

Oregon Health & Science University
School of Medicine

Scholarly Projects Final Report

Title: Musculoskeletal Point-of-Care Ultrasound: Piloting an Educational Workshop Series

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Project Course: Scholarly Projects Curriculum

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Project/Research Question: Will a series of three musculoskeletal point-of-care ultrasound hybrid didactic and hands-on training sessions improve faculty comfort level and skill in ultrasound image instrumentation, acquisition, and interpretation in clinical practice?

Type of Project: Educational Research

Key words: Point-of-care ultrasound; musculoskeletal ultrasound; faculty development; family medicine; outpatient education; rural health

Meeting Presentations:

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Publications:

N/A

Submission to Archive:

N/A

Next Steps: Future work could expand this curriculum longitudinally, incorporate objective assessments of scanning technique, and evaluate downstream effects on clinical practice patterns, resident education, and patient outcomes. Data and curricular materials from this project may be used by future learners to study longitudinal POCUS skill acquisition, barriers to sustained adoption, and optimal faculty development models in primary care.

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Introduction

Point-of-care ultrasound (POCUS) is an established diagnostic tool that enhances clinical decision making, reduces time to diagnosis, lowers health care costs, and decreases exposure to ionizing radiation¹. Its use can also strengthen the patient–physician relationship by allowing real-time visualization of anatomy during clinical encounters¹. In recognition of these benefits, the American Academy of Family Physicians has recommended POCUS training for family medicine clinicians^{2,3}. Despite these recommendations, outpatient adoption of POCUS remains inconsistent.

A major barrier to POCUS integration in family medicine is insufficient faculty training. Limited faculty expertise constrains both resident education and clinical use, perpetuating a cycle in which clinicians lack confidence in image acquisition and interpretation. Prior studies consistently identify lack of training, time constraints, and limited access to equipment as key obstacles to outpatient POCUS utilization⁴⁻⁶. These barriers are particularly relevant in rural and community-based practices.

Musculoskeletal (MSK) complaints account for approximately 40% of outpatient primary care visits, making MSK POCUS a high-yield application for family medicine⁷. MSK ultrasound is well validated in emergency medicine and sports medicine, where it improves diagnostic accuracy for soft tissue infections, tendon injuries, joint effusions, and nerve entrapments⁸. However, there is relatively little published work on MSK POCUS implementation and faculty development in primary care settings.

Faculty development represents a critical area for expanding POCUS use in family medicine. Training faculty clinicians may not only improve direct patient care but also enhance the educational capacity of residency programs. This study aimed to evaluate the feasibility and effectiveness of a brief, hybrid MSK POCUS faculty development curriculum. We hypothesized that participation would improve clinician comfort, knowledge, and perceived clinical utility of MSK POCUS, while identifying areas requiring additional training.

Methods

A hybrid didactic and hands-on educational workshop with a pre-post survey design was utilized for this project. The curriculum was implemented at a rural family medicine health center affiliated with an academic residency program. The primary aim was to assess the feasibility and educational outcomes of a brief MSK POCUS faculty development curriculum.

Participants included family medicine attending physicians and advanced practice providers (physician assistants and nurse practitioners) practicing at the study site. Participation was voluntary, and there were no exclusion criteria based on age, gender, years in practice, or prior ultrasound experience. Recruitment occurred via email invitation describing the purpose, structure, and time commitment of the curriculum. Participation did not involve financial incentives and was conducted during protected lunch-hour time.

The curriculum consisted of three one-hour workshops delivered over three consecutive weeks. Sessions were designed to balance efficiency, accessibility, and educational value. Each workshop focused on a specific MSK POCUS application commonly encountered in outpatient family medicine practice: (1) ultrasound fundamentals and soft tissue applications, (2) median nerve and Achilles tendon, and (3) knee ultrasound.

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Each session followed a standardized format consisting of a brief didactic component (approximately 15–20 minutes) followed by supervised hands-on scanning practice (20–25 minutes). Didactic content included basic ultrasound physics, probe selection, relevant anatomy, common clinical indications, scanning technique, and basic image interpretation. Hands-on components allowed participants to practice scanning on volunteer models under direct supervision, with real-time feedback provided by instructors experienced in MSK POCUS. Ultrasound machines available in the clinic were used for hands-on practice.

Participants completed surveys at three time points: baseline (pre-intervention), immediately following completion of the curriculum (post-intervention), and at follow-up six weeks after the final session. Surveys assessed multiple domains, including perceived importance of ultrasound training, comfort with ultrasound use, confidence in scanning specific MSK structures, perceived feasibility and relevance of the curriculum, and perceived clinical utility of MSK POCUS.

Comfort and agreement measures were assessed using 5-point Likert-type scales (extremely uncomfortable to somewhat comfortable and strongly disagree to strongly agree, respectively). Knowledge was assessed using image-based questions evaluating recognition of MSK anatomy and common pathology relevant to the curriculum. The knowledge assessment was identical on the post-intervention and follow-up surveys to evaluate retention.

Changes in perceived comfort, importance, and knowledge scores were compared across time points to assess trends following the intervention. Given the small sample size and exploratory nature of the project, formal statistical analysis was not performed. Qualitative comments from open-ended survey responses were reviewed to contextualize findings and identify recurring themes related to feasibility, confidence, and perceived barriers to implementation.

Results

Ten clinicians participated in the MSK POCUS faculty development curriculum, including seven attending family medicine physicians, two physician assistants, and one nurse practitioner. Participants represented a range of clinical experience levels and baseline exposure to ultrasound, with most reporting limited prior formal training in MSK POCUS. The most frequently reported barriers to ultrasound use were clinical time constraints and time commitment for training. Other barriers included lack of training, cost of training, lack of equipment, and travel time to educational events (Figure 1).

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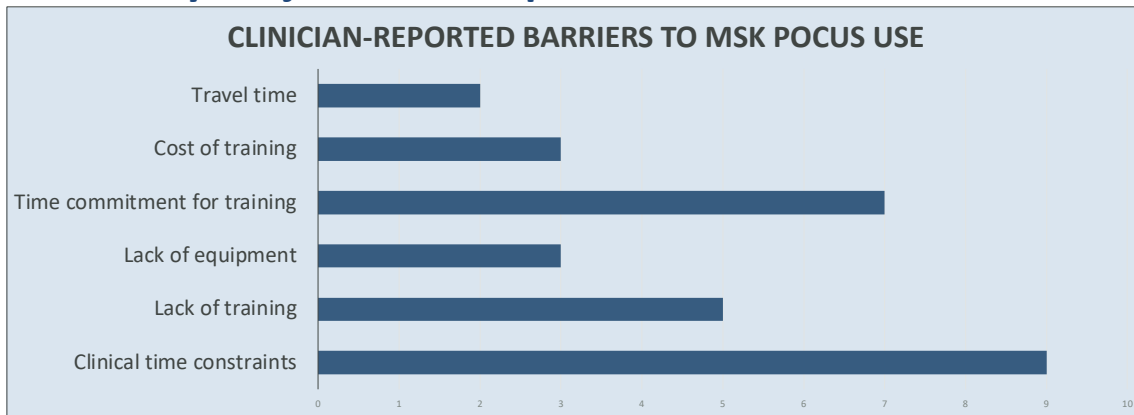


Figure 1. Clinician-Reported Barriers to Musculoskeletal Point-of-Care Ultrasound Use and Training.

Following completion of the three-session workshop series, overall self-reported comfort using ultrasound increased. Participant reports of “somewhat agree” rose from 55.6% pre-intervention to 75.0% post-intervention. Strong disagreement was eliminated (11.1% to 0%), and overall disagreement decreased from 44.4% to 25.0%. However, improvements in comfort were not uniform across individual musculoskeletal applications. Participants reported higher comfort with soft tissue ultrasound compared with more technically complex examinations. In soft tissue scanning, “somewhat comfortable” increased from 44.4% to 62.5% and “extreme discomfort” was eliminated (11.1% to 0%). However, comfort with scanning the median nerve and knee remained persistently low with 75% “somewhat” or “extremely uncomfortable” post-intervention. Comfort with scanning the Achilles tendon demonstrated minimal change, with 87.5% of respondents remaining uncomfortable post-intervention (Figure 2). These findings suggest that while the curriculum effectively improved global comfort with ultrasound, structure-specific technical proficiency may require additional hands-on practice and longitudinal reinforcement.

Perceived importance of ultrasound substantially shifted post-intervention. “Strongly agree” increased from 22.2% to 62.5%, and 100% of participants agreed ultrasound was important (somewhat or strongly) post-intervention, compared to 88.9% pre-intervention (Figure 2).

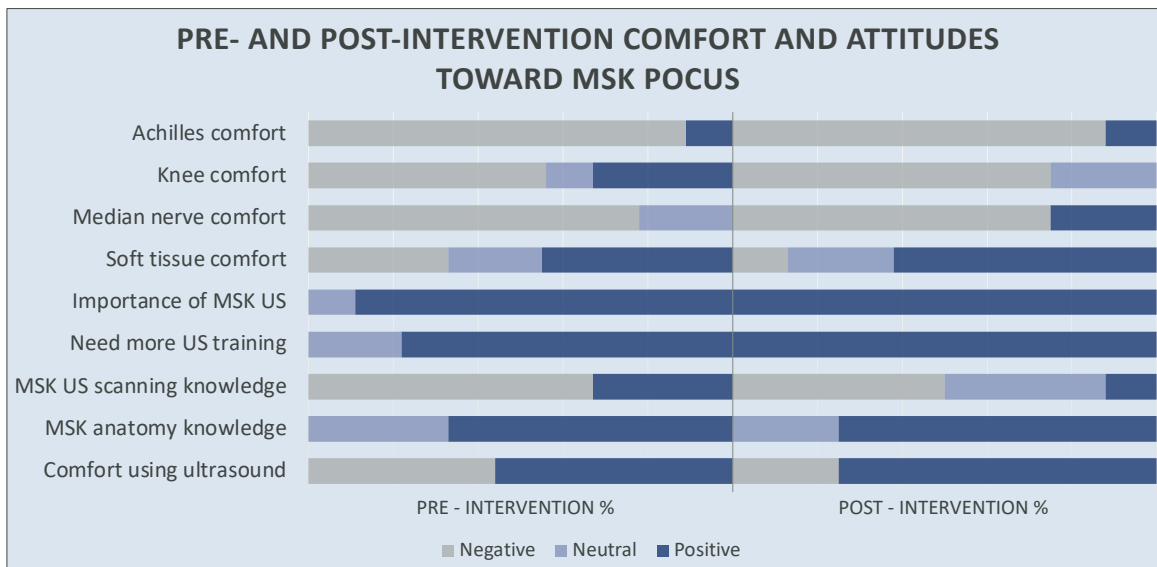


Figure 2. Pre- and post-intervention changes in clinician comfort, knowledge, and perceived importance of MSK POCUS. Responses were collapsed into negative, neutral, and positive categories.

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Perceived clinical utility also increased over time. At baseline, all participants reported MSK ultrasound “might or might not” aid in clinical decision making, while at follow-up, there was a 100% increase in participants agreeing that ultrasound “probably” or “definitely” would aid clinical decision making. Post-intervention, all respondents reported that ultrasound was useful in guiding outpatient evaluation and management. Baseline agreement that faculty require additional ultrasound training was already high (77.8%) and increased to 100% post-intervention, reflecting universal recognition of ongoing training needs (Figure 2).

Knowledge assessment performance was strong following the workshop. Immediately post-intervention, participants answered 92% of image-based questions correctly. At follow-up, accuracy remained high at 86%, demonstrating retention of image-based learning over time.

Participants reported high satisfaction with the curriculum across all feasibility domains. All respondents agreed that the teaching methods met the stated learning objectives, that the training was relevant to their practice, and that it was easy to access, with 87.5% strongly agreeing in each category. Perceptions of time adequacy were also favorable, with all participants agreeing that the time spent in sessions was adequate (50% strongly agree) and 87.5% agreeing they had sufficient time to practice skills. Facilitator support and the learner-to-ultrasound machine ratio were rated positively by all respondents, with 87.5% strongly agreeing. All participants indicated they would have preferred more sessions. Qualitative comments described the workshops as helpful and expressed interest in additional training opportunities.

Survey response rates declined over time, with fewer participants completing follow-up surveys than at baseline and immediate post-intervention assessments. Despite this expected attrition, trends across outcomes, including comfort, perceived importance, knowledge retention, and clinical utility, were consistent among respondents. These findings suggest meaningful educational effects despite incomplete longitudinal data.

Overall, participation in a brief MSK POCUS faculty development curriculum was associated with increased clinician comfort using ultrasound, sustained knowledge retention, and enhanced perceived clinical utility. The workshops were reported to be a feasible way to integrate ultrasound education into a busy outpatient family medicine clinic environment. While overall ultrasound confidence improved, persistently lower comfort with technically complex scanning highlights the need for additional practice opportunities.

Discussion

This study demonstrates that a brief, hybrid MSK POCUS faculty development curriculum is both feasible and effective in improving clinician confidence, knowledge, and perceived clinical utility in a family medicine setting. The observed improvements in overall comfort with ultrasound use and sustained performance on knowledge assessments suggest that even short-format educational interventions can meaningfully address key barriers to outpatient POCUS adoption. These findings are particularly relevant in busy outpatient and rural practice environments, where time constraints often limit participation in more intensive training programs.

One of the most notable findings was the discrepancy between increased overall comfort with ultrasound and persistently low confidence in scanning specific musculoskeletal structures, particularly the knee, Achilles tendon, and median nerve. While participants demonstrated strong retention of image-based knowledge and improved comfort with ultrasound fundamentals, achieving scanning proficiency in more complex structures was more difficult in this brief curriculum. This finding aligns with prior literature emphasizing the need for repeated hands-on practice, deliberate skill reinforcement, and longitudinal

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exposure to achieve procedural competence in ultrasound⁴⁻⁶. Ongoing faculty development, incorporating spaced workshops with hands-on practice and mentorship, may be necessary to support mastery or routine use of MSK scanning techniques. Sustained performance on image-based knowledge assessments supports the curriculum's effectiveness in developing image interpretation skills. Knowledge scores remained high at follow-up, despite the absence of continued formal instruction or practice. The dissociation between knowledge retention and technical comfort highlights the importance of repeated hands-on practice for skill development in ultrasound education.

Importantly, there was a substantial increase in recognition of ultrasound's role in clinical decision making between baseline and follow-up. This shift suggests that the workshop revealed the practical utility of MSK POCUS and may serve as an early indicator of future adoption, even before consistent confidence or training infrastructure is fully achieved.

The feasibility and acceptability measures suggest strong support for the curriculum's structure and content. Participants reported the curriculum as accessible, relevant, and aligned with stated learning objectives. These findings indicate that brief faculty development programs delivered on-site during lunch-hour sessions, integrating didactic and hands-on training, can be feasibly incorporated into routine outpatient workflows, addressing several commonly reported barriers to POCUS adoption.

Several limitations should be considered when interpreting these findings. The study was conducted at a single site with a small sample size, limiting generalizability. Participation was voluntary, introducing potential selection bias toward clinicians with preexisting interest in ultrasound. Outcomes relied primarily on self-reported measures, which may overestimate confidence or perceived utility. Additionally, objective assessments of scanning technique, frequency of ultrasound use in clinical practice, and patient-level outcomes were not included.

Despite these limitations, this study contributes to a growing body of literature highlighting faculty development as a critical strategy for advancing MSK POCUS integration in family medicine. Brief, accessible training models may increase adoption, particularly in resource-limited or rural settings where traditional ultrasound training opportunities are scarce. Future studies should incorporate objective assessments of technical skills and examine effects on clinical practice patterns, resident education, and patient outcomes to support sustained and meaningful integration of MSK POCUS into outpatient family medicine practice.

Conclusions

A brief, hybrid MSK POCUS faculty development curriculum is feasible and improves clinician confidence, knowledge retention, and perceived clinical utility. Ongoing faculty training may be necessary to support the full integration of MSK POCUS into outpatient family medicine practice.

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