Clinical Practice Guideline – Postoperative Fluid Management for Ward Patients

Background:

Postoperative paediatric patients are a different population from medical inpatients. The important differences regarding their fluid management are:

Intra-operative fluid losses – blood and insensible

Potential for ongoing losses – "maintenance" fluids and replacement for ongoing losses need to be considered and calculated separately.

Increased circulating antidiuretic hormone due to multiple factors including surgical stress, pain, nausea, and episodes of hypovolaemia.

Potential for ileus due to abdominal/spinal surgery or analgesic infusions.

Care should be taken when prescribing maintenance fluids, with consideration of

patient selection

fluid type

rate of administration

strict fluid balance

ONGOING CLINICAL MONITORING

Patient Selection:

Patients are given fluids in theatre and recovery to replace their deficit from fasting and intra-operative blood loss. Only those who are still not drinking for a period of hours to days post-op will need ongoing *maintenance* IV fluid for their metabolic requirements.

Some postoperative patients will also require *replacemen*t fluid for their ongoing losses which can be measured in drains or estimated (in the case of concealed losses) from vital signs, urine output and serum biochemistry.

Example patients: after major bowel or spinal surgery (likely to develop ileus), surgery to the head and neck, or patients requiring large doses of intravenous analgesics.

Patients with cirrhosis, renal impairment, or congestive cardiac failure are at extra risk of fluid retention and electrolyte imbalances. These groups should be managed by medical specialists or in PICU after major surgery.

Fluid Type:

Evidence is emerging that isotonic fluids are preferable in postoperative patients, due to their increased risk of free water retention and hyponatraemia. Postoperative patients can also be at risk of hyperglycaemia if excessive glucose is administered. **Blood glucose and electrolytes should be monitored closely regardless of fluid choice.**

Appropriate maintenance fluids readily available on RCH wards are:

0.9% NaCl with 5% dextrose

0.45% NaCl with 5% dextrose

(Plasmalyte with 5% dextrose is currently being compared in the PIMS study and will hopefully become available for routine use if benefit is shown)

0.9% NaCl (mainly used for fluid boluses to replace ongoing losses or correct hypovolaemia), but also an appropriate maintenance fluid

Hartmann's solution = Compound Sodium Lactate

Potassium should be added after >24hours of fasting, usually KCl 20mmol/L.

Rate of administration:

Standard maintenance rates according to the 4-2-1 rule* may deliver excessive fluid to postoperative patients. ½ to 2/3 standard maintenance rates may be more appropriate.

Ongoing losses should be replaced like for like.

> e.g. nasogastric losses are replaced with 0.9% NaCl with 20mmol/L KCl
>
> ongoing bleeding should trigger Hb monitoring and consideration of blood products

Hypovolaemia or dehydration, as evidenced by decreased urine output, weight loss, tachycardia, decreased perfusion, should be corrected with boluses of 0.9% NaCl - give 20ml/kg and reassess.

Keep vein open infusions running purely to "piggyback" IV drug infusions can be any compatible fluid, run at a low rate. For example a total of 2ml/hour for small babies <10kg, 5ml/hr 10-40kg patients, 10ml/hr >40kg patients. These infusions only need to run if there is no other maintenance through that particular lumen\cannula or if there is only an infusion at such a low rate that it is not adequate to keep the vein open (eg morphine or PCA).

Monitoring:

In order to avoid iatrogenic complications of intravenous fluid regimes, all patients on maintenance fluid should ideally have:

Frequent vital signs

Daily weight

Strict input and output charts, including drain and nasogastric losses

> Note: Urine output should be greater than 0.5-1.0ml/kg/hour (depending on age)

At least daily serum biochemistry and glucose monitoring

At least daily medical review to determine ongoing need for intravenous therapy.

Special Groups:

Neurosurgical patients – more likely to be prescribed 0.9% saline maintenance, to maintain serum sodium in the high-normal range.

Neonates - managed according to neonatal unit maintenance fluid protocol

Craniofacial surgery – at particular risk of SIADH and anaemia. This guideline applies but particular care is required. Blood tests on the evening of surgery and the following morning are recommended.

Scoliosis surgery – older children who rarely require additional glucose. Should receive 0.9% saline or Hartmann's for postoperative day 1 at 2/3 – 3/4 maintenance with a rescue order of 10mL/kg if urine output declines below 0.5mLs/kg/hr for 2 consecutive hours or systolic BP is low.

* **4/ 2/ 1 rule for maintenance fluid calculations:**

i.e. 4mls/kg/hr for any part of the first 10 kilos
2mls/kg/hr for any part of the second 10 kilos
1ml/kg/hr for the remaining kilos

e.g.	8 kg	4x 8	= 32mls/hr
	17kg	(4x10) + (2x7)	= 54mls/hr
	25kg	(4x10) + (2x10) + (1x5)	= 65mls/hr
	43kg	(4x10) + (2x10) + (1x23)	= 83mls/hr