Assessing Family Medicine Residents' Accuracy and Attitudes Regarding POCUS For Abdominal Aortic Aneurysm Screening

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Background

Point of Care Ultrasound (POCUS) is rapidly being incorporated into the primary care setting[1]. While it has been well-established and researched in other specialties such as Emergency and Internal Medicine, relatively fewer studies have explored the perceptions, barriers, and accuracy of POCUS in Family Medicine. A variety of studies have demonstrated that undifferentiated learners and/or medical trainees can achieve accurate results using point-of-care based exams[2,3].

Using POCUS-based Abdominal Aortic Aneurysm Screening as an exemplar, the aim of this study is twofold: firstly, to compare the accuracy of WFM residents' point-of-care measurements of the abdominal aorta to those obtained by formal studies; secondly – and more importantly – to explore the extent to which resident confidence and attitudes regarding POCUS are impacted by their own perceptions of themselves as ultrasound operators, given the findings of the quantitative assessment.

Methods

- ❑ **Study Site:** Waco Family Medicine – Central
- ❑ **Participants:** Convenience sample of WFM PGY1-2 Residents (N=16) attending protected didactic teaching time; no previous formal ultrasound training
- ❑ **Study Design**: Sequential, Explanatory Mixed Methods Study

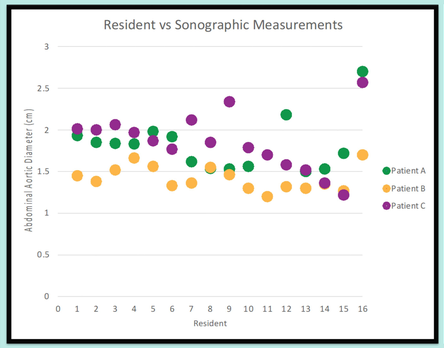
Phase 1
- Participant recruitment and selection
- Survey of baseline resident confidence and attitudes

Phase 2
- In-person educational workshop teaching POCUS exam for AAA Screening
- Participants independently measure abdominal aortas for three standardized patients
- "True" abdominal aortic diameter confirmed by radiographic measurement
- Quantitative assessment conducted comparing resident measurements to true value

Phase 3
- Results of quantitative assessment disseminated to study participants
- Repeat survey of resident confidence and attitudes
- Targeted interviews conducted w/ residents who demonstrated high, low, or unique levels of change on pre- and post- workshop surveys
- Qualitative assessment of interviews performed

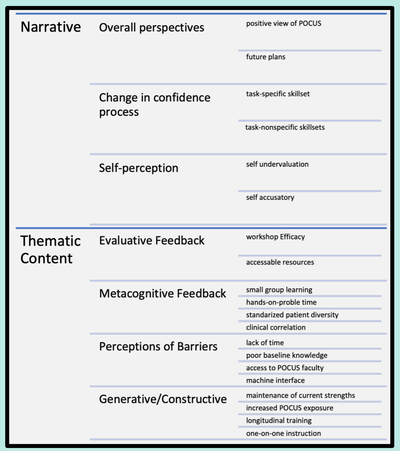
- ❑ **Measurement:** All ultrasound measurements were taken within a 2-hour window using the same GE Logiq-e Ultrasound device for each patient, recorded on paper slips, and encoded to a secure MS Excel spreadsheet. Qualitative information was collected via Google Forms survey and interviews were recorded with an encrypted voice recorder until transcription occurred.
- ❑ **Data Analysis:** Statistic analysis of the measurements was conducted using unpaired-t test (see results). Analysis of the survey results was conducted using paired t-test assessment. Qualitative assessment was conducted using narrative and thematic content analysis methods.

Results



	Abd Aortic Diameter (in cm)		
Measurement:	**Patient A**	**Patient B**	**Patient C**
Sonographer	1.86	1.47	2.01
Resident 1	1.93	1.45	2.01
Resident 2	1.85	1.38	2.00
Resident 3	1.84	1.52	2.06
Resident 4	1.83	1.66	1.97
Resident 5	1.98	1.56	1.87
Resident 6	1.92	1.33	1.77
Resident 7	1.62	1.36	2.12
Resident 8	1.54	1.55	1.85
Resident 9	1.53	1.46	2.34
Resident 10	1.56	1.30	1.79
Resident 11	1.70	1.20	1.70
Resident 12	2.18	1.32	1.58
Resident 13	1.50	1.30	1.52
Resident 14	1.53	1.35	1.36
Resident 15	1.72	1.27	1.22
Resident 16	2.70	1.70	2.57
Avg	1.81	1.42	1.86
Variance:	0.098	0.024	0.144
Stdv	0.314	0.154	0.379
t score	-0.662	-1.318	-1.602
Critical t-value	2.13	2.13	2.13
Null Hypothesis:	Fail to reject	Fail to reject	Fail to reject

	Survey Topic	Pre-Workshop Mean Confidence Level (on Likert Scale)	Post-Workshop Mean Confidence Level (on Likert Scale)	Difference:
Task-specific skillsets	**Identify the Abdominal Aorta**	1.00	3.28	+2.28 (p<0.0005)
	Determine Direction of Flow with Color Doppler	1.38	2.88	+1.50 (p<0.0005)
	Locate an Imaging Window for AAA Screening	0.71	2.00	+1.29 (p<0.0005)
	Measure a Target Structure	1.57	3.29	+1.71 (p<0.0005)
	Correctly Diagnose Abdominal Aortic Aneurysm	0.43	2.29	+1.86 (p<0.0005)
Task-nonspecific skillsets	Describe B-mode and M-mode in POCUS	1.00	1.57	+0.57 (p=0.026)
	Change the machine gain and imaging depth	1.43	2.36	+0.93 (p<0.0005)
	Obtain Desired Imaging Windows	1.21	1.79	+0.57 (p=0.014)
	List Common Indications for POCUS	1.64	2.71	+1.07 (p<0.0005)
	Interpret POCUS Images	1.07	1.57	+1.57 (p<0.005)
	Evaluate Image Quality	0.79	1.29	+0.5 (p=0.110)
	Document POCUS Exam	0.71	1.71	+1.0 (p=0.002)
	Troubleshoot Problems Encountered While Imaging	0.79	1.43	+0.643 (p=0.13)



Key Findings:

- Resident measurements = not significantly different than true value measurements
- Confidence levels markedly improved following workshop and receiving results of their measurements
- Confidence improved more for skills explicitly taught in workshop than for skills peripheral to main task of AAA identification
- Residents have a positive view of POCUS and desire more training in this modality

Discussion

Potential Applications of Findings:
- POCUS can be considered as a screening modality for Abdominal Aortic Aneurysm at WFM
- Possibly greater compliance rates with USPSTF-recommended screenings if implemented
- Confidence and accuracy are linked, but more data is needed to explore the strength of this relationship
- Improvement in one POCUS domain may have positive effects in other POCUS domains
- Longitudinal training is vital to the development of these confidences

Limitations:
- Small, single site study
- Positive attitudes prior to study might skew results or bias measured changes in confidence
- Underpowered for conclusions about POCUS non-inferiority
- Unconscious bias may also exist in the selection of interviewees
- Curriculum not standardized, may differ from year to year or site to site

More studies are indicated to further characterize and validate the use of point-of-care ultrasound amongst WFM trainees, and more broadly amongst all family medicine physicians. Promoting the education, analysis, and dissemination of information about AAA screening serves as a useful inroad to these future conversations.

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