1. Introduction
Peritoneal dialysis is a high risk procedure and therefore has given rise to the development of guidelines for the management of acute renal failure and peritoneal dialysis in PICU patients. However with the current problem of getting appropriate giving sets for administrating peritoneal dialysate the current guidelines and formulations used need to be reviewed again.

The opinions of the Paediatric Renal Physician and Renal and ICU pharmacists in the Trust were gathered. Also Paediatric Intensive Care pharmacists were contacted to gain information on their current practice of treating paediatric intensive care patients with peritoneal dialysis. All this information has helped to put together these guidelines.

2. Aim
The aim of this guideline is to provide safe and efficacious guidance for medical, nursing and pharmacy staff on the management of acute peritoneal dialysis in paediatric intensive care.

3. Contraindications
3.1 Peritoneal Dialysis should not be used in the following situations;
- Omphalocoele or Gastrochisis
- Diaphragmatic Hernia
- Bladder extrophy
- Obliterated peritoneal cavity

3.2 Peritoneal Dialysis should be used with extreme caution in the following situations:
- Recent abdominal surgery
- Abdominal malignancy

4. Insertion of a Peritoneal Dialysis Catheter
4.1 Cardiac Surgery
A peritoneal dialysis catheter is routinely placed at the time of operation in neonates undergoing complex repair as well as some older children at risk of post-operative renal failure.

4.2 General Paediatric Intensive Care
The intensivists or general surgeons undertakes insertion of the catheter.
5. **Management**

Adequate urinary output is >0.5ml/kg/hr

- **OLIGURIA**
  
  1. **1st Exclude and correct**
     - Blocked catheter
     - Hypovolaemia, if present consider 5-10ml/kg of a colloid
     - Poor cardiac output
  
  2. **2nd Give diuretics**
     - Frusemide 1-2mg/kg iv or oral (risk of deafness if patients also on aminoglycosides, consider Bumetanide)
     - Spironolactone 1mg/kg oral (if feeding)

**NOTE:** DO NOT give Spironolactone in hyperkalaemia or acute renal failure

3. **3rd, if no response consider Peritoneal dialysis (PD)** (always discuss with Paediatric Cardiothoracic Consultant or Intensivist).

6. **Peritoneal Dialysis (PD)**

6.1 **Indications:**

- Anuria and oliguria (<0.5ml/kg/hr) unresponsive to diuretics.
- Borderline 'normal' urine output in severely fluid overloaded patients.
- Hyperkalaemia (Potassium >6mmol/L)
- Refractory acidosis
- Uraemic symptoms
- Poisoning
- Metabolic Abnormalities
- Create space for nutrition

6.2 **Peritoneal Dialysis (PD) Cycles:**

**Initial Prescription**

- Use BicaVera 1.5% dialysate
- 10ml/kg/cycle: 10mins in, 10mins dwell and 10mins out
- In patients with tense ascites limit the fluid removal to 5ml/kg with each initial cycle.
- In patients with persistent acidosis / hyperkalaemia, cycle volume can be increased to 15ml/kg/cycle and up to 20ml/kg/cycle

**Regular Prescription**

- The patients that are haemodynamically stable, the cycle volumes may be increased to 20-30ml/kg/cycle and the in, dwell and out times changed.
  - i.e. 5mins in, 45mins dwell and 10mins out.
- Variations in dwell time allow greater clearances of solute or fluid. In severe hyperkalaemia shortened dwell times of 15mins should be used.
6.3 Monitoring

- Hyperglycaemia can occur in patients on PD as glucose may be absorbed from the dialysate. Regular blood glucose monitoring is mandatory.
- Base deficit should be checked at least 4 hourly on the capillary blood gas machine, until stable.
- Lactate should be checked at least 12 hourly on the capillary blood gas machine, and increased to 6 hourly in a patient with deranged LFT’s and/or rising lactate.

6.4 Formulations available

All these formulations are kept on ward 4 or in the ICU fluid store (C floor jubilee wing). If these supplies are low then order further supplies from pharmacy stores.

<table>
<thead>
<tr>
<th>Solution</th>
<th>Glucose (%)</th>
<th>Bicarbonate mmol/L</th>
<th>Sodium mmol/L</th>
<th>Calcium mmol/L</th>
<th>Magnesium mmol/L</th>
<th>Chloride mmol/L</th>
<th>Lactate mmol/L</th>
<th>Osmolality mmol/L</th>
<th>pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>BicaVera 1.5%</td>
<td>1.5</td>
<td>34</td>
<td>134</td>
<td>1.75</td>
<td>0.5</td>
<td>104</td>
<td>0</td>
<td>358</td>
<td>7.4</td>
</tr>
<tr>
<td>BicaVera 2.3%</td>
<td>2.3</td>
<td>34</td>
<td>134</td>
<td>1.75</td>
<td>0.5</td>
<td>104</td>
<td>0</td>
<td>401</td>
<td>7.4</td>
</tr>
<tr>
<td>BicaVera 4.25%</td>
<td>4.25</td>
<td>34</td>
<td>134</td>
<td>1.75</td>
<td>0.5</td>
<td>104</td>
<td>0</td>
<td>511</td>
<td>7.4</td>
</tr>
</tbody>
</table>

6.5 Criteria for use of each dialysis solution

- Patient not Acidotic (base deficit is less than 6) - BicaVera (Bicarbonate solution)
- Patient Acidotic (base deficit equal or greater than 6) - BicaVera (Bicarbonate solution)

use the appropriate BicaVera dialysate regime, depending on desired effect

- Initial starting fluid / No removal of excessive fluid needed - 1.5%
- Moderate removal of excessive fluid needed – 1.5%, 2.3% or 4.25% to achieve desired response.
- Removal of excessive fluid needed quickly – 4.25%

6.6 Additives

- Heparin 200units per Litre for the first 48 hours.
  This can be omitted if fluid is subsequently visibly clear
- Antibiotics - seek advise on from microbiology / paediatric renal physician and pharmacy
## 6.8 Trouble Shooting Guide

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluid won’t run in</td>
<td>▪ Check height of fill bag / bottle</td>
</tr>
<tr>
<td></td>
<td>▪ Check correct taps are open</td>
</tr>
<tr>
<td></td>
<td>▪ Check air inlet valves on burette</td>
</tr>
<tr>
<td></td>
<td>▪ Check for kinked lines</td>
</tr>
<tr>
<td></td>
<td>▪ Reposition patient</td>
</tr>
<tr>
<td>Fluid won’t run out</td>
<td>▪ Check correct taps are open</td>
</tr>
<tr>
<td></td>
<td>▪ Check for kinked lines</td>
</tr>
<tr>
<td></td>
<td>▪ Reposition patient</td>
</tr>
<tr>
<td></td>
<td>▪ Check cycle was run in</td>
</tr>
<tr>
<td></td>
<td>▪ Refill if first time</td>
</tr>
<tr>
<td></td>
<td>▪ Call for help</td>
</tr>
<tr>
<td>Fluid is cloudy</td>
<td>▪ Check for peritonitis</td>
</tr>
<tr>
<td></td>
<td>▪ Send PD fluid for</td>
</tr>
<tr>
<td></td>
<td>○ Urgent microscopy</td>
</tr>
<tr>
<td></td>
<td>○ Gram stain</td>
</tr>
<tr>
<td></td>
<td>○ Culture</td>
</tr>
<tr>
<td>Fluid is leaking</td>
<td>▪ Decrease fill volume</td>
</tr>
<tr>
<td></td>
<td>▪ Check catheter insertion site</td>
</tr>
<tr>
<td></td>
<td>▪ Check taps closed</td>
</tr>
</tbody>
</table>

### Reference


Authors
Teresa Brooks (Lead Paediatric Cardiac and Intensive Care Pharmacist)
Ramesh Kumar (Paediatric Intensive Care Consultant)

Approved by: Paediatric Intensive Care Medicine management group and the PICU renal group

Date written: April 09; Updated May 2017 (Teresa Brooks)
Review date: May 2020