

Simulator Training for Transesophageal Echocardiography

To the Editor:

We read with interest the study by Ferrero *et al.*¹ in the recent edition of *ANESTHESIOLOGY*. There has been a considerable interest in the utility of echocardiography simulators to assist and accelerate the acquisition of echocardiography knowledge and skills. Indeed, we reviewed the global reach and value of simulation within echocardiography training, with particular reference to anesthesia and critical care, in the previous edition of *ANESTHESIOLOGY*.² Although we applaud the authors' attempt to extend our understanding and further evaluate this technology, we would like to raise a number of issues with this study.

First, the authors state, "Bose *et al.* published the only investigation assessing the utility of mannequin based transesophageal echocardiography teaching."³ Bose *et al.* did indeed study this subject, but the authors have overlooked our study, which randomized United Kingdom residents to didactic teaching methods or a Web-based transesophageal echocardiography learning resource and then assessed the benefit of supplemental simulator teaching in both these groups.⁴ Whereas our endpoint was acquisition of knowledge rather than technical performance, we showed an advantage of simulation-based transesophageal echocardiography teaching in both groups.

Second, we would question the design of the study whereby didactic teaching methods were used to train the control group of study participants in image acquisition. Our echocardiography training programs have demonstrated to us that image acquisition is a technical skill that can only be successfully taught by practical demonstration—whether that be simulation or real-time operating room demonstration. The really interesting question is whether structured echocardiography simulation teaching may be superior in some ways to real-time operating room instruction in the acquisition of transesophageal echocardiography knowledge and skills.

Third, we would question the validity of the scoring system to grade the images. The authors assessed the reliability of the scoring system by independent expert evaluation of the two groups plus the faculty anesthesiologist's images. They then inferred that the lack of interrater discrepancy would validate the scoring system. We would like to emphasize that reliability is not equivalent to validity. We would further hypothesize that there is no preexisting scoring system for image quality precisely because of the difficulty in adequately validating such a system. Further work is required to establish the validity of the quality metric, and we remain unconvinced of its ability to distinguish accurately between the groups. To develop and validate such a scoring system is an important step in assessing the performance and teaching of echocardiography.

Competing Interests

The authors declare no competing interests.

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In Reply:

We would like to thank Drs. Fletcher and Sharma for their interest in our study.¹ We are aware of their study that was published in June 2013 to assess the benefits of transesophageal echocardiography (TEE) simulation training in cognitive skill acquisition among anesthesiology residents in the United Kingdom.² However, in April 2013, at the time of the initial submission of our article, the above study was not available. We apologize for the omission.

Image acquisition is indeed a technical skill that evolves on a continuum starting with knowledge in basic physics, probe manipulation, and anatomic/spatial orientation. This progresses on to supervised hands-on training on actual patients. Advanced levels of expertise are then achieved by on the job experience, which may not reach a plateau for years. Undoubtedly, there is no substitute for an actual patient and only parts of the skill sets can be taught in a classroom. However, different methods of classroom teaching may affect the acquisition of technical skills. To maximize image acquisition skills in the privileged operating room environment, it becomes necessary to prepare the trainees by relying on didactic and Web-based training using anatomic heart models and video clips, similar to what was used in our control group. A majority of training programs do not have access to mannequin-based TEE simulation. Our goal was to compare this current reality, the traditional method of teaching, with mannequin-based teaching on practical image acquisition skills.

We also appreciate the critique of our image scoring system. We agree that in the current literature, there are no validated scoring systems to assess image quality. There has been only one other study published simultaneously with