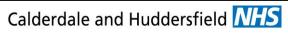
# Acute management of Hyperosmolar Hyperglycaemic State (HHS)



**NHS Foundation Trust** 

# **Establish Diagnosis:**

- Hypovolaemia
- Marked hyperglycaemia (≥ 30 mmol/L) without Ketones (blood <3 mmol/L), (urine < 2+) or acidosis (pH > 7.3, bicarbonate > 15 mmol/L)
- Osmolality usually ≥ 320 mosmol/kg (calculated osmolality = 2(Na+) + glucose + urea)

## Fluids:

- Target to achieve positive fluid balance:
- 2-3 litres by 6 hours
- 3-6 litres by 12 hours
- IV 0.9% NaCl 1L over 1 hour
- IV 0.9% NaCl further 0.5 to1L/hr
- Consider faster if SBP < 90 mmHg, caution in elderly and depending on clinical assessment of dehydration / risk of heart failure and fluid balance
- Check U+Es and glucose every 1-4hours initially
- Target for osmolality: fall of 3-8 mosmol/kg/hr
- An initial rise in sodium is expected and is not in itself an indication for hypotonic fluids. Thereafter, the rate of fall of plasma sodium should not exceed 10 mmol/L in 24 hours)
  - o If Na ↑ but osmolality ↓ at appropriate rate, continue 0.9% NaCl
  - If Na ↑ AND osmolality ↑ (or ↓ at less than 3 mosmol/kg/hr) check fluid balance If positive balance inadequate, increase rate of infusion of 0.9% NaCl
  - o If osmolality ↑ and fluid balance adequate, switch to 0.45% NaCl at same rate
  - If osmolality ↓ at rate exceeding 8 mosmol/kg/hr, reduce infusion rate of IV fluids and/or insulin (if already commenced)

### Glucose:

Glucose will often improve with IV fluids alone

If blood glucose falling less than **5 mmol/L per hour** check fluid balance:

- If positive balance inadequate, increase rate of infusion of 0.9% NaCl
- If positive fluid balance adequate, commence IV insulin see below.

#### Insulin:

DO NOT start insulin unless significant ketones (blood > 1 mmol/L, urine ≥ 2+) i.e. mixed DKA and HHS

#### Start insulin if:

- blood glucose falling less than 5 mmol/L and
- positive fluid balance adequate

#### Regimen:

- low dose fixed rate IV insulin (0.05 units/kg/hr)
- Increase to 0.1 units/kg/hr if glucose falling less than 5 mmol/L
- Avoid hypoglycaemia (target glucose 10-15 mmol/L in first 24 hours)
- If blood glucose < 14 mmol/L commence 5% or 10% glucose at 125 ml/hr AND CONTINUE 0.9% NaCl

#### Potassium:

- K+ > 5.5 no added potassium
- K= 3.5-5.5 add 40mmol/L in infusion
- K+ < 3.5 senior review as additional potassium required

## Additional measures:

- Assess for degree of dehydration, sepsis, vascular event, foot risk and consciousness
- Insert urinary catheter to monitor hourly urine output and calculate fluid balance
- Commence prophylactic LMWH (unless contraindicated)