

Summary Sheet

Fluid Therapy

Version 1.0 (08/09/2017)

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Fluid therapy consists of fluid resuscitation and fluid maintenance. Fluid resuscitation is a replacement of peri-operative fluid loss, from pre-operative fasting, intra-operative blood loss, stomata, fistulae, diarrhoea and vomit etc. The need of fluid resuscitation is guided by either direct monitoring fluid loss or assessing fluid responsiveness. Assessing fluid responsiveness, by monitoring central venous pressure, pulmonary capillary wedge pressure, stroke volume variation or pulse pressure variation, is widely practiced in the intensive care units and operation theatres, albeit not much in the wards, due to lack of facility and expertise. However, fluid responsiveness can also be easily assessed by passive leg raising test.

Fluid maintenance is required when surgical patients are not allowed or cannot tolerate the amount of fluid orally, to make even urine loss and insensible fluid loss. The requirement of fluid maintenance should be assessed on a daily basis, taken into account patients' fluid loss, oral intake and other sources of fluid intake, such as NG feeding, PEG feeding and TPN.

The principle objectives of peri-operative fluid management include:

- Assessment of haemodynamic state and fluid responsiveness.
- Ensuring adequate circulatory volume.
- Ensuring optimal fluid and electrolyte balance.
- Ensuring optimal oxygen delivery to the tissues.
- Avoidance of ischaemia, interstitial oedema and anastomotic leak.
- Tailor fluids to individual needs.
- Monitor potassium levels and supplement if necessary.
- Oral fluids as soon as tolerated.
- Early risk assessment for special nutritional needs.
- Consideration of enteral feed for malnourished patients and parenteral feed for the severely malnourished.



NICE guidelines recommend a maintenance fluid and electrolyte requirement of 25-30ml/kg/day water and 1mmol/kg/day sodium, potassium and chloride. The British Consensus Guidelines on IV Fluids for Adult Surgical Patients (GIFTASUP) recommend low volume maintenance fluid of 1-1.5ml/kg/hr. Post-operative oliguria is a normal physiological response to surgery and locally we recommend a maintenance rate of 0.5ml/kg/hr with fluid boluses for resuscitation if required.

If adequate fluid resuscitation has occurred and patients are able to take oral fluids in the post-operative period many of our surgical patients will not require maintenance fluid in the peri-operative period.

A plethora of fluids are used in medical practice. Colloid fluid such as Gelofusin®, albumin solution, blood and Hydroxyethyl starch are no longer recommended for routine use.

Crystalloid fluids can be divided into isotonic, hypertonic and hypotonic fluid.

Hypertonic fluid includes 3% NaCl, used in severe hyponatraemia patients with cerebral oedema, 10% Dextrose and 20% Dextrose, used in small volume to treat hypoglycaemia.

Hypotonic fluid includes 0.45% NaCl and 2.5% Dextrose, used to treat severe dehydration, for example in cases of DKA and hyperosmolar hyperglycaemic state.

Both hypertonic and hypotonic fluid are not routinely used in clinical practice or recommended by NICE in managing peri-operative patients, due to risk of cerebral oedema and osmotic demyelination syndrome.

Isotonic fluids are routinely used in managing peri-operative patients. Examples are:

- Dextrose/saline is isotonic and there are differing concentrations available. Common use includes 0.45% NaCl/2.5% Dextrose and 0.18%NaCl/4%Detrose. Dextrose/saline helps maintain circulation and also contributes to the energy requirement. Locally it is our preferred maintenance solution in the perioperative period.
- Hartmann's fluid, as shown in the table below, consists of electrolyte concentration similar to extracellular fluid, hence more physiological than saline and preferred as maintenance fluid in post-operative patients. Notably given alone, Hartmann's fluid does not meet the adult requirements of potassium and calories and potassium supplement and dextrose fluid are required.
- 0.9% NaCl, one of the most commonly prescribed fluid. Its high sodium concentration makes it a good choice of fluid in resuscitation. However, its high chloride content causes hyperchloraemic metabolic acidosis. We do not commonly use it as a maintenance fluid as further dextrose and potassium chloride would be required to meet the patients caloric and electrolyte requirement of patients.
- 5% Dextrose is used as maintenance fluid to meet caloric requirements of NBM patients or in conjunction with sliding scale insulin. As glucose is metabolised, water content is widely distributed intracellularly and extracellularly, which makes it an ineffective resuscitation fluid.

References

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