CHEST

Original Research

INTERVENTIONAL PULMONOLOGY

Training for Linear Endobronchial Ultrasound Among US Pulmonary/Critical Care Fellowships

A Survey of Fellowship Directors

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Background: **Endobronchial ultrasound (EBUS) has revolutionized the ability of bronchoscopists to visualize and sample structures surrounding the tracheobronchial tree. It has been shown to be safe, minimally invasive, and highly accurate in the staging and diagnosing of mediastinal diseases. A prior survey of pulmonary fellowship program directors conducted in 2004 showed that only 2% of programs offered EBUS training.**

Methods: **Surveys were mailed to 154 pulmonary/critical care fellowship directors in the United States and Puerto Rico. Demographics of the fellowship and details of EBUS training were recorded. A comparison of EBUS volume was made between programs with and without an identifiable interventional pulmonologist (IP).**

Results: **The survey response rate was 71%. EBUS equipment was available at 89% of programs. Of those without EBUS, 100% expressed the goal of obtaining equipment within the year. An identifiable IP was present in 70% of programs. This was associated with more EBUS procedures performed by trainees ($P < .01$). Only 30% of programs have a formal protocol in place to evaluate EBUS competency. Conventional transbronchial needle aspiration is routinely taught in 89% of fellowship programs.**

Conclusions: **EBUS exposure has rapidly disseminated into fellowship training programs, and programs with an identifiable IP are more likely to provide fellows with more EBUS procedures. The findings of this survey point out the need to develop a standardized protocol for EBUS competency that includes current recommendations and may require training with simulation.**

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Abbreviations: ACCP = American College or Chest Physicians; EBUS = endobronchial ultrasound; IP = interventional pulmonologist; TBNA = transbronchial needle aspiration

Pulmonary and critical care medicine has seen vast improvements in technology develop over the past decade. Endobronchial ultrasound (EBUS) is one such technology that has revolutionized the bronchoscopist's ability to both visualize and sample structures surrounding the tracheobronchial tree. Over the past 10 years, there has been a growing body of medical literature. A PubMed search for publications including EBUS from January 2002 cited 479 references, with more than one-half of these published within the past 3 years.

EBUS first became commercially available in 1999 with the production of a flexible catheter with an ultrasound for application in the central airways.[1] This radial EBUS probe has a balloon tip that allows the

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ultrasound to have circular contact with the airway, thus providing a 360° view of the parabronchial structures. It was not until 2005 that the linear EBUS, or convex probe EBUS, which incorporated an ultrasound at the tip of a flexible bronchoscope, was marketed. The linear EBUS provided a new modality to sample parabronchial or paratracheal structures using transbronchial needle aspiration (TBNA) under real-time ultrasound guidance.[2]

With the advent of linear EBUS technology, the usefulness of the instrument for the staging and diagnosis of lung cancer and mediastinal disease became readily apparent. Numerous studies showed a specificity of 100%, a weighted sensitivity of 93%, and a false-negative rate of 9% for linear EBUS in mediastinal staging of lung cancer.[2-14] Two meta-analyses reported similar good results.[15,16] In addition, linear EBUS has more recently shown superior sensitivity for detecting mediastinal nodal metastasis when combined with surgical staging than does surgical staging alone.[17] Outside of lung cancer staging, linear EBUS has been shown to be a useful tool for the diagnosis of lymphoma and sarcoidosis.[18-20] With the increased demand for this technology, the availability of linear EBUS training in US fellowship programs has yet to be completely addressed.

In 2003, the American College of Chest Physicians (ACCP) published guidelines for all interventional pulmonary procedures including radial EBUS, with recommendations for a number of procedures needed for competency (n = 50).[21] It is important to note that there have been no established guidelines for a threshold number of procedures needed for competency in linear EBUS. Controversy remains on the use of a threshold number to achieve competency, and a survey conducted in 2004 demonstrated a large variation in the pulmonary procedures offered to trainees, with very few reaching numbers needed for competency.[22] At the time of this first survey, only 2% of pulmonary programs offered training in EBUS of any kind, none of which reached the numbers for competency.[22]

Within this context, and after 7 years and a robust body of literature supporting EBUS technology, we sought to determine what training is being offered to pulmonary fellows, how competency is being assessed, and whether the recommended threshold numbers of radial EBUS are being met. The collection of these data has implications in the design of the technical skill training curriculum for future pulmonary and critical care fellows.

Materials and Methods

A survey was developed by the authors at the Medical University of South Carolina by referencing the previous survey of program directors to ensure similar questions were used, to facilitate comparison. The survey inquired about the availability of EBUS equipment and further assessed how fellows are trained in EBUS. If a specific number of linear EBUS procedures was required for competency, this was recorded. In addition, seven questions were posed to assess the content of the respondent's fellowship program (see e-Appendix 1 for full survey). Following Institutional Review Board approval (IRB committee III, Pro00009849), surveys were distributed to program directors at the Association of Pulmonary and Critical Care Program Directors Seventh Conference and Workshop in Hollywood, Florida (March 26-27, 2011). In addition, three mailings were sent to the 154 accredited pulmonary/critical care fellowship programs in the United States and Puerto Rico listed by the American Medical Association. Surveys were mailed in April, June, and August 2011. If additional responses were received from the same program director, they were disregarded.

The number of procedures performed at programs with an identifiable interventional pulmonologist (IP) was compared with the number performed at institutions without an IP, using the Mann-Whitney *U* statistic. Of note, the definition of an IP was not specified on the survey and was left to the program director's interpretation.

Results

Surveys were mailed to 154 pulmonary/critical care fellowship program directors in the United States and Puerto Rico. A total of 110 surveys were returned (overall response rate, 71%). Table 1 demonstrates the characteristics of the fellowship programs, including the length of the program, the number of fellows, and the presence of an identifiable IP. Of the 110 responding program directors, 75 described their program as university hospital based, 17 as community hospital based, 91 as 3-year pulmonary/critical care programs, and two as pulmonary programs. Seventy programs (77%) had an identifiable IP on staff.

When queried about the availability of EBUS, 98 (89.1%) indicated that their institutions had EBUS equipment. Linear EBUS was performed by pulmonologists (94, 97%) and thoracic surgeons (31, 32%). Of the 12 programs without linear EBUS, 100% were interested in obtaining the equipment within the next 12 months. Ten program directors went on to answer further questions about obtaining EBUS. Eight (80%) had plans for EBUS to be added to the core fellowship curriculum, whereas two did not. Nine selected reasons for obtaining EBUS equipment, including to increase the competitiveness of the fellowship program (nine of nine), because EBUS is considered the standard of care for lung cancer staging (nine of nine), to improve local competitiveness (four of nine), and because a new EBUS-competent attending physician was available to train fellows (one of nine). These nine respondents also selected which training venue would be preferred for training faculty. The majority selected recruiting faculty trained in EBUS as the first choice, followed by a 3-month sabbatical and a course with animal laboratory.