REFERENCES

1. Riha HM, Erdman MJ, Vandigo JE, et al: Impact of Moderate Hyperchloremia on Clinical Outcomes in Intracerebral Hemorrhage Patients Treated With Continuous Infusion Hypertonic Saline: A Pilot Study. *Crit Care Med* 2017; 45:e947–e953
2. Roquilly A, Mahe PJ, Latte DD, et al: Continuous controlled-infusion of hypertonic saline solution in traumatic brain-injured patients: A 9-year retrospective study. *Crit Care* 2011; 15:R260
3. Qureshi AI, Suarez JI, Castro A, et al: Use of hypertonic saline/acetate infusion in treatment of cerebral edema in patients with head trauma: Experience at a single center. *J Trauma* 1999; 47:659–665
4. Li M, Hu YH, Chen G: Hypernatremia severity and the risk of death after traumatic brain injury. *Injury* 2013; 44:1213–1218
5. Ichai C, Payen JF, Orban JC, et al: Half-molar sodium lactate infusion to prevent intracranial hypertensive episodes in severe traumatic brain injured patients: A randomized controlled trial. *Intensive Care Med* 2013; 39:1413–1422

DOI: 10.1097/CCM.0000000000002794

The authors reply:

We thank Poignant and Laffon (1) for their letter outlining where they feel our research contributes to patient care. As the authors mention, current research has demonstrated variable benefits related to the use of continuous infusion 3% hypertonic saline (HTS) in neurocritical care. They have raised several valid points that we feel require further commentary.

Overall, the current body of evidence evaluating continuous infusion HTS is mainly limited to single-center studies with small patient samples. Although the randomized, double-blind study referenced by Poignant did demonstrate a potential benefit of an induced hyperosmolar hypernatremic state, it included only 30 patients receiving this intervention. Patients in this study received a half-molar sodium lactate infusion and had lower serum chloride levels than the control group (2). Notably, our study of intracerebral hemorrhage (ICH) patients found no association, positive or negative, with hypernatremia and mortality (3). Wagner et al (4) retrospectively reported that the use of continuous 3% HTS significantly decreased cerebral edema volume and occurrences of intracranial pressure crisis, but only 26 patients received continuous 3% HTS. In the referenced study by Qureshi et al (5), use of continuous HTS was a positive predictor of in-hospital mortality in 36 head trauma patients. An earlier study by the same authors evaluated the use of a mixed HTS/acetate continuous infusion on a cohort of 27 patients that included those with head trauma, ICH, ischemic stroke, and postoperative cerebral edema. It revealed possible benefits in those with head trauma and postoperative edema, but these data are even more limited considering only 13 patients had these types of injuries (6). While there have been several other studies on the subject, there still remains a paucity of data showing benefits of this therapy, yet the practice seems to be one that is widely used to reduce cerebral edema and limit episodes of intracranial hypertension across a broad range of neurologic injuries. In fact, no major guideline related to neurocritical care recommends this therapy with even a moderate level of evidence.

While this practice requires further study, we also feel that studies are needed regarding hyperchloremia in those with severe neurologic injuries. Our analysis of patients with ICH supports a recent publication that demonstrated an association between hyperchloremia and increased rates of acute kidney in subarachnoid hemorrhage (7). The impact of hyperchloremia on acute ischemic stroke and traumatic brain injury are of equal interest and currently lack sufficient evaluations. Additionally, clinicians would benefit from studies aimed at identifying predictors of hyperchloremia in all the aforementioned populations. Does the use of continuous infusion 3% HTS increase the likelihood of hyperchloremia? Is hyperchloremia an indicator of disease severity or prescribing bias? Does the use of balanced mixtures of HTS lead to less hyperchloremia and reduced adverse effects? Should total volume of chloride-based fluids be monitored, including fluids from medication admixtures? All these questions remain unanswered based upon the current available evidence and require further evaluation.

Drs. Jones and Erdman disclosed off-label product use of hypertonic saline for intracranial hypertension. Dr. Riha has disclosed that she does not have any potential conflicts of interest.

G. Morgan Jones, PharmD, BCCCP, FCCM, Department of Pharmacy, Methodist University Hospital, Memphis, TN; **Michael J. Erdman, PharmD, BCPS,** Department of Pharmacy, University of Florida Health, Jacksonville, FL; **Heidi M. Riha, PharmD, BCPS,** Department of Pharmacy, Methodist University Hospital, Memphis, TN

REFERENCES

1. Poignant S, Laffon M: Impact of Moderate Hyperchloremia on Clinical Outcomes in Intracerebral Hemorrhage Patients. Is there Still Room for Continuous Infusion of 3% Hypertonic Saline? *Crit Care Med* 2018; 46:e178–e179
2. Ichai C, Payen JF, Orban JC, et al: Half-molar sodium lactate infusion to prevent intracranial hypertensive episodes in severe traumatic brain injured patients: A randomized controlled trial. *Intensive Care Med* 2013; 39:1413–1422
3. Riha HM, Erdman MJ, Vandigo JE, et al: Impact of moderate hyperchloremia on clinical outcomes in intracerebral hemorrhage patients treated with continuous infusion hypertonic saline: A pilot study. *Crit Care Med* 2017; 45:e947–e953
4. Wagner I, Hauer EM, Staykov D, et al: Effects of continuous hypertonic saline infusion on perihemorrhagic edema evolution. *Stroke* 2011; 42:1540–1545
5. Qureshi AI, Suarez JI, Castro A, et al: Use of hypertonic saline/acetate infusion in treatment of cerebral edema in patients with head trauma: Experience at a single center. *J Trauma* 1999; 47:659–665
6. Qureshi AI, Suarez JI, Bhardwaj A, et al: Use of hypertonic (3%) saline/acetate infusion in the treatment of cerebral edema: Effect on intracranial pressure and lateral displacement of the brain. *Crit Care Med* 1998; 26:440–446
7. Sadan O, Singbartl K, Kandiah PA, et al: Hyperchloremia is associated with acute kidney injury in patients with subarachnoid hemorrhage. *Crit Care Med* 2017; 45:1382–1388

DOI: 10.1097/CCM.0000000000002848

Burnout Research: Eyes Wide Shut

To the Editor:

In a study published in a recent issue of *Critical Care Medicine*, Colville and Smith (1) found modest overlap between burnout and depression and assumed that burnout and depression are distinct entities. We think that the conducted study is seriously flawed.

First, Colville and Smith (1) assessed burnout symptoms with an abbreviated version of the Maslach Burnout Inventory (MBI), the psychometric properties of which are unclear. Second, the authors used clinically and theoretically arbitrary cutoff scores for categorizing burnout—a modus operandi that, unfortunately, has become commonplace in studies of medical professionals (2). Third, participants could be categorized as "burned out" without showing any sign of exhaustion—a troubling choice given that, as emphasized by Maslach et al (3), "exhaustion is a necessary criterion for burnout" (p. 403). Major methodological problems thus undermine the conducted study.

The authors partly recognized that major problems affected their study when lamenting the "enormous variability" in their estimates of burnout's "prevalence"—from 6% to 60%—as a function of the scoring algorithm used. That estimates varied by a factor of 10 well illustrates the vacuity of research on burnout's prevalence (2). As noted by Balon (4) (p. 82): "Numerous studies keep showing ever-increasing rates [of burnout] without any substantial debate about *what* these numbers mean and *how* we should interpret them."

Finally, Colville and Smith (1) overlooked basic similarities between burnout and depression. We turn here to key symptom items of the MBI and compare them with the symptoms used to diagnose depressive disorders. The emotional exhaustion (EE) subscale of the MBI includes such items as "I feel used up at the end of the workday" and "I feel fatigued when I get up in the morning and have to face another day" (5). Consider the symptoms of depression described in the *Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition (DSM-5) (6). They include sleep disturbance, fatigue, and loss of energy. The DSM-5 notes that in depression, "often insomnia or fatigue is the presenting complaint" (p. 162). Consider another EE item: "I feel like I'm at the end of my rope." It suggests severely depressed mood, a cardinal DSM-5 criterion for depression (6).

In our structural equation modeling research (5), we found that latent EE correlates 0.85 with latent depression, controlling for measurement error, and item overlap. Latent depersonalization was a little less closely correlated with latent depression, 0.70, although related closely enough to suggest overlap. Consider some exemplary depersonalization items, such as "I worry that this job is hardening me emotionally" or "I don't really care what happens to some patients." The DSM-5 observes that withdrawal, increased irritability, and "not caring anymore" often accompany depressive affect (p. 163).

The third component of burnout, nonconsidered by Colville and Smith (1), is (diminished) personal accomplishment (PA). Although we found that latent PA represented the burnout dimension least related to latent depression, the correlation was still moderate, –0.49. According to DSM-5 (p. 164), "negative evaluations of one's worth" and feelings of failure—what diminished PA is about—are symptoms of depression.

The view that burnout overlaps with depression has been increasingly supported in recent years (2). The study by Colville and Smith (1) in no way weakens this view.

The authors have disclosed that they do not have any potential conflicts of interest.

Irvin Sam Schonfeld, PhD, MPH, Department of Psychology, The City College of the City University of New York, New York City, NY; **Eric Laurent, PhD,** Laboratory of Psychology (EA 3188), Bourgogne Franche-Comté University, Besançon, France; **Renzo Bianchi, PhD,** Institute of Work and Organizational Psychology, University of Neuchâtel, Neuchâtel, Switzerland

REFERENCES

1. Colville GA, Smith JG: The Overlap Between Burnout and Depression in ICU Staff. *Crit Care Med* 2017; 45:e1102–e1103
2. Bianchi R, Schonfeld IS, Laurent E: The "burnout" construct: An inhibitor of public health action? *Crit Care Med* 2016; 44:e1252–e1253
3. Maslach C, Schaufeli WB, Leiter MP: Job burnout. *Annu Rev Psychol* 2001; 52:397–422
4. Balon R: What about burnout? *Ann Clin Psychiatry* 2017; 29:81–82
5. Schonfeld IS, Verkuilen J, Bianchi R: Confirmatory factor analysis of burnout and depressive symptoms. 12th International Conference on Occupational Stress and Health, "Work, Stress and Health 2017: Contemporary Challenges and Opportunities," Minneapolis, MN, June 7–10, 2017
6. American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders. Fifth Edition. Washington, DC, American Psychiatric Publishing, 2013

DOI: 10.1097/CCM.0000000000002795

The authors reply:

We thank Schonfeld et al (1) for their comments on our letter (2) on the degree to which depression and burnout overlap in ICU staff. However, although we agree that these two forms of distress are associated, that does not mean they are the same thing—correlation is not the same as overlap.

In our survey of 218 staff (3), only five met criteria for burnout and depression, whereas 62 met burnout criteria without meeting depression criteria and two met depression criteria without meeting burnout criteria. We inferred from this that high-risk burnout symptoms are significantly more common in ICU staff than symptoms of clinical depression and that burnout and depression are not the same thing. Interestingly, another recent study of 5,897 practicing physicians (4), using different measures of depression and burnout, has reported that burnout was five times as common as depression, suggesting that this finding may be more widely applicable to health professionals who are functioning well enough to be at work.

The definition we used for burnout was not "arbitrary." It was based on research by Schaufeli et al (5) which shows that emotional exhaustion and depersonalization are most strongly associated with a clinical diagnosis of burnout and is consistent with previous research practice in this field (6). However, we agree that there needs to be greater evidence-based consensus on the dichotomous classification of burnout. We would also support the idea that it might be useful to screen staff with high rates of burnout symptoms for depression, as well as anxiety and posttraumatic stress (which were both more prevalent in our sample than depression) and moral distress, which we did not measure.

Even if, for argument's sake, burnout is viewed as a "subclinical" form of depression, that is not the same thing as saying there is no point measuring it. There is now a huge literature supporting the construct of burnout and demonstrating