Joint Recommendations and Resources for Clinical Ultrasound Education Amidst the COVID-19 Era

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In mid-March 2020, many North American emergency medicine (EM) physician educators found their campuses closed, educational programs canceled, and research projects furloughed as operations were directed to the clinical arena due to the novel coronavirus of 2019 (COVID-19) pandemic. Widespread need for personal protective equipment (PPE) and viral testing led to concerns over supply and rationing.

The value and necessity of clinical ultrasound (CUS) education has not changed during the pandemic and has arguably grown.[1] COVID-19 patients are prone to lung pathology, cardiomyopathy, renal injury, and volume status compromise, and CUS may improve the diagnosis and management of these conditions.[2,3] Additionally, CUS may limit the need for patient transportation for imaging, reduce the number of health care workers (HCW) in contact with COVID-19–positive patients and those who are persons under investigation (PUI), reduce PPE usage, and address concerns about infection control as the CUS devices, particularly handheld devices, are more easily disinfected.[4]

Social distancing, which is effective in reducing viral transmission, is antithetical to CUS education, which

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requires direct hands-on supervision to achieve competence. CUS education supports a heterogeneous group of learners, ranging from preclinical medical students to ultrasound fellows, with different learning styles and supervisorial needs.[5,6] Historically, the rich clinical environment of the emergency department (ED) has been used to expose learners to unique pathology and opportunities for repetition of the skill.[7] However, this educational model results in exposure of individuals who would otherwise not have direct patient contact with PUIs or patients with active COVID-19 infection.

This consensus document is a joint statement by EM CUS nationally recognized leaders and educators to provide recommendations and resources directly related to the continuation of CUS education during the era of COVID-19. Authors represented have leadership roles in the American College of Emergency Physicians (ACEP) Ultrasound Section and/or Section Subcommittees, Society for Academic Emergency Medicine (SAEM) Academy of Emergency Ultrasound (AEUS), Society of Clinical Ultrasound Fellowships (SCUF), and American Academy of Emergency Medicine (AAEM) ultrasound section. Because of the urgency to distribute this consensus document with the new academic year upon us, the recommendations below are solely those of the individual authors and may not represent the views of the societies they serve. This document is intended to add to, but not supersede, any local or institutional independent judgment of the immediate needs of its patients and preparation of its students, residents, and fellows.

In addition to recommendations related to CUS education during the era of COVID-19, the authors sought to develop a centralized appendix of educational resources available to ultrasound educators of learners at varying levels. The decision to use the "novice/intermediate/expert" grading system was to balance more delineated grading systems (of five levels or more) with the creation of a succinct, easy-to-read resource for educators looking for resources for their various level of learners. The grading of each resource was based on expert opinion, and all 18 authors agreed to the designations. We intend on keeping this appendix a living document, so educators and learners can continue to use this as an essential resource.

GENERAL RECOMMENDATIONS

Many of our consensus recommendations for educators apply to all learners regardless of academic level. General recommendations for educators are as follows:

1. Be familiar with your local and institutional guidelines.
2. Standardize and communicate infection control practices.[8]
3. Establish and maintain social distancing practices.
4. Utilize technology and available open-access resources (see Appendix S1, available as supporting information in the online version of this paper, which is available at http://onlinelibrary.wiley.com/doi/10.1002/aet2.10506/full), and objectively review new educational initiatives regularly.
5. Increase flexibility, creativity, and adaptability.

Medical Students

During the COVID-19 era, many medical schools have converted both preclinical and clinical sessions to asynchronous learning, small-group sessions, and distanced learning to maintain social distancing, avoid unnecessary patient contact, and reduce the use of PPE for nonclinical indications. According to the Association of American Medical Colleges, if active community spread is high, or PPE is in short supply, medical students should not be involved in direct patient care activities.[9] The level of PPE used by the HCW during a patient encounter should be guided by intuitional and national guidelines;[10] however, it should be noted that CUS training may require close patient contact for an extended period of time.

We propose the following recommendations:

- Ultrasound should continue to be utilized as an educational strategy within existing medical school curricula.[11,12]
- Educators should be familiar with local, institutional, and national guidelines that pertain to medical students' ultrasound education. Ultrasound curricular changes may be dynamic and should align with these recommendations.
- PPE availability, testing protocols for students, local incidence of community transmission, stability of departmental protocols, and bandwidth of faculty to appropriately supervise and educate should be considered when introducing medical students into the clinical environment.[13]
- Depending on local viral activity, ultrasound-specific elective rotations can be developed (if not already in place) or expanded to allow for additional educational experiences in light of fewer away rotations.

This would remedy education gaps created by lapses that may have occurred during the early stages of the pandemic.
- Objectively review novel educational programs frequently to ensure preestablished goals are being achieved and essential knowledge is being received.

Residents

The Accreditation Council for Graduate Medical Education (ACGME) has deemed CUS competency mandatory for all graduating EM residents, designating it as patient care skill number 12 (PC12).[3,5,14] In the COVID-19 era, many programs curtailed educational scanning in the ED, and educators pivoted to provide virtual instruction.[15] Facilitating the skill of image acquisition remains the greatest hurdle to resident education for the foreseeable future given that the duration of the pandemic may be years not months.

We propose the following resident-centered recommendations:

- Utilize available handheld ultrasound machines or acquire them for residents to perform training scans outside of the clinical environment.
- Explore teleguidance technologies for real-time, remote, image acquisition mentorship that could facilitate scanning skill development while minimizing exposure risk.
- Collaborate with residency leadership to integrate CUS training into existing resident educational sessions.
- Utilize performance-based metrics over quantitative metrics.[16] For credentialing letters describing POCUS proficiency, consider listing areas of deficiency and labeling them as "COVID impacted" with a description of methods used to assess proficiency (indirect observation via QA platforms, informal OSCEs during clinical shifts, individualized statements stating that the program director is confident regarding the resident's ability to perform scans, etc.).
- Utilize the ACGME's framework for the operation of graduate medical education during the COVID-19 pandemic to assist in decisions about suspending or reinstituting educational activities.[17]

Fellows

The CUS fellowship year is unique in that it is rigorous and time constrained. Trainees develop expertise in CUS advanced applications, education, research, and administration of a CUS workflow within 1 year. Moreover, guidelines recommend that fellows perform at least 1,000 CUS examinations during their training.[18] Considering this timeline, every effort should be made to minimize lapses in fellow education. Didactics, image review, journal club, and simulated or teleguidance mechanisms for learning image acquisition skills should be continued, digitally or in person, depending on local/institutional recommendations on group gatherings.[19]

Beyond the skills of image interpretation and acquisition, the fellowship curriculum requires development of educator skills, research, and program administration. Leading a CUS fellowship program during a crisis provides many opportunities to model administrative best practices. Including fellows in the process of establishing cleaning protocols, developing novel virtual educational content, procuring machines, or negotiating for simulation equipment presents a unique opportunity for education.

We propose the following fellow-centered recommendations:

- Fellowship directors should closely monitor scan numbers throughout the year to ensure adequate progression. Supplementation with simulated scanning may be utilized.
- Similar to the resident recommendations, utilize available handheld ultrasound machines or acquire them for fellows to perform training scans outside of the clinical environment.
- Utilize teleguidance and telementorship. The fellow can continue mastering educational skills when not physically present using well-described do-it-yourself methods of remote monitoring or new technologies that offer teleguidance features.[20,21]
- Develop novel teaching opportunities. Fellows may give virtual presentations to residents and rotators during weekly conferences. Resident teaching sessions led by fellows in a nonclinical environment can also be used to supplement the fellow teaching experience.
- Similar to the resident section, utilize performance-based metrics over quantitative metrics. The ultrasound fellowship guidelines recommend that at least 1,000 scans be performed during fellowship, which may not be feasible or appropriate during the COVID-19 era. While both are important, quality should be prioritized over quantity during these unpredictable times.

- Extenuating circumstances that put a fellow at increased risk of severe COVID-19 infection may require flexibility in the training program.
- Fellow research projects disrupted by the COVID-19 era should be restarted as soon as appropriate. Analysis of retrospective data, meta-analysis, case reports, and editorials may be encouraged in place of prospective research during the ongoing pandemic. Projects that are incomplete may be handed off to incoming fellows or ultrasound faculty and authorship discussions should happen early. Presentation of data at national meetings may need to occur after the completion of fellowship.
- Other CUS specialty stakeholders, such as but not limited to, critical care, cardiology, radiology, and OB/GYN, may have transitioned ultrasound didactics to virtual settings. Multispecialty virtual didactics may supplement fellow education or teaching skills and build bridges across the institution.

Physicians in Practice

Community EDs are faced with fluctuations and uncertainty in patient care volumes. Ultrasound education is an ongoing need for many community EDs and the need for education remains. The COVID-19 era has created increased administrative duties (developing cleaning protocols, educational efforts for recognizing COVID-19–related sonographic findings, and additional clinical care areas to support) for community ultrasound directors and the possibility of decreased support for these duties.

In addition to the recommendations above, we recommend:

- Communicate with employer leadership about any increased ultrasound-related administrative duties to ensure adequate support.
- Continue quality assurance efforts with special attention to examinations that may be less familiar to users but more relevant to COVID-19 patients (e.g., lung ultrasound).
- Utilize available open-access resources when developing educational sessions for faculty, particularly on topics related to COVID-19 patient care (see Appendix S1).
- Utilize available handheld ultrasound machines or acquire them for faculty to perform training scans outside of the clinical environment, and in the clinical environment to limit infection control risks associated with large multi-surfaced cart-based machines.
- Explore, develop, and utilize teleguidance and telementorship technologies to support CUS in the patient care and training environments.

CONCLUSIONS

The COVID-19 pandemic has disrupted clinical operations, scholarly activities, and the paradigm of traditional educational practice for many of us, and there is no clear timeline or evidence to suggest that we will return to pre–COVID-19 activities. Strategies for providing didactic and hands-on CUS education may vary based on the educational level of the learner, institutional guidelines, availability of personal protective equipment and COVID-19 testing, and personal needs of the learner. Innovation, flexibility, evidence, and communication are more essential than ever when considering medical education and patient and provider safety.

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Supporting Information

The following supporting information is available in the online version of this paper available at http://onlinelibrary.wiley.com/doi/10.1002/aet2.10506/full

Appendix S1. Appendix of resources.