Fluid management in the critically ill: science or invention?

Correspondence
J. Wernerman, Department of Anesthesia and Intensive Care Medicine, K32 Karolinska University Hospital Huddinge, 14186 Stockholm, Sweden
E-mail: jan.wernerman@karolinska.se

Conflicts of interest
The authors have no conflicts of interest to declare.

doi: 10.1111/aas.12661

Volume substitution in case of circulatory instability is widely practiced, and it is regarded as a cornerstone in treatment of for example hypovolemia and septic shock. Recently, the type of fluid used in volume substitution has attained a widespread interest. Large prospective randomized controlled trials have been performed, comparing different fluids in resuscitation. The results have been debated extensively. Guidelines are produced, but the issue remains controversial. In clinical practice in Europe and in Scandinavia, there is a large variability in indications for fluid therapy, in the choice of fluid used, and also in how to monitor the effect and the result.[1]

In this perspective, the recent publishing of Scandinavian clinical practice guideline on choice of fluid in resuscitation of critically ill patients with acute circulatory failure by a working group within the Scandinavian Society of Anesthesiology and Intensive Care Medicine is helpful.[2] The authors used the Grading of Recommendations Assessment, Development and Evaluation (GRADE) methodology after having systematically searched the literature for recently updated systematic reviews of randomized clinical trials (RCTs) comparing crystalloid solutions with colloid solutions. They ask a number of very relevant questions and come up with three strong recommendations; to use crystalloids rather than hydroxyl ethyl starch for resuscitation in general ICU patients and in sepsis, and to use crystalloids rather than any colloid for resuscitation in trauma. In the summary, they conclude a recommendation to use crystalloids rather than colloids for resuscitation in the majority if critically ill patients.

As pointed out by the authors the strength of this guideline is the use of the GRADE methodology including a transparent process. The major limitation, also pointed out by the authors, is the lack of subgrouping of patients based on the indication for fluid therapy. It is a big leap forward to have access to guidelines produced by authors familiar to the Scandinavian reality in terms of traditions, epidemiology, clinical routines, and case-mix. Most important is perhaps how the guideline exposes the shortage of evidence on the level of randomized controlled clinical trials for some situations.

The concern over the use of hydroxyl ethyl starch containing colloid solutions is now well documented and the authors find that this merits for strong recommendations. There has been (and still is) shortage of documentation for the perioperative use of hydroxyl ethyl starch and for the use in acute resuscitation. Still emerging results from observational studies support the concern raised. Also perioperative use appears to be associated with an increased risk of acute kidney injury.[3]

The remaining issues include whether or not any colloid is a better choice than a crystalloid solution perioperatively, in any critical illness or in trauma. Although the Scandinavian Clinical Practice Guidelines give a strong recommendation for the use of crystalloids rather than colloids, they characterize the level of evidence as very low. The main problem is that randomized clinical trials in accordance with the Helsinki Declaration include a consent from patient or proxy to be randomized, and this means that the period before inclusion is not protocolized. Still there are a number of situations where the informed consent may be waived by the Ethics Committee in order to make it possible to gain proper evidence also in this type of very acute situations. Hopefully investigators may succeed in performing the necessary studies to produce guidelines with high level of evidence also for emergency situations.

Management end points and monitoring of fluid therapy in critically ill patients remain to be a major problem in clinical practice. The traditional way of circulatory monitoring gives us an incomplete picture of the circulatory status.[4] Heart rate and blood pressure are clearly

Acta Anaesthesiologica Scandinavica
AN INTERNATIONAL JOURNAL OF ANAESTHESIOLOGY AND INTENSIVE CARE, PAIN AND EMERGENCY MEDICINE

insufficient in many situations. Pulse rate gives more information, as the character of the pulse and the peripheral temperature may be estimated when pulse rate is palpated, preferably at different sites. Peripheral capillary refill and general skin color and moisture of oral mucosa may add further information. These observations and measurements may be done by any health care professional. More dynamic measures of the cardiovascular system include; echocardiography and ultrasound of larger vessels and there are a variety of techniques to measure or estimate stroke volume and cardiac output. However, these are not always applicable or even necessary. Functional measures such as mental status and urinary output should also be included in a circulatory assessment as well as basic blood tests such as hemoglobin concentration, base excess and lactate. Regardless of choice of circulatory monitoring, an indication for fluid administration needs to be specified, as well as type and intensity of monitoring required.

Concerning fluid management one should keep in mind the study from East Africa, where children with septic shock had a higher mortality rate after being given boluses of albumin.[5] The external validity of that study in Scandinavia is of course limited, but the physiology involved with that study remains to be explained and understood. It is quite common that an immediate effect upon blood pressure is the sole argument to give boluses of albumin also today in Scandinavia. The short term effect is often, but not always, obvious. The long term effect, however, is not well characterized.[6]

In conclusion, the Scandinavian clinical practice guideline on choice of fluid in resuscitation of critically ill patients with acute circulatory failure is a welcome and helpful initiative, and it is important to implement it into clinical routines. At the same time, the limitations of the randomized controlled clinical trials, which build up the evidences behind the guidelines and the knowledge gaps there are, must be recognized. In saying that it is also important to realize that we should have an obligation to help to bridge these gaps of knowledge by participating in well designed studies that are presented to us.

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J. Wernerman[1] and G. H. Sigurdsson[2]

[1]Department of Anaesthesia and Intensive Care Medicine, Karolinska University Hospital Huddinge and Karolinska Institutet, Stockholm, Sweden

[2]Department of Anaesthesia and Intensive Care Medicine, Landspitali University Hospital and Faculty of Medicine, University of Iceland, Reykjavik, Iceland

