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BRIEF REPORT

A Novel Learner- and Patient-Oriented Needs Assessment for a Point-of-Care Ultrasound Curriculum in Family Medicine

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ABSTRACT

Background and Objectives: New Accreditation Council for Graduate Medical Education and American Board of Family Medicine guidelines encourage training family medicine residents in point-of-care ultrasound (POCUS). Prior studies have focused on the perceived needs of learners but did not assess patient or community need.

Methods: We performed a triangulated learner- and patient-oriented needs assessment to inform POCUS curriculum development within a family medicine residency. Our learner assessment consisted of a Likert scale survey of the perceived skill and importance of 36 POCUS modalities discussed in the 2016 American Academy of Family Physicians POCUS curriculum guidelines. Our patient-oriented needs assessment was collected through analysis of all family medicine practice (FMP) site imaging orders placed in 2023.

Results: The learner survey demonstrated the highest skill gaps in POCUS training to be evaluation for hemothorax and evaluation for pleural effusion. FMP site imaging order analysis demonstrated that hepatobiliary and obstetrics/gynecology concerns were the most frequently answered by POCUS for patients seen at the FMP site.

Conclusions: POCUS is an important and underutilized diagnostic tool in family medicine. POCUS curricula in graduate medical education are vital to successful implementation of POCUS in primary care; however, needs assessment techniques used in prior studies differ from the patient and community needs in our study. We recommend the use of both needs assessment strategies for optimal POCUS training outcomes. Further research replicating this modality is necessary to determine the optimal needs assessment approach for POCUS in family medicine.

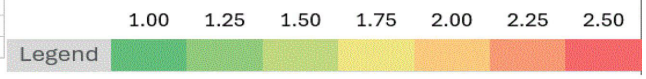
INTRODUCTION

New Accreditation Council for Graduate Medical Education (ACGME) program requirements for family medicine graduate medical education[1] and American Board of Family Medicine (ABFM) procedural competency recommendations[2] encourage training in point-of-care ultrasonography, representing a shift to bring point-of-care ultrasound (POCUS) into primary care to improve the efficiency and accuracy of health care delivery. Existing studies have demonstrated the development of POCUS curricula in primary care specialties;[3-10] however, many of these studies focused on the perceived needs of learners without attention to the needs of the patients or communities in which these residents practice. In accordance with ACGME recommendations for residencies to provide care that meets the needs of communities,[1] we performed a needs assessment to inform POCUS curriculum development within a family medicine residency.

We employed a triangulated needs assessment approach to capture learner and patient needs in POCUS. Specifically, we analyzed patient needs through

FIGURE 1. Skill Gap by POCUS Modality

Skill Gap By POCUS Modality	Mean Skill Gap	SD
Gynecology		
Confirmation of IUD Position	1.41	1.18
Dysfunctional Uterine Bleeding	1.41	1.00
Adnexal Mass Evaluation	1.82	1.01
Breast Mass Evaluation (simple cyst vs. complex cyst vs. solid)	1.82	1.51
Cardiac		
Limited Echocardiogram (pericardial effusion, LV function, RV function, IVC measurement)	1.82	1.38
Trauma		
FAST Assessment	1.53	1.46
Evaluation for Hemothorax	2.29	1.16
Hepatobiliary/Abdominal		
Identification of Gallstones	2.00	1.22
Assessment for Acute Cholecystitis	2.18	1.13
Assessment for Common Bile Duct Dilation	1.82	1.07
Hepatobiliary/Abdomina: Assessment for Ascites	2.18	1.29
Ultrasound-guided Paracentesis	2.00	1.46
Urology		
Identification of Hydronephrosis	1.94	1.20
Assessment of Bladder Volume (pre and post-void residual)	1.71	1.16
Vascular		
AAA Screening	1.94	1.34
Assessment for DVT	2.06	1.34
Ultrasound-guided Peripheral IV placement	1.47	1.42
Vascular Ultrasound-guided Central Line Placement	1.53	1.87
Skin and Soft Tissue		
Assessment for Abscess vs. Cellulitis	2.12	1.73
Assessment for Foreign Body	2.18	1.63
Ultrasound-guided Removal of Foreign Body	2.06	1.56
Musculoskeletal		
Assessment for Joint Effusion	1.88	1.32
Assessment for Bone Fracture	1.41	1.87
Assessment for Tendinopathy (tear/rupture vs. chronic disease vs. normal)	1.41	1.62
Ultrasound-guided Joint Injection	1.88	1.50
Pulmonary/Thoracic		
Assessment for Pulmonary Edema	1.82	1.51
Assessment for Consolidation (pneumonia)	1.76	1.68
Assessment for Pneumothorax	1.88	1.69
Assessment for Pleural Effusion	2.47	1.33
Ultrasond-guided Thoracentesis	1.88	1.36
Neurologic/Ocular		
Assessment for Retinal Detachment	1.12	0.78
Assessment for Vitreous Detachment	1.24	0.90
Assessment for Vitreous Hemorrhage	1.24	0.90
Ultrasound-guided Lumbar Puncture	1.53	1.18



Abbreviations: POCUS, point-of-care ultrasound; IUD, intrauterine device; LV, left ventricle; RV, right ventricle; IVC, inferior vena cava; FAST, Focused Assessment with Sonography in Trauma; AAA, abdominal aortic aneurysm; DVT, defibrillation threshold; IV, intravenous

the family medicine practice (FMP) site imaging orders as an indicator of community demand, recognizing that patient interviews may not fully capture the utility of this underutilized tool. We paired this with a traditional learner-centered assessment by replicating established survey methodologies.[11,12] By integrating patient-oriented data with learner perspectives, we sought to identify convergences and divergences in training needs. We hypothesized that curricular priorities derived from these complementary sources would differ and that triangulating assessments would provide a richer, more inclusive foundation for POCUS curriculum development and inform future research in this topic.

METHODS

Context

This study occurred at an unopposed single family medicine residency in an urban community hospital affiliated with a large academic health system. Residents completed introductory didactics in POCUS and approximately two to four interactive POCUS workshops to improve their familiarity with POCUS modalities and techniques prior to the study. Musculoskeletal and skin infection workshops were the only specific modalities taught before the study. Institutional review board approval was obtained through Northwestern University (STU00220400). All data were analyzed using SPSS version 28 for Windows (IBM Corp).

Learner-Oriented Needs Assessment: Survey of Perceived Importance and Confidence

The survey was developed *de novo* because no existing instruments capture POCUS needs in family medicine residencies. We reviewed the American Academy of Family Physicians (AAFP) POCUS curriculum guidelines[13] and extracted 36 POCUS modalities to include in our survey instrument. Participants were asked to rate the importance of and their perceived skill in performing each modality on a 5-point Likert scale as performed in prior studies.[11,12] The skill gap for each modality was calculated as the mean difference between the importance and confidence ratings, with greater differences indicating important yet unfamiliar US modalities. The survey was generated in REDCap (REDCap Consortium) and distributed to all faculty and residents at the program via email over a 30-day period. All items were analyzed using descriptive statistics.

Patient-Oriented Needs Assessment: Imaging Order Analysis at FMP Site

We analyzed imaging orders placed over a 1-year period (2023). Each order was categorized by imaging type (eg, ultrasound, CT, MRI) and clinical indication (associated ICD-10 code). We then determined whether the clinical question could be answered using basic or advanced POCUS modalities, as defined by the AAFP curriculum guidelines.[13] Chart review was performed when these data were unclear.

If the clinical question was not identifiable with the given information, it was excluded from the analysis (N = 98).

RESULTS

Learner Survey

Of 24 eligible participants, 17 completed the survey (71% response rate). Survey participation represented all levels of training (five postgraduate year [PGY] 1, four PGY-2, five PGY-3, three faculty). Of the participants, 59% had some POCUS training prior to joining the residency program. We found were no statistical differences when comparing responses between different training levels. The three most important ultrasound modalities rated by learners were second and third trimester obstetrics ultrasound, assessment for joint effusion, and ultrasound-guided joint injection being. Skill gap averages are summarized in Figure 1. Assessment for pleural effusion and assessment for hemothorax had the highest average skill gap among the POCUS modalities (2.47 and 2.29, respectively), while hepatobiliary and skin/soft tissue categories carried the highest skill gaps among system groupings.

Imaging Order Analysis

A total of 1,271 imaging studies were ordered at the FMP site in 2023, with the percentage of each imaging type summarized in Figure 2. Of these, 7.7% were excluded from analysis due to an unclear clinical question. Of the remaining 1,173 orders, 30% were found to be answered by a POCUS modality in the AAFP curriculum guidelines (18.7% basic, 11.3% advanced). Obstetrics and gynecology, hepatobiliary, and vascular studies were the most common imaging classifications identified, while evaluation for cholelithiasis, cholecystitis, and breast mass were the most common specific clinical questions for imaging studies, with more detailed analysis summarized in Figure 3.

DISCUSSION

POCUS is a tool that stands to enhance efficiency and accuracy of care in the primary care setting. New ACGME and ABFM requirements support this call for additional training and implementation within the field of family medicine. Our study demonstrated a useful methodology for multisource needs assessment when designing and implementing POCUS curricula in graduate medical education.

Collectively, our data illustrate how learner-perceived training needs and actual imaging order patterns only partially overlapped. Figure 1 shows that trainees identified the greatest skill gaps in evaluation of hemothorax and pleural effusions, whereas Figure 3 demonstrates that the most frequent POCUS-related clinical questions in the community involved hepatobiliary, obstetrics and gynecology, and vascular concerns. This study represents, to our knowledge, the first POCUS published needs assessment within a family medicine residency, and the first POCUS needs assessment to incorporate both learner perspectives and patient-oriented data.

This study highlights how established learner survey methodologies[11,12] differ from measure of patient needs in

FIGURE 2. Percentage of Each Imaging Type

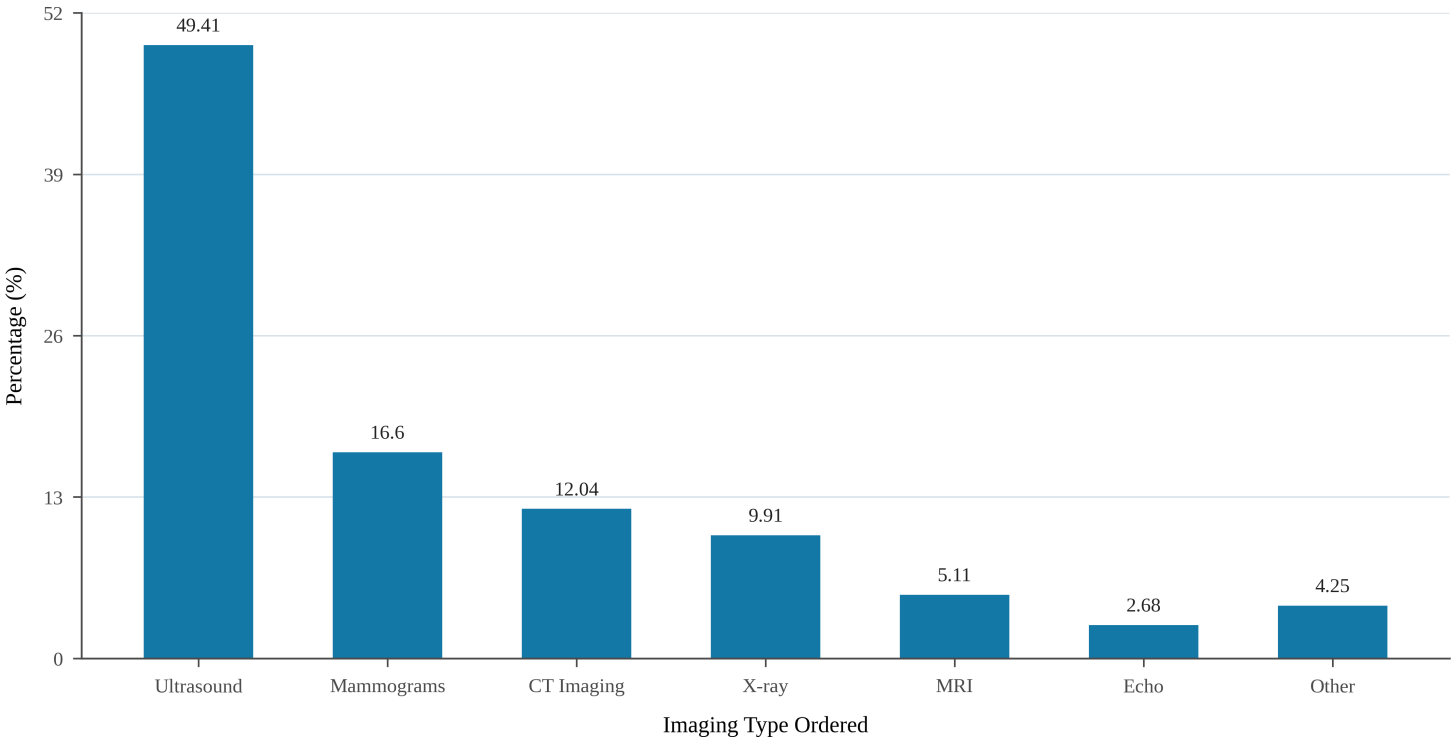


FIGURE 3. Summary of the Most Common Clinical Questions for Imaging Studies

Category	Total	Subcategory	Subcategory Frequency
Skin Soft Tissue	14	Joint Effusion	8
		Tendonopathy	2
		Fracture	2
		Abscess	0
		Foreign Body	0
		Removal Foreign Body	0
		Joint Injection	0
OB/GYN	97	Breast Mass Evaluation	45
		Adnexal Mass Evaluation	29
		First Trimester Dating	18
		Confirm IUD Placement	3
		Abnormal Uterine Bleeding	2
		Limited 2nd/3rd Tri US	0
Hep/ABD	66	Gallstones	57
		CBD Dilation	57
		Acute cholecystitis	5
		Assessment of Ascites	4
		Ultrasound-Guided Paracentesis	0
Pulm	5	Consolidation	3
		Pulmonary Edema	1
		Pleural Effusion	1
		Pneumothorax	0
		Thoracentesis	0
Vascular	54	Assessment for DVT	29
		AAA Screening	25
		PIV Placement	0
		Central line placement	0
Oph/Neuro	0	Retinal Detachment	0
		Vitreous Detachment	0
		Vitreous Hemorrhage	0
		Lumbar Puncture	0
Trauma	0	FAST	0
		Eval for Hemothorax	0
GU	2	Hydronephrosis	1
		Bladder Volume	1
Cardio	17	Echocardiograms	17

Abbreviations: IUD, intrauterine device; Tri, trimester; CBD, corticobasal degeneration; DVT, defibrillation threshold; AAA, abdominal aortic aneurysm; PIV, peripheral intravenous; FAST, Focused Assessment with Sonography in Trauma; Eval, evaluation; Cardio, cardiology; OB/GYN, obstetrics and gynecology; Hep/ABD, hepatitis/acute behavioral disturbance; Oph/neuro, ophthalmology/neurology; GU, genitourinary

POCUS training. Updated ACGME requirements in family medicine emphasize a need for training that meets community needs, with our study suggesting that these needs may be at odds with traditional curriculum development strategies. Though confirmation of this trend in other settings is outside the scope of this study, both needs assessment strategies are practical methodologies that other residency programs may borrow in crafting their own curricula. Our study had limitations that will guide future study. First, learner self-assessment of importance and confidence may not correlate with more objective measures of learner performance.[14,15] Longitudinal surveys after further training, coupled with observed clinical competence, are necessary to ensure reliability of our findings and demonstrate effectiveness of POCUS curricula in closing skill gaps. Second, the learner survey questions did not specify a particular care setting. Given the broad spectrum of settings (eg, inpatient, outpatient, labor and delivery) in which residents and faculty practice, importance may be skewed by which practice setting participants envisioned while completing the survey. To address this concern, future surveys will explicitly reference care settings to determine whether context influences reported priorities. Lastly, we did observe higher importance ratings for musculoskeletal topics and high skill gaps in skin and soft tissue ultrasound modalities, which were workshops many learners were exposed to prior to the survey. The Dunning-Kruger effect[16] may have altered our results; however other studies have called this effect into question.[17]

CONCLUSIONS

Given the benefits and underutilization of POCUS in the primary care setting, we suggest that family medicine residencies use multiple perspectives to prioritize POCUS curriculum design to satisfy new ACGME and ABFM requirements and implement POCUS in a way that immediately meets community needs for more effective and efficient care. Our triangulated approach (integrating objective imaging order analysis with learner-centered surveys) offers a unique and transferable methodology for balancing educational and community perspectives. As POCUS curricula continue to evolve, this dual approach will help educators decide how to prioritize training to more effectively implement POCUS into the practice of family physicians.

PRESENTATIONS

North American Primary Care Research Group Annual Meeting, Quebec City, Canada, November 20–24, 2024.

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