The impact of optical ultrasound simulation using automated metrics on skill acquisition in obstetric ultrasound

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Introduction
It is acknowledged that the quality of an ultrasound (US) image is operator dependent, reliant on technical ability and breadth of experience. Gaining US experience is challenging for trainees, with teaching often opportunistic and lacking formal structure. There is increasing interest in simulation training to teach and evaluate US skills. We examined the impact of a teaching session on an optical US simulator with automatic metrics on the quality of images subsequently obtained by trainees with minimal US experience.

Methods
11 trainees novice in US completed a 90-minute obstetric simulation training session on the Volutracer OPUS (Medge Platforms). They obtained 3 different views of 3 target planes, percentage of correctly acquired target planes, average number of movements, time to achieve image, distance travelled by probe and accumulated angling for the probe for each image. Paired T test comparison of the pre- and post-tutorial test scores was performed.

Results
Mean post-test vs. pre-test scores were: accuracy score 64 vs. 57 (p=0.018), percentage of correctly acquired target planes 47.4\% vs. 37.6\% (p=0.04), number of movements: 21 vs. 34 (p=0.004), user time: 17.2 seconds vs. 25.7 seconds (p=0.006), distance 8.44 vs. 18.03cm (p=0.022) and in accumulated angling 141 vs. 236 (p=0.041).

Conclusion
There was an improvement in all domains, indicating the trainees had become more efficient and accurate in image acquisition. Further investigation is warranted to assess the validity of simulation metrics and establish the degree to which the improvements transfer to a clinical setting. If this were the case, the use of optical simulators providing objective analysis of performance has the potential to both equip trainees with ultrasound competencies and provide an environment to refine those skills prior to scanning real patients.