DKA MANAGEMENT IN RESOURCE LIMITED SETTINGS : a case report from a rural Zambian clinic

INTRODUCTION

Diabetic ketoacidosis (DKA) is a life-threatening complication of diabetes mellitus requiring urgent recognition and management. In resource-limited settings, lack of advanced monitoring tools—electrolyte analysers, syringe pumps, and bedside ketone meters—poses significant challenges to standard DKA protocols.

This case describes pragmatic, physiology-based DKA management based on the author's experience as a house officer in a resource-limited hospital in Zambia, using approaches commonly practiced by doctors working in rural areas across Africa.

Such approaches are highly relevant to rural and remote healthcare settings globally, where limited resources, delayed transfers, or lack of immediate high-dependency care necessitate adaptable, safe management strategies.

CASE DESCRIPTION

•24-year-old female with type 1 diabetes mellitus ran out of insulin.
•Symptoms: Polyuria, polydipsia, vomiting, lethargy x 3 days.
•Signs
- lethargic, Kussmaul breathing.acetone breath
- BP: 90/60 mmHg, HR: 120 bpm. Rr 32
- Dry mucous membranes, sunken eyes.
- Delayed capillary refill >3 seconds.
- Cold extremities, weak peripheral pulses.
- Deep sighing respiration, acetone breath.
- CBG: 28 mmol/L, urine dipstick: 3+ ketonuria.

•No access to serum electrolytes or blood ketones—clinical assessment guided management.

Diagnosis= Diabetic ketoacidosis

MANAGEMENT PRINCIPLES

1. Insulin. 2. fluid replacement. 3. potassium supplementation

- guided by ECG changes, urine ketone testing, and close clinical monitoring.

INSULIN

IV Insulin Infusion (Gravity Drip Method):
- Mix 50 units of soluble insulin in 50 mL of 0.9% NaCl (1 unit/mL concentration).
- Infuse at 0.1 units/kg/hour (e.g., 7 mL/hour for a 70 kg patient). To do this:
- Adjust drops per minute based on IV set drop factor:

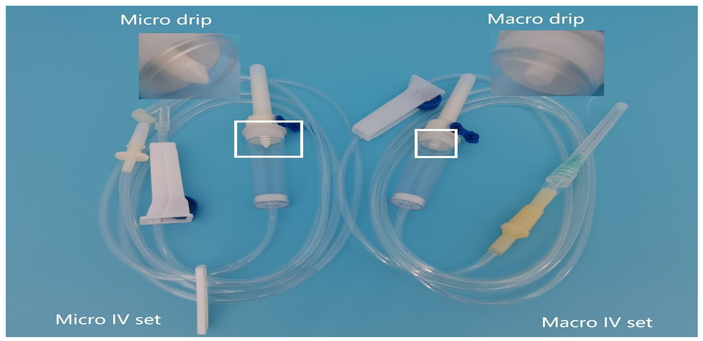
•**Pediatric IV set (60 drops/mL):** (7 mL × 60 drops/mL) ÷ 60 min = 7 drops/min or
•**Adult IV set (20 drops/mL):** (7 mL × 20 drops/mL) ÷ 60 min = ~2-3 drops/min

- Monitor capillary blood glucose (CBG) hourly (or 2-hourly if limited glucometer strips).
Target glucose drop: ~3 mmol/L/hour.

- Adjust insulin dose by **±1–2 units/hour** if not achieving target.

Clinical improvement: improved consciousness, haemodynamics, and reduced vomiting.
Urine ketones: resolution indicated by **< 2+**.
- When ketosis resolved ➔ switch to usual subcutaneous regimen (e.g., rapid-acting insulin with meals + long-acting insulin).

- Assess for ongoing ketosis through clinical signs (persistent nausea, abdominal pain, tachypnea).



FLUID MANAGEMENT

- Insert a urinary catheter to closely monitor urine output.
- Initial resuscitation bolus: 500 mL 0.9% NaCl IV over 15–30 min.
- Reassess perfusion and hydration status: If hypovolaemic, repeat bolus.

Maintenance fluid:
- Continue **0.9% NaCl**, adjust volume to achieve **urine output 0.5–1 mL/kg/hr**.
- Avoid fluid overload (respiratory distress, basal lung crackles, jugular venous distension). —especially in elderly or cardiac/renal compromise.

Once **blood glucose <13 mmol/L**, start **10% dextrose IV at 125 mL/hr**:
- Adjust rate according to CBG readings.
- Continue insulin alongside dextrose to resolve ketosis.
- Stop dextrose once patient is eating.

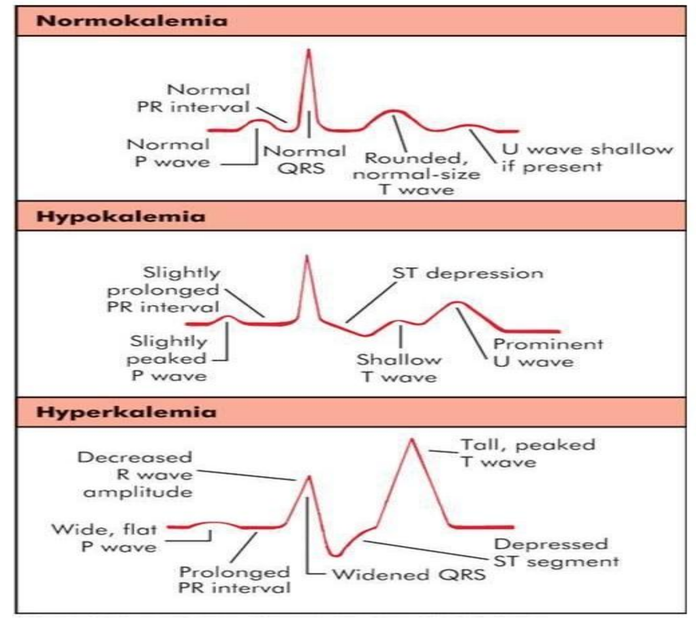
Clinical signs of adequate resuscitation:
- Improved mental status.
- BP stabilization (>90/60 mmHg).
- Warm extremities, improved capillary refill time (<2 sec).
- Increased urine output, improved skin turgor

POTASSIUM

- Initial serum potassium often normal or high, but falls rapidly with insulin therapy and rehydration.
- Ideally, place patient on **cardiac monitor**.If unavailable, perform **12-lead ECG hourly or 2-hourly**.
- Monitorfor ECG signs of hypokalemia (flattened T waves, ST depression, U waves) and hyperkalemia (peaked T waves, widened QRS, bradycardia).

- **Do NOT give K^+ if anuric or ECG shows hyperkalaemia.**

If **passing urine and ECG is normal**:
- Add **20 mmol KCl** to every **1000 mL 0.9% NaCl**.
- **Maximum infusion rate: 500 mL/hr** (i.e., **10 mmol K^+/hr**).



ECG EKG Changes in Hypokalemia and Hyperkalemia

CONCLUSION

This pragmatic, physiology-based DKA management uses minimal resources, making it feasible in resource-limited settings. Advantages include flexibility and prevention of hypoglycaemia, but disadvantages include inaccurate urine ketone monitoring, and undetected electrolyte imbalances. Limited escalation capacity highlights the need for early referral and protocol standardisation.

Shahin Saif. - MBChB, MRCP, DTM&H, MHSc. IHM
GPST2 – Portsmouth Hospitals University NHS Trust
Email: drshahinsaif@gmail.com