

# HYPEROSMOLAR HYPERGLYCEMIC STATE (HHS)

FLAME LECTURE: 10

BAQAIS 11.1.18

# LEARNING OBJECTIVES

- ▶ To understand the difference between HHS and DKA
- ▶ To be able to establish HHS diagnosis
- ▶ To understand HHS management
- ▶ See also – for closely related topics
  - ▶ Diabetes Mellitus
  - ▶ DKA

# HHS OVERVIEW

- ▶ Hyperosmolar hyperglycemic state is a life-threatening emergency!
- ▶ The mortality rate from HHS ranges from 10-50%, which is considerably higher than that of DKA
- ▶ The hallmarks of HHS include profound dehydration, marked hyperglycemia, variable degrees of neurologic impairment, and mild or no ketosis
- ▶ Although DKA and HHS have been described as distinct entities, one-third of patients exhibit findings of both

# DKA & HHS KEY DIFFERENCES

	Anion gap	Arterial pH	Effective Serum Osmolality	Plasma Glucose	Serum Bicarb.	Urine or serum Ketones
DKA	>12	<7.3	Variable	>250	<15	Positive
HHS	Variable, could be normal	>7.3	>320	>600	>15	Trace or negative

# CAUSES

- ▶ Medications:
  - ▶ Beta blockers, calcium channel blockers, antipsychotics, diuretics, glucocorticoids
- ▶ Infections
- ▶ Uncontrolled DM: noncompliance, new diagnosis or insufficient treatment.
- ▶ Acute stress: Trauma, MI, CVA, etc

# INITIAL MANAGEMENT

- ▶ ICU placement if cardiovascular instability, cannot maintain an airway, obtunded, acute abdominal symptoms, or cannot be monitored adequately on the general medical ward
- ▶ Calculate corrected sodium: add 1.65 to serum Na for every 100 of serum glucose (after the first 100)
- ▶ Calculate effective osmolality:  $(2 \times \text{Corrected sodium}) + (\text{glucose}/18)$
- ▶ Vigorous intravenous rehydration: (average fluid deficit is 80-100cc/kg)

# MANAGEMENT (CONT'D)

- ▶ Electrolyte management:
  - ▶ Follow replacement protocol
  - ▶ Labs initially every 2-4 hours until stable
- ▶ Intravenous insulin:
  - ▶ Bolus of 0.1 units per kg → continuous infusion of 0.1 units per kg per hour
- ▶ Diagnosis and management of precipitating and coexisting problems

# REFERENCES

1. The American Family Physician (AFP), Hyperosmolar Hyperglycemic State  
<https://www.aafp.org/afp/2017/1201/p729.html>. Last Accessed: 10/11/2018