Response

To the Editor:

I appreciate the added perspective of Coen and colleagues regarding my recent counterpoint editorial in CHEST (September 2010) of yet another group reporting difficulty adhering to an early goal-directed therapy (EGDT) protocol despite extensive efforts. Using a novel approach, these authors are studying a dynamic fluid responsiveness predictor (vena caval collapsibility on hand-carried ultrasound examination) in place of the central venous pressure (CVP). This tactic addresses a major failing in conventional EGDT: CVP simply fails to distinguish patients who will respond to fluids from those who will not. For example, in one large study of volume challenges in septic subjects, the positive predictive value of CVP < 8 mm Hg for identifying those who respond was only 47%. The impact of this is that many patients who could respond to further fluids despite a CVP > 8 will be treated with inappropriate blood transfusion or vasoactive therapy. At the same time, many patients who are fluid unresponsive, despite a CVP < 8, will be driven to receive yet more ineffective fluid. These findings mirror those of many other studies published over the past 2 decades showing the physiologic unsuitability of CVP for guiding fluid resuscitation.

In addition to using ultrasound to replace CVP, these investigators then turn the probe on the lungs in an attempt to identify those patients who already have pulmonary edema. A complete goal-oriented ultrasound examination (vena cava plus both lungs) can probably be completed in 3 min, certainly in less time than required for insertion and calibration of a central venous catheter.

Even these possible improvements on EGDT will not lead to superior outcomes if the whole concept of EGDT is flawed. The unusually high mortality in the control group of that study casts doubt on both the adequacy of control group care and the generalizability of these results to other patients. Finally, a Bayesian analysis of the original trial shows that even a mildly skeptical clinician will conclude that the EGDT trial failed to show benefit.

For many reasons, pending the results of larger, multicenter trials, EGDT should not be considered the standard of care. Meanwhile, creative attempts to meld the common sense approach of urgent treatment with state-of-the-art knowledge of circulatory physiology will lay the foundation for the future of sepsis resuscitation.

Gregory A. Schmidt, MD, FCCP
Iowa City, IA

Affiliations: From the Division of Pulmonary Diseases, Critical Care, and Occupational Medicine; Department of Internal Medicine, University of Iowa.

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Correspondence to: Gregory A. Schmidt, MD, FCCP University of Iowa, 200 Hawkins Dr, C33-GH, Iowa City, IA 52242; e-mail: gregory-a-schmidt@uiowa.edu

Is Pleural Ultrasonography Better Than Chest Radiograph for Follow-up Resolution of Pneumothorax?

To the Editor:

In a recent issue of CHEST (September 2010), Galbois and colleagues concluded that pleural ultrasonography (PU) was more accurate and gave faster results than chest radiograph (CXR) in follow-up of pneumothorax resolution. Although we (in the Department of Pulmonary and Critical Care at Louisiana State University) believe that PU is a great diagnostic tool in the ICU, we disagree with some of the findings of their research and have concerns related to its validity.

The study used a single center and single investigator in an operator-dependent technique. CXRs were read by the caring physician rather than by an independent experienced radiologist; this may have led to a bias favoring PU over CXR. The confirmation of pneumothorax was done in most cases by a nonstandard method (aspiration of 10 mL of air) and may have picked up cases of no clinical significance.

Although we understand that the study was designed to evaluate the resolution of pneumothoraces, it can still be criticized for using the same subjects (44 patients), obtaining at least three CXRs and three PUs on each, and counting these tests as independent variables. Furthermore, the use of Fisher exact test for data analysis without establishing independency in this situation is not supported.

The study population was mainly patients with primary spontaneous pneumothoraces (31/44), except for only one subject with dysmorphic emphysema in which PU gave false-positive results. The prevalence of severe emphysema in the patient population with pneumothoraces in practice is high, causing concerns about the ability to generalize the findings of this study to the external population.

The sample size of this study was too small, especially when the independency issue stated previously is considered. According to our calculations, for a well-powered study, approximately 320 independent subjects and tests are needed. Finally, the clinical
significance of detecting a small loculated pneumothorax by PU cannot be determined in this study, and overtreatment with possible negative outcomes could be an issue if we apply the results of this study to practice.

Saadah Alrajab, MD, MPH
Shreveport, LA

Affiliations: From the Department of Pulmonary and Critical Care, Louisiana State University-Shreveport.

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Correspondence to: Saadah Alrajab, MD, MPH, Department of Pulmonary and Critical Care, Louisiana State University-Shreveport, 1512 W Kirby Pl, Shreveport, LA 71103-3822; e-mail: salraj@lsuhsc.edu

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Response

To the Editor:

This pilot monocentric study1 provides data that must be confirmed on a more significant number of patients before being generalized. We acknowledge that the study used a single investigator and that pleural ultrasonography (PU) is an operator-dependent technique, but the semiology used in the study is easy to learn, and physicians with no knowledge in ultrasound become confident after very minimal training. This point is confirmed by the fact that residents’ performance was reliable after 2 h of training and has already been observed for other focused ultrasound examinations.3,4

Dr Alrajab noted that chest radiographs (CXR s) were read by the caring physician rather than by independent experienced radiologists. In France, CXRs performed on patients in the ICU are never read by radiologists.3 Because physicians in our ICU read >4,600 CXRs in 2009, we would consider that they have a certain degree of experience. Moreover, Ball et al.5 showed that <24% of missed pneumothoraces on CXR might have been inferred from subtle radiologic findings and concluded that most of occult pneumothoraces on CXR are really occult and not simply missed.

The Fisher exact test was used to test whether lung point, a specific feature of pneumothorax at PU, was more prevalent in pneumothoraces detected only by PU than in pneumothoraces detected by both CXR and PU. To maximize power, the analysis was made PU-wise but yielded a nonsignificant difference. Therefore, analyzing on the basis of the patient would not have altered the conclusion. Our results show that in this population, more pneumothoraces were detected by PU than by CXR (McNemar test, \( P < .006 \)), and this was especially true for evaluation at 6 h after clamping. Based on this significant difference, we believe that the study had sufficient power on which to base our conclusion.

Dr Alrajab is right to be cautious with PU use in patients with nonprimary spontaneous pneumothoraces. Abolition of lung sliding has been reported with conditions other than pneumothorax, explaining the nonperfect specificity of this sign.7 As highlighted in the “Discussion” section of our study, physicians must be aware that in the absence of lung point (the only sign with a specificity of 100%), a pneumothorax diagnosis should not be made if other causes of lung sliding abolition have not been ruled out.1

In the present study, pneumothorax was deemed to be related to emphysema in 9%. Nevertheless, PU results were inaccurate in only one of these patients with giant dystrophic emphysema (Fig 5B of our study). Whereas the incidence of emphysema is important in general population, the incidence of giant dystrophic emphysema is fairly low, minimizing the concerns about the ability to generalize our findings.

Finally, Dr Alrajab seems to imply that pneumothoraces missed by CXR are always small. In fact, some pneumothoraces are not seen on CXR because of their anterior location, not because they are too small to be detected. The example reported in Figure 5A of our study illustrates why a bedside CXR cannot detect this anterior pneumothorax, whereas it is a large-tension pneumothorax that pushes the heart to the right side of the thorax.1 Because we did not perform CT scans in each patient, we are not able to assess the incidence of tension pneumothoraces among those missed by CXR, but this was 16/34 (47%) in the study of Tocino et al.8

Compared to CXR, PU performs better in following pneumothoraces after drainage, is reliable when performed by physicians after a brief training session, gives faster results, is radiation free, and is economical because numerous ICUs already have an ultrasound system.

Arnaud Galbois, MD
Eric Maury, MD, PhD
Paris, France

Affiliations: From the Université Pierre et Marie Curie, Paris Universitaires; and AP-HP, Hôpital Saint-Antoine, Service de Réanimation Médicale.

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Correspondence to: Arnaud Galbois, MD, Service de Réanimation Médicale, Hôpital Saint-Antoine, 184 rue du faubourg Saint-Antoine, 75571 Paris Cedex 12, France; e-mail: galbois@gmail.com

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