Implementation of Fellows EBUS Workshop Improves Procedural Knowledge

Melissa New[1,2], Matthew Rustici[3], Anna Neumeier[1,4], Tristan Huie[1,5]

1 University of Colorado, Division of Pulmonary Sciences & Critical Care Medicine; 2 Rocky Mountain Regional VA Medical Center; 3 Denver Health Medical Center; 4 Denver Health Pulmonary and Critical Care Medicine; 5 National Jewish Health;

University of Colorado Anschutz Medical Campus

BACKGROUND

Bronchoscopy is a skill learned by pulmonologists during the course of their fellowship training. Endobronchial ultrasound (EBUS), which is performed to visualize airway-adjacent lesions or lymph nodes in the hila and mediastinum, is a skill that is frequently utilized by pulmonologists and increasingly standard of care for diagnosing patients with certain conditions, including lung cancer and sarcoidosis.

A needs assessment of bronchoscopy education for our Pulmonary and Critical Care fellowship program revealed that EBUS is a skill that most fellows wanted to learn and be able to perform independently, but most fellows felt they were not receiving sufficient training to accomplish this goal. Bronchoscopy education in our program has traditionally used an apprenticeship model of instruction, however when a validated objective assessment tool, the EBUS-STAT, was used to evaluate our upper-level fellows, this confirmed that fellows are not adequately trained to perform EBUS independently.[1] Simulation has been shown to improve procedural education, including for EBUS, and is now a recommended approach.[2-6] We endeavored to create a workshop to teach fellows necessary skills to be able to perform EBUS.
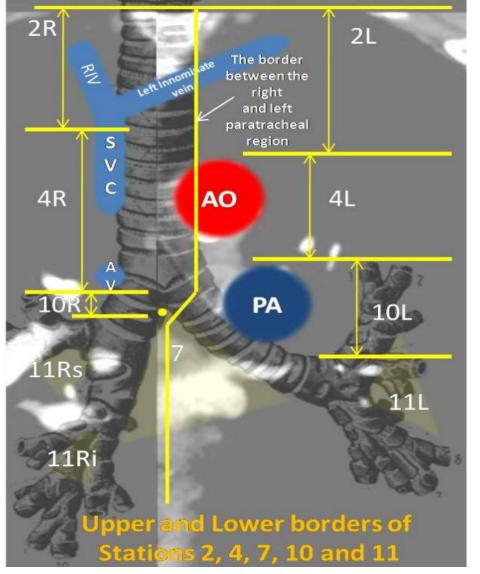
GOALS & OBJECTIVES

Goal: Teach pulmonary fellows to perform endobronchial ultrasound, including performing EBUS for lung cancer staging.
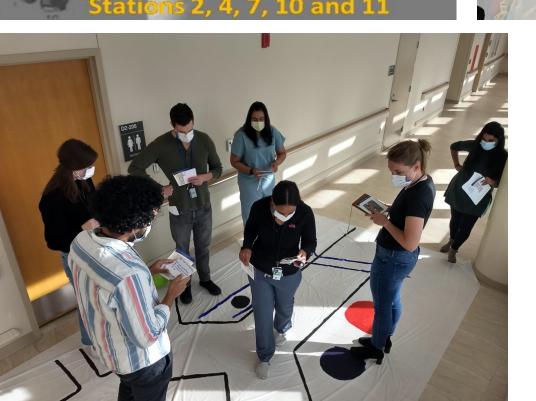
Objective 1: Determine the cognitive and procedural skills required to perform EBUS.

Objective 2: Develop materials to teach the cognitive and procedural skills for EBUS to be delivered in a workshop teaching session.

Objective 3: Evaluate outcomes of the EBUS workshop, including fellows' knowledge and confidence regarding performing EBUS.

Objective 4: Assess retention of knowledge and skills with objective measurements at a remote time following the workshop.
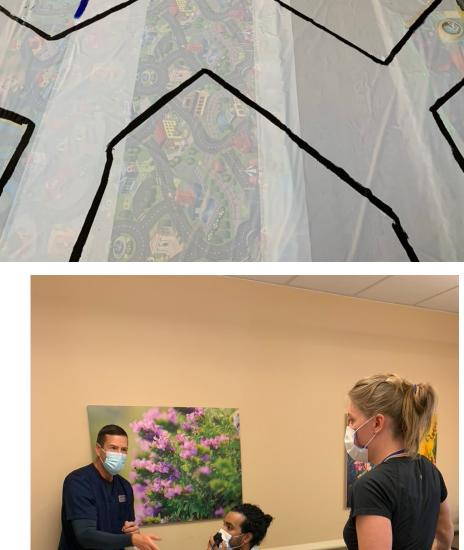
MATERIALS & METHODS

We developed a half-day EBUS training workshop to teach the cognitive and procedural skills needed to perform EBUS for lung cancer staging. The procedural skills that were taught were: (1) driving the EBUS scope; (2) performing transbronchial needle aspiration (TBNA). The cognitive skills taught included: (1) lymph node station anatomy including anatomic borders; (2) approach to a lung cancer staging procedure and staging results; (3) radiographic identification of lymph node stations by CT scan interpretation; (4) interpretation of ultrasonographic views obtained by EBUS.
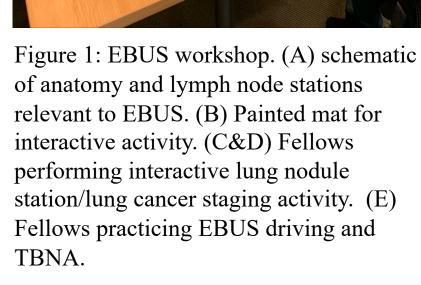
To teach these skills, the workshop included multiple learning stations: (1) hands-on transbronchial needle aspiration (TBNA) instruction and practice; (2) interactive lung cancer staging cases using a schematic map; (3) use of a virtual reality EBUS simulator to practice EBUS scope driving and ultrasonographic image identification; (4) CT lymph node station image identification with anatomy review. Pre- and post-assessments of self-assessed knowledge and confidence of components of an EBUS procedure, including anatomic knowledge and procedural comfort, were collected using a 4-point Likert scale. Learners were also asked about the usefulness of all portions of the session.

Figure 1: EBUS workshop. (A) schematic of anatomy and lymph node stations relevant to EBUS. (B) Painted mat for interactive activity. (C&D) Fellows performing interactive lung nodule station/lung cancer staging activity. (E) Fellows practicing EBUS driving and TBNA.

RESULTS

Prior to the attending the session, few learners agreed/strongly agreed with all self-assessment questions of knowledge and confidence in EBUS procedures. Upon completion of the session, self-assessments demonstrated that fellows nearly uniformly agreed that they knew how to identify relevant anatomic structures (90-100%), could identify lymph node stations on CT and EBUS imaging (100%), knew how to perform TBNA (95%), and were confident in staging a patient for lung cancer (85%). Fellows agreed that all components of the workshop were useful and should be included in future sessions. Comments highlighted the interactive and hands-on components of the workshop as being especially useful.

	Pre	Post
I know mediastinal LN stations	30%	100%
I know hilar LN stations	25%	100%
I know how to drive an EBUS scope	35%	100%
I know how to identify mediastinal vascular structures	10%	95%
I know the LN stations with regards to cancer staging (N1, N2, N3)	30%	90%
I know how to approach LN staging for lung cancer	25%	100%
I know how to identify LN stations on CT images	40%	100%
I know how to identify a LN on EBUS views	35%	100%
I know the TBNA steps	20%	100%
I know how to perform a TBNA	15%	95%
I feel confident in my ability to drive an EBUS scope	25%	90%
I feel confident in my ability to perform a TBNA	5%	90%
I feel confident in my ability to stage a patient with lung cancer	5%	85%

Table 1. Pre/post knowledge and confidence self-assessment responses, percentage of fellows selecting "agree" or "strongly agree" on a 4-point Likert scale.

I found intro to EBUS and Lung Cancer Staging Presentation to be useful	100%
The Intro to EBUS and Lung Cancer Staging presentation should be included next time	100%
I found the Interactive Lung Cancer Staging activity to be useful	100%
The Interactive Lung Cancer Staging activity should be included next time	100%
I found the TBNA practice activity to be useful	100%
The TBNA practice activity should be included next time	100%
I found the TBNA steps ordering activity to be useful	94%
The TBNA steps ordering activity should be included next time	88%
I found the Virtual Simulator practice activity to be useful	94%
The Virtual simulator practice activity should be included next time	100%
I found the Lymph Node Image Practice activity to be useful	95%
The Lymph Node Image practice activity should be included next time	100%
The opportunity to ask questions of EBUS bronchoscopists was valuable	100%

Table 2. Fellow assessment on the usefulness of each part of the EBUS workshop, presented as percentage of responses that were "agree" or "strongly agree" on a 4-point Likert scale.

CONCLUSIONS

We found that the apprenticeship approach to EBUS training has been inadequate for teaching this skill in our program. The implementation of an EBUS workshop significantly improved fellows' self-assessed knowledge and confidence in performing EBUS procedures. Additional objective assessments and entrustment evaluations are now being performed to assess knowledge and skill retention following the implementation of this workshop. Future areas of focus will include more interactive learning for mediastinal anatomy and lung cancer staging.

REFERENCES

1 Davoudi M, Colt HG, Osann KE, Lamb CR, Mullon JJ. Endobronchial ultrasound skills and tasks assessment tool: assessing the validity evidence for a test of endobronchial ultrasound-guided transbronchial needle aspiration operator skill. Am J Respir Crit Care Med. 2012;186(8):773-9.

2 Murin S, Stollenwerk NS. Simulation in procedural training: at the tipping point. Chest. 2010;137(5):1009-11.

3 Wahidi MM, Silvestri GA, Coakley RD, Ferguson JS, Shepherd RW, Moses L, et al. A prospective multicenter study of competency metrics and educational interventions in the learning of bronchoscopy among new pulmonary fellows. Chest. 2010;137(5):1040-9.

4 Wahidi MM, Hulett C, Pastis N, Shepherd RW, Shofer SL, Mahmood K, et al. Learning experience of linear endobronchial ultrasound among pulmonary trainees. Chest. 2014;145(3):574-8.

5 Ernst A, Wahidi MM, Read CA, Buckley JD, Addrizzo-Harris DJ, Shah PL, et al. Adult Bronchoscopy Training: Current State and Suggestions for the Future: CHEST Expert Panel Report. Chest. 2015;148(2):321-32.

6 Naur TMH, Nilsson PM, Pietersen PI, Clementsen PF, Konge L. Simulation-Based Training in Flexible Bronchoscopy and Endobronchial Ultrasound-Guided Transbronchial Needle Aspiration (EBUS-TBNA): A Systematic Review. Respiration. 2017;93(5):355-62.

ACKNOWLEDGEMENTS & CONTACT