Unique Multidisciplinary Training Practices in Cytopathology: Simulation Training in Ultrasound-Guided Fine Needle Aspiration of the Thyroid

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Abstract
The training of ultrasound-guided fine needle aspiration in pathology residency and fellowship programs can be a challenging task with variable outcomes, particularly when there is a lack of a standardized approach. In 2014, the Department of Pathology and Laboratory Medicine in collaboration with the Endocrine Division of the Department of Medicine at the University of Vermont Medical Center implemented simulation training for the incoming cytopathology and endocrinology fellows prior to fellows interacting with patients at the clinic in order to provide a structured approach to learning the technical components of ultrasound-guided fine needle aspiration. In 2018, a second simulation session was added to focus on communication, providing fellows an opportunity to further develop the communication skills that enhance patient connection, empathy, and trust. The combined simulation experience has provided the fellows an ideal learning environment to enhance their understanding of the technical aspects of ultrasound-guided fine needle aspiration as well as the necessary components of communication prior to having to perform the procedure on actual patients. This results in a biopsy clinic that runs more efficiently with improved patient satisfaction and trainee confidence when addressing patient concerns. This collaborative training experience also addresses many of the important aspects surrounding the Accreditation Council for Graduate Medical Education competencies in patient safety, procedure, communication, professionalism, and team-based systems. We report the details of these simulation sessions, how they are structured, key stakeholders involved, and means for communicating feedback to our learners with an emphasis on the importance and value of utilizing standardized patients.

Keywords
multidisciplinary training, training in ultrasound-guided thyroid fine needle aspiration, cytopathology fellowship training, fine needle aspiration communication, simulation training in thyroid fine needle aspiration, cytopathology milestones

Received June 24, 2020. Received revised August 5, 2020. Accepted for publication August 15, 2020.

Cytopathologists have been performing palpation-guided fine needle aspirations (FNAs) for decades; however, the use of ultrasound guidance in performing these procedures has recently gained popularity. Ultrasound guidance provides several benefits over traditional palpation guidance, including the ability to sample smaller lesions and to target different areas in heterogenous nodules as well as real-time visualization of needle placement. In addition, there are data supporting the clinical

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value of ultrasound guidance while performing FNAs, as it results in decreased nondiagnostic rates and fewer needle passes when compared to palpation guidance.\textsuperscript{1,2} The 2015 American Thyroid Association Guidelines recommends ultrasound over palpation guidance for thyroid nodules with a high likelihood of either a nondiagnostic cytology (>25%-50% cystic component) or sampling error due to difficult to palpate or posteriorly located nodules.\textsuperscript{3} Many cytopathology fellowship programs are seeing the utility of providing instruction to their fellows in performing ultrasound-guided FNA; however, the training provided is often not formally defined and often utilizes the “teach one, do one” approach, which can be fraught with knowledge gaps and lack of consistency, and offers little, if any, experience to the learner prior to performing the technique on an actual patient.

The Department of Pathology and Laboratory Medicine at the University of Vermont Medical Center (UVMCM) and The Larner College of Medicine (LCOM) at the University of Vermont offer a 1-year Accreditation Council for Graduate Medical Education (ACGME)-accredited Fellowship in Cytopathology. One of the unique aspects of this fellowship training is providing fellows experience in performing ultrasound-guided FNAs of thyroid nodules in collaboration with the Endocrinology Division of the Department of Medicine at LCOM. In preparation for this multispecialty experience, the cytopathology fellow, in conjunction with the endocrinology fellow, attends simulation training modules which address both the technique and components of communication for performing ultrasound-guided FNAs. The use of the LCOM Clinical Simulation Laboratory for training our cytopathology fellows in ultrasound-guided FNA began in 2014. The initial training focused on the technical aspects of the procedure. A second session, added in 2018, focused on communication, providing fellows an opportunity to further develop communication skills that enhance patient connection, empathy, and trust. The goal of these sessions is to provide a structured approach to learning the technical aspects of the procedure and improve communication by helping fellows learn to address common patient concerns and frequently asked questions before direct interaction with patients in the clinic. In addition to gaining a better understanding of the procedure, these sessions also address several important ACGME competencies including patient safety, procedures, communication, professionalism, and team-based systems.

This training came to fruition with help from the LCOM Clinical Simulation Laboratory’s simulation specialist, who is knowledgeable in methodologies for simulation, working in collaboration with the program directors from cytopathology and endocrinology, who provided session objectives and served as clinical content experts. The Clinical Simulation Laboratory, through the use of standardized patients (SPs) and advanced technology, provides opportunities for learners to enhance clinical skills that will ultimately improve the quality and safety of the patient care they provide. The use of simulation is widely employed throughout the LCOM curriculum and is popular in residency programs as well. However, survey results from the Association of American Medical Colleges on Medical Simulation in Medical Education showed the use of simulation in training pathology residents was low at <10% and it was not utilized in pathology subspecialty training.\textsuperscript{4} Despite its low use in training pathology residents, a few publications have recognized its value in improving the patient experience through enhancing communication skills,\textsuperscript{5} helping pathology residents prepare for clinical pathology call,\textsuperscript{6} and providing a simulation model for grossing difficult cancer resection specimens.\textsuperscript{7} This is the first report to our knowledge of utilizing this technique in a subspecialty area of pathology. We report the details of these simulation sessions, how they are structured, key players involved, and ideal methods for communicating feedback to our learners.

**Mandatory Presimulation Meetings**

Presimulation meetings with key stakeholders are essential to ensure success. At these meetings, the program directors from endocrinology and cytopathology (1) discuss key objectives and design clinical scenarios to be utilized by the SPs to address these objectives, (2) meet with the simulation specialist to discuss the objectives and assess the equipment needed, the space required, and the number of SPs needed to complete the simulation in a timely fashion, and (3) meet directly with the SPs to educate them on the procedure and inform them of common patient questions.

**Reading Material**

A week prior to the first session, learners are provided with required reading materials, including the current American Thyroid Association Guidelines for the Management of Thyroid Nodules and Thyroid Cancer, a detailed description of the simulation sessions with focused objectives, and a checklist of the key steps for performing ultrasound-guided FNAs which also serves as the evaluation form to be completed by the program directors following the technical session (Supplemental Appendix 1).

**Technical Session**

The technical portion of the training takes approximately 3 hours for 2 fellows to complete; it entails a 10-minute introduction to the course, a 30-minute didactic session on thyroid biopsies, a 50-minute clinical skills session, a 1-hour clinical simulation of the thyroid biopsy with an SP, and a 20-minute debriefing session.

The didactic session involves a short PowerPoint overview which covers the elements of obtaining an informed consent, highlights the key points of the procedure (Supplemental Appendix 1), and the postprocedure instructions to the patient. The informed consent overview specifically addresses how the fellows introduce themselves and their role in the procedure as well as discussing the risks and benefits including potential complications. The fellows are instructed on how to describe
the procedure including the patients avoiding brisk movement, swallowing, or speaking during the actual aspiration. The fellows are also instructed to inform the patient of pathology being on-site and the benefits of reviewing the slides at the procedure to decrease the possibility of nondiagnostic samples. This is followed by a separate brief didactic session on the general approach to ultrasonographic nodule characterization with an emphasis on benign versus worrisome patterns.

The clinical skills session focuses on the technical aspects of performing the thyroid ultrasound FNA and slide preparation. The portion on FNA technique utilizes 2 ultrasound machines and a thyroid training model where skilled faculty demonstrate nodule sampling using 1-½-in, 25-G needles. The thyroid training model contains nodules of various consistencies including cystic and solid lesions. A second station, utilizing a prepared model such as chicken breast with olives or gelatin with olives, is available for additional practice. Trainees practice on the models while faculty confirm proper technique and accurate sampling. Instruction on proper slide preparation is performed at a separate station with an emphasis on labeling, smearing, fixation, and rinsing of needles. Trainees are also educated on the differences between air-dried and alcohol-fixed slides. Faculty can observe trainees practice smear technique and provide guidance as needed.

Following the clinical skills session, trainees individually attend a clinical simulation of the thyroid FNA with an SP. The simulation rooms are designed with tinted windows and audio equipment allowing faculty to see and listen to the interaction without being visible to the trainee. Trainees are instructed to perform the entire procedure from introduction and obtaining consent to simulating the procedure and providing necessary post-FNA instructions. Both program directors observe the interaction and evaluate the trainee utilizing the provided evaluation form (Supplemental Appendix 1). A separate evaluation form (Supplemental Appendix 2) is provided to the SP that focuses on the overall communication and professionalism of the fellow and is adapted from the work by Gregory Makoul. Following the simulation sessions, a debriefing occurs in a separate room where feedback from the program directors and the SP is provided to the trainee (see below).

Communication Session

The session on communication is strategically scheduled after fellows have had an opportunity to observe/participate in an actual thyroid FNA clinic at least once. This timing, following exposure to the clinic setup and flow of the procedure, seems to instill a greater comfort level and maximizes the learning experience during the simulation. The objectives of this session focus on the importance of proper communication throughout the procedure, from obtaining informed consent to post-FNA instructions. It tackles challenges that may arise including how to approach difficult questions, managing patient anxiety, communicating the need to acquire additional passes, and explaining the utility of molecular testing. Some questions are planned ahead of time and discussed with the SPs; however, SPs also have the liberty to improvise, as they deem appropriate.

Approximately 3 hours are reserved for 2 fellows to complete 2 different scenarios focused on effective communication. Both scenarios reflect an anxious patient, with the first scenario focusing on the informed consent process and identifying body language in a quiet nervous patient. The second scenario focuses more on questions that may arise during the procedure as well as communicating the need for additional passes, whether it be related to inadequacy or the need for molecular testing.

The first 15 minutes of this session involves a brief review of the schedule. During this time, fellows are provided session objectives and clinical vignettes for each SP which include basic demographics, ultrasonographic findings, family history, and how the patient was referred to the clinic (primary care physician). We found providing this information to the fellows instills more confidence when they are handling patient questions. Fellows are introduced to the layout of the simulation rooms, one for the informed consent process and the other representing the clinic room where the biopsy will be performed. Fellows are responsible for setting up the biopsy room to include all the items they will need to perform the biopsy, including placement of the ultrasound machine. A total of 45 minutes is allotted for each scenario, approximately 20 minutes for each fellow. A 30-minute debrief in an adjacent conference room follows each clinical scenario.

Debriefing Session

This is a high-yield learning session as the program directors and SPs review the experience with the trainees together in a small classroom setting. The session begins by asking the trainees what went well and what areas they thought could be improved. The SP then provides feedback, followed by feedback from the program directors. This session uses a methodology similar to the ADAPT feedback model.

Conclusion

We have received excellent feedback from our fellows who appreciate the opportunity to practice both the technical aspects and key components of communication needed to perform ultrasound-guided FNA prior to performing it on actual patients. The simulation experience provides the fellow with an ideal learning environment that is both relaxing and engaging to help acquire these necessary skills. Many fellows comment on the confidence it provides them when they start performing these procedures in the clinic.

The addition of the session on communication has provided the fellows a way to find appropriate terminology in explaining various steps of the procedure, as it allows them to discover which words to avoid, how to be more concise, how to communicate uncertainty (atypical findings), and find alternate and more effective approaches to explaining a particular task. This session also reinforces the importance of observing body
language and checking in with the patient following each needle pass. By emphasizing the essential skills needed to communicate challenging and difficult information with patients, the session also provides a means to effectively address the ACGME competency on interpersonal and communication skills (ICS).

The importance of utilizing SPs for this simulation experience cannot be overemphasized. In our experience, subtleties that can easily be missed by the program directors are often picked up by the SP. In addition, we have found that it is often the feedback from the SPs provided at the debriefing sessions that the trainees value the most and make a dedicated effort to rectify on subsequent biopsies. For example, in a recent session, both fellows neglected to assist the patient in going from a lying to a seated position when providing postbiopsy care instructions. This feedback was given to the fellows by the SP and an improvement was noticed in the following session.

By allowing fellows to observe one another (outside the clinic room) during the simulation with the SP, we found the debriefing sessions to be more interactive and supportive, enhancing knowledge and helping them navigate together alternate approaches to handling patient concerns. This provides an opportunity for fellows to develop a multidisciplinary team approach early on in their training to promote safe patient practices.

The timing of the debriefing session is also very important. We discovered that debriefing immediately following a scenario, as opposed to debriefing following completion of all scenarios, enhanced learning and avoided information/feedback overload. Furthermore, the information learned during the first clinical scenario could be immediately reinforced when applied during the second scenario.

Overall, the implementation of simulation sessions as a methodology to teach ultrasound-guided FNA has been very successful for both our endocrinology and cytopathology fellows at UVMMC. Unlike endocrinology fellows, most pathology fellows are not exposed to the same level of patient interaction or ultrasound experience prior to starting fellowship. The sessions provide a unique multidisciplinary collaborative opportunity to improve both their communication and technical skills needed to perform this procedure. Since implementation, both endocrinology and cytopathology program directors have found the clinic to run more smoothly and have noted improved patient satisfaction and trainee confidence when addressing patient concerns. It also has enhanced fellow collaboration between the 2 departments resulting in improved communication and teamwork in preparation for the biweekly clinic as well as during the actual clinic. Prior to this implementation, any training for these procedures was being done at the patient bedside, which resulted in knowledge gaps in both communication skills and technical components of the procedures as evidenced by lack of confidence in utilizing the ultrasound machine, difficulty and uncertainty in answering patient questions, and overall less empathy. Fellows were often more reserved, nervous, and overly focused on the technical aspects of the procedure, often not recognizing the patients’ uneasy emotional state.

It is important to highlight that these sessions also address several important ACGME competency milestones in cytopathology, particularly in areas concerning patient safety, procedures, professionalism, patient care, and ICS. It is our opinion that addressing these important milestones early on in fellowship training facilitates further development of these important skills throughout their training. Collaboration with the endocrine department provides trainees an understanding of the impact a team-based approach can have in promoting and enhancing patient care.

By reporting our unique training implementation, we hope to encourage and facilitate other pathology residency and cytopathology fellowship programs to adopt similar training sessions to help trainees gain the necessary technical and communication skills to perform these procedures prior to attending the clinic, resulting in enhanced overall patient and operator satisfaction. The unique implementation of simulation in this setting also highlights the importance of this tool in overall trainee education as the scenarios can be designed to address several ACGME competencies. Patient care, procedure, professionalism, and interpersonal communication skills milestones are all addressed in this simulation experience. While the simulation focuses on ultrasound-guided FNA procedures, the milestones addressed by the simulation laboratory training session are broad, helping the program assess a fellow’s milestone trajectory and providing education and experience necessary for milestone progression throughout training. Further directions for our programs include adding an assessment of the training by implementing a patient survey that addresses comfort, safety, and overall satisfaction, including a comment box for free text. Prompt timing of the survey immediately following the procedure is critical to ensure accurate feedback. Furthermore, opportunities for the program directors to incorporate elements of cultural humility into the training through simulation allows for a safe environment to help identify and address biases.

Authors’ Note
A portion of the technical component of this innovation was published in the American Society of Cytopathology Program Director Communicator, March 2018.

Acknowledgments
The authors would like to acknowledge Dr Cate Nicolas, EdD, MS, PA, Director of Simulation Education and Operations, Sarah Page, MEd, Lead Simulation Specialist, and Bob Bolyard, Standardized Patient Educator at the Clinical Simulation Laboratory at the University of Vermont.

Declaration of Conflicting Interests
The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.
Funding
The author(s) received no financial support for the research, author-ship, and/or publication of this article.

Supplemental Material
Supplemental material for this article is available online.

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