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### **Acute Complications in Pediatric Patients with Diabetes Admitted with Isolated Diabetic Ketoacidosis, Isolated Hyperglycemic Hyperosmolar State, and Mixed Hyperosmolar Diabetic Ketoacidosis**

Erica Zarse

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**Acute Complications in Pediatric Patients with Diabetes Admitted with Isolated Diabetic Ketoacidosis, Isolated Hyperglycemic Hyperosmolar State, and Mixed Hyperosmolar Diabetic Ketoacidosis**

**Submitting/Presenting Author (must be a trainee):** Erica Zarse

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**Medical Student**

**Resident/Psychology Intern ( $\leq$  1 month of dedicated research time)**

**Resident/Ph.D/post graduate ( $>$  1 month of dedicated research time)**

**Fellow**

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**Other authors/contributors involved in project:** Michelle Knoll, MD; David D. Williams, MPH; Kelsee Halpin, MD, MPH; Gouri Kallanagowdar, medical student

**IRB Number:** STUDY00001830

**Describe role of Submitting/Presenting Trainee in this project (limit 150 words):** I, the submitting/presenting trainee, am a current Pediatric Endocrinology Fellow. I am the principal investigator, and this data is the focus of my primary fellow's project. This abstract presents the preliminary data collected and analyzed over the last 6 months. I have submitted this abstract to the Pediatric Endocrine Society in hopes of a poster or oral presentation. My long-term plan is to have a completed manuscript for fellowship graduation and hopefully get accepted for publication.

**Background, Objectives/Goal, Methods/Design, Results, Conclusions limited to 500 words**

**Background:**

Diabetic ketoacidosis (DKA), hyperglycemic hyperosmolar state (HHS), and mixed DKA and HHS (hyperosmolar DKA) are hyperglycemic emergencies for which children with diabetes mellitus (DM) are admitted to the hospital. To date, there is little evidence to guide the management of pediatric diabetic patients with hyperosmolarity.

**Objectives:**

The objective of this study is to compare the in-hospital complications at our institution in patients who have isolated DKA to those with a component of hyperosmolarity.

**Methods:**

We reviewed medical records of patients from 01/2019 through 12/2020 admitted with DKA (serum bicarbonate  $\leq 16$  mEq/L) and/or HHS (blood glucose  $\geq 600$  mg/dL and osmolality  $\geq 320$  mOsm/kg). Patients transferred from an outside facility were excluded. Isolated HHS patients were combined with hyperosmolar DKA for analysis. We defined acute kidney injury (AKI) as an elevated creatinine level for age. We defined altered mental status (AMS) by any of the following: physician documented AMS in exam, Glasgow Coma Scale  $< 15$ , administration of hypertonic saline or mannitol, or head CT obtained. P-values were generated via two-sample Wilcoxon rank-sum (Mann-Whitney), Fisher's exact, or chi-square tests. All analyses were conducted using Stata/SE 15.1.

**Results:**

Three hundred sixty-nine admissions were evaluated: 334 (90.5%) had isolated DKA, 32 (8.7%) had hyperosmolar DKA, and 3 (0.8%) had isolated HHS. The median age of patients was 14 years (IQR 11.2-16.8) and 60% were female. Ninety-six percent of patients had type 1 DM; 4% had type 2 DM. Sixty-nine percent of patients had a known diagnosis of DM; 31% were new onset DM. Compared to isolated DKA patients, hyperosmolar patients had longer median lengths of hospital stay (37.4 vs 26.5 hours,  $p=0.0021$ ), higher percentage admitted to the pediatric intensive care unit (71% vs 28%,  $p<0.001$ ), higher percentage with AKI (63% vs 15%,  $p<0.001$ ), and higher percentage with AMS (46% vs 12%,  $p<0.001$ ). One patient with hyperosmolar DKA had complications of intubation, dialysis, and rhabdomyolysis. Two patients with hyperosmolar DKA had an arrhythmia secondary to electrolyte disturbances.

**Conclusions:**

In children with DM, hyperosmolarity increases acute complications compared to isolated DKA. Given the small number of patients with hyperosmolarity, data on a larger scale is needed. Our findings will be useful to guide interventional studies and identify ways to prevent acute complications.