TREATMENT OF DIABETIC KETOACIDOSIS

UHSussex (RSCH and PRH)

Last updated Nov 2022, Dr Ali Chakera

BASELINE INVESTIGATIONS
- blood ketones
- capillary blood glucose
- VBG
- FBC, U&Es, blood cultures
- CXR
- ECG
- urinalysis & culture
- patient bodyweight (or estimate)

DIAGNOSTIC CRITERIA - ALL MUST BE PRESENT
- Ketonaemia of 3mmol/L and over **or** significant ketonuria (more than 2+ on urine dipstick)
- Blood glucose over 11mmol/L **or** known diabetes mellitus (type 1 or type 2)
- Serum bicarbonate below 15mmol/L **and/or** venous pH less than 7.3

A. 0-60minutes - IMMEDIATE MANAGEMENT

AIMS:
a. rapid clinical assessment & evaluation of severity
b. fluid resuscitation
c. initiation of fixed rate insulin
d. identification & treatment of underlying causes

FEATURES OF SEVERE DKA?
- blood ketones >6mmol/L
- serum HCO_3^- <5mmol/L
- serum pH <7.1
- serum K^+ on admission <3.5mmol/L
- GCS <12 or abnormal AVPU
- SpO_2 <92% on air (assuming normal resp function)
- Systolic BP <90mmHg
- Pulse >100bpm or <60bpm
- Anion gap >16

YES

NO

HIGH RISK PATIENT?
- young people age 18-25
- elderly
- pregnant
- cardiac or renal failure
- other serious comorbidities

YES

SEVERE DKA OR HIGH RISK PATIENT SHOULD PROMPT DISCUSSION WITH ITU FOR LEVEL 2/HDU CARE

NO

PRESCRIBE FLUIDS

1L 0.9% sodium chloride over 1st hour

*if further fluid needed for resuscitation consider adding potassium chloride

PRESCRIBE INSULIN

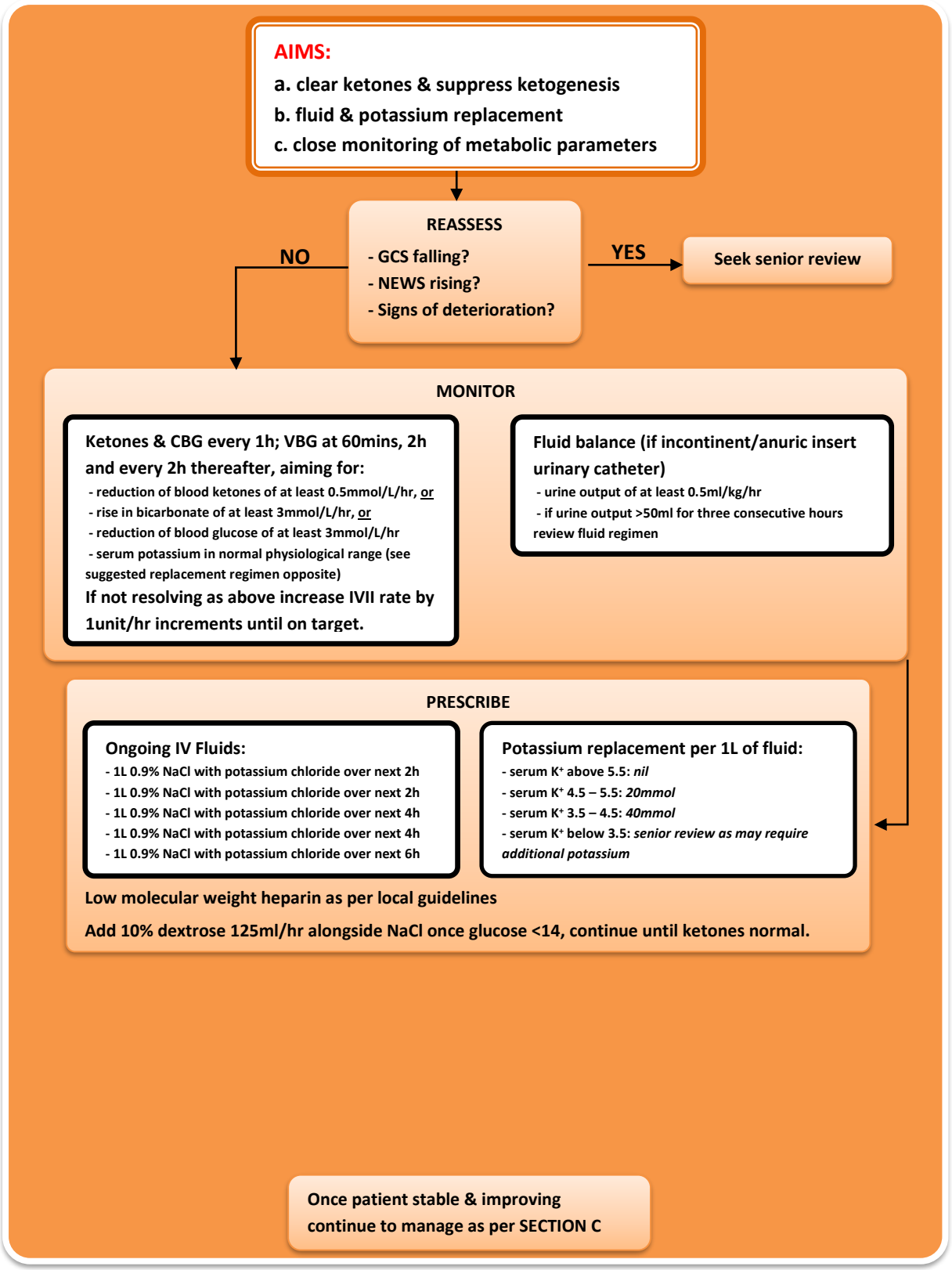
Fixed rate intravenous insulin infusion (FRIII)
- 50 units soluble insulin (Actrapid) in 49.5ml 0.9% sodium chloride
- administer at 0.1 units/kg bodyweight/hr intravenously

Continue any long acting insulins at normal dose (Lantus/glargine or Levemir/detemir)

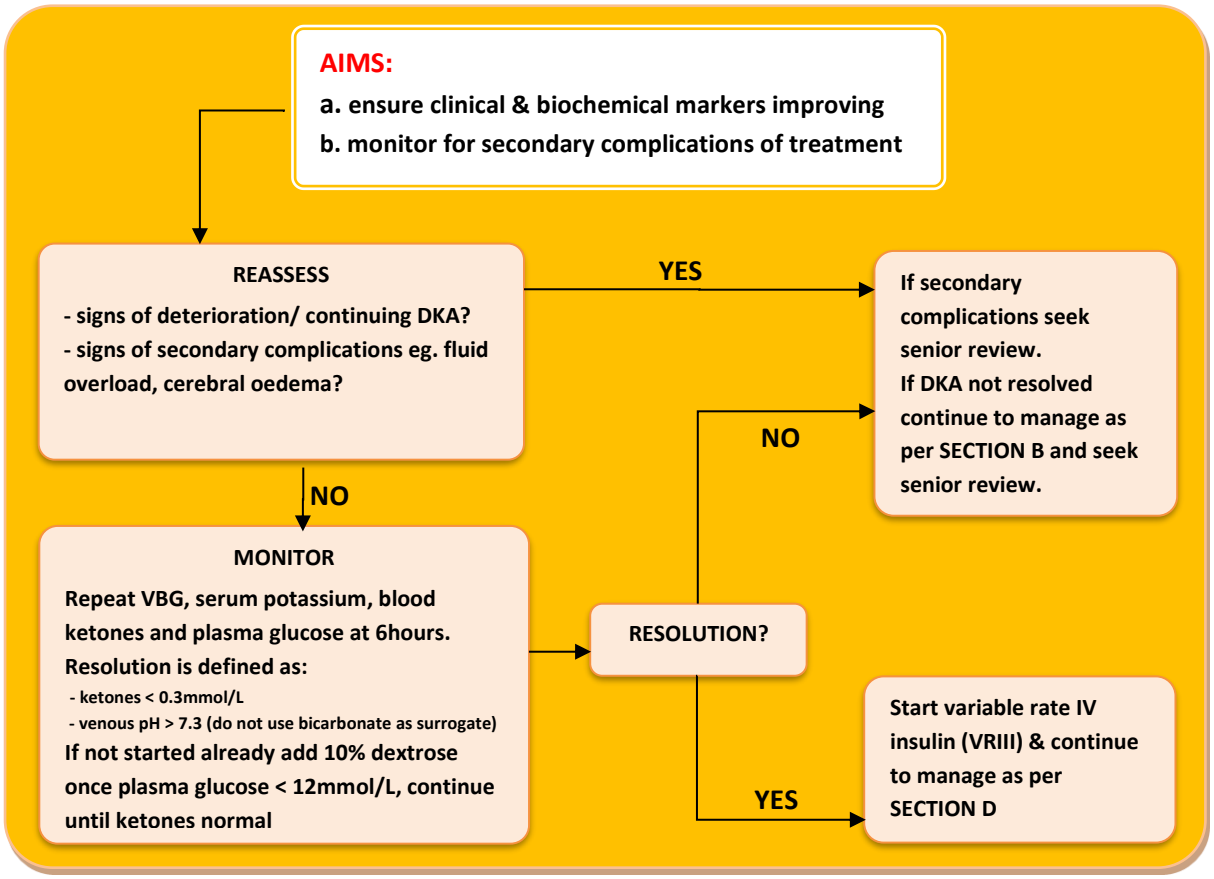
IDENTIFY & TREAT CAUSES
- infection (often pneumonia or UTI)
- missed insulin doses/poorly controlled DM
- illicit drug use/excessive alcohol consumption
- high/prolonged levels of stress

Continue to manage as per SECTION B

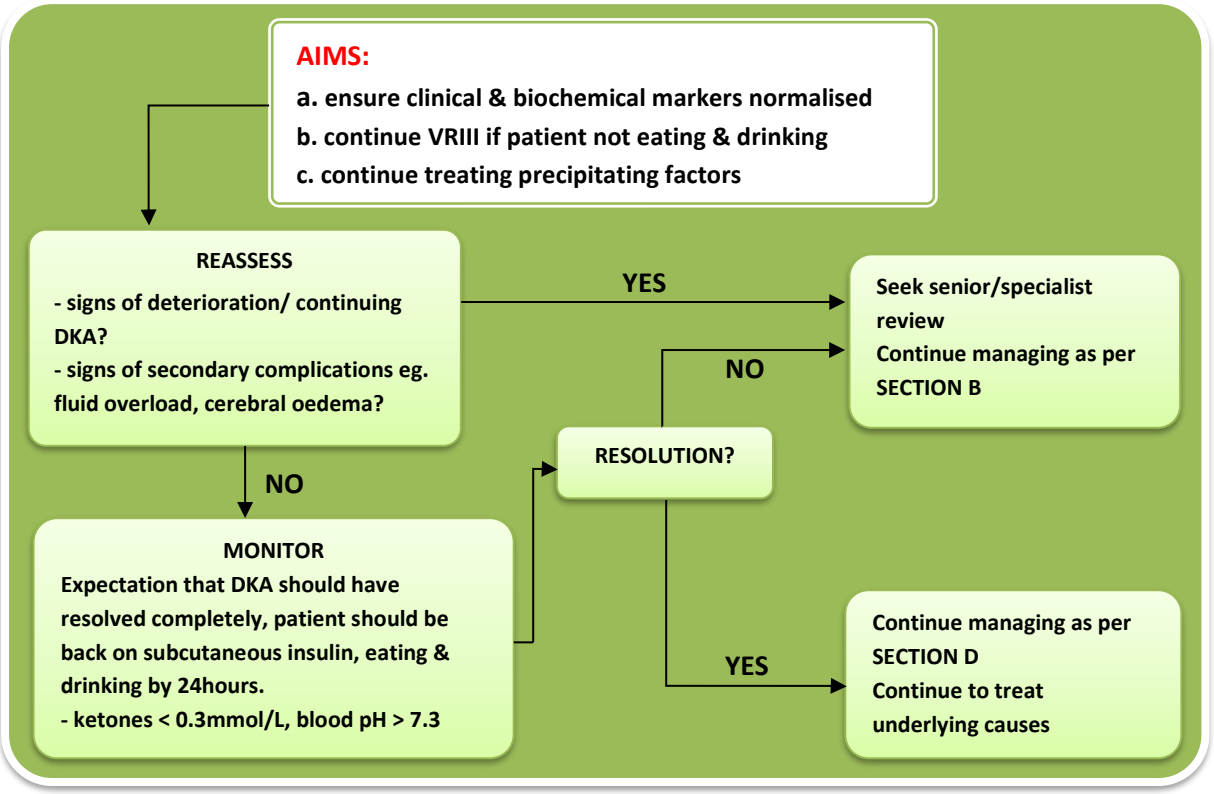
B. 1-6hours


AIMS:
a. clear ketones & suppress ketogenesis
b. fluid & potassium replacement
c. close monitoring of metabolic parameters
REASSESS
- GCS falling?
- NEWS rising?
- Signs of deterioration?
NO
YES
Seek senior review
MONITOR
Ketones & CBG every 1h; VBG at 60mins, 2h and every 2h thereafter, aiming for:
- reduction of blood ketones of at least 0.5mmol/L/hr, or
- rise in bicarbonate of at least 3mmol/L/hr, or
- reduction of blood glucose of at least 3mmol/L/hr
- serum potassium in normal physiological range (see suggested replacement regimen opposite)
If not resolving as above increase IVII rate by 1unit/hr increments until on target.
Fluid balance (if incontinent/anuric insert urinary catheter)
- urine output of at least 0.5ml/kg/hr
- if urine output >50ml for three consecutive hours review fluid regimen
PRESCRIBE
Ongoing IV Fluids:
- 1L 0.9% NaCl with potassium chloride over next 2h
- 1L 0.9% NaCl with potassium chloride over next 2h
- 1L 0.9% NaCl with potassium chloride over next 4h
- 1L 0.9% NaCl with potassium chloride over next 4h
- 1L 0.9% NaCl with potassium chloride over next 6h
Potassium replacement per 1L of fluid:
- serum K+ above 5.5: nil
- serum K+ 4.5 – 5.5: 20mmol
- serum K+ 3.5 – 4.5: 40mmol
- serum K+ below 3.5: senior review as may require additional potassium
Low molecular weight heparin as per local guidelines
Add 10% dextrose 125ml/hr alongside NaCl once glucose <14, continue until ketones normal.
Once patient stable & improving
continue to manage as per SECTION C

C. 6-12hours



D. 12-24hours



E. Conversion to subcutaneous insulin

Convert back to appropriate subcutaneous insulin regime when patient is able to eat and biochemically stable (ketones < 0.3mmol/L, blood pH >7.3 and serum bicarbonate >20mmol/L), ideally with involvement of Specialist Diabetes Team.
Long acting insulins should be started at least 4 hours before insulin infusion is stopped.
If patient is newly diagnosed they must be seen by the Specialist Diabetes Team prior to discharge.