Development, Implementation, and Evaluation of a mobile point-of-care ultrasound tracking system and mobile research tool within an Internal Medicine residency

David Tierney MD, FACP; Abbott Northwestern Hospital, Dept. of Graduate Medical Education; Minneapolis, Minnesota

CONCLUSION
A robust point-of-care mobile tool resulted in more timely, complete, and accurate data for students, residents, and faculty performing point-of-care ultrasound. The ability for the administration and individual to track their progress and certification with the application was essential to the POCUS training environment. The administrative back-end added significant efficiency to a hybrid mastery learning approach to assess competency in point-of-care ultrasound. Integration of routine clinical POCUS exam data collection with research study data gathering may also make point-of-care ultrasound research more efficient. The conversion of the application to a fully customizable, web-based, and platform independent tool will allow use by other training programs in need of a comprehensive solution for gathering and analysis of POCUS user data.

BACKGROUND
Ultrasound competency and certification declarations both require timely, complete, and accurate collection of user exam data. The ability to record ultrasound exam data at the point of care with a mobile device may assist in these requirements.

METHODS
A mobile, smartphone-based application (Fig. 1) was developed to track point-of-care ultrasound (POCUS) exams performed across the Internal Medicine Bedside UltraSound (IMBUS) program at a quaternary care center’s IM residency program. The application was built to gather immediate, complete, and robust data about the exam performed, physician/student interpretation of the exam, and any research data applicable to the performed exam. This mobile tracking system replaced the previously in place paper-based system (Fig. 2). The administrative back-end of the application was built to function as:

1. the QA interface for over-reading (Fig. 3)
2. a tracking interface for identifying struggling users
3. a graphic interface to track individual’s progress towards competency and certification within the residency’s IMBUS program (Fig. 4)
4. a flexible control center for an evolving certification and competency program (Fig. 5)
5. a data gathering and analysis center for research studies
6. a single central hub for interrogation and analysis of data across an entire system of POCUS at multiple sites (Fig. 6).

Analysis pre and post application implementation was completed to address completeness of data gathering and user experience.

RESULTS
- Following implementation of the tracking application, 22,000 exams were performed over 30 months (Fig. 6).
- 99% of exams performed by residents and staff were recorded using the application at the point-of-care. The capture rate prior to the smartphone application while utilizing a paper-based system was 68%.
- Residents felt that the ability of the application to show them their progress towards certification in each area of IMBUS was helpful and motivational in guiding their practice exams.
- Users felt the application was a more efficient way to enter data with the primary reasons being the user-friendly interface and accessibility (as all physicians carry smartphones as their pager amongst this group).
- The application successfully recorded data for POCUS research studies.
- The administrative back-end of the application allowed tracking and modification of our competency/credentialing exam targets.
- The original application was converted to a platform independent, web-based, and fully customizable interface.

FIGURE 6: EXAM COUNTS BY QUARTER AND CLINICAL AREA

Vascular Soft Tissue MSKL HEENT Abdominal Pulmonary Cardiac


Exams (n)