POINTING THE INDICATOR TOWARD INNOVATION: A FOCUSED POINT-OF-CARE ULTRASOUND (POCUS) FACULTY DEVELOPMENT PROGRAM IN AN ACADEMIC SAFETY NET HOSPITAL

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Background

Point-of-care ultrasound (POCUS) is now part of the internist’s toolkit. Data has consistently demonstrated internists, hospitalists, residents, and medical students can effectively learn POCUS across a spectrum of clinical applications.1-3 Educating providers in POCUS during the clinical day is challenging, and educating providers during non-clinical days is in direct competition with other important priorities such as wellness, work-life balance, and childcare.

So how does a moderate-sized academic hospitalist group in a safety net hospital with minimal funding for POCUS receive an introductory experience in POCUS? We created the Faculty Development Workshop Series (FDWS) in POCUS to address this question.

Methods

The FDWS was studied with approval by the Colorado Multiple Institutional Review Board (COMIRB). The primary outcome was hospital medicine providers attending an abridged POCUS curriculum will exhibit improved POCUS image acquisition and interpretation as demonstrated by comparison of pre- and post-test scores of trainees. Trainees completed a five question pre-test to start each session and a five question post-test to end each session. The pre-test and post-test questions mirrored each other thematically but were 10 unique questions applicable to each session. Trainees also completed a FDWS evaluation survey after the last session.

A COMIRB-approved POCUS needs assessment survey of the hospitalist group was conducted six months prior and resulted in 33 responses. The survey indicated the main motivators for POCUS training were to improve bedside education to learners as well as to increase accuracy and speed of clinical decision making. All tests and surveys were built using RedCAP and accessed using Quick Response (QR) codes embedded in audiovisual presentation material.

Target Audience and Resources

Denver Health is a 527-bed academic safety net hospital. At the time of the FDWS there were 47 clinical hospitalists: 39 physicians (MD/DO) and eight advanced practice practitioners (APPs). Three hospitalist faculty from the Denver Health Hospital Medicine group directed the FDWS; two of whom are experienced POCUS educators (co-authors NN and GS). At the time of the FDWS, the group had one cart-based POCUS device, and one portable tablet-based device with a single phased array probe. Four different industry vendors provided day-of presentation cart-based equipment for each session free of charge. Paid volunteers were used for live-scanning.

Design

We chose a duration of six one-hour sessions at the traditional lunch hour of 12pm-1pm, each 2 weeks apart. We disseminated shared expectations for the scheduled sessions to the entire group in advance of each session. Each session was 55 minutes. A prior-session review, a

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quiz, and a ten minute didactic comprised the first 20 minutes, followed by three interactive stations and a post-test for 35 minutes. We based our session structure on cumulative experience teaching POCUS courses.

**Structure priorities:**

1. **Each session should stand alone.** The trainee’s experience is not contingent on attendance at prior sessions.

2. **Create an educational model emphasizing hands-on training accommodating trainees with various levels of POCUS learning ability.** Some users can mimic an expert with little coaching, and others require a great deal of hands-on guidance. The goal was to create enough space in the program to accommodate the spectrum.

3. **Make time management a shared priority.** The learning space was protected from unnecessary noise with phones and pagers on silent. Both didactics and live scanning of volunteers took place in a single room to avoid lost time and distraction moving between separate locations.

4. **Create space for faculty to experience uncertainty.** We excluded residents, students, and other learners from the FDWS to promote a low-stakes learning environment and maximize the amount of 1:1 expert: faculty learner hands-on time.

**Curriculum**
The co-directors tailored the curriculum towards a novice audience by reviewing the Needs Assessment and through their experience as educators. Focused sessions were Cardiac parasternal long axis (PLAX) only, Lung, Urinary system and Free fluid (“Abdomen” in results), Vascular (inferior vena cava and internal jugular), Skin & Soft Tissue, and the PEARLS approach to scanning for the internist. Didactics focused on visual aids and high-yield bullet points for the abridged application being presented. Trainees then divided into three equally sized groups for the three interactive stations. Two hands-on stations involved live scanning of volunteers guided by NN and GS. The third station was equipped with a self-guided slideshow pathology review associated with the session’s application. RA kept time for each session to ensure transitions occurred on schedule.

**Statistical Analysis**
For descriptive data, continuous variables are presented as the median (range). Pre-test versus post-test data were compared using the Wilcoxon test, and data were paired when appropriate. Data was analyzed using R studio v1.1.453 and a p-value of <0.05 was considered to be statistically significant.

**Results**
Twenty-eight physicians and all eight of the groups’ advanced practice practitioners attended at least one session. The majority of attendees reported “No prior training” or “Less than 5 hours of prior training” in POCUS. Median pre- and post-test scores were compared by session. Post-test scores significantly improved compared to pre-test scores at five out of six sessions (see figure). For the PEARLS session, a trend towards test score improvement was observed, but did not achieve statistical significance (p = 0.061).

We compared the change in pre- to post-test scores for physicians v. APPs for the four sessions that were attended by at least five APPs (Cardiac, Vascular, Skin and Soft Tissues, and PEARLS). There was no significant difference in the improvement between pre- and post-test scores when comparing APPs to physicians for 3 of the 4 sessions. In the PEARLS session, APP scores improved significantly more than physician scores (p = 0.002).

Twenty-six hospitalists completed the post-series evaluation: 20 physicians, six advanced practice providers; of these, 20 providers attended at least one workshop. “The design of the workshop is innovative” and “the design of the workshops respects my time” were both given “Agree” and “Strongly Agree” by 100% of respondents. The vast majority of attendees (94%) felt that the core curricular components were “highly valuable” or “valuable.”

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We expect that physicians and APPs will utilize POCUS in the same fashion in clinical practice; therefore, we want to ensure that both groups made significant gains after attending a session. Our results demonstrate that the design and learning material accommodated both training levels.

Our study has several limitations. Some providers attended POCUS courses previous to the workshop series, but because testing data was anonymous, we did not identify which scores are associated with experience. However, data only reflects providers that took both the pre- and post-tests, which means improvements measured included both inexperienced and experienced providers. In the last session scores did not reach statistical significance which may be due to a Type II error. A control group would have been ideal to test the efficacy of the curriculum, but we did not want to deny any provider educational activity.

We set out to create a series that would give our providers an experience to prepare them to engage in future immersive courses, and expose them to the potential of POCUS in their clinical work. We succeeded in creating an accessible course, well-designed to accommodate our clinical services and still engage learners.

Conclusion
Effective faculty education on clinical days is challenging, but can be well attended with creative design focused on consistency and shared expectations. Physicians and advanced practice practitioners have a similar test score improvement in an abridged novice curriculum. This reproducible workshop design offers a way to improve POCUS education for hospitalists.

References