30. Diabetic Ketoacidosis (DKA) / Hyperosmolar Hyperglycaemic State (HHS) Algorithm

This clinical pathway is intended to supplement, rather than substitute for, professional judgment and may be changed depending upon a patient's individual needs. Failure to comply with this pathway does not represent a breach of the standard of care.

Begin 29. Hyperglycaemia Algorithm

Serum Ketones >1.5 mmol/L
+
(pH < 7.3 OR HCO₃⁻ < 18mmol/L)

Diabetes Ketoacidosis

RBS > 33.3mmol/L
+
Serum Osmolality > 320mOsm/kg
+
pH > 7.3
Hyperosmolar Hyperglycaemic State (HHS)

Normal VBG
+
Serum Ketones < 1.5mmol/L
+
Serum Osmolality < 320mOsm/kg

Uncomplicated Hyperglycaemia

- **Identify and Treat precipitating illness;** consider ACS, Sepsis
- **Consult a Physician** and continue with the Algorithm

Go to
29. Hyperglycaemia Algorithm

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1. Fluid Protocol

(Ringer's Lactate)

If **Hypovolaemic Shock**, give fluid boluses at 15 to 20mL/kg; Repeat until BP stable. Consider inotropes if no response to fluid resuscitation.

If **Hypovolaemic but No Shock**; Give **15 - 20 mL/Kg/hr** Ringer's Lactate

DO NOT give > 50 mL/kg of isotonic solution in the **first 4 hours** of treatment because of the risk of **cerebral oedema.**

If **CORRECTED** serum sodium is **< 135 mmol/L**, continue treatment with Ringer's Lactate at **250-500 mL/hour**

If **CORRECTED** serum sodium is **≥ 135 mmol/L**, continue treatment with **0.45% NaCl** instead of Ringer's Lactate at **250-500 mL/hour**

Success in fluid therapy is reflected by an improvement in hemodynamic and hydration status and pH values, a satisfactory urine output of **1 to 2 mL/kg/hour**, and clinical progress.

2. Potassium Protocol

DO NOT give potassium if patient is **anuric** or **serum K⁺ > 5.3mmol/L**

Serum K⁺ (mmol/L)	Action
> 5.3	**DO NOT** give K⁺, **but** check potassium levels hourly and start replacement when **K⁺ < 5.3mmol/L**
3.3 to 5.3	Add 20-30 mmol K⁺/1L fluid/hour to IV fluids until **K⁺ > 4.0-5.0mmol/L** range
< 3.3	**Hold** insulin. Add 20-30 mmol K⁺/1L fluid/hour. Continuous cardiac monitoring until **K⁺ > 3.3mmol/L**

Venous Glucose reaches < 11.1 mmol/L (DKA) < 16.7 (HHS)

3. Insulin Protocol

DO NOT give insulin until you have K⁺ levels > 3.3mmol/L

Give **0.14u/kg/hr IV Infusion**

- Hourly RBS monitoring
- Target RBS drop **3-4mmol/L/hr**
- If the RBS does not fall by 3-4 mmol/L/hr, give a bolus of **0.14u/kg IV** and continue with the infusion

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- Change IV fluid infusion to **5 % Dextrose with 0.45% NaCl** at 150-250mL/hr
- **Decrease** insulin to **0.02-0.05u/kg/hr IV Infusion**
- Maintain glucose between **8.3 – 11.1mmol/L (DKA)/ 13.9 - 16.7mmol/L (HHS)** and continue insulin infusion and fluid hydration **until ketosis or hyper osmolality resolves**

Useful formulas in DKA (available in **MDCalc**)

Anion gap = Na⁺ - [(Cl⁻ + HCO₃⁻)]

Serum sodium correction = Na⁺$_{measured}$ + $\frac{1.6 *\{Glucose - 5.6\}}{5.6}$ (all values in mmol/l)

Serum potassium correction during acidaemia = [K+] - (0.6 mmol/L X (7.4 - measured pH) X 10)

Serum osmolality (mOsm/L) = 2 [Na⁺ + K+] (mmol/L) + Glucose (mmol/L) + BUN (mmol/L)

Total body water deficit (L) = 0.6$_{men/children}$ or 0.5$_{women}$ x body weight (kg) X [serum Na⁺/140 - 1]