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Research Article

Point-of-care Ultrasound Curriculum in United Arab Emirates Emergency Medicine Residency Programs

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Abstract

Objective: To gather information on the current status of POCUS training in emergency medicine residency programs in UAE.

Method: We conducted a 40-questionnaire online survey for all emergency medicine program directors in UAE. Various information on the methods of POCUS training, availability of resources, and the extent of POCUS utilization in clinical decision making were collected.

Results: A total of four out of five program directors completed the survey. In 75% of the emergency medicine residency programs, POCUS training was part of the formal residency curriculum. Only one residency program included a POCUS rotation while the rest included a mandatory radiology rotation. Seventy five percent of the programs dedicated more than 30 hours on formal didactics, bedside teaching, workshops and simulations to teach POCUS. All of the respondents reported that their hospital emergency department had an exclusively dedicated ultrasound machine. Fifty percent of the programs reported that emergency medicine faculty and residents make clinical decisions based on POCUS interpretation. Program directors identified various areas needing improvement that included lack of experienced instructors, availability of ultrasound machines, residents' application of skills in clinical practice, increasing hours of didactic and hands-on training, and standardization of evaluation tools.

Conclusion: Only a quarter of the emergency medicine faculty taught POCUS stating a heavy reliance on radiology rotation. The study revealed that POCUS training among emergency medicine residency programs in the UAE is variable and suggests standardization of the training and curriculum to unify POCUS skills in emergency medicine practice in UAE.

Keywords: Emergency medicine, Point-of-care ultrasound, United Arab Emirates

Introduction

The specialty of Emergency Medicine (EM) is relatively new in the United Arab Emirates (UAE). In 2000, emergency departments started recruiting specialist trained in EM. The first EM residency program was established in 2007 [1]. EM practice is considered as a part of acute medicine, which mandates emergency physicians to get trained in certain procedures. One of the most important procedures is Point of Care Ultrasound (POCUS) which is essential for diagnostic and therapeutic purposes and is considered as a fundamental part of EM practice [2-5]. Numerous existing research and literatures provide strong evidence that supports the use of POCUS in patients care delivery [6-11]. The objective of this study was to identify current status of POCUS training in EM residency programs in the UAE.

Material and Methods

An online questionnaire of 40 questions was sent to all EM training program directors (PDs) in the UAE from December 2015 to March 2016. Information was collected about the methods and resources used in teaching POCUS, as well as the depth of training and the extent of incorporation of POCUS in clinical decision-making. It also explored the current limitations of POCUS training.

The survey instrument inquired whether POCUS training is mandatory, type and methods used in teaching ultrasound (US), number of hours dedicated for POCUS

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through residency, number of physicians who participate in teaching or supervising POCUS, methods used to assess the resident's skills in POCUS, and the clinical conditions for which the POCUS was used. Survey responses were recorded onto Excel data sheets (Microsoft Corporation) via export function in the Google form. The survey data were summarized by numbers and percentages in charts and tables using Microsoft Excel.

Results

Participant information

Five EM training programs in UAE were included in the study. Survey questionnaire were sent to all EM residency PDs. Response from four participants out of five (response rate 80%) were received.

Program details

We have collected background information about the size of training programs and the number of trainees per residency training year. The programs were all established between 2007 and 2013, with a total of 92 residents and 23 graduates, as of March 2016. The largest program included 46 residents while the smallest program included 7 residents only. Three programs trained residents for four years while one program trained residents for five years.

Resource assessment

Only one program had a POCUS program director. Across all programs, there were a total of 24 core-faculty physicians and at least 33 non-core faculty physicians who contributed to resident training and education. Core faculty physician has been defined per the Accreditation Council for Graduate Medical Education International (ACGME-I) as physicians who devote at least 15 hours per week to resident education and administration [12]. Among the core and non-core faculty, 62% and 39% were trained in POCUS, respectively. However, only 45% of the core-faculty and 12% of non-core faculty physicians taught POCUS. Table 1 summarizes the faculty characteristic among EM residency programs.

	Number of Core Faculty (%)	Number of Non-Core Faculty (%)
Total	24	33
Trained in POCUS	15 (63%)	13 (39%)
Teach POCUS	11 (46%)	4 (12%)
Supervise POCUS	16 (67%)	9 (27%)

Table 1: Faculty Characteristic across all EM Programs

The average ratio of resident to core faculty ranged from 2.3 to 4.6. The average ratio of resident to physicians trained in POCUS ranged from 2.3 to 6.5.

POCUS curriculum

In 75% of the programs, POCUS was a formal part of the training curriculum. It was taught during a rotation in the radiology department. Only one program had a dedicated POCUS rotation run by EM faculty that was different than the radiology rotation.

There was a large variation in the total number of POCUS studies required by each resident by the time of completion of their residency training. One program (25%) did not require a fixed number of scans, one program (25%) required more than 150 scans prior to graduation while the rest (50%) required a range from 50-99 scans prior to graduation.

All of the programs reported that they teach E-FAST, assessment for abdominal aortic aneurysm, thoracic, basic cardiac, DVT and central venous access. Seventy five percent of programs taught POCUS for intrauterine pregnancy, biliary US, renal US, soft tissue and peripheral venous access. Only half used POCUS for musculoskeletal, soft tissue and ocular US. Figure 1 demonstrates the percentage of EM programs teaching various POCUS applications.

The programs reported various methods of teaching POCUS during the residency training. All of the programs conducted POCUS-specific lectures during the residency didactic curriculum. In addition, all program taught POCUS during the clinical shifts. Seventy five percent of the programs reported using commercial POCUS courses, conducting procedure training workshops and using simulation to teach POCUS. Fifty percent of the programs reported using the radiology rotation to teach POCUS. Figure 2 demonstrates the percentage of EM programs using by the reported various methods used to teach POCUS.

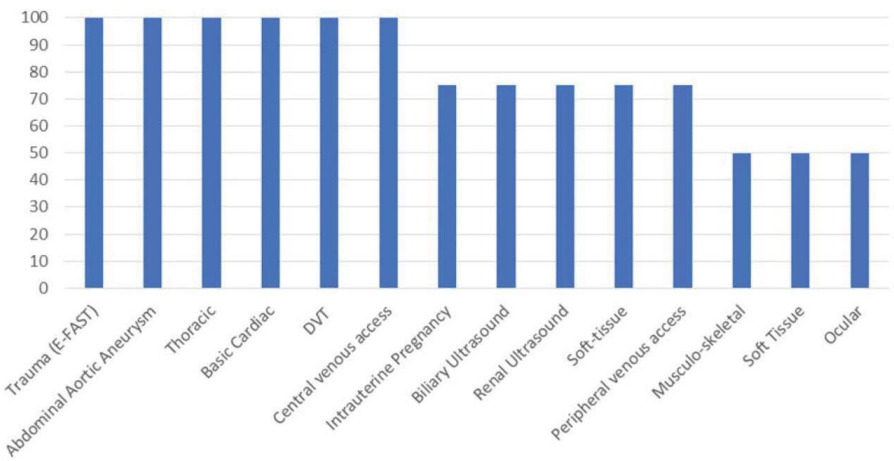

Figure 1: Demonstrates the percentage of EM programs teaching various POCUS applications.

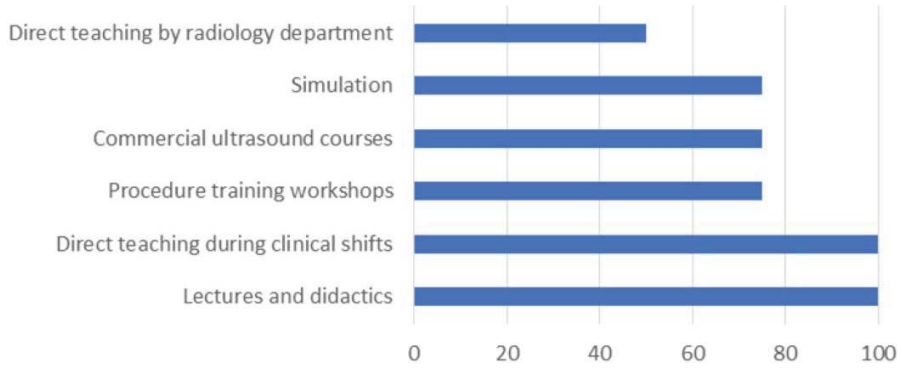

Figure 2: Demonstrates the percentage of EM programs using by the reported various methods used to teach POCUS

Seventy five percent of the programs reported that they dedicated more than 30 hours for POCUS training.

One program reported that teaching POCUS was limited to first year of residency, whereas the rest reported that POCUS was taught throughout the training years. Fifty percent of the programs reported that POCUS was often used as a tool for medical decision making and residents performed more than 3 POCUS scans per shift on average.

Equipment

The number of US machines per department ranged from two to five machines. Most machines were supplied by FUJIFILM SonoSite, others included Zonare Medical Systems and General Electric US. All departments had machines with Curvilinear (abdominal), Linear (vascular) and Phased array (cardiac) probes. One department also used trans-vaginal probes. Seventy five percent of the programs were not satisfied with their current equipment. Common reasons included small number of equipment, old models, lack of variety of technical functions and poor maintenance service.

POCUS assessment methods

The programs used various methods to assess the resident's competency in POCUS. The most common method was standardized direct observation tool. Table 2 summarizes the various methods used to assess resident's competency in POCUS.

When asked about the POCUS competency level of the program graduates, 50% of the PDs estimated the overall level of competency of their graduates in POCUS as 'basic' defined as that the graduate performs POCUS under supervision and able to interpret basic findings. Fifty percent of the programs estimated their graduate's competency level in POCUS to be 'intermediate' defined as the ability of the graduate to perform POCUS with minimal supervision and reliably interprets the findings.

Seventy five percent of the programs reported that there was slight variation in POCUS skills among most of the trainees in the same post graduate year level.

Areas for Improvement

PDs identified various areas of improvements in POCUS training. The most common identified areas of improvement included: residents' application of skills in clinical practice, expanding POCUS curriculum into more advanced topics, and implementing better evaluation tools. Table 3 summarizes the areas of improvement in POCUS training curriculum identified by program directors.

Method	Number of Programs (%)
Standardized direct observation tool	3 (75%)
Objective structured clinical examination (OSCE)	2 (50%)
Recorded ultrasound video review	2 (50%)

Table 2: Number of EM programs by the various assessment methods for POCUS competency

Area of Improvement	Number of programs (%)
Residents' application of skills in clinical practice	3 (75%)
Expanding POCUS curriculum into more advanced topics	3 (75%)
Implementing better evaluation tools	3 (75%)
Lack of experienced instructors	2 (50%)
Availability of ultrasound machines	2 (50%)
Increasing hours of didactic or hands-on teaching	1 (25%)

Table 3: Number of emergency medicine programs by the identified areas for improvement of the current POCUS training curriculum

Discussion

Our study confirmed that POCUS training is variable among the EM residency programs in the UAE. Although most of the programs teach similar POCUS applications; however, the curriculum is variable in terms of number of didactic hours, number of required completed ultrasound exams prior to graduation and assessment methods. Most of the EM programs depend on a radiology rotation rather than EM run POCUS rotation. This is not considered standard among the international EM training programs. According to the 2008 Council of Emergency Medicine Residency Directors consensus recommendations, POCUS should be taught in a minimum of 2 weeks in a dedicated EM POCUS rotation, or an equivalent of 80 hours of training [13]. When comparing POCUS to radiology performed ultrasound, the scope of practice and training skills is known to be different [14]. Therefore, when residents rotate in radiology department they may be taught ultrasound skill that are pertinent to radiology but are not within the scope of POCUS practice.

Although most of the departments have ultrasound machines readily available, the study identified that the available number of supervising faculty was a major limitation to POCUS training.

Most programs reported having limited number of experienced faculties who were trained in POCUS, hence there was always a question on their capability to supervise and train the residents. Most PDs identified that they would like to expand POCUS curriculum and resident's application of POCUS skills in clinical practice. These are hard goals to reach without increasing the number of availed experienced faculty to teach and supervise POCUS.

Programs should put effort in training their faculty in POCUS. This will help increase the number of trained faculty which is essential to ensure adequate supervision especially when incorporating POCUS in clinical decision making during patient care. In programs with adequate POCUS trained EM faculty, we suggest having a POCUS rotation rather than radiology rotation to teach POCUS skills. In programs with limited number of faculties, a radiology rotation may be used for POCUS training; however, the rotation objectives should be clarified to ensure that the skills taught are relevant to POCUS.

Conclusions and Limitations

To meet a growing need for a standardized approach to emergency point of care ultrasound (PoCUS) worldwide, emergency physicians must be trained to deliver and teach this skill in an accepted and reliable format. As such, the International Federation for Emergency Medicine (IFEM) convened a sub-committee of international experts in PoCUS to outline a curriculum for training of specialists in emergency PoCUS, which was able to provide a framework for PoCUS education in emergency medicine. It cannot be denied that there is a wide variability in how this curriculum is implemented and taught with respect to the goals of educational programs. In this line, we recommend developing a uniform POCUS curriculum in all the residency programs in UAE. The main objective of this POCUS curriculum would be to ensure that all EM residents graduating from the EM residency programs must consider having the same basic skills of POCUS accompanied with confident and reliable interpretation of clinical findings, thereby eliminating any knowledge gap and skill discrepancies among graduated residents.

The curriculum should address the mandated hours of practice needed during residency years, suggest methods to teach POCUS, detail the methods of clinical practice where POCUS is applied, and provide objective tools to evaluate residents. POCUS training can be standardized among all residency programs, especially when it comes to the number of required hours of training, number of exams, and the number of didactic hours.

The International Federation for Emergency Medicine (IFEM) developed a point of care ultrasound curriculum guideline to provide the structure and best practice in POCUS training programs in emergency departments [4]. This curriculum can be used as the basis for the unified POCUS curriculum among EM residency programs in UAE.

One of the major limitations of the study is that this study gathers information on the current status of POCUS training in emergency medicine residency programs in UAE. As such, it was not possible and very challenging to include subjects from the Middle East because this study is specifically meant to study the UAE programs, which currently have five programs only. We can consider expanding our study to Middle East in our future works.

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