Not All Procedures Are Treated Equally by Pulmonary and Critical Care Fellowships

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An assumption of the current time-fixed model of graduate medical education is that trainees will naturally accrue the necessary experience and competence they need over those years of training. For pulmonary and critical care medicine (PCCM) fellows, one crucial aspect of such training is procedural education, with a range of invasive procedures expected to be mastered by the completion of fellowship (1). However, although fellowship experience with individual procedures such as bronchoscopy (2) and endotracheal intubation (3, 4) has been characterized, there have been little data describing if and how PCCM trainees more globally achieve the procedural experience and competence they need.

In this issue of *ATS Scholar*, Richards and colleagues (5) present important data on variation in procedural training among US PCCM programs. They compared training practices for two groups of invasive procedures: high-risk, low-volume (HRLV) procedures, such as pericardiocentesis and cricothyroidotomy, and low-risk, high-volume (LRHV) procedures, such as thoracentesis and central venous catheter insertion. They surveyed PCCM program directors to describe training practices, including the use of simulation, requirement for training before performance of the procedure in clinical practice, and the ability to perform the procedure independently during fellowship. They also asked about methods of assessing procedural competence and program director confidence in their graduates' ability to perform these two groups of procedures competently.

Richards's group found notable differences in training patterns between HRLV and LRHV procedures. Half of the responding programs noted that they had no dedicated training whatsoever for HRLV procedures compared with 9% having no training for LRHV procedures. Of the various procedural teaching methods queried (e.g., simulation, online modules, and dedicated procedure rotation), all were much less commonly used for HRLV procedures than for LRHV procedures. Likewise, programs were substantially less likely to have any mechanism for determining competence for HRLV procedures compared with LRHV procedures. Finally, although the use of direct observation to assess competence was common, many programs also used numerical targets to determine competence, particularly for LRHV procedures.

There are several strengths to this study. First, it adds both breadth and granularity

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to our understanding of procedural training in PCCM fellowship programs. The study also identifies a notable gap in procedural training across many programs. Moreover, it reinforces an important weakness of the current model of time-fixed graduate medical education by identifying the minimal experience acquired with HRLV procedures during fellowship training. Not only was experience with HRLV procedures low, but program directors were less confident that they could attest graduates were competent to perform these procedures.

The study is not without limitations; first, as is common in survey studies, a low response rate (31%) does temper the generalizability of the findings. Specifically, the programs responding were mostly urban, at academic medical centers, and located in the Northeast and Midwest. Community programs or those located elsewhere in the country may have different practices when it comes to procedural teaching. For instance, programs in the northeastern United States were outliers when it came to performance of endotracheal intubation in the intensive care unit during fellowship (3). Second, the classification of procedures into HRLV and LRHV, although useful, is not all-inclusive, and there are important procedures that may not fit into these classifications—such as endotracheal intubation, which one could argue is a high-risk, high-volume procedure at many institutions. Likewise, percutaneous tracheostomy and chest tube insertion, procedures whose performance may be impacted by the presence of an interventional pulmonary program, are not considered in this study. Indeed, a study of French residents' procedural experience in intensive care units suggested that chest tubes in particular were infrequently done by junior trainees (6). Finally, fellows' actual procedural competence was not assessed but rather program directors' confidence in their ability to certify fellows, which may be a poor surrogate for actual competence.

What are the implications of this study for PCCM training? First, although direct observation was commonly used to determine competence, many programs also reported using volume targets to inform decisions about procedural competence despite the fact that this practice is not supported by the literature. For instance, a recent study of learning curves in bronchoscopy demonstrated that different fellows achieve competence in flexible bronchoscopy at different rates (7), illustrating that volume targets are likely inaccurate predictors of competence. However, without good assessment tools, it is understandable that program directors will rely on procedural volume to inform decisions about competence, so the findings of Richards and colleagues make the need for better assessment tools for all procedures—whether LRHV or HRLV—more urgent. Second, this study supports existing evidence (8, 9) that the classic, time-fixed, apprenticeship model of graduate medical education guarantees neither experience nor competence in procedural education, and intentional training to precede or supplement clinical experience is necessary. The authors' findings definitely support the use of additional educational methods such as simulation for infrequently encountered HRLV procedures. Although individual programs have created curricula for certain HRLV procedures, such as simulation modules (10) or online videos (11) for bronchial blocker placement, Richards and colleagues call for professional societies and national training organizations to share curricula and resources. Given the demands on program directors' time and the infrequency of fellows' encounters with HRLV procedures, collaboration to create and disseminate curricula will be important.

Finally, the low experience with HRLV procedures described by Richards raises provocative questions about procedural training in PCCM, such as the following: should PCCM fellowships attempt to train all fellows in all HRLV procedures? Or should training be individualized based on the career path of a fellow? For instance, a physician planning to practice in a rural setting may need more experience with HRLV procedures than one planning to work in an urban setting with multiple subspecialists readily available. Would it be more valuable to focus limited time and educational resources on better ensuring competence in a core group of both LRHV and HRLV procedures rather than a larger number of these? The present study does not answer these questions but instead illuminates an important gap in training that will fuel these conversations in the years to come.

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