Comparison of Handheld Ultrasound Devices used in Carotid and Abdominal Aortic Vascular Studies

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Background

- Point-of-Care Ultrasound (POCUS) is widely used in clinical settings.[1]
- Numerous devices are available with similar functions.[2]
- Objective: to compare the image quality of handheld POCUS devices and evaluate their use in vascular ultrasound and as educational tools.

Methods

- The Butterfly IQ+, GE Vscan Air, and Phillips Lumify transducers were evaluated.
- COMIRB: **22-0091**.
- Twenty-five healthy subjects (convenience sample) had carotid and abdominal imaging using all devices.
- An expert panel, including a radiologist, reviewed images and completed a survey which included numerical and Likert scale assessments.
- Criteria included image quality, clinical utility, and educational value

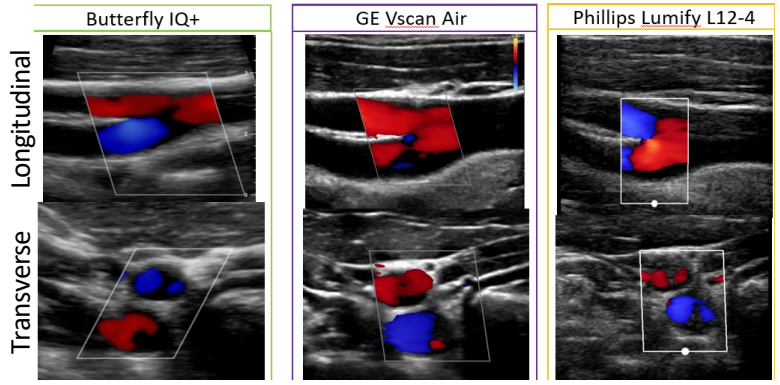

Figure 1: Sample carotid ultrasound studies from the same subject using the Butterfly IQ+, GE Vscan Air, and Phillips L12-4 transducers.

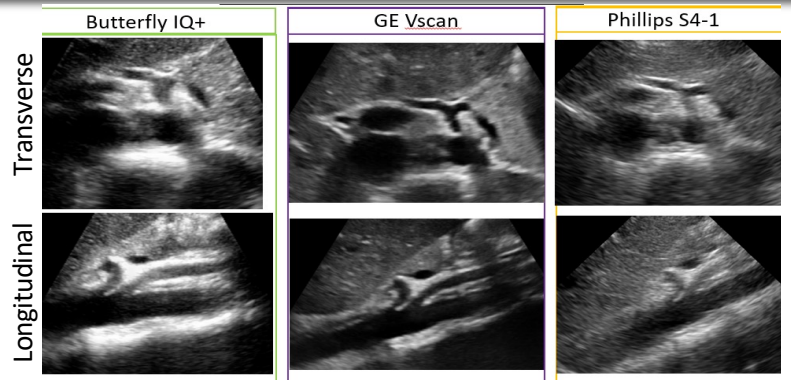

Figure 2: Sample aortic ultrasound studies from the same subject using the Butterfly IQ+, GE Vscan Air, and Phillips S4-1 transducers.

Transducers

Butterfly IQ+ | GE Vscan Air | Phillips Lumify L12-4 and S4-1

Results

- N = 25; one reviewer completed the survey.
- Mean participant age: 27.3 years; 48% male.
- Past surgical/medical history: 8%
- GE Vscan Air scored higher (ANOVA) for image quality on a Likert Scale for carotid (**5.24, p = 0.03**) and aortic (**4.91, p = 0.04**) exams compared to the Butterfly IQ+ and Lumify.
- All devices scored favorably for educational value with no statistical preference for transducer, χ^2 (2, N = 122) = 4.75, p = 0.09.

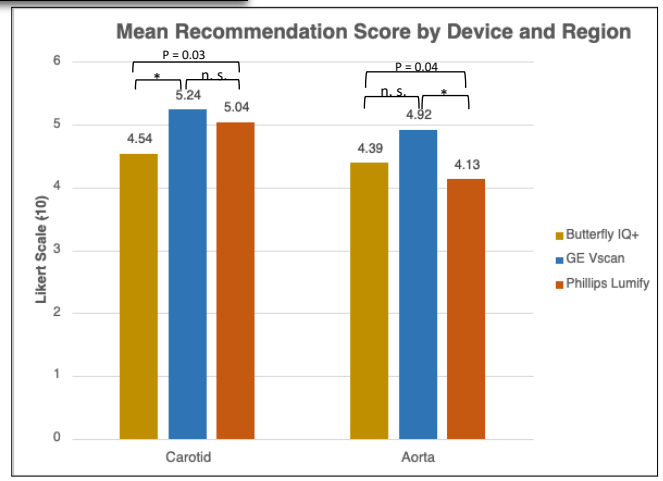

Figure 3: Mean score for quality of the study produced by each device p-values shown for ANOVAs; significance from post-hoc analysis shown below.

Conclusion

- The Vscan Air scored statistically higher on recommendation than the Butterfly IQ+ and the Phillips Lumify for carotid and aortic scans, respectively.
- All devices globally scored low on recommendation, potentially due to higher quality conventional scans generally available to the reviewer (a radiologist).
- The use of the tested handheld devices for educational purposes was supported, though this was not statistically significant between devices.
- Sonographers were not registered vascular technologists.
- Results underpowered due to limited data and single-rater bias. Use of healthy participants limits external validity.
- No comparisons with gold standard vascular laboratory imaging.
- Despite various commercially available POCUS devices, further studies are needed to compare the quality and utility of these devices in vascular ultrasound.

References