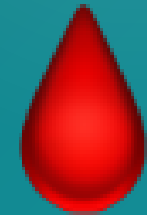


ENDOCRINE SYSTEM • PHARM FOCUS

Type 1 *Diabetes* Mellitus



The Insulin-Dependent Autoimmune Blueprint — NGN NCLEX 2026

Category: **Physiological Adaptation**

Onset: **Usually < 30 yrs**

Etiology: **Autoimmune**

Lifetime Tx: **Insulin required**

DEFINITION & OVERVIEW

01 What Is Type 1 Diabetes?



THE DISEASE

Autoimmune Destruction

The body's immune system attacks and destroys the **beta cells of the pancreas** (Islets of Langerhans), causing absolute insulin deficiency.

WHY IT MATTERS

No Insulin = No Glucose Entry

Without insulin, glucose cannot enter cells. The body starves while blood glucose climbs dangerously high —

CLINICAL REALITY

Insulin-Dependent For Life

Oral hypoglycemics **do NOT work** — there is no insulin to stimulate. Patients require **exogenous insulin** (subcut or pump) every day, for life.

cells break down fat for fuel,
producing **ketones**.



02 PATHOPHYSIOLOGY

The Cascade to Crisis

1

Autoimmune trigger (genetic + viral) → T-cells attack pancreatic beta cells



2

Beta cells destroyed → insulin production *stops* (absolute deficiency)



3

Glucose **cannot enter cells** → cells starve while serum glucose rises



Hyperglycemia → **osmotic diuresis** → polyuria, polydipsia, dehydration

5

Body breaks down **fat for energy** → free fatty acids → liver makes **ketones**

6

Ketoacidosis → metabolic acidosis → Kussmaul respirations, fruity breath



DIABETIC KETOACIDOSIS (DKA) — Medical Emergency

SIGNS & SYMPTOMS

03

Classic Presentation vs Emergency



CLASSIC "3 P'S"

Early / Classic Signs



Polyuria — excessive urination from osmotic diuresis

DKA RED FLAGS

Late / Severe Signs

-  **Polydipsia** — excessive thirst (body trying to rehydrate)
-  **Polyphagia** — excessive hunger (cells are starving)
-  **Weight loss** — despite eating more; fat & muscle catabolism
-  **Fatigue & weakness** — cells lack fuel
-  **Blurred vision** — glucose-induced lens swelling
-  **Glucose > 200 mg/dL** random or ≥ 126 fasting

-  **Kussmaul respirations** — deep, rapid breathing (blowing off CO_2)
-  **Fruity / acetone breath** — exhaled ketones
-  **Nausea, vomiting, abdominal pain** — ketosis
-  **Hot, dry, flushed skin** — dehydration
-  **Altered LOC** → confusion → coma
-  **Hypotension, tachycardia** — volume depletion
-  Labs: pH < 7.35, HCO_3^- < 15, ketones+, BG > 300

 **DKA is life-threatening — treat with IV fluids FIRST, then insulin drip & K^+ monitoring**

PRIORITY NURSING INTERVENTIONS

04 Clinical Actions in Order



A Airway, Breathing, Circulation



Monitor Glucose

→ **Fingerstick AC & HS** (before meals, at bedtime)

- **Assess LOC** — DKA/hypoglycemia both impair consciousness
- **Monitor respirations** — Kussmaul = metabolic acidosis
- **IV access** — two large-bore lines for DKA
- **0.9% NS bolus first** for severe dehydration

- Every **1 hour** during insulin drip
- Target: **80–130 mg/dL** fasting; < 180 postprandial
- Check **HgbA1c** every 3 months (goal < 7%)



Administer Insulin

- Rotate **subcut sites** within same region (abdomen absorbs fastest)
- **Never mix** glargine (Lantus) or detemir with any other insulin
- Only **Regular insulin** is given IV
- Roll (never shake) NPH to mix — cloudy is normal



Watch Potassium (DKA)

- Initial K⁺ may appear **high** (acidosis shifts K⁺ out of cells)
- Insulin drives K⁺ back **into cells** → can cause hypokalemia
- **Do NOT give insulin if K⁺ < 3.3** — replace potassium first
- Continuous cardiac monitoring for dysrhythmias



Treat Hypoglycemia (< 70)

- **Rule of 15:** 15 g carbs → recheck in 15 min
- Conscious: 4 oz juice, 3 glucose tabs, or 1 tbsp honey
- Unconscious: **D50 IV push** OR **glucagon IM**
- Follow with complex carb + protein snack



Rehydrate in DKA

- **1st:** 0.9% NS at 15–20 mL/kg/hr
- **2nd:** Switch to 0.45% NS once BP stable
- Add **D5½NS** when BG reaches ≈ 250 (prevent hypoglycemia)

→ Strict I&O — watch for cerebral edema (pediatric risk)



05 PHARMACOLOGY Insulin — Types, Timing & Rules

TYPE	NAME(S)	ONSET	PEAK	DURATION	KEY NURSING NOTE
RAPID <i>Clear</i>	Lispro (Humalog) Aspart (NovoLog) Glulisine (Apidra)	15 min	1 hr	3–4 hrs	Give with or just before meals — food must be on the tray.
SHORT <i>Clear</i>	Regular (Humulin R, Novolin R)	30–60 min	2–3 hrs	5–7 hrs	The ONLY insulin given IV . Used in DKA drips. Give 30 min before meals.
INTERMEDIATE <i>Cloudy</i>	NPH (Humulin N, Novolin N)	1–2 hrs	4–12 hrs	12–18 hrs	Roll between palms to mix — never shake. Can be mixed with Regular.
LONG <i>Clear</i>	Glargine (Lantus, Toujeo) Detemir (Levemir) Degludec (Tresiba)	1 hr	NO peak	24 hrs	NEVER mix with other insulins. Once-daily basal dose.

Mixing Insulins — "RN → Clear Before Cloudy"

When mixing NPH (cloudy) and Regular (clear) in **one syringe**, always draw up the **CLEAR first** to prevent contaminating the short-acting vial with the intermediate.



DKA Emergency Protocol

Priority sequence: Fluids → Insulin → Potassium → Correct acidosis

1 Fluids FIRST

- ▶ 0.9% NS bolus 15–20 mL/kg/hr
- ▶ Switch to 0.45% NS when stable
- ▶ Add D5 when BG ≈ 250 mg/dL

2 Insulin Drip

- ▶ Regular insulin IV (0.1 U/kg/hr)
- ▶ Lower BG by 50–75/hr only
- ▶ Too fast = cerebral edema

3 Monitor K⁺

- ▶ HOLD insulin if K⁺ < 3.3
- ▶ Replace K⁺ in IV fluids
- ▶ Continuous cardiac monitor

06 NCLEX TEST TRAPS

Where Students Lose Points



Hypoglycemia vs Hyperglycemia

~~"Fruity breath = low sugar"~~

VS

Fruity breath = HIGH (DKA)

Key cue: Cold, Clammy = need Candy (low). Hot, Dry = Sugar's High.



DKA First Action

~~Give insulin immediately~~

VS

IV fluids (NS) first

Why: Dehydration kills first. Fluids restore perfusion before insulin shifts K⁺ into cells.



Which Insulin Is IV-Safe?

~~NPH or Lantus IV~~

VS

Regular insulin ONLY

Remember: "R" is Right for IV. All others are subcut only.



Sick Day Rule

~~Hold insulin when ill~~

VS

CONTINUE insulin, may need MORE

Why: Stress hormones raise BG during illness. Skipping insulin → DKA.



Mixing Order

~~NPH first, then Regular~~

VS

Regular first (Clear → Cloudy)



Exercise & Snacks

~~Skip snack before exercise~~

VS

Eat carb snack pre-exercise

Mnemonic: "RN" — Regular before NPH. Clear Before Cloudy.

Why: Exercise ↑ insulin sensitivity → risk of hypoglycemia.

Somogyi Phenomenon

Rebound hyperglycemia

Drops ~2–3 AM → Rises by morning

Too much evening insulin → nighttime **hypoglycemia** → body releases counter-regulatory hormones → **morning hyperglycemia**.

Intervention: *DECREASE* evening insulin OR add bedtime snack.

Dawn Phenomenon

Natural AM hormone surge

Normal overnight → Rises pre-dawn (5–8 AM)

Natural release of GH, cortisol, and glucagon in early morning → **insulin resistance** → BG rises without prior hypoglycemia.

Intervention: *INCREASE* evening/basal insulin OR move NPH later.

07 PATIENT EDUCATION Lifelong Self-Management



Sick Day Rules



Site Rotation

Never stop insulin — even if not eating. Check BG & ketones **every 4 hrs**. Drink sugar-free fluids. Call HCP if vomiting > 4 hrs or ketones moderate/large.

Rotate within same region to keep absorption consistent. **Abdomen** absorbs fastest & most reliable; then arms, thighs, buttocks. Avoid lipohypertrophy.



Insulin Storage

Unopened vials: refrigerated (36–46°F). **In-use vials:** room temp up to 28 days. NEVER freeze. Inject at room temperature to prevent pain/lipodystrophy.



Carbohydrate Counting

Match mealtime insulin to carb intake (**1 unit per 10–15 g carbs**, individualized). Consistent meal times. Limit simple sugars except for hypoglycemia treatment.



Exercise Safety

Check BG **before, during, after**. Hold exercise if BG > 250 with ketones. Carry a **fast-acting carb** always. Avoid injecting into a limb you're about to exercise.



Medical ID & Emergency

Wear **medical alert bracelet** at all times. Teach family to recognize hypoglycemia and administer **glucagon IM/SQ**. Keep glucose tabs within reach.



Foot Care

Inspect feet **daily** (use mirror). Never walk barefoot. Wash with warm (not hot) water, pat dry, moisturize (not between toes). Cut nails straight across.



Routine Screening

Annual: **dilated eye exam**, **urine microalbumin**, lipid panel, foot exam. **A1C every 3 months**. Dental exam twice yearly. Flu & pneumonia vaccines.



08

NCJMM CLINICAL JUDGMENT

Apply It: A Bedside Scenario

NCJMM

Scenario: A 19-year-old with T1DM is admitted with 3 days of flu. VS: BP 92/58, HR 124, RR 32 deep & rapid. Breath has a fruity odor. Client is drowsy but arousable. Labs: glucose 548 mg/dL, pH 7.22, HCO_3^- 12, K^+ 5.8, ketones large.

01

Recognize Cues

Kussmaul breathing, fruity breath, hyperglycemia, metabolic acidosis (pH ↓, HCO_3^- ↓), ketones, hypotension, tachycardia, altered LOC.

02

Analyze Cues

Pattern = DKA triggered by illness. K^+ appears high but is depleted intracellularly — will drop fast with insulin.

03

Prioritize

1st — 0.9% NS bolus. **2nd** — cardiac monitor + K^+ trend. **3rd** — Regular insulin drip. **4th** — add D5 when BG ≈ 250.

04

Evaluate

Expect: BG ↓ 50–75/hr, HR normalizes, LOC clears, pH ≥ 7.30, urine output ≥ 30 mL/hr, K^+ stays 3.5–5.0.

09

MEMORY BOOSTERS

Mnemonics That Stick



3 P's

The Classic Triad of DM

- P** — Polyuria
- P** — Polydipsia
- P** — Polyphagia

R · N

Insulin Mixing Order

- R** egular first (clear)
- N** PH second (cloudy)
- "Clear before Cloudy"

Hot & Dry

BG Is HIGH (Hyperglycemia)

- "Hot & dry = sugar high"
- "Cold & clammy = need some candy"
- Fast way to differentiate at bedside

15 / 15

Hypoglycemia Rule

- 15** g fast-acting carb
- Wait **15** minutes
- Recheck — repeat if still < 70

DKA

Priority Action Order

- D** — Dehydration (fluids FIRST)
- K** — Potassium before insulin
- A** — Add insulin drip

ONLY R

The IV-Compatible Insulin

- R** egular is the ONLY insulin that can go IV
- All others: subcut only
- No NPH, no Lantus IV — ever

NGN NCLEX 2026 STUDY RESOURCE • **TYPE 1 DIABETES MELLITUS** • ENDOCRINE / PHARM