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In Reply:

I thank Drs. Pitkin and Rice for their interest in my editorial, "Reconstructing Deconstructed Blood for Trauma,"[1] and the issue of the utility of whole blood. Although my editorial focused on trauma, I agree with Drs. Pitkin and Rice that the potential for the appropriate utilization of whole blood applies to other clinical circumstances of substantial blood volume replacement, as well.

When citing the limited supportive clinical trial literature,[2,3] I was careful to indicate that those studies addressed adults. I did not cite the study performed in pediatric cardiac surgery patients[4] because it was not fully blinded and only partially randomized, thus making interpretation of the results quite problematic. In addition, the analysis in that publication of a subpopulation (whose removal from the overall analysis reduced the results to statistical nonsignificance in the remaining population: those younger than 2 yr with surgery of lesser difficulty, and all those studied who were older than 2 yr) appears to have been *post hoc*, thus providing an interesting hypothesis, but not proof.

As I wrote,[1] determination of platelet efficacy is not straightforward and requires careful analysis of source, and storage conditions (time, temperature, and medium), as well as the timing and method of assessment. Platelet quantity and quality are critical components of coagulation, making transfusion of viable, functional platelets an important consideration for the use of whole blood.

The author has a relationship with or consults for the following companies and organizations that have an interest in erythrocyte, plasma, or whole blood transfusion: US Food and Drug Administration (Rockville, Maryland), US National Heart, Lung, and Blood Institute/National Institutes of Health (Bethesda, Maryland), US Department of Defense (Washington, D.C.), Caridian BCT (Lakewood, Colorado), CSL Behring (King of Prussia, Pennsylvania), Entegrion (Research Triangle, North Carolina), OPK Biotech (Cambridge, Massachusetts), and Sangart Inc. (San Diego, California). The author was project/corporate vice president and executive scientific advisor at Novo Nordisk A/S (Bagsvaerd, Denmark) 2005–2007.

Whole blood has potential indications other than that of trauma, although current studies and greatest interest are focused on trauma. The U.S. military continues to use whole blood for some combat injuries, but the road to the return for its use in civilian practice will require a concerted effort by interested clinicians, such as Drs. Pitkin and Rice.

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'Evidence' for Practice Guidelines for Central Venous Access?

To the Editor:

Although we applaud the American Society of Anesthesiologists (ASA) in the development of evidence-based guidelines and the effort and expertise of esteemed leaders of our field in their preparation, we are concerned with several aspects of the guidance section in the recently published practice guidelines for central venous access.[1]

The prologue to the guidelines emphasize their application to "anesthesiologists or health care professionals under the direction/supervision of anesthesiologists" (in the Focus section) and intent "for use by anesthesiologists and individuals under the supervision of an anesthesiologist" (in the Application section). As such, the dearth of level 1 evidence presented by anesthesiologists is disconcerting.

For adults, only one of the three presented studies for static ultrasound use for internal jugular access, and only one of the eight presented for real-time ultrasound use, are from anesthesiologists, incongruent to the preceding admonition in the preamble. Examination of the referenced adult studies and their subsequent meta-analysis is disturbing for their heterogeneity, which does not necessarily reflect the practice of average ASA members, and is apparent as such in the ASA member survey responses.

The majority of the referenced studies (all fewer than 100 subjects) include hemodialysis and central line access by both nephrologists and interventional radiologists and multiple studies by nonanesthesia critical care physicians, including

junior house staff. The largest of these (450 subjects) had incidences in the landmark group of carotid artery puncture (10.6%), hemothorax (1.7%), and pneumothorax (2.4%) greater than most anesthesiologists would accept. Thus it is not surprising that meta-analysis of these disparate studies (which have not been scored by traditional methods to assess for bias and scientific rigor) would find statistical significance only in success of line insertion.

Given this weak supportive evidence, it is further surprising to conclude that ASA members "agree" with the presented recommendation (table 5). In fact, only 48.2% agree in any form with the statement that real-time ultrasound should be used (table 3, item 35), which even by partisan estimation is not a majority. The vigorous discussion at the 2010 and 2011 ASA House of Delegates and reference committees, including more anecdotal comments than evidentiary discussion, is testimony to the discomfort that many ASA members have with the supportive level of evidence.

As users of ultrasound for central line insertion when indicated by prudent physician judgment and experience, we call for additional quality prospective, randomized investigations of ultrasound use for internal jugular placement by the anesthesia community before uniform adoption of guidelines based on data from nonanesthesiologists.

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Removal of Central Venous Catheters

To the Editor:

The recently published Practice Guidelines for Central Venous Access provide a valuable resource for anesthesiologists and others who insert and maintain central venous catheters (CVCs).[1] We commend the members of the American Society of Anesthesiologists Task Force on their efforts.

Although the guidelines deal extensively with insertion and maintenance of CVCs, there is no discussion of removal of those CVCs. There is considerable anecdotal evidence and a plethora of published case reports highlighting the occurrence of adverse events during CVC removal, including bleeding and venous air embolism.[2,3] Venous air embolism, which occurs as a result of entrainment of air when an open vein is above the level of the heart, has the potential to result in cardiorespiratory compromise, devastating neurologic sequelae, and death.[4–10] A failure to appreciate the potential for, and cause of, venous air embolism may result in improper practices during CVC removal. In some circumstances, inexperience, unfamiliarity, and lack of education or training may play a role.

Although there are many steps in the process of CVC removal, essential elements of the procedure include (for internal jugular and subclavian CVCs), positioning of the patient in the head down (Trendelenburg) position, having the patient perform a Valsalva maneuver as the catheter is being withdrawn, application of pressure to the catheter-entry site as the catheter is being withdrawn, placement of an air-occlusive dressing over the site after removal, and a period of postprocedure monitoring.[11] If VAE occurs, interventions should include placement of the patient in the head-down, left-side-down position, administration of 100% O_2, and appropriate cardiopulmonary resuscitation.[3,12]

As part of an initiative to optimize and standardize practice with a goal of improving patient safety, our institution – similar to other medical centers – has developed and implemented a policy for removal of CVCs.[13] In addition to the placement of written practice guidelines in appropriate locations on our internal Web site, a mandatory educational module for those who remove CVCs has been developed. Furthermore, we have incorporated essential supplies and informational materials into a "CVC removal kit." These initiatives are being incorporated into our institutional global "CVC educational module" targeted at those who insert CVCs, but are also independently directed at those who remove but do not insert CVCs.

We appreciate the efforts of those involved in the production of the Practice Guidelines. We respectfully suggest that, when the guidelines are revised and updated in the future, a section relating to safe removal of carefully placed and carefully maintained CVCs be included.

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