PEDIATRIC DKA PROTOCOL

This protocol is intended as a guide – individual patient modifications may be necessary.

Criteria for PICU Admission:
- Arterial pH < 7.3 or venous pH < 7.25
- Altered mental status
- Severe vomiting/dehydration
- Glucose > 600

*Patients not meeting any of these criteria may be candidates for subcutaneous insulin on the inpatient floor with peds endocrine consult

Therapy Time Line

<table>
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<th>1st hour</th>
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<tr>
<td>▪ NPO</td>
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<td>▪ IV, D-stick</td>
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<tr>
<td>▪ Labs – chem 8, Mg, Phos, CBC, VBG</td>
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<tr>
<td>▪ *20 cc/kg fluid bolus over 30-60 minutes</td>
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<td>▪ Order insulin drip</td>
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<td>*If poor perfusion or shock is present, give fluid bolus over 10-20 min and consider additional bolus if shock not resolved.</td>
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<th>2nd hour</th>
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<td>▪ Contact Peds Endo and PICU</td>
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<td>▪ 2nd IV (for insulin drip)</td>
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<tr>
<td>▪ Repeat dextrose stick</td>
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<tr>
<td>▪ Start rehydration fluid at 1 ½ times maintenance</td>
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<tr>
<td>▪ Start insulin drip</td>
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<tr>
<td>▪ Correct electrolyte abnormalities</td>
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Fluid Therapy

Type of Fluid
½ NS + 20 mEq/L KCl + 20 mEq/L Kphos
- If the serum K⁺ ≥ 5, decrease total K⁺ in fluids to 20 mEq/L
- If the serum K⁺ is ≥ 5.5, omit K⁺ from the fluids

Fluid Rate
- Total fluid rate is 1 ½ times maintenance for 24 hours or until the acidosis is resolved.
- Make sure to include the rate of the insulin drip in the total fluids

*Note: Sodium bicarbonate is almost never necessary in the treatment of DKA, and its use is associated with increased risk of cerebral edema in children. Any consideration of bicarbonate administration requires the input of the Endo or PICU attending.

Insulin

Dose: 0.1 Units/kg/hr
Concentration: 50 Units Regular Insulin/500 cc NS (1 cc = 0.1 Units)
Prime all IV tubing because insulin binds to the plastic tubing
*If an insulin infusion cannot be accomplished, then substitute hourly IM injections (not IV).
Dextrose

- Add dextrose when serum glucose <300.
- Goal of therapy is to resolve the ketoacidosis – insulin is necessary to do this.
- Dextrose sticks should be monitored every 1 hour
- Amount of dextrose given should be titrated to maintain dextrose sticks 200 – 300.

2 Bag System to Allow Rapid Titration of Dextrose

The fluids are ordered in 2 bags that are identical in electrolyte concentration:
- Each bag will contain ½ NS + 20 mEq KCl/L + 20 mEq KPhos/L
- The first bag (A) will contain no dextrose
- The second bag (B) will contain D10

The bags will run at the calculated fluid rate (1 ½ times maintenance minus the insulin drip rate) and the relative rates of the 2 bags will be adjusted to change the amount of dextrose delivered to the patient from D0 all the way to D10
- In the beginning of management, run Bag A at the full rate and keep Bag B off – this gives fluids with no dextrose.
- Increase dextrose by increasing the rate of Bag B and decreasing the rate of Bag A.
- Decrease dextrose by decreasing the rate of Bag B and increasing the rate of Bag A.

Ongoing Monitoring:

- Never put the patient on autopilot
- Dextrose stick every 1 hour
- Neuro exam every 30 – 60 minutes
- VBG every 2-4 hours
- Serum electrolytes every 4 hours
- Make sure that Intake>Output – consider Foley catheter if patient is in shock or if resuscitation is not straightforward
- UA every 8 hours for glucose and ketones

Neurologic Complications

- Every patient with DKA is at risk for cerebral edema
- Signs and symptoms – change in mental status, decrease in heart rate, hypertension.
- For neurologic deterioration consider head CT and mannitol (0.5 – 1 gram/kg)
- If intubation is necessary use strict increased ICP precautions