**A 12-Year Single-Center Retrospective Cohort Study on the Characteristics of Hyperosmolar Hyperglycaemic State (HHS) and Mixed Diabetic Ketoacidosis / Hyperosmolar Hyperglycaemic State (DKA/HHS)**

**Aim**

This study aims to characterise the increasingly prevalent hyperglycemic emergencies, hyperosmolar hyperglycaemic state (HHS) and mixed diabetic ketoacidosis / hyperosmolar hyperglycaemic state (DKA/HHS), which have significant morbidity and mortality.

**Methods**

A single-centre retrospective cohort study was undertaken in a regional tertiary Australian hospital to assess admissions for HHS and DKA/HHS from 1/1/2012 to 31/12/2023. HHS was defined as a serum osmolality ≥320mOsm/kg and glucose ≥30mmol/L without ketoacidosis, while mixed DKA/HHS was defined as hyperosmolality with ketoacidosis.

**Results**

66 HHS and 100 DKA/HHS cases were identified. HHS patients were older (median 66.5 vs. 48.5 years, p<0.001) and had more comorbidities (median Charlson Comorbidity Index 4.0 vs. 3.0, p<0.001). Initial osmolality was not significantly different (median 336.8 mOsm/kg in HHS vs. 341.4 mOsm/kg in DKA/HHS, p=0.554).

The most common causes of HHS and DKA/HHS were insulin omission (31.3%) and infections (24.1%). New diabetes diagnoses accounted for 15.2% of HHS and 8% of DKA/HHS cases, with the majority (83.3%) being type 2 diabetes.

The mortality rate of HHS and DKA/HHS was 4.5% and 4% respectively. HHS was associated with a longer length of stay compared to DKA/HHS (median 10.0 vs. 6.0 days, p=0.003). HHS patients had more gastrointestinal bleeding (12.1% vs. 2.0%, p=0.007), and seizures or strokes (9.1% vs. 0.0%, p=0.002), but less hypokalaemia (12.1% vs. 27%, p=0.021), compared to DKA/HHS patients.

**Conclusion**

Significant clinical overlap exists between HHS and DKA/HHS. Further investigation is warranted to determine the necessity of developing individualised management protocols for these conditions.