November 2013 Critical Care Journal Club

Four manuscripts were reviewed. The first two were review articles from the New England Journal of Medicine. Both are good assessments of the current state of the art of fluid resuscitation and shock in the intensive care unit.

Myburgh JA, Mythen MG. Resuscitation fluids. N Engl J Med. 2013;369(13):1243-51. [\[CrossRef\]](#) [\[PubMed\]](#)

Fluid administration is one of the most common interventions in medicine. The authors review the use of resuscitation fluids and point out that until recently that the evidence basis for the selection, timing, and doses of intravenous fluids was empiric, based more on training and preference than data. The authors summarize the literature nicely in Table 2 of their manuscript with the following being major points of the manuscript:

- No currently available resuscitation fluid can be considered to be ideal.
- Fluids should be administered with the same caution that is used with any intravenous drug.
- Fluid resuscitation is a component of a complex physiological process. Replace the fluid and amount most likely to be lost.
- Fluid requirements change over time in critically ill patients.
- Specific considerations apply to different categories of patients.
 1. Bleeding patients require control of hemorrhage and transfusion with red cells and blood components as indicated.
 2. Isotonic, balanced salt solutions are a pragmatic initial resuscitation fluid for the majority of acutely ill patients.
 3. Albumin is not indicated in patients with traumatic brain injury.
 4. Hydroxyethyl starch is not indicated in patients with sepsis or those at risk for acute kidney injury.
 5. The safety of other semisynthetic colloids has not been established, so the use of these solutions is not recommended.

Vincent JL, De Backer D. Circulatory shock. N Engl J Med. 2013;369(18):1726-34. [\[CrossRef\]](#) [\[PubMed\]](#)

Circulatory shock is associated with high morbidity and mortality. The authors review the major types of shock and emphasize that appropriate, aggressive treatment is based on a good understanding of the underlying pathophysiological mechanisms (distributive, cardiogenic, hypovolemic, obstructive). Treatment should include correction of the cause of shock and hemodynamic stabilization, primarily through fluid infusion with colloids for most patients. Failing rapid correction, administration of vasoactive agents such as norepinephrine as a vasopressor, dobutamine as an inotropic agent, and in some instances judicious use of vasodilators to reduce afterload. The patient's response can be monitored

by means of careful clinical evaluation and blood lactate measurements; microvascular evaluation may be feasible in the future.

The last two articles were randomized, controlled trials from JAMA.

Morelli A, Ertmer C, Westphal M, Rehberg S, Kampmeier T, Ligges S, Orecchioni A, D'Egidio A, D'Ippoliti F, Raffone C, Venditti M, Guarracino F, Girardis M, Tritapepe L, Pietropaoli P, Mebazaa A, Singer M. Effect of heart rate control with esmolol on hemodynamic and clinical outcomes in patients with septic shock: a randomized clinical trial. JAMA. 2013;310(16):1683-91. [\[CrossRef\]](#) [\[PubMed\]](#)

Epinephrine and norepinephrine levels are elevated in septic shock. β -Blocker therapy may control heart rate and attenuate the deleterious effects of β -adrenergic receptor stimulation. However, β -Blockers are not traditionally used for this condition and may worsen cardiovascular decompensation related through negative inotropic and hypotensive effects. The authors performed an open-label, randomized phase 2 study of esmolol infusion or placebo in 77 septic shock patients with a heart rate of 95/min or higher requiring high-dose norepinephrine to maintain a mean arterial pressure of 65 mmHg or higher. The primary outcome was a reduction in heart rate below the predefined threshold of 95/min and to maintain heart rate between 80/min and 94/min by esmolol treatment over a 96-hour period. Targeted heart rates were achieved in all patients in the esmolol group. Secondary outcomes of arterial lactatemia, norepinephrine requirements, fluid requirements and twenty-eight day mortality were all improved with esmolol.

The role of β -blockers in several diseases such as heart failure has done a complete flip-flop from contraindicated 30 years ago to a standard of care. This is an extension of this expanded role of β -blockers and although the group found the study interesting, it was pointed out that the study was small and the mortality in the control group was high. We agreed with the authors that the observed improvement in mortality and other secondary clinical outcomes warrants further investigation.

Mentzelopoulos SD, Malachias S, Chamos C, Konstantopoulos D, Ntaidou T, Papastylianou A, Kolliantzaki I, Theodoridi M, Ischaki H, Makris D, Zakynthinos E, Zintzaras E, Surlas S, Aloizos S, Zakynthinos SG. Vasopressin, steroids, and epinephrine and neurologically favorable survival after in-hospital cardiac arrest: a randomized clinical trial. JAMA. 2013;310(3):270-9. [\[CrossRef\]](#) [\[PubMed\]](#)

The authors performed a randomized, double-blind, placebo-controlled, parallel-group trial to determine whether combined vasopressin-epinephrine and corticosteroid supplementation for cardiopulmonary resuscitation (CPR). 268 consecutive patients with cardiac arrest requiring epinephrine according to

resuscitation guidelines (from 364 patients assessed for eligibility).were randomized and the primary endpoints of a return of spontaneous circulation (ROSC) for 20 minutes or longer and survival to hospital discharge with a CPC score of 1 or 2. Patients treated with vasopressin-epinephrine had higher probability for return of spontaneous circulation of 20 minutes or longer and survival to hospital discharge with a CPC score of 1 or 2.

Like the previous study we found this interesting. Also like the previous study, the improvement in mortality and other secondary clinical outcomes warrants further investigation. However, it is difficult to determine if the effects, if confirmed, are due to one of the therapies or the combination is necessary.

Richard A. Robbins, MD
Editor