Response

To the Editor:

Thank you, Dr Poelaert, for your comments and your interest in our article.1 We carefully reviewed your study again for a detailed explanation of the methods used.2 As stated in your publication, “Patients scheduled for cardiac surgery were randomly assigned to receive polyurethane (PU) (Sealguard; Covidien, Mansfield, MA) or a standard polyvinyl chloride (PVC; Mallinckrodt Inc, Hazelwood, MO), high volume, low-pressure cuffed endotracheal tube (ETT) at induction of anesthesia.”2 Your correspondence on our article suggests that the Sealguard ETT used in your study was a barrel-shaped polyurethane cuffed ETT, which is different from the tapered-shaped polyurethane product featured on the company’s website using the specific trademarked name described in your study, accessed by us in spring 2011 and reconfirmed at the time of this writing in July 2012.3 In addition, the online product description references the ETT studied by Lorente et al3 as a tapered PU cuff as well. The specific description of the shape of the ETT is not actually found in either your article2 or that of Lorente et al, suggesting an important limitation of the current literature. Future studies should describe in detail not only the material of the ETT and cuff but also the shape of the cuff. Therefore, we believe our review was correct based on the information that was available to us at the time of writing the article.

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References


Development and Efficacy of a 1-d Thoracic Ultrasound Training Course

To the Editor:

Thoracic ultrasound (TUS) improves the safety of pleural interventions,1,2 and guidelines strongly recommend that image guidance should be used for pleural fluid procedures.3 Adequately trained nonradiology physicians have a comparable safety profile to radiologists and are increasingly undertaking TUS,4 partially stimulated by physician training curricula that now require TUS skill acquisition in multiple specialties.5-7 Although several TUS qualifications exist (e-Table 1), a common requirement is the attendance of a training course to gain the essential background knowledge and skills.

Anticipating an increasing demand for TUS courses, the British Thoracic Society pleural diseases group set up a UK...
multicenter, 1-day theoretical and practical TUS course. Given a lack of data examining the appropriate TUS course format, we report a description and evaluation of the first six consecutive courses.

**Description and Evaluation of the Program**

Twenty-four to 25 participants enrolled in each 1-day, not-for-profit course. The teaching faculty comprised attending physicians (consultants) and fellows in pleural diseases and thoracic radiologists. The lectures covered pathologic conditions (including case-based discussions), ultrasound physics, governance, and machine care (Table 1). Practical sessions allowed scanning of patients with pleural diseases and homemade phantom-based stations that simulated pleural and lymph node intervention (e-Appendix 1). Of 146 participants, the distribution of seniority was 62% for specialist registrars or year 3 + specialty trainees (senior residents and fellows), 26% for consultants and associate specialists (attending physicians), 10% for year 1 and 2 specialty trainees (junior residents), 1% for foundation year 1 and 2 physicians (interns), and 1% for nurses.

To assess acquisition of knowledge and image recognition skills, participants undertook a test based on ultrasound videos and images at the start and end of the course, using both multiple choice and free-text questions. Participants were also contacted a minimum of 3 months after the course to undertake a further test and were asked whether they had attained TUS accreditation locally.

Participant performance significantly improved at the end of the course from a median of 53.8% (interquartile range [IQR], 46.2%-69.2%; n = 119) to 84.6% (IQR, 76.9%-92.3%; n = 129; \( P < .001 \)) (Fig 1). Improvements ≥ 3 months after the course were slightly less marked but were still significant (median, 83.3%; IQR, 75.0%-91.7%; n = 41; \( P < .001 \)).

At least 3 months after the course, 30% of participants (16 of 53) had attained TUS accreditation, which was lower than expected given that 79% (42 of 53) had access to a ward-based ultrasound machine. The primary reason for failure to attain TUS accreditation was poor availability of local mentors. Supervision was provided by a variety of trainers, including 38% pulmonology consultants (attending physicians), 34% thoracic radiologists, 17% pulmonology registrars (residents), and 11% nonthoracic radiologists.

### Table 1—Format and Feedback of British Thoracic Society 1-d Thoracic Ultrasound Course

<table>
<thead>
<tr>
<th>Format and Title</th>
<th>Subjects Covered</th>
<th>Time Allocated, min</th>
<th>No. Participants</th>
<th>Participant Feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lecture</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ultrasound physics</td>
<td>Definition of ultrasound, generation of ultrasound wave, velocity and interaction of ultrasound with tissue, probe choice, artifacts, color Doppler echocardiography, image optimization</td>
<td>25</td>
<td>108</td>
<td>4.2</td>
</tr>
<tr>
<td>Thoracic ultrasound in practice</td>
<td>Training requirements, imaging of pleural effusions, pneumothorax, pulmonary abnormalities, chest wall, mediastinum, neck lymph nodes, guided intervention and biopsy</td>
<td>45</td>
<td>109</td>
<td>4.7</td>
</tr>
<tr>
<td>Ultrasound equipment and control familiarization</td>
<td>Machine and probe choice, scanning routine, ultrasound mode selection, use of gain, depth, time gain compensation, color Doppler echocardiography, focal point, measurement strategies, image storage and governance</td>
<td>25</td>
<td>73</td>
<td>4.6</td>
</tr>
<tr>
<td>Clinical application of pleural ultrasound and development of a pleural service</td>
<td>Pleural disease guidelines, case-based discussions, use of ultrasound prior to drain insertion, indwelling pleural catheter insertion and thoracoscopy, use for outpatient management, recognition of limitations</td>
<td>30</td>
<td>72</td>
<td>4.6</td>
</tr>
<tr>
<td><strong>Practical sessions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two workshops allowing hands-on scanning</td>
<td>Participants rotate among four to five patients and one phantom-based station</td>
<td>75 each</td>
<td>110</td>
<td>4.7</td>
</tr>
<tr>
<td><strong>Tests</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start and end of course still image and video-based test</td>
<td>Including discussion of answers at end of course</td>
<td>45 total</td>
<td>107</td>
<td>4.5</td>
</tr>
<tr>
<td>Overall participant feedback(^a)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The course was useful</td>
<td>( \ldots )</td>
<td>( \ldots )</td>
<td>110</td>
<td>4.8</td>
</tr>
<tr>
<td>The program was well structured</td>
<td>( \ldots )</td>
<td>( \ldots )</td>
<td>110</td>
<td>4.8</td>
</tr>
<tr>
<td>The course met my expectations</td>
<td>( \ldots )</td>
<td>( \ldots )</td>
<td>110</td>
<td>4.8</td>
</tr>
</tbody>
</table>

\(^a\)Rating scale: 5 = excellent, 4 = good, 3 = average, 2 = below average, 1 = poor.

\(^b\)Rating for each statement was from 5 = strongly agree to 1 = strongly disagree.
software was used for the statistical analyses.

**Discussion**

To our knowledge, this report presents the first description and evaluation of a TUS course designed to meet the requirements of nonradiology physicians. A structured TUS course that covers theoretical knowledge and an introduction to patient scanning increases the standardization of training. Furthermore, the use of low-cost phantom stations (e-Appendix 1) introduces guided procedures and allows participants to develop psychomotor skills in a zero-risk environment.

The postcourse results show that completion of TUS accreditation remains problematic for some nonradiology physicians because of poor availability of local training mentors (partially a consequence of radiologists already being responsible for the supervision of their own trainees). These difficulties should improve with time as more pulmonologists gain TUS accreditation and become able to supervise trainees.

**Acknowledgments**

Additional information: The e-Appendix and e-Table can be found in the “Supplemental Materials” area of the online article.

**References**


**Figure 1.** Box and whisker plots of test scores at various time points. Circles show extreme values lying > 1.5 times the interquartile range. *P < .001; **P < .001 (related-samples Wilcoxon signed rank test). SPSS Statistics version 20 (IBM Corporation) software was used for the statistical analyses.