ICU
MANAGEMENT & PRACTICE

Fluid resuscitation in ICU: crystalloids inferior to colloids?

Researchers performed a systematic review and meta-analysis to evaluate data from randomised controlled trials (RCTs) of crystalloids and colloids for fluid resuscitation in critically ill adults. They found that crystalloids were less effective than colloids at stabilising haemodynamic resuscitation endpoints such as adequate central venous pressure (CVP) and cardiac index.

Current international guidelines recommend crystalloids for fluid resuscitation in sepsis/shock and switching to albumin in cases where crystalloids are insufficient. Importantly, the guidelines do not include a clear recommendation to guide physicians on what constitutes a substantial amount of crystalloids and consequently when albumin should be administered.

Fluid therapy is moving away from the conventional 'one-size-fits-all' approach, and advice included in the 1-hour Surviving Sepsis guideline bundle to administer 30mL/kg of crystalloids within one hour to all patients with sepsis/septic shock should not necessarily be followed in all cases. Moreover, the timing of fluid administration should be considered when treatment decisions are made, according to the phases of fluid therapy defined by the ROSE concept: resuscitation; optimisation; stabilisation; evacuation. Recent studies have shown that administration of fluid in line with these phases can have notable positive effects on outcomes in critically ill patients and those undergoing surgery.

The present systematic review examined whether crystalloids were adequate for volume replacement in the intensive care unit (ICU), focusing on clinical parameters such as haemodynamic outcomes, which are often under-reported, in addition to patient-centred outcomes such as mortality. RCTs were identified using PubMed and EMBASE, and screened against predefined inclusion/exclusion criteria. A total of 55 RCTs (N=27,036 patients) were included in the analysis. All trials included at least one colloid comparator arm.

The reviewers reported these key findings:

- CVP was significantly lower with crystalloids than with albumin, hydroxyethyl starch (HES), or gelatine (all p<.001).
- Mean arterial pressure (MAP) was significantly lower with crystalloids vs. albumin (mean difference [MD]: -3.5mmHg; p=.03) or gelatine (MD: −9.2mmHg; p=.02).
- Significantly higher volumes of crystalloids were administered vs. HES (MD: +1775mL); volume administered was numerically higher vs. albumin (MD: +1985mL).
- Compared with the albumin group, cardiac index was significantly lower in the crystalloid group (MD: −0.6L/min/m2, p<.001).

- All mortality and 90-day mortality were significantly lower for crystalloids compared with HES (relative risk 0.91; p=.009 and 0.9; p=.005, respectively).

Of note, HES was the only colloid associated with increased mortality vs. crystalloids. Therefore, alternative fluid therapy with colloids such as albumin may be appropriate to restore haemodynamic endpoints in a more timely and effective manner.

These findings highlight an urgent need for further research and guidance for physicians regarding when to administer colloids to ensure optimal fluid therapy for resuscitation of critically ill patients. The question of when to switch to colloids, however, is complex and must take into account several factors, including blood loss, patient weight, and haemoglobin concentration.

In addition, it has not yet been established how best to accurately monitor cumulative fluid balance. Daily fluid balance can be calculated based on input and output volumes recorded on patient charts, and by body weight measured at defined timepoints; however, both have been criticised as non-robust, insensitive, and unreliable predictors of fluid overload in critically ill patients.

Source: Journal of Critical Care
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