Guidelines for the Management of Diabetic Hyperosmolar Non-Ketotic State

Establish diagnosis
- **Hyperglycaemia**: blood glucose frequently >40 mmol/l
- **Hyperosmolarity**: usually >340 mOsmol/l.
- **Exclude ketosis**: N.B. patients may have concurrent lactic acidosis secondary to sepsis
- Clinical picture is usually one of insidious onset unlike the acute presentation of DKA.
- Neurological features including seizures may be present.
- Mortality is 30-35% and increases with age, medical co-morbidity, severity of metabolic derangement and degree of impairment of consciousness. N.B. Coma is present in <10% of HONK at presentation.
- Seek senior help early and consider appropriate environment in which to manage patient e.g. MAU / ITU.

Investigations
- Laboratory glucose.
- Plasma osmolarity.
- FBC, U&E’s, CRP, CK, troponin I.
- Blood cultures, MSU and additional microbiology as indicated.
- Arterial blood gases
- ECG and CXR.

N.B. Osmolarity can be calculated using the formula (all in mmol/l):

\[
\text{Plasma osmolarity} = 2[\text{Na}^+] + 2[\text{K}^-] + [\text{Urea}] + [\text{glucose}]
\]

Treatment

1. **Fluid Regimen**
   - Rehydrate with Normal saline. **Half Normal saline is dangerous and contra-indicated** - rapid lowering of the osmolality may result in cerebral oedema.
   - Fluid replacement will often need to be guided using CVP line and monitoring urine output as these patients frequently have significant medical co-morbidity.
   - The aim is usually to replace the fluid deficit (average 10 litres) over approximately 48 hours.

2. **Insulin**
   - The aim is to reduce glucose levels by 3 mmol/hr. These patients can be very sensitive to insulin and require much lower doses than patients in DKA.
   - Prescribe 50U soluble insulin (e.g. actrapid) in 50mls N Saline to run IV according to sliding scale below.
   - Measure glucose hourly and alter insulin infusion accordingly.

<table>
<thead>
<tr>
<th>Capillary glucose (mmol/l)</th>
<th>Soluble insulin (units/hour) e.g. actrapid</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 4.0</td>
<td>0</td>
</tr>
<tr>
<td>4.1 - 7.0</td>
<td>1</td>
</tr>
<tr>
<td>7.1 - 11.0</td>
<td>2</td>
</tr>
<tr>
<td>11.1 - 17</td>
<td>3</td>
</tr>
<tr>
<td>&gt; 17</td>
<td>4</td>
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</tbody>
</table>
This is purely a guide and the insulin infusion rate may need to be adjusted on an individual patient basis.

3. **Potassium Replacement**  
   - Regular electrolye monitoring should guide potassium replacement.  
   - Check U&E’s at baseline, 2hrs, 6hrs and further as indicated.

4. **Anticoagulation**  
   - Formal anticoagulation with low molecular weight heparin is indicated in the absence of contraindications in view of the increased risk of thromboembolism.

**Identify Underlying Cause**  
- Consider cause of HONK: infection (in 50%), new diagnosis (in >50%), MI, drugs (e.g. diuretics).  
- Consider antibiotics (WCC invariably raised in HONK and does not confirm infection. History and examination, presence of pyrexia and elevated CRP are more helpful markers. Urinary tract and respiratory tract infections are common precipitants).

**Long-term Management**  
- Most HONK patients will not need insulin in the long-term.  
- Once stable the patient can be commenced on either an appropriate oral hypoglycaemic agent or insulin if necessary. Please seek advice from the diabetic specialist nurse or the diabetic team to ensure patient education, appropriate choice of agent for long-term management and follow-up.