







**The Bronchoscopy Education Project.** We assume this cadre of educators will use some or all project materials in future regional or institution-based teaching programs. As a result of this work, it is our hope to facilitate the work of our professional colleagues by providing a uniform instructional framework that can be expanded, researched, and improved upon, and to alleviate patients from the burdens of procedure-related training. Increasingly knowledgeable and competent bronchoscopists will thus enhance their practice through a more rapid implementation of new technologies, and a better use of existing ones, all to the benefit of our patients.

**Part I: *Introductory Course in Flexible Bronchoscopy.*** This course addresses bronchoscopic inspection, lavage, brushing, endobronchial biopsy, transbronchial lung biopsy and conventional transbronchial needle aspiration.

**Part II: *Endobronchial Ultrasound and EBUS-Transbronchial Needle Aspiration.*** This course addresses Endobronchial Ultrasound physics, equipment (processors, bronchoscopes, needles, radial and linear array transducers), techniques including EBUS-TBNA, mediastinal anatomy, lung cancer staging according to universally accepted IASLC guidelines, and EBUS-radiographic-bronchoscopic correlations.

**Part III: *Introduction to Interventional Flexible Bronchoscopy.*** This course addresses flexible bronchoscopic resection techniques including electrosurgery and Nd:YAG laser, foreign body removal techniques and instrumentation, difficult airway management including difficult intubation and hemoptysis, flexible bronchoscopic stent and airway valve insertion, bronchoscopic techniques of electromagnetic navigation, and bronchial thermoplasty.

***Train the Trainers Seminars:*** These hands-on seminars are specifically designed to familiarize participants with materials and techniques necessary for teaching each of the three other components of **The Bronchoscopy Education Project**. Each seminar targets mastery of didactic and associated reading materials, and provides opportunity to practice using checklists, assessment tools, practical approach patient-centered exercises, and simulation or role playing exercises. Debriefing and 360 degree feedback techniques are employed to foster teamwork, provide individual intrinsic value, and enhance individual as well as group performance.

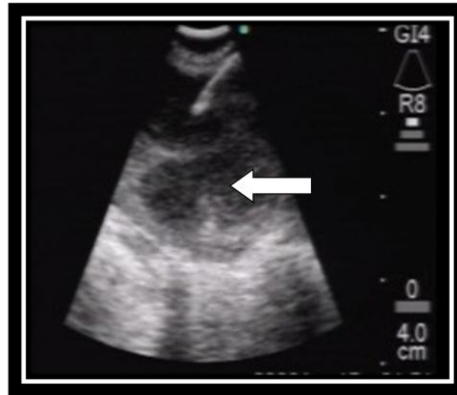


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## The Bronchoscopy Education Project

**EBUS CHECKLISTS**

Welcome to **The Bronchoscopy Education Project**. The purpose of this project is to provide bronchoscopists with competency-oriented tools and materials with which to train and assess progress along the learning curve from novice to competent practitioner performing endobronchial ultrasound and EBUS-TBNA. Material can be incorporated in whole or in part, as needed by each program.

The foundation of this project is a standardized curriculum (schedule, content, checklists, assessment tools, training models, and train-the-trainers instruction) pertaining to an *Endobronchial Ultrasound and EBUS-TBNA*. In this section, you will find a collection of CHECKLISTS that can be used to enhance patient safety and monitor progress along the bronchoscopy learning curve.

- EBUS Sedation-Anesthesia
- EBUS Informed consent
- EBUS Procedural pause
- EBUS Image processor, needle and scope handling
- EBUS Practical Approach
- EBUS Proctored EBUS-TBNA
- EBUS Program completion

The Bronchoscopy Education Project is ongoing and will be updated at [www.bronchoscopy.org](http://www.bronchoscopy.org) as components become available. We invite your comments as you use these materials.

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**Funding statement**

Funding for The Bronchoscopy Education Project Materials is a result of Dr. Colt's philanthropic endeavors and from the general support of the University of California, Irvine. No corporate support was either solicited or received for this work.

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## EBUS Checklists

A collection of checklists,

- EBUS Sedation-Anesthesia
- EBUS Informed consent
- EBUS Procedural pause
- EBUS Image processor, needle and scope handling
- EBUS Practical Approach
- EBUS Proctored EBUS-TBNA
- EBUS Program Completion

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# Scoring Recommendations for EBUS CHECKLISTS

(Sedation/Anesthesia, Informed Consent, Procedural Pause, Image Processor, needle and scope handling, Practical Approach, Proctored EBUS-TBNA,)

The goal of these checklists is to be able to monitor a student's progress along the learning curve from *novice* (Score < 60) to *advanced beginner* (Score 60-79), *intermediate* (score 80-99), and *competent* (score 100). The instructor should be able to ascertain, by observing the student's performance that each of the TEN elements in each tool are covered satisfactorily. The frequency with which these tools should be used remains to be studied and is currently at the discretion of program directors.

Repeated testing will demonstrate knowledge and skill acquisition as the student climbs the learning curve from novice to advanced beginner, intermediate and competent bronchoscopist for the procedure being assessed.

To maximize objective scoring, each task in the checklists has been defined explicitly in this user manual. Participation in specially-designed *Train-the-Trainers* courses being currently organized is encouraged to assist with standardization, and to help instructors use this program to its fullest potential.

Scores can be plotted on a graph, and each institution/program can obviously choose its own cut-offs for a PASS grade, although we recommend that a final PASS grade be achieved with a score of 100, in order for the student to be judged competent to perform bronchoscopy independently.

In the absence of a large pilot study demonstrating standard normograms as is done for high-stakes testing, consensus of world renowned experts was obtained to delineate cut-off scores for the following four categories.

<b>Category</b>	<b>Score</b>
Novice	< 60
Advanced Beginner	60-79
Intermediate	80-99
Competent	100

Specific instructions marked by an asterisk (\*) are provided in each of the following checklists.

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**EBUS SEDATION/ANESTHESIA 10-Point CHECKLIST\***

Student \_\_\_\_\_ Training Year \_\_\_\_\_

Faculty \_\_\_\_\_ Date \_\_\_\_\_

Interactive session     Patient environment

<b>Educational Item*</b> Items 1-10 are scored 10 points each (no partial points given)	<b>Satisfactory Yes/No</b>
2. Definitions <input type="checkbox"/> Moderate sedation <input type="checkbox"/> Deep sedation <input type="checkbox"/> General anesthesia	Yes / No
2. Able to obtain sedation-anesthesia informed consent	Yes / No
3. Able to describe ASA classification <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5	Yes / No
3. Able to identify high risk patients	Yes / No
4. Able to describe potential contraindications	Yes / No
5. Able to list equipment that must be available	Yes / No
6. Sedation/anesthetic agents: role, dosage, precautions <input type="checkbox"/> Midazolam <input type="checkbox"/> Fentanyl <input type="checkbox"/> Propofol	Yes / No
7. Reversal agents: role, dosage, precautions <input type="checkbox"/> Flumazenil <input type="checkbox"/> Naloxone	Yes / No
8. Able to describe how to respond to complications such as <input type="checkbox"/> Vomiting <input type="checkbox"/> Seizure <input type="checkbox"/> Hypotension	Yes / No
9. Able to describe how to respond to over-sedation and <input type="checkbox"/> Hypotension <input type="checkbox"/> Airway obstruction	Yes / No
10. Able to describe how to respond to over-sedation and <input type="checkbox"/> Hypoxemia <input type="checkbox"/> Respiratory failure	Yes / No

\* Each of the 10 items contains all of the elements required by ACGME (patient care, medical knowledge, practice-based learning and improvement, interpersonal communication skills, professionalism, and systems-based practice).

**FINAL GRADE**    **PASS**    **FAIL**    **SCORE** \_\_\_\_\_/100

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**EBUS INFORMED CONSENT 10-Point CHECKLIST\***

Student \_\_\_\_\_ Training Year \_\_\_\_\_

Faculty \_\_\_\_\_ Date \_\_\_\_\_

 Simulation EBUS-TBNA Workshop     Patient-based EBUS-TBNA Scenario

<b>Educational Item*</b> Items 1-10 are scored 10 points each (no partial points given)	<b>Satisfactory Yes/No</b>
1. Able to define "Informed Consent": <input type="checkbox"/> Informed decision-making regarding indications and expected outcomes, conflict of interest <input type="checkbox"/> Protection from liability <input type="checkbox"/> Provides opportunity to assess management strategies <input type="checkbox"/> Provides opportunity to discuss risks, benefits, and alternatives	Yes / No
1. Able to discuss diagnosis and pertinent clinical issues	Yes / No
2. Able to describe the purpose of the procedure	Yes / No
3. Able to describe the nature of the procedure	Yes / No
4. Able to describe procedure-related risks	Yes / No
5. Able to describe procedure-related benefits	Yes / No
7. Able to describe alternative procedures regardless of cost or health care coverage	Yes / No
8. Able to describe potential risks and benefits from choosing the alternatives	Yes / No
9. Able to describe the risks and benefits of not performing the procedure or not choosing any of the alternatives	Yes / No
10. Able to demonstrate "effectiveness" of the informed consent process by asking the patient to explain in his or her own words, their understanding of the procedure	Yes / No

\* Each of the 10 items contains all of the elements required by ACGME (patient care, medical knowledge, practice-based learning and improvement, interpersonal communication skills, professionalism, and systems-based practice).

**FINAL GRADE**    PASS    FAIL    **SCORE** \_\_\_\_\_/100

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**EBUS PROCEDURAL PAUSE 10-Point CHECKLIST\***

Student \_\_\_\_\_ Training Year \_\_\_\_\_

Faculty \_\_\_\_\_ Date \_\_\_\_\_

Simulation EBUS Workshop       Patient-based EBUS Scenario

<b>Educational Item*</b> Items 1-10 are scored 10 points each (no partial points given)	<b>Satisfactory Yes/No</b>
1. Able to define “Procedural Pause” as: <input type="checkbox"/> Time-Out <input type="checkbox"/> Wrong patient, site, procedure <input type="checkbox"/> Team communication/patient understanding <input type="checkbox"/> Mandatory in USA	Yes / No
4. Able to describe requirements of the procedural pause: <input type="checkbox"/> Immediately before procedure <input type="checkbox"/> Correct site, position, procedure <input type="checkbox"/> Correct patient <input type="checkbox"/> Pertinent medical records and equipment <input type="checkbox"/> Verbal acknowledgements by all team members <input type="checkbox"/> Elimination of environmental distractions	Yes / No
5. Able to describe the team leader’s role	Yes / No
6. Able to describe the nursing team’s role	Yes / No
7. Able to describe the patient’s role	Yes / No
8. Able to describe other person’s roles (technicians, other physicians)	Yes / No
7. Able to list the elements that must be covered: <input type="checkbox"/> Patient <input type="checkbox"/> Procedure <input type="checkbox"/> Side and site <input type="checkbox"/> Informed consent <input type="checkbox"/> Medical records and equipment <input type="checkbox"/> Medications <input type="checkbox"/> Allergies/drug reactions <input type="checkbox"/> Safety concerns based on history	Yes / No
8. Able to address behaviors in case of distractions	Yes / No
9. Able to describe behaviors in case of disagreements	Yes / No
10. Able to describe other elements pertaining to assuring a culture of safety: <input type="checkbox"/> Communication <input type="checkbox"/> Ability to prevent and respond to complications <input type="checkbox"/> Universal, Droplet, and Airborne pathogen precautions	Yes / No

Each of the 10 items contains all of the elements required by ACGME (patient care, medical knowledge, practice-based learning and improvement, interpersonal communication skills, professionalism, and systems-based practice).

**FINAL GRADE**    PASS      FAIL      **SCORE** \_\_\_\_\_/100

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**EBUS Image Processor, Needle and Scope Handling 10-Point CHECKLIST\***

Student \_\_\_\_\_ Training Year \_\_\_\_\_

Faculty \_\_\_\_\_ Date \_\_\_\_\_

 Interactive session  Patient environment

<b>Educational Item*</b> Items 1-10 are scored 10 points each ( <b>no partial points given</b> )	<b>Satisfactory Yes/No</b>
1. Airway access and alternate among EBUS and White light bronchoscopy <input type="checkbox"/> Airway access Oral/LMA/ET Tube <input type="checkbox"/> Alternate EBUS/WLB	Yes / No
2. Image quality adjustments: <b>Depth</b> <input type="checkbox"/> Describe <input type="checkbox"/> Demonstrate	Yes / No
3. Image quality adjustments: <b>Gain</b> <input type="checkbox"/> Describe <input type="checkbox"/> Demonstrate	Yes / No
4. Image quality adjustments: <b>Frequency</b> <input type="checkbox"/> Describe <input type="checkbox"/> Demonstrate	Yes / No
5. Image quality adjustments: <b>Doppler</b> <input type="checkbox"/> Describe <input type="checkbox"/> Demonstrate	Yes / No
6. Image target measurements: <b>Cursor placement</b> <input type="checkbox"/> Able to describe cursor placement for measuring lymph node size <input type="checkbox"/> Able to demonstrate cursor placement and size measurements	Yes / No
7. Scope: Able to demonstrate balloon placement and functionality for optimal image acquisition <input type="checkbox"/> Balloon placement onto scope <input type="checkbox"/> Balloon integrity check <input type="checkbox"/> Removal of air bubbles	Yes / No
8. Needle: Able to check mechanics and integrity of: <input type="checkbox"/> Needle adjuster lock <input type="checkbox"/> sheath adjuster knob <input type="checkbox"/> Connecting slide	Yes / No
9. Needle: Integrity, retraction, and slider <input type="checkbox"/> Integrity <input type="checkbox"/> Retracts into sheath <input type="checkbox"/> Slider moves freely and locks	Yes / No
10. Needle: Stylet and aspiration syringe integrity and function <input type="checkbox"/> Moves freely <input type="checkbox"/> Aspiration syringe functions	Yes / No

\* Each of the 10 items contains all of the elements required by ACGME (patient care, medical knowledge, practice-based learning and improvement, interpersonal communication skills, professionalism, and systems-based practice).

**FINAL GRADE**    PASS            FAIL            **SCORE** \_\_\_\_\_/100

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**EBUS PRACTICAL APPROACH 10 Point CHECKLIST\***

Student \_\_\_\_\_ Training Year \_\_\_\_\_

Faculty \_\_\_\_\_ Date \_\_\_\_\_

 Instructor-learner 30 minute session  Daily rounds & EBUS consultation

<b>Educational Item*</b> Items 1-10 are scored 10 points each (no partial points given)	<b>Satisfactory Yes/No</b>
1. Initial evaluation A <input type="checkbox"/> Physical examination, laboratory tests, and functional assessment <input type="checkbox"/> Comorbidities	Yes / No
2. Initial evaluation B <input type="checkbox"/> Support system <input type="checkbox"/> Preferences and expectations	Yes / No
3. Procedural strategies A <input type="checkbox"/> Indications, contraindications, expected results <input type="checkbox"/> Operator and team experience and expertise	Yes / No
4. Procedural strategies B <input type="checkbox"/> Risk-benefits and therapeutic alternatives <input type="checkbox"/> Informed consent	Yes / No
5. Techniques and results A <input type="checkbox"/> Anesthesia and perioperative care <input type="checkbox"/> Techniques and instruments	Yes / No
6. Techniques and results B <input type="checkbox"/> Anatomic dangers and other risks <input type="checkbox"/> Results and complications	Yes / No
7. Long-term management plan A <input type="checkbox"/> Outcome assessment <input type="checkbox"/> Follow-up tests and procedures	Yes / No
8. Long-term management plan B <input type="checkbox"/> Referrals to other specialists <input type="checkbox"/> Quality improvement and team evaluation	Yes / No
9. Able to answer case-specific questions <input type="checkbox"/> Question 1 <input type="checkbox"/> Question 2 <input type="checkbox"/> Question 3	Yes / No
10. General ability to provide evidence for and rationally justify decision making <input type="checkbox"/> Subjective assessment of learner ability	Yes / No

\*These 10 items contains all of the elements required by ACGME (patient care, medical knowledge, practice-based learning and improvement, interpersonal communication skills, professionalism, and systems-based practice).

**FINAL GRADE**      PASS      FAIL      **SCORE** \_\_\_\_\_/100

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**EBUS PROCTORED EBUS & EBUS-TBNA 10-Point CHECKLIST\***

Student \_\_\_\_\_ Training Year \_\_\_\_\_

Faculty \_\_\_\_\_ Date \_\_\_\_\_

 Simulation EBUS Workshop Patient-based EBUS Scenario

<b>Educational Item*</b> Items 1-10 are scored 10 points each (no partial points given)	<b>Satisfactory Yes/No</b>
<b>1. Formulation of effective plan and strategy:</b> <input type="checkbox"/> Informed consent obtained, signed and in medical record <input type="checkbox"/> History and physical <input type="checkbox"/> Review imaging studies <input type="checkbox"/> Cost-effective practice <input type="checkbox"/> Use of information resources <input type="checkbox"/> Applies evidence-based medicine <input type="checkbox"/> Use of systems resources	Yes / No
<b>2. Patient safety:</b> <input type="checkbox"/> ASA assessment <input type="checkbox"/> Airway assessment <input type="checkbox"/> Allergies <input type="checkbox"/> Medications <input type="checkbox"/> Comorbidities	Yes / No
<b>3. Patient safety:</b> <input type="checkbox"/> Positioning <input type="checkbox"/> Supplemental oxygen <input type="checkbox"/> Vital signs <input type="checkbox"/> Suction <input type="checkbox"/> Bite-block and/or ET tube if applicable <input type="checkbox"/> Verifies ability to respond to complications and accessibility of resuscitation equipment	Yes / No
<b>4. Patient and procedural team safety:</b> <input type="checkbox"/> Knowledgeable use of image processor <input type="checkbox"/> Hand disinfection <input type="checkbox"/> Universal precautions <input type="checkbox"/> "Time-Out".	Yes / No
<b>5. Procedure:</b> <input type="checkbox"/> Premedication <input type="checkbox"/> Moderate sedation <input type="checkbox"/> Topical anesthetic <input type="checkbox"/> General anesthesia as applicable	Yes / No
<b>6. Procedure:</b> <input type="checkbox"/> Scope insertion <input type="checkbox"/> Empathy and Communication with patient	Yes / No
<b>7. Procedure:</b> <input type="checkbox"/> Image processor controls <input type="checkbox"/> Balloon attachment and troubleshooting <input type="checkbox"/> Needle, stylet, and syringe function and troubleshooting	Yes / No
<b>8. Procedure:</b> <input type="checkbox"/> Alternate between white light and EBUS <input type="checkbox"/> Image acquisition <input type="checkbox"/> Recognition of mediastinal and hilar nodal anatomy <input type="checkbox"/> Recognition of mediastinal and hilar vascular structures <input type="checkbox"/> Lymph node sampling <input type="checkbox"/> Smear preparation and station labeling	Yes / No
<b>9. Communication with staff, patient, and patient family</b> <input type="checkbox"/> Puts needs of patient first <input type="checkbox"/> Punctuality <input type="checkbox"/> Respect <input type="checkbox"/> Listening skills <input type="checkbox"/> Personal appearance <input type="checkbox"/> Initiative & Motivation <input type="checkbox"/> Empathy <input type="checkbox"/> Honesty <input type="checkbox"/> Accepts responsibility	Yes / No
<b>10. Documentation/procedure note</b> <input type="checkbox"/> Informative <input type="checkbox"/> Accurate <input type="checkbox"/> Communication with colleagues	Yes / No

\* Each of the 10 items contains all of the elements required by ACGME (patient care, medical knowledge, practice-based learning and improvement, interpersonal communication skills, professionalism, and systems-based practice).

**FINAL GRADE**    **PASS**            **FAIL**            **SCORE** \_\_\_\_\_/100

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# Recommendations for Using the EBUS and EBUS-TBNA Competency Program Completion Checklist

This checklist contains all of the elements of the EBUS and EBUS-TBNA bronchoscopy curriculum. The purpose of this curriculum is to help trainees climb the learning curve from novice and advanced beginner to intermediate and then competent EBUS bronchoscopist, able to independently perform EBUS and EBUS-TBNA.

Not all students will progress at the same speed. It is also assumed that students may become competent at certain procedures before they become competent at others. The frequency with which the checklists and assessments tools pertaining to the individual components of the curriculum need to be administered has not yet been ascertained.

This curriculum assures that all students have completed certain materials to the satisfaction of their instructors. It is understood that some students may need to repeat certain elements of the curriculum until they obtain a passing grade. Some institutions may wish for their trainees to repeat parts of the curriculum during the course of their training (yearly for example, or during the months prior to completing their training).

To maximize objective scoring, each element in the program checklist has been defined explicitly in this user manual. Participation in specially-designed *Train-the-Trainers* courses (being currently organized) is encouraged to assist with standardization and helping instructors use this program to its fullest potential.

A PASS grade signifies that each student has achieved a satisfactory (passing) score in each of the ten elements contained in the curriculum. The overall number of procedures performed by the student should also be recorded; it is recommended that students keep a diary-log of their procedures, and that program directors conduct feedback sessions with students to monitor patient-care related outcomes.

## EBUS and EBUS-TBNA Competency Program Completion Checklist

Educational Item	Complete Yes / No	Assessment Item	Pass/Fail/Incomplete
1. Participation in regional EBUS course if available*	Yes / No	Post-test scores Target 12/20 (60% correct) Score _____%	Pass / Fail / Incomplete
2. Mandatory reading: <i>EBUS Bronchoscopist</i> Other reading assignments are optional (Lung cancer staging & lymph node map, EBUS-CT-FB, EBUS Physics)	Yes / No	Post-test scores Target (70% correct) Score _____	Pass / Fail / Incomplete
3. EBUS Airway access, and image acquisition simulation workshop	Yes / No	Image processor, needle and scope handling 10-pt Checklist : Target 100% Score _____%	Pass / Fail / Incomplete
4. EBUS Airway access and image acquisition patient encounter	Yes / No	Image Processor, Needle & Scope handling 10-pt Checklist: Target 100% Score _____%	Pass / Fail / Incomplete
5. Practical Approach interactive workshop	Yes / No	EBUS Practical Approach 10-pt Checklist: Target 100% Score _____% and Subjective scores: Target Pass	Pass / Fail / Incomplete
6. EBUS-TBNA simulation workshop Can include completion of Informed Consent, Patient Safety and Procedural Pause workshops	Yes / No	Target scores 100% EBUS-STAT _____% EBUS-SAT Completed Consider using Informed consent, Procedural Pause, and Processor, needle & scope handling checklists	Pass / Fail / Incomplete
7. EBUS-TBNA Patient encounters	Yes / No	Target scores 100% EBUS-STAT _____% EBUS-SAT completed. Informed Consent, Sedation/anesthesia, Procedural Pause, , and Processor, needle & scope handling checklists	Pass / Fail / Incomplete
8. Proctored case EBUS-TBNA proctored checklist	Yes / No	Proctored EBUS-TBNA 10-pt Checklist: Target 100% Score _____%	Pass / Fail / Incomplete

\* Regional sites being recruited.



# **USER INSTRUCTIONS**

## **FOR**

# **EBUS CHECKLISTS**

- EBUS Sedation-Anesthesia
- EBUS Informed consent
- EBUS Procedural pause
- EBUS Image processor, needle and scope handling
- EBUS Practical Approach
- EBUS Proctored EBUS-TBNA
- EBUS Program completion

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# Scoring Recommendations for EBUS CHECKLISTS

(Sedation/Anesthesia, Informed Consent, Procedural Pause, Image Processor, needle and scope handling, Practical Approach, Proctored EBUS-TBNA,)

The goal of these checklists is to be able to monitor a student's progress along the learning curve from *novice* (Score < 60) to *advanced beginner* (Score 60-79), *intermediate* (score 80-99), and *competent* (score 100). The instructor should be able to ascertain, by observing the student's performance that each of the TEN elements in each tool are covered satisfactorily. The frequency with which these tools should be used remains to be studied and is currently at the discretion of program directors.

Repeated testing will demonstrate knowledge and skill acquisition as the student climbs the learning curve from novice to advanced beginner, intermediate and competent bronchoscopist for the procedure being assessed.

To maximize objective scoring, each task in the checklists has been defined explicitly in this user manual. Participation in specially-designed *Train-the-Trainers* courses being currently organized is encouraged to assist with standardization, and to help instructors use this program to its fullest potential.

Scores can be plotted on a graph, and each institution/program can obviously choose its own cut-offs for a PASS grade, although we recommend that a final PASS grade be achieved with a score of 100, in order for the student to be judged competent to perform bronchoscopy independently.

In the absence of a large pilot study demonstrating standard normograms as is done for high-stakes testing, consensus of world renowned experts was obtained to delineate cut-off scores for the following four categories.

<b>Category</b>	<b>Score</b>
Novice	< 60
Advanced Beginner	60-79
Intermediate	80-99
Competent	100

Specific instructions marked by an asterisk (\*) are provided in each of the following checklists.

# User Instructions

## EBUS Sedation/Anesthesia Checklist

Questions pertaining to sedation can be asked during a separate simulation session or during a patient encounter. The learner will have received the sedation-anesthesia synopsis as well as any institution-specific guidelines and protocols. A passing score of 100, although somewhat subjective, is encouraged.

<b>Educational Item*</b> Items 1-10 are scored 10 points each (no partial points given)	<b>Satisfactory Yes/No</b>
6. Definitions <input type="checkbox"/> Moderate sedation <input type="checkbox"/> Deep sedation <input type="checkbox"/> General anesthesia	Yes / No
2. Able to obtain sedation/anesthesia informed consent	Yes / No
7. Able to describe ASA classification <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5	Yes / No
3. Able to identify high risk patients	Yes / No
4. Able to describe potential contraindications	Yes / No
5. Able to list equipment that must be available	Yes / No
6. Sedation agents: role, dosage, precautions <input type="checkbox"/> Midazolam <input type="checkbox"/> Fentanyl <input type="checkbox"/> Propofol	Yes / No
7. Reversal agents: role, dosage, precautions <input type="checkbox"/> Flumazenil <input type="checkbox"/> Naloxone	Yes / No
8. Able to describe how to respond to complications such as <input type="checkbox"/> Vomiting <input type="checkbox"/> Seizure <input type="checkbox"/> Hypotension	Yes / No
9. Able to describe how to respond to over-sedation and <input type="checkbox"/> Hypotension <input type="checkbox"/> Airway obstruction	Yes / No
10. Able to describe how to respond to over-sedation and <input type="checkbox"/> Hypoxemia <input type="checkbox"/> Respiratory failure	Yes / No

\* Each of the 10 items contains all of the elements required by ACGME (patient care, medical knowledge, practice-based learning and improvement, interpersonal communication skills, professionalism, and systems-based practice).

**FINAL GRADE**

PASS

FAIL

**SCORE** \_\_\_\_\_/100

# User Instructions

## EBUS Informed consent Checklist

<b>Educational Item*</b> Items 1-10 are scored 10 points each (no partial points given)
<p>1. Able to define “Informed Consent”</p> <p><input type="checkbox"/> Informed decision-making regarding indications and expected outcomes, conflict of interest <input type="checkbox"/> Protection from liability <input type="checkbox"/> Provides opportunity to assess management strategies <input type="checkbox"/> Provides opportunity to discuss risks, benefits, and alternatives</p> <p>* The instructor may wish that the student be able to address some of the history of informed consent, and explain how and why informed consent plays a prominent role in medicine today.</p>
<p>2. Able to discuss diagnosis and pertinent clinical issues</p> <p>* Which diagnostic elements and clinical information help guide a patient’s choice of procedures? Why is this particular procedure being performed based on diagnosis and clinical issues? This provides the background to the informed consent process and opens the door for a dialogue with the patient so that the patient understands that simple authorization to perform the procedures is not what is being requested.</p>
<p>3. Able to describe the purpose of the procedure</p> <p>* Based on the clinical picture, the procedure is placed into context and the different elements of the procedure (such as to sample lymph nodes, exclude infection, or to diagnose or stage a malignancy) are described.</p>
<p>4. Able to describe the nature of the procedure</p> <p>* The procedure is described in layman’s terms.</p>
<p>5. Able to describe procedure-related risks</p> <p>*Risks applicable to the procedure are noted; the student may offer a few questions and answers, such as when can the patient eat, will the procedure hurt, is there a chance for bleeding, lung collapse, or infection. Some patients may fear death, and so this also may need to be addressed. A description of risks can increase both state and trait anxiety, and therefore, patients should probably be asked about their anxiety level and whether medication or other interventions are desired.</p>
<p>6. Able to describe procedure-related benefits</p> <p>*Benefits should be described clearly, such as diagnosis leads to early treatment, may avoid need for more invasive tests, provide information to other doctors to assist with therapeutic and diagnostic strategies, certain illnesses might be excluded so as to simplify further work-up.</p>
<p>7. Able to describe alternative procedures regardless of cost or health care coverage</p> <p>* Alternatives to EBUS &amp; EBUS-TBNA should be cited and described; these might include, for example, invasive procedures such as open surgery, mediastinoscopy, percutaneous needle aspiration, and noninvasive procedures</p>

such as radiographic studies, etc.
8. Able to describe potential risks and benefits from choosing the alternatives * The risks and benefits from each of the alternatives should be addressed and explained. They can be compared to those of EBUS & EBUS-TBNA, and the physician can provide expert opinion as to why EBUS is being proposed and recommended.
9. Able to describe the risks and benefits of not performing the procedure or not choosing any of the alternatives * If EBUS is not performed, the patient should be told about potential consequences, whether or not alternatives are chosen, such as, for example, delayed diagnosis, prolonged illness, endangerment, need for different modes of surveillance or subsequent diagnostic tests or therapeutic measures.
10. Able to demonstrate “effectiveness” of the informed consent process by asking the patient to explain in his or her own words, their understanding of the procedure * The patient should be asked to describe EBUS or EBUS-TBNA and its consequences in general terms. This also provides an opportunity for dialogue.

\* Each of the 10 items contains all of the elements required by ACGME (patient care, medical knowledge, practice-based learning and improvement, interpersonal communication skills, professionalism, and systems-based practice).

**FINAL GRADE**    **PASS**                    **FAIL**                    **SCORE**    \_\_\_\_\_/100

# User Instructions

## EBUS Procedural Pause Checklist

<p>1. Able to define “Procedural Pause” as</p> <p><input type="checkbox"/> Time Out <input type="checkbox"/> Wrong patient, site, procedure <input type="checkbox"/> Team communication/patient understanding <input type="checkbox"/> Mandatory in USA</p>
<p>2. Able to describe requirements of the procedural pause</p> <p><input type="checkbox"/> Immediately before procedure <input type="checkbox"/> Correct site, position, procedure <input type="checkbox"/> Correct patient <input type="checkbox"/> Pertinent medical records and equipment <input type="checkbox"/> Verbal acknowledgements by all team members <input type="checkbox"/> Elimination of environmental distractions</p>
<p>3. Able to describe the team leader’s role</p> <p>* Mark the site if applicable, state name, patient, and procedure being performed, lead the time out, assure that all distractions are avoided during the time, requests a new time-out in case distractions occur, assures that time-out is being done according to protocol, addresses discrepancies, cancels procedure if all elements are not ascertained, modifies procedural strategy if applicable according to results of the time out.</p>
<p>4. Able to describe the nursing team’s role</p> <p>* Assures patient identification using at least two independent identifiers, assures right side right patient, right procedure, reviews and reads informed consent, assures appropriate medical records and equipment are available, assures appropriate response to complications or adverse events is possible.</p>
<p>5. Able to describe the patient’s role</p> <p>*If alert, able to state name, agree with procedure and site, signal family members who might be present.</p>
<p>6. Able to describe other person’s roles (technicians other physicians)</p> <p>* Able to state name and role.</p>
<p>7. Able to list the elements that must be covered</p> <p><input type="checkbox"/> Patient <input type="checkbox"/> Procedure <input type="checkbox"/> Side and site <input type="checkbox"/> Informed consent <input type="checkbox"/> Medical records and equipment <input type="checkbox"/> Medications <input type="checkbox"/> Allergies/drug reactions <input type="checkbox"/> Safety concerns based on history</p>
<p>8. Able to address behaviors in case of distractions</p> <p>*No one should enter or leave the room during the time-out; any interruptions should prompt renewing the time-out; if a new or second procedure is being performed, time-out should be repeated; individuals should remain silent so that all present can focus on the time-out being performed.</p>
<p>9. Able to describe behaviors in case of disagreements</p> <p>* Verbal comments, behavior modification during or after the time-out; anyone should be able to disagree with what is being said during the time-out if it is inconsistent with the informed consent, predesignated procedural strategy, or clinical suspicions.</p>
<p>10. Able to describe other elements pertaining to assuring a culture of safety</p> <p><input type="checkbox"/> Communication <input type="checkbox"/> Ability to prevent and respond to complications <input type="checkbox"/> Universal, Droplet, and Airborne pathogen precautions</p> <p>*It is understood that differences between institutions and countries exist. Guidelines specific to each institution or country of practice can be given to students. General rules and concepts, however, should be understood and are covered in the special simulation session.</p>

# User Instructions

## EBUS Image Processor, Needle and Scope Handling Checklist

Questions pertaining to EBUS can be asked during a separate simulation session or during a patient encounter. The learner will have received the EBUS image processor and needle synopsis as well as any institution-specific guidelines and protocols. A passing score of 100, although somewhat subjective, is encouraged.

<b>Educational Item*</b> Items 1-10 are scored 10 points each ( <b>no partial points given</b> )	<b>Satisfactory Yes/No</b>
1. Able to alternate between EBUS and White light bronchoscopy * The instructor should assure that the operator knows how to switch between white light and EBUS bronchoscopy imaging and screen displays	Yes / No
2. Image quality adjustments: <b>Depth</b> <input type="checkbox"/> Describe <input type="checkbox"/> Demonstrate * The instructor verifies that the learner can describe meaning of depth, and demonstrate depth control on the processor	Yes / No
3. Image quality adjustments: <b>Gain</b> <input type="checkbox"/> Describe <input type="checkbox"/> Demonstrate * The instructor verifies that the learner can describe principles of gain, and demonstrate gain control on the processor	Yes / No
4. Image quality adjustments: <b>Frequency</b> <input type="checkbox"/> Describe <input type="checkbox"/> Demonstrate * The instructor verifies that the learner can describe principles of frequency, and demonstrate frequency control on the processor	Yes / No
5. Image quality adjustments: <b>Doppler</b> <input type="checkbox"/> Describe <input type="checkbox"/> Demonstrate * The instructor verifies that the learner can describe principles of Doppler, and demonstrate Doppler control on the processor	Yes / No
6. Image target measurements: <b>Cursor placement</b> <input type="checkbox"/> Able to describe cursor placement for measuring lymph node size <input type="checkbox"/> Able to demonstrate cursor placement and size measurements	Yes / No
7. Scope: Able to demonstrate balloon placement and functionality for optimal image acquisition <input type="checkbox"/> Balloon placement onto scope <input type="checkbox"/> Balloon integrity check <input type="checkbox"/> Removal of air bubbles * The instructor verifies that the learner can place and troubleshoot balloon-related issues.	Yes / No
9. Needle: Able to check mechanics and integrity of: <input type="checkbox"/> Needle adjuster lock <input type="checkbox"/> sheath adjuster knob <input type="checkbox"/> Connecting slide *The instructor assures that the learned knows how the needle functions (eg. is not bent) and is able to troubleshoot malfunction	Yes / No



9. Needle: Integrity, retraction, and slider <input type="checkbox"/> Integrity <input type="checkbox"/> Retracts into sheath <input type="checkbox"/> Slider moves freely and locks	Yes / No
10. Needle: Stylet and aspiration syringe integrity and function <input type="checkbox"/> Moves freely <input type="checkbox"/> Aspiration syringe functions *The instructor assures that the learner can verify proper functioning of the stylet and aspiration syringe before performing EBUS-TBNA	Yes / No

\* Each of the 10 items contains all of the elements required by ACGME (patient care, medical knowledge, practice-based learning and improvement, interpersonal communication skills, professionalism, and systems-based practice).

**FINAL GRADE**    **PASS**            **FAIL**            **SCORE**    \_\_\_\_\_/100

# User Instructions

## EBUS Practical Approach Checklist

This practical approach exercise is held as a 30-minute session between learner and instructor, similar to an “oral examination”. Of course, programs including Practical Approach-like discussions for each EBUS bronchoscopy consultation may choose to forego a formal session. Using a structured format (the four boxes), learners and instructors are more certain to cover in as great a depth as desired all aspects of a procedure: strategy and planning, techniques and instruments, and response to complications. Because each element is important, items are equally weighted at ten points each with no partial points given. A passing score of 100, although somewhat subjective, is encouraged.

<b>Educational Item*</b> Items 1-10 are scored 10 points each (no partial points given)	<b>Satisfactory Yes/No</b>
2. Initial evaluation A <input type="checkbox"/> Physical examination, laboratory tests, and functional assessment <input type="checkbox"/> Comorbidities	Yes / No
2. Initial evaluation B <input type="checkbox"/> Support system <input type="checkbox"/> Preferences and expectations	Yes / No
3. Procedural strategies A <input type="checkbox"/> Indications, contraindications, expected results <input type="checkbox"/> Operator and team experience and expertise	Yes / No
4. Procedural strategies B <input type="checkbox"/> Risk-benefits and therapeutic alternatives <input type="checkbox"/> Informed consent	Yes / No
5. Techniques and results A <input type="checkbox"/> Anesthesia and perioperative care <input type="checkbox"/> Techniques and instruments	Yes / No
6. Techniques and results B <input type="checkbox"/> Anatomic dangers and other risks <input type="checkbox"/> Results and complications	Yes / No
7. Long-term management plan A <input type="checkbox"/> Outcome assessment <input type="checkbox"/> Follow-up tests and procedures	Yes / No
8. Long-term management plan B <input type="checkbox"/> Referrals to other specialists <input type="checkbox"/> Quality improvement and team evaluation	Yes / No
9. Able to answer case-specific questions <input type="checkbox"/> Question 1 <input type="checkbox"/> Question 2 <input type="checkbox"/> Question 3	Yes / No
10. General ability to provide evidence for and rationally justify decision making <input type="checkbox"/> Subjective assessment of learner ability	Yes / No

\*These 10 items contains all of the elements required by ACGME (patient care, medical knowledge, practice-based learning and improvement, interpersonal communication skills, professionalism, and systems-based practice).

**FINAL GRADE**      **PASS**      **FAIL**      **SCORE** \_\_\_\_\_/100

\* Each of the 10 items contains all of the elements required by ACGME (patient care, medical knowledge, practice-based learning and improvement, interpersonal communication skills, professionalism, and systems-based practice).

# User Instructions

## EBUS Proctored EBUS-TBNA Checklist

<b>Educational Item*</b>
Items 1-10 each scored 10 points (no partial points given)
<p><b>1. Formulation of effective plan and strategy</b></p> <p><input type="checkbox"/> Informed consent obtained, signed and in medical record</p> <p><input type="checkbox"/> History and physical <input type="checkbox"/> Review imaging studies <input type="checkbox"/> Cost-effective practice <input type="checkbox"/> Use of information resources <input type="checkbox"/> Applies evidence-based medicine</p> <p><input type="checkbox"/> Use of systems resources</p> <p>* The instructor should be certain that the student has obtained the informed consent and that it is signed and available. The student should be able to describe pertinent clinical and radiographic findings and to use evidence-based medicine in addition to any other information gained from other resources, such as faculty expert opinion, advice, and requests by referring physicians, to justify the procedure being performed. The student should be able to describe the use of institutional resources, and use them according to institutional practices, such as computed tomography, ultrasound, other instruments and equipment. This also includes nursing surveillance, respiratory therapy assistance, on-site cytology, and need for procedure suite, operating theater or intensive care unit. Cost-effectiveness can be discussed in regards to other diagnostic or therapeutic modalities, but also how EBUS bronchoscopy may or may not increase or decrease health-related expenditures in the context of the patient's diagnosis and treatment plan.</p>
<p><b>2. Patient safety:</b></p> <p><input type="checkbox"/> ASA assessment <input type="checkbox"/> Airway assessment <input type="checkbox"/> Allergies <input type="checkbox"/> Medications</p> <p><input type="checkbox"/> Comorbidities</p> <p>*ASA and airway assessments should be performed according to the institution's guidelines. Allergies, medications, especially anticoagulants and antiplatelet agents should be noted, comorbidities that might increase the risk of adverse events should also be described and identified.</p>
<p><b>3. Patient safety:</b></p> <p><input type="checkbox"/> Positioning <input type="checkbox"/> Supplemental oxygen <input type="checkbox"/> Vital signs <input type="checkbox"/> Suction <input type="checkbox"/> Bite-block and/or ET tube, if applicable <input type="checkbox"/> Verifies ability to respond to complications and accessibility of resuscitation equipment</p> <p>*These measures should be taken according to institutional biases and protocols.</p>
<p><b>4. Patient and procedural team safety:</b></p> <p><b>4. Patient and procedural team safety:</b></p> <p><input type="checkbox"/> Knowledgeable use of image processor <input type="checkbox"/> Hand disinfection</p> <p><input type="checkbox"/> Universal precautions <input type="checkbox"/> "Time-Out".</p> <p>*Students should be observed as they comply with these safety measures. Additional information pertaining to time-out, universal precautions, and knowledge of</p>

<p>fluoroscopy are provided in the modules. Protocols may vary among institutions.</p>
<p><b>5. Procedure:</b>  <input type="checkbox"/> Premedication <input type="checkbox"/> Moderate sedation <input type="checkbox"/> Topical anesthetic <input type="checkbox"/> General anesthesia as applicable                  *These should be administered according to institutional biases and according to protocols.</p>
<p><b>6. Procedure:</b>  <input type="checkbox"/> Scope insertion <input type="checkbox"/> Empathy and Communication with patient                  *Performed according to institutional practices. Empathy and communication with the patient should be observed. Students should be able to speak comfortably and reassuringly with their patient. Open dialogues should be encouraged to enhance confidence and decrease patient anxiety.</p>
<p><b>7. Procedure:</b>  <input type="checkbox"/> Image processor controls <input type="checkbox"/> Balloon attachment and troubleshooting <input type="checkbox"/> Needle, stylet, and syringe function and troubleshooting                  *Performed according to institutional practices.</p>
<p><b>8. Procedure:</b>  <input type="checkbox"/> Alternate between white light and EBUS <input type="checkbox"/> Image acquisition <input type="checkbox"/> Recognition of mediastinal and hilar nodal anatomy <input type="checkbox"/> Recognition of mediastinal and hilar vascular structures <input type="checkbox"/> Lymph node sampling <input type="checkbox"/> Smear preparation and station labeling                  *Performed according to institutional practices. It is recognized that not all patients will undergo all of these procedures, therefore, if the institution desires, a different proctored checklist can be completed for each (or each set) of the procedures listed.</p>
<p><b>9. Communication with staff, patient, and patient family</b>  <input type="checkbox"/> Puts needs of patient first <input type="checkbox"/> Punctuality <input type="checkbox"/> Respect  <input type="checkbox"/> Listening skills <input type="checkbox"/> Personal appearance <input type="checkbox"/> Initiative &amp; Motivation <input type="checkbox"/> Empathy <input type="checkbox"/> Honesty <input type="checkbox"/> Accepts responsibility                  *These are for the most part subjective assessments, and also require feedback from nursing staff. Students should be told that they will be judged on these items during the course of their training, so that they can obtain feedback from their instructors and improve their performance in these areas.</p>
<p><b>10. Documentation/procedure note</b>  <input type="checkbox"/> Informative <input type="checkbox"/> Accurate <input type="checkbox"/> Communication with colleagues                  *Procedure notes may vary according to institution; however, in general, the note should be informative, telling a story about the procedure that referring physicians can understand. The note should be accurate regarding what was done, why it was done, and how it was done. Procedure-related adverse events should be described. Communication with colleagues should be observed, by watching how the student interacts with the nursing team, other physicians, and with referring physicians. While this element is also, for the most part subjective, in general, communication should be informative, accurate polite, and considerate.</p>

\* Each of the 10 items contains all of the elements required by ACGME (patient care, medical knowledge, practice-based learning and improvement, interpersonal communication skills, professionalism, and systems-based practice).

**FINAL GRADE**      **PASS**      **FAIL**      **SCORE** \_\_\_\_\_/100

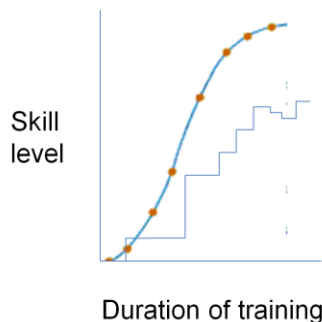
# Recommendations for Using the EBUS and EBUS-TBNA Competency Program Completion Checklist

This checklist contains all of the elements of the EBUS and EBUS-TBNA bronchoscopy curriculum. The purpose of this curriculum is to help trainees climb the learning curve from novice and advanced beginner to intermediate and then competent EBUS bronchoscopist, able to independently perform EBUS and EBUS-TBNA.

Not all learners will progress at the same speed<sup>1</sup>. It is thus assumed that learners may become competent at certain procedures before they become competent in others. The frequency with which the checklists (and assessments tools) pertaining to the individual components of the curriculum need be administered has not yet been ascertained. Participation in specially-designed *Train-the-Trainers* courses is encouraged to assist with uniformization and to help instructors use this program to its fullest potential.

This curriculum assures that learners complete certain materials to the satisfaction of their instructors. It is understood that some learners may need to repeat certain elements of the curriculum until they obtain a passing grade. Some institutions may wish for their trainees to repeat parts of the curriculum during the course of their training (yearly for example, or during the months prior to completing their training).

A PASS grade signifies that satisfactory (passing) score in each of the elements contained in the curriculum. The overall number of procedures performed by the learner should also be recorded; it is recommended that learners keep a diary-log of their procedures, and that program directors and bronchoscopy educators conduct feedback sessions with learners to monitor patient-care related outcomes.



<sup>1</sup> German psychologist Hermann Ebbinghaus (1850-1909) is credited with originally describing the learning curve in his work on memory (see RH Wozniak. Introduction to Memory. Classics in psychology 1855-1914: Historical essays. Bristol UK, Thoemmes Press, 1999). Learning curves can be mathematically calculated and may have different shapes representing incremental change, including a series of plateaus, rises and dips, and the traditional ogive “S” shaped curve.

## EBUS and EBUS-TBNA Competency Program Completion Checklist

Educational Item	Complete Yes / No	Assessment Item	Pass/Fail/Incomplete
1. Participation in regional EBUS course if available*	Yes / No	Post-test scores Target 12/20 (60% correct) Score _____%	Pass / Fail / Incomplete
2. Mandatory reading: <i>EBUS Bronchoscopist</i> Other reading assignments are optional (Lung cancer staging & lymph node map, EBUS-CT-FB, EBUS Physics)	Yes / No	Post-test scores Target (70% correct) Score _____	Pass / Fail / Incomplete
3. EBUS Airway access, and image acquisition simulation workshop	Yes / No	Image processor, needle and scope handling 10-pt Checklist : Target 100% Score _____%	Pass / Fail / Incomplete
4. EBUS Airway access and image acquisition patient encounter	Yes / No	Image Processor, Needle & Scope handling 10-pt Checklist: Target 100% Score _____%	Pass / Fail / Incomplete
5. Practical Approach interactive workshop	Yes / No	EBUS Practical Approach 10-pt Checklist: Target 100% Score _____% and Subjective scores: Target Pass	Pass / Fail / Incomplete
6. EBUS-TBNA simulation workshop Can include completion of Informed Consent, Patient Safety and Procedural Pause workshops	Yes / No	Target scores 100% EBUS-STAT _____% EBUS-SAT Completed Consider using Informed consent, Procedural Pause, and Processor, needle & scope handling checklists	Pass / Fail / Incomplete
7. EBUS-TBNA Patient encounters	Yes / No	Target scores 100% EBUS-STAT _____% EBUS-SAT completed. Informed Consent, Sedation/anesthesia, Procedural Pause, , and Processor, needle & scope handling checklists	Pass / Fail / Incomplete
8. Proctored case EBUS-TBNA proctored checklist	Yes / No	Proctored EBUS-TBNA 10-pt Checklist: Target 100% Score _____%	Pass / Fail / Incomplete

\* Regional sites being recruited.

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