ACUTE KIDNEY INJURY
Supporting information

This guideline has been prepared with reference to the following:

NICE. Acute kidney injury: prevention, detection and management. 2024. NICE. London

https://www.nice.org.uk/guidance/ng148

Renal Association. Clinical practice guideline Acute Kidney Injury (AKI). 2019. Renal Association. London

https://ukkidney.org/sites/renal.org/files/FINAL-AKI-Guideline.pdf

Singer M, Deutschman CS, Seymour CW et al. The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3). JAMA. 2016;315:801-10

http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4968574/

NICE. Acutely ill adults in hospital: recognising and responding to deterioration. 2007. London. NICE

https://www.nice.org.uk/guidance/cg50

Correction of dehydration (CVP maintained at 10-14 cm H_2O) with IV crystalloid improves the prognosis?
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) in critically ill people [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

Evidence Level: I

Maintaining crystalloid fluid balance as Input = Output + 30 ml/hr (plus continuing fluid losses) is the optimal policy?
This is a commonly-used system where high fluid replacement is required (Arturson, 1985; Hatch, 1985) as 30 ml/hr is the normal urinary output for an adult.

Arturson G. Fluid therapy of thermal injury. Acta Anaesth Scand Suppl 1985;82:55-9

Hatch DA, Barry JM, Norman DJ. A randomized study of intravenous fluid replacement following living-donor renal transplantation. Transplantation 1985;40:648-51

Evidence Level: V

If fluid overloaded, furosemide 250 mg IV over 2 hr should be administered?
A meta-analysis of 9 RCTs in a total of 849 patients (Ho, 2006) concluded that "(furosemide) is not associated with any significant clinical benefits in the prevention and treatment of acute renal failure in adults." The authors commented that no large RCTs or meta-analyses had previously evaluated the role of furosemide in acute renal failure, and that despite its widespread use, "potential benefits, adverse effects, and cost effectiveness remain uncertain".
A similar lack of significant benefit and a possible increase in death or non-recovery of renal function (OR 1.77; 95% CI 1.14-2.76) was observed in an earlier cohort study in 552 patients (Mehta, 2002). This apparent lack of benefit may be due to the low statistical power of the available trials (Bagshaw, 2007; Sampath, 2007; Schetz, 2004).
A review on the specific subject of fluid overload (Cerda, 2010) states that: "Use of diuretics should be only short term as long as it is effective, generally at high doses, while avoiding simultaneous utilization of nephrotoxins such as aminoglycosides. Multiple randomized controlled trials have not shown benefit in the use of diuretics, either to prevent AKI or to treat established AKI. If fluid overload

(defined as fluid accumulation >10% over baseline) develops and the patient does not respond to diuretics, persistent use of these drugs will only lead to a delay in the initiation of dialysis or ultrafiltration and an increased risk of negative patient outcomes. In that setting, early initiation of continuous renal replacement therapies may be preferable."

Bagshaw SM, Delaney A, Haase M, et al. Loop diuretics in the management of acute renal failure: a systematic review and meta-analysis. Crit Care Resusc 2007;9:60-8

Cerda J, Sheinfeld G, Ronco C. Fluid overload in critically ill patients with acute kidney injury. Blood Purif 2010;29:331-338
http://www.karger.com/Article/Pdf/287776

Ho KM, Sheridan DJ. Meta-analysis of frusemide to prevent or treat acute renal failure. BMJ . 2006. 333. 420.
http://www.bmj.com/content/333/7565/420

Mehta RL, Pascual MT, Soroko S, et al. Diuretics, mortality, and nonrecovery of renal function in acute renal failure. JAMA 2002;288:2547-53

Sampath S, Moran JL, Graham PL, et al. The efficacy of loop diuretics in acute renal failure: assessment using Bayesian evidence synthesis techniques. Crit Care Med 2007;35:2516-24

Schetz M. Should we use diuretics in acute renal failure? Best Pract Res Clin Anaesthesiol 2004;18:75-89

Evidence Level: I

Can dopamine reduce the risk of renal failure in critically ill patients with signs of early renal dysfunction?

A trial of 328 ICU patients with at least one indication of renal dysfunction were randomly assigned a continuous intravenous infusion of low-dose dopamine or placebo administered through a central venous catheter. There was no difference between the dopamine and placebo groups in peak serum creatinine concentration during treatment (245 [SD 144] vs 249 [147] micromol/L; p=0.93), in the increase from baseline to highest value during treatment (62 [107] vs 66 [108] micromol/L; p=0.82), or in the numbers of patients whose serum creatinine concentration exceeded 300 micromol/L (56 vs 56; p=0.92) or who required renal replacement therapy (35 vs 40; p=0.55). Durations of ICU stay (13 [14] vs 14 [15] days; p=0.67) and of hospital stay (29 [27] vs 33 [39] days; p=0.29) were also similar. There were 69 deaths in the dopamine group and 66 in the placebo group. Hence the authors concluded that administration of low-dose dopamine by continuous intravenous infusion to critically ill patients at risk of renal failure does not confer clinically significant protection from renal dysfunction.

Bellomo R, Chapman M, Finfer S et al. Low-dose dopamine in patients with early renal dysfunction: a placebo-controlled randomised trial. Australian and New Zealand Intensive Care Society (ANZICS) Clinical Trials Group. Lancet. 2000;356:2139-43

Evidence Level: II

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