FLUID RESUSCITATION
Supporting information

This guideline has been prepared with reference to the following:

NICE. Intravenous fluid therapy in adults in hospital. 2017. London. NICE

https://www.nice.org.uk/guidance/cg174

Isotonic saline (sodium chloride 0.9%) is preferred to hypertonic saline (sodium chloride 3% or 5%) as a resuscitation fluid?

A 2020 systematic review of RCTs concluded that hypertonic saline/dextran or hypertonic saline compared with isotonic fluid did not result in superior 28- to 30-day survival as well as in survival to hospital discharge (Safiejko, 2020). However, the review found that patients with hypotension who received resuscitation with hypertonic saline/dextran had less overall mortality as patients who received conventional fluid. Fifteen studies RCTs (including 3264 patients) were included in the review. Survival to hospital discharge rate amounted to 71.2% in hypertonic saline/dextran group vs. 68.4% for isotonic/normotonic fluid solutions (odds ratio [OR] = 1.19; 95% confidence interval [CI] 0.97 to 1.45). 28- to 30-days survival rate for hypertonic fluid solutions was 72.8% survivable, while in the case of isotonic fluid - 71.4% (OR = 1.13; 95% CI 0.75 to 1.70).

A Cochrane systematic review of 18 studies with 1087 participants (Shrum, 2016) found that hypertonic saline reduced the volume of intravenous fluid required to maintain patients undergoing surgery (MD -1.92 L, 95% confidence interval -2.61 to -1.22 L; P < 0.00001) but transiently increased serum sodium, whilst remaining within normal limits (136 to 146 meq/L). The review was unable to tell if hypertonic saline adversely affected patient survival and morbidity.

Safiejko K, Smereka J, Pruc M et al. Efficacy and safety of hypertonic saline solutions fluid resuscitation on hypovolemic shock: A systematic review and meta-analysis of randomized controlled trials. Cardiol J. 2022;29:966-77
https://journals.viamedica.pl/cardiology_journal/article/view/70622

Shrum B, Church B, McArthur E et al. Hypertonic salt solution for peri-operative fluid management. Cochrane Database Syst Rev. 2016;6
https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD005576.pub3/full

Evidence Level: I

Are crystalloids safer than colloids when used for fluid resuscitation in surgical and trauma patients?

The safety of colloids vs crystalloids in fluid resuscitation has been a contentious issue since the 1990s when adverse effects of colloid use including increased mortality, bleeding and renal failure were first reported. Colloids are still used, particularly when blood is unavailable, as they remain longer in circulation and preserve high colloid osmotic pressure (Verheij, 2006).

A 2018 systematic review of RCTs compared the safety of crystalloids against four types of colloids (starches – 28 RCTs, dextrans – 20 RCTs, gelatins – 7 RCTs and albumin or FFP – 22 RCTs) [Lewis, 2018]. Meta-analysis found no statistically significant differences in mortality between crystalloids and any of the colloids. Starches were found to slightly increase the risk of blood transfusion (RR 1.19, 95% CI 1.02 to 1.39).

Lewis SR, Pritchard MW, Evans DJ et al. Colloids versus crystalloids for fluid resuscitation in critically ill people. Cochrane Database Syst Rev. 2018 Aug 3;8:CD000567
https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD000567.pub7/full

Verheij J, et al. Cardiac response is greater for colloid than saline fluid loading after cardiac or vascular surgery. Intensive Care Med 2006;32:1030–8

Hypovolaemia due predominantly to blood loss should be treated with a suitable colloid until packed red cells are available?

The recommendation by BAPEN (Powell-Tuck 2011) suggest treating with either a balanced crystalloid solution or a suitable colloid.

Powell-Tuck, J., Gosling, P, Lobo, D. N et al. British Consensus Guidelines on Intravenous Fluid Therapy for Adult Surgical Patients. Redditch, Worcs, British Association for Parenteral and Enteral Nutrition (BAPEN), 2011 http://www.bapen.org.uk/pdfs/bapen_pubs/giftasup.pdf

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