and complex carbohydrate once NPO lifts. Consider transitioning to insulin while inpatient.

5 TAKE ACTION

Implementation

1. Place head of bed flat, side-rails up
2. Verify IV patency; D50 25 g IV push over 1–3 min
3. Recheck BG in 15 min
4. Notify provider — request hold on glipizide, transition to scheduled insulin, evaluate sepsis trajectory
5. Increase BG checks to q1h until stable 3 readings > 100
6. Document time, dose, response, provider notification

6 EVALUATE OUTCOMES

Did it work?

Effective: BG > 100 mg/dL within 15 min, mental status returns to baseline, vital signs stable, no recurrence in next hour, glipizide held, provider notified, transition plan in place.
Re-evaluate if: BG < 70 on recheck → repeat D50, start D10 infusion, consider octreotide 50 mcg SQ q8h for refractory sulfonylurea-induced hypoglycemia.

06 Red Flag Triggers

WHAT STOPS THE DOSE, TODAY

Sore throat + fever on methimazole or PTU
→ **Hold drug.** Obtain same-day CBC. Suspect agranulocytosis (ANC < 500).

K^+ < 3.3 on insulin drip
→ **Stop insulin.** Replace K^+ before resuming. Risk of fatal arrhythmia.

Severe abdominal pain on GLP-1 or DPP-4
→ **Hold drug.** Check lipase, amylase. Suspect acute pancreatitis.

Perineal pain + swelling + fever on SGLT2
→ **Emergent surgical consult.** Suspect Fournier gangrene.

Muscle aches + Kussmaul respirations on metformin
→ **Stop drug.** Check lactate, ABG, electrolytes. Lactic acidosis emergency.

RUQ pain + jaundice on PTU
→ **Hold.** STAT LFTs. Black-box hepatotoxicity.

Hypotension + hyponatremia + hyperkalemia in steroid-dependent patient

HR > 110 + tremor + insomnia on levothyroxine
→ **Hold dose.** Notify provider. Over-replacement; recheck TSH.

Confusion + Na^+ < 130 on desmopressin
→ **Hold drug.** Restrict fluids. Watch for seizures; possibly hypertonic saline.

→ **Adrenal crisis.** Hydrocortisone 100 mg IV STAT + NS bolus + D5.

07 Confusing Drugs · Side-by-Side

TESTED CONSTANTLY · LEARN THE DIFFERENCES

Regular Insulin vs NPH Insulin

	Regular (R)	NPH (N)
Appearance	Clear	Cloudy
Onset	30 min SQ · 15 min IV	1–2 hr
Peak	2–4 hr	4–12 hr
Duration	5–8 hr	14–24 hr
Route	SQ + **only IV insulin**	SQ only — never IV
DKA use	First-line (drip)	Not for DKA
Mixing	Draw R **before** NPH	Mix with R; never glargine

Rapid-acting Insulin vs Long-acting Insulin

	Rapid (lispro/aspart)	Long (glargine/detemir)
Use	Mealtime / correction	Basal coverage
Onset	10–15 min	1–2 hr
Peak	1 hr	**No peak**
Duration	3–4 hr	24 hr (degludec up to 42)
Mixing	OK with NPH	**Never mix**
Food rule	Meal must be present	Continue even without food (per provider)

DKA Insulin vs Basal Insulin

	DKA Insulin Drip	Outpatient Basal Insulin

Drug	Regular insulin IV	Glargine, detemir, degludec SQ
Indication	Acidosis + ketosis + hyperglycemia	Daily background coverage
Rate adjustment	q1h based on BG, K^+	Adjust based on fasting BG trend
Add dextrose when	BG ≤ 200 mg/dL	N/A
Stop when	Anion gap closed (not just BG normal); overlap with SQ insulin first	Provider-directed; never on a whim

Methimazole vs PTU

	Methimazole	PTU (propylthiouracil)
When preferred	Most hyperthyroid pts (potency, fewer doses, less hepatotoxic)	**1st trimester pregnancy, thyroid storm, methimazole intolerance**
Frequency	Once or twice daily	Three times daily
Black-box	Less hepatotoxic; teratogenic in 1st trimester	Severe hepatotoxicity, hepatic failure
Mechanism extra	Blocks synthesis only	Blocks synthesis + **peripheral T4→T3 conversion**
Both share	Agranulocytosis risk · sore throat & fever rule · CBC + LFT monitoring	

Metformin vs Sulfonylureas

	Metformin	Sulfonylureas (glipizide, glyburide)
Mechanism	↓ Hepatic gluconeogenesis · ↑ insulin sensitivity	Stimulate pancreas to release more insulin
Hypoglycemia	Rare alone	**Common, prolonged in elderly/renal**
Weight	Neutral / loss	Gain
Renal	Hold < eGFR 30; hold for contrast	Risk of accumulation in AKI
Killer effect	Lactic acidosis	Prolonged hypoglycemia 24–48 hr

Hydrocortisone vs Fludrocortisone

	Hydrocortisone	Fludrocortisone
Class	Mainly glucocorticoid (some mineralocorticoid effect)	Mainly mineralocorticoid
Use	Adrenal crisis, anti-inflammatory, stress dose	Addison's maintenance, orthostatic hypotension
Key effect	↑ BG, ↑ BP, anti-inflammatory	↑ Na^+ retention, ↑ K^+ excretion
Toxicity	Cushingoid syndrome, GI bleed, infection masking	Edema, hypertension, hypokalemia

08 Visual Summary · Day 2

EVERYTHING YOU SHOULD REMEMBER TOMORROW MORNING

Diabetes & Endocrine, distilled.

A snapshot of the day's high-yield drugs, peaks, and pitfalls. Save this as a screensaver.

INSULIN TIMELINE · CRITICAL TO MEMORIZE

Rapid	Regular	NPH	Long
Onset 15m · Peak 1h · 3–4h	Onset 30m · Peak 2–4h · 5–8h	Onset 1–2h · Peak 4–12h · 14–24h	Onset 1–2h · NO peak · 24h

MEALTIME INSULINS

- Rapid: meal must be present
- Regular: 30 min before meal; only IV insulin
- NPH: snack at peak window
- Long: never mix; same time daily

HYPOGLYCEMIA RESCUE

- Awake + IV: D50 25g IV push
- Awake, no IV: 15g fast carbs
- Unconscious, no IV: Glucagon 1mg IM, side-lying
- Follow up: complex carb + protein

ORAL ANTIHYPERGLYCEMICS

- Metformin: lactic acidosis; hold for contrast
- Sulfonylureas: long hypoglycemia in elderly
- DPP-4 (-gliptins): pancreatitis
- TZDs (-glitazones): HF, bladder CA

INJECTABLE NON-INSULINS

- GLP-1 (-tides): thyroid CA, pancreatitis, NPO pre-op
- SGLT2 (-flozins): UTI, euglycemic DKA, Fournier
- Octreotide: gallstones, bradycardia

THYROID TRIAD

ADRENAL & PITUITARY

Levothyroxine: AM empty stomach, lifelong, ↑in pregnancy

Methimazole: sore throat = STAT CBC

PTU: 1st trimester + thyroid storm; hepatotoxicity

Corticosteroids: never abrupt stop; stress dose

Hydrocortisone: adrenal crisis rescue 100 mg IV

Fludrocortisone: Addison's; watch K^+ & edema

DDAVP: hyponatremia killer; restrict fluids

TOP 5 NCLEX TRAPS

Lispro without a meal tray

Metformin + contrast

Sudden steroid stop

Sore throat on thionamide ignored

Mixing glargine with anything

NCJMM QUICK LOOP

Recognize: sweat, shake, drowsy, BG < 70

Analyze: drug → mechanism → timing

Prioritize: rescue before workup

Solutions: route depends on consciousness + IV

Act: 15g carbs / D50 / glucagon

Evaluate: recheck BG in 15 min

NCLEX-RN Pharm Mastery · Day 02

Diabetes & Endocrine · Application-level review · Aligned to the 2026 NCLEX-RN® Test Plan