

Background

- Current standard DKA treatment includes fluid resuscitation with intravenous (IV) insulin infusion.
- Some studies (mostly in adults) have shown early administration of subcutaneous (SC) insulin glargine is beneficial, decreasing time to DKA resolution.
- Few studies in children have been published, but studies are limited because of small sample sizes, varying timing of basal insulin administration, retrospective, non-randomized study design and lack of prospective studies.

Objective

- Assess whether administration of subcutaneous insulin glargine early during DKA treatment improves time to DKA resolution in children with type 1 diabetes.
- Assess the safety of using insulin glargine while in DKA on continuous insulin infusion.

Methods

- Prospective cohort with retrospective control.
- 21 participants 1 to <18 years old with severe DKA (serum bicarbonate <12 mmol/L) will be enrolled.
- Intervention group:** SC insulin glargine (0.3 units/kg) given ≥4 hrs after starting IV insulin + standardized PICU DKA treatment protocol.
- Control group:** age- and sex-matched patients treated with usual DKA treatment protocol.
- Primary outcome:** time to DKA resolution (beta hydroxybutyrate ≤3 mmol/L, serum bicarbonate >15 mmol/L).
- Secondary outcomes:** frequency of hypoglycemia or rebound ketosis/acidosis.

Results

- 8 participants enrolled from Feb 21 to May 7, 2024.
- One patient was excluded from analysis because she received glargine just prior to being brought to emergency room.
- Details of current patients are described in **Table 1**.
- Biochemistries at baseline and at time of resolution of DKA (based on beta hydroxybutyrate and serum bicarb) are shown in **Table 2**.
- Time to resolution of DKA is also shown in **Table 2**.
- Too few patients have been enrolled to make a comparative analysis.
- There were no episodes of hypoglycemia or rebound ketosis.

Table 1. Baseline characteristics of patients enrolled through May 7, 2024.

Baseline characteristics (n=7)	
Age±SD (range)	11.8±3.2 years (7.9-16.2)
# Male / Female	4 / 3
# New-onset diabetes	5
# Initially seen at outside hospital	3
Mean A1c (±SD) (range)	13.3±2.2% (9.9-15.7)

Table 2. Biochemistries at baseline and at DKA resolution.

	Baseline	DKA Resolution	Normal range
pH	7.08±0.16	n/a*	7.32-7.43
Serum bicarbonate (mmol/L)	9.14±4.10	16.4±1.9	22-32
Beta hydroxybutyrate (mmol/L)	9.07±2.21	1.3±0.7	≤0.3
Time to DKA resolution (hours) (range)	---	13.1±6.2 (7.5-23.7)	n/a

* pH not routinely assessed during DKA management except at presentation. Values are mean±SD (n=7).

Discussion

- Continuous IV insulin infusion in DKA ultimately needs to be transitioned to subcutaneous basal insulin.
- Long-acting basal insulin analogues may facilitate earlier transition from IV to SC insulin in children with resolving DKA.
- Co-administration of basal insulin with regular insulin infusion has shown to accelerate the resolution of DKA.
- Prospective randomized studies to examine this approach in the management of DKA in children are warranted.

Conclusions

- Co-administration of basal insulin with regular insulin infusion may accelerate earlier transition from IV to SC insulin in children with DKA.
- Additional subjects continue to be enrolled to fully assess the value of basal glargine administration while children are receiving IV insulin infusion for treatment of DKA.

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