

Management of diabetic ketoacidosis and hyperosmolar hyperglycaemic state in adults in the emergency department

The intention of this flow chart is to provide emergency clinicians in NSW with a standardised approach to the treatment required for adults in the management of diabetic ketoacidosis (DKA) and hyperosmolar hyperglycaemic state (HHS), particularly in situations where there is no access to endocrinology support and advice.

Important considerations when using the flow charts on the following pages

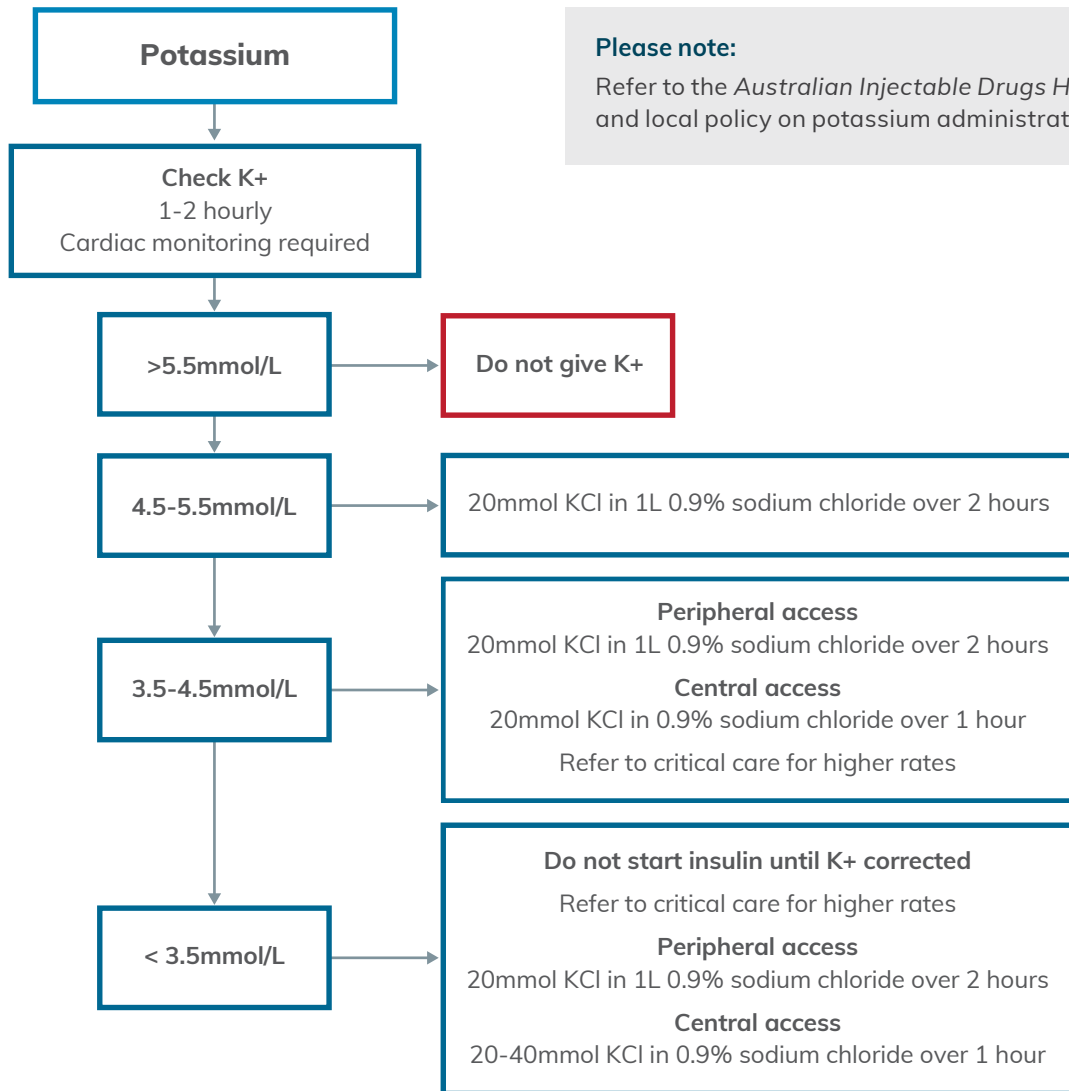
- When treating DKA, the emphasis is primarily on reducing ketoacidosis with supportive fluid management, whereas the primary emphasis in HHS is on fluid replacement with supportive blood glucose control. The management of potassium and supportive treatments is the same for both DKA and HHS.
- This flow chart recommends that all patients with DKA and HHS receive subcutaneous basal long-acting insulin as the first step towards glucose control.
- A mixed picture of DKA and HHS may occur.
- Intravenous insulin infusions are resource intensive and are potentially dangerous because of the rapid drop in potassium and/or glucose which can occur. If insulin infusions are commenced in the emergency department, use half dose insulin infusion rates (see flowchart) until the patient can be moved to the ICU or similar specialist area.
- This flowchart uses ketones as an indicator of a disturbance of normal biochemical function. Treatment is directed at reducing ketones, because the presence of ketones indicates an ongoing disturbance of glucose metabolism.
- Ensure the patient's personal insulin pump is kept with the patient when it has been disconnected. Early contact with diabetes support is required.
- This guideline recommends the use of 0.9% sodium chloride. The use of balanced crystalloids such as Hartmann's solution or Plasmalyte should follow locally approved policies.
- Patients with DKA and HHS will require management by a diabetes physician during their inpatient stay and following their discharge.

Table 1: choosing DKA or HHS treatment pathway

| Parameter | DKA (Focus is glucose management) | | | HHS (Focus is fluid replacement) Mixed picture may occur |
|--|---|-----------|--------|--|
| | Mild | Moderate | Severe | |
| pH | 7.25-7.30 | 7.00-7.24 | <7.00 | >7.30 |
| Ketones mmol/L | 1.5-3 | >3 | >3 | <3 |
| HCO ₃ mmol/L | 15-18 | 10-14 | <10 | >18 |
| Osmolality mmol/L (calculated) | Variable | | | >320 |
| Blood glucose level (BGL) mmol/L | Glucose >11 Euglycaemic DKA can occur in pregnancy, in known T1DM and patients on SGLT2 inhibitors. | | | >33 |
| Calculated osmolality = 2 x sodium + urea + glucose (all measurements in mmol/L) | | | | |

Table 2: supportive treatment considerations

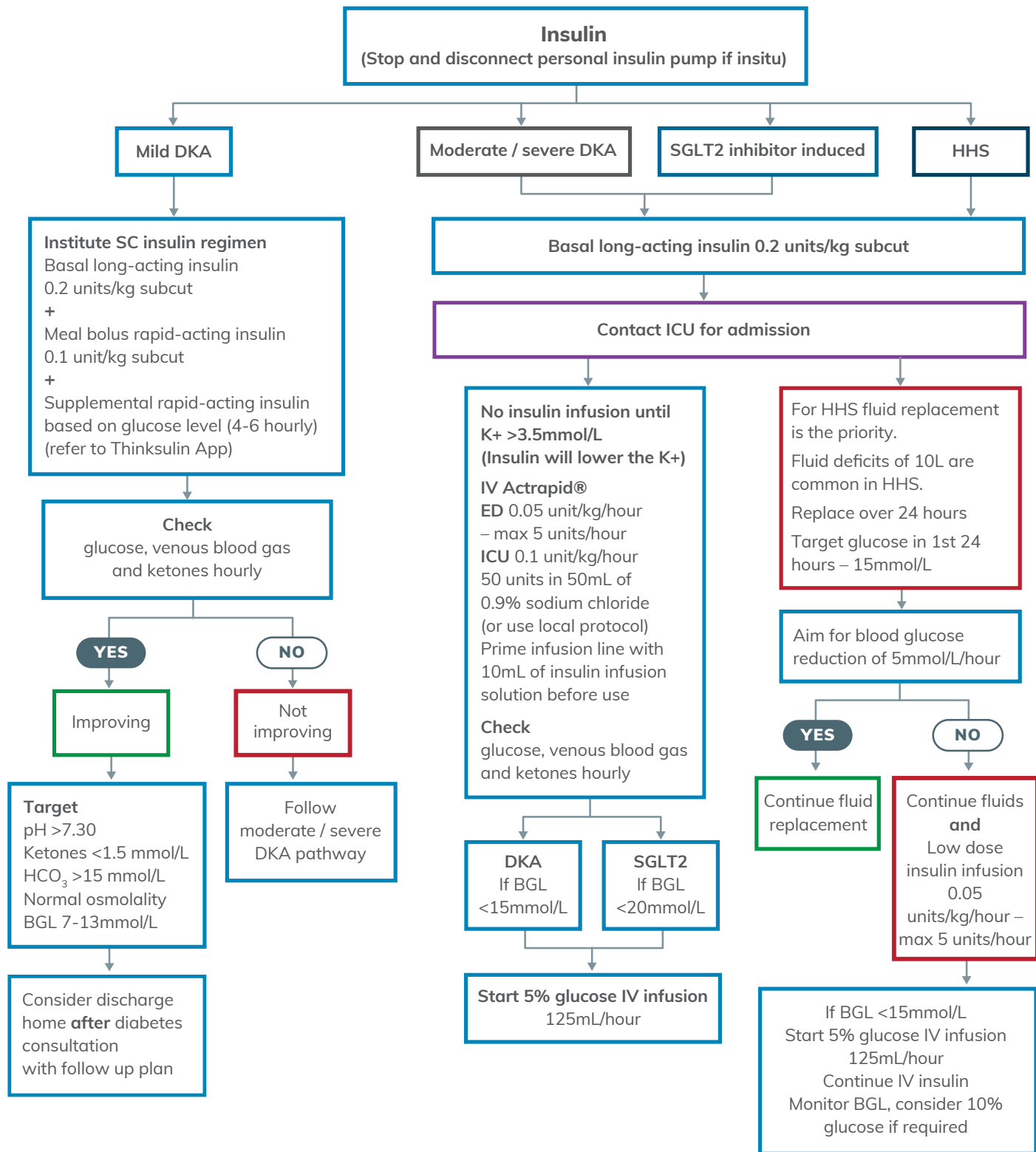
| Magnesium | Phosphate | DVT prophylaxis | Feeding / anti-emetic |
|--|--|---|--|
| Mg <0.8 mmol/L give MgSO ₄ 2.5g (10mmol) over 4 hours IV | PO ₄ <0.32 mmol/L give KH ₂ PO ₄ 20mmol over 4 hours IV | Heparin 5000 units subcut BD or Clexane 20-40mg subcut OD | NBM PO or IV anti-emetic (do not use steroids) |
| Assess and appropriately manage precipitating factors, e.g. MI, infection, overdose and non-adherence to insulin | | | |



Please note:
Refer to the *Australian Injectable Drugs Handbook* and local policy on potassium administration.

How to use the flow charts

- Ensure you have read the introduction pages to understand the intent of this document.
- Use table 1 to help in choosing either a DKA or HHS treatment pathway.
- Refer to table 2 for supportive treatment considerations
- Commence IV fluids, potassium, insulin and other therapies concurrently.
- You may move between the DKA and HHS treatment pathways, depending on test results and patient condition.
- Hourly vital signs, including Glasgow Coma Scale.

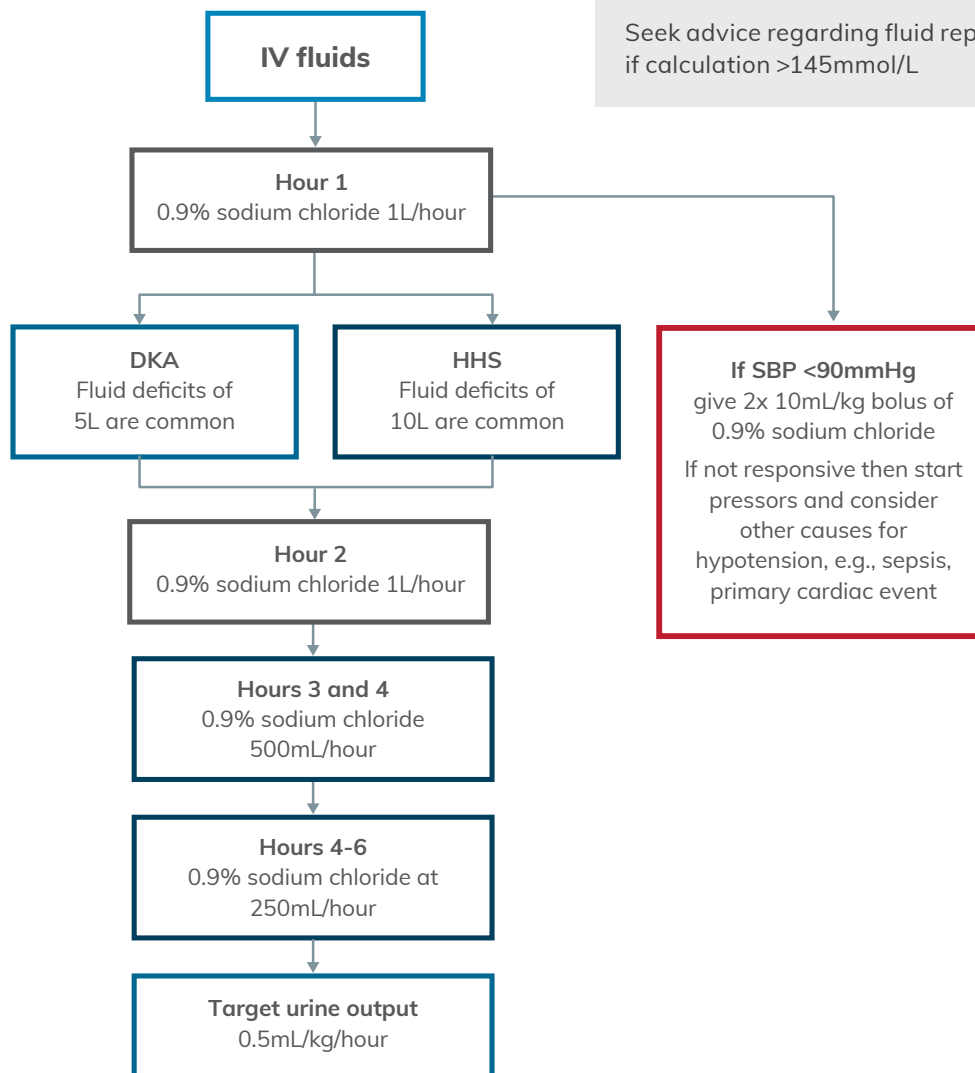


How to use the flow charts

- Ensure you have read the introduction pages to understand the intent of this document.
- Use table 1 to help in choosing either a DKA or HHS treatment pathway.
- Refer to table 2 for supportive treatment considerations
- Commence IV fluids, potassium, insulin and other therapies concurrently.
- You may move between the DKA and HHS treatment pathways, depending on test results and patient condition.
- Hourly vital signs, including Glasgow Coma Scale.

Please note:

Sodium corrected for hyperglycaemia
 Sodium (corrected) = Sodium (measured) + (blood glucose level/4)
 Seek advice regarding fluid replacement if calculation >145mmol/L



How to use the flow charts

- Ensure you have read the introduction pages to understand the intent of this document.
- Use table 1 to help in choosing either a DKA or HHS treatment pathway.
- Refer to table 2 for supportive treatment considerations
- Commence IV fluids, potassium, insulin and other therapies concurrently.
- You may move between the DKA and HHS treatment pathways, depending on test results and patient condition.
- Hourly vital signs, including Glasgow Coma Scale.

