The contribution of optical ultrasound simulation and automated metrics on skill acquisition in transvaginal ultrasound

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Introduction

Obtaining practical ultrasound skills in gynaecology can be challenging for trainees with a long learning curve. Transvaginal ultrasound (TV) scanning is perceived as a more intrusive investigation than transabdominal (TA) and as such the use of real patients for training or skill assessment in this modality has ethical considerations. The objective of this study was to assess the quality of images obtained by novice trainees on a TV ultrasound simulator with inbuilt metrics following a simulation teaching session.

Methods

32 trainees with minimal ultrasound experience completed a two-hour gynaecology ultrasound simulation session on the Volutracer OPUS system (Medge Platforms) using a TV probe. The trainees were asked to obtain 12 different views of pelvic structures and complete a pre-tutorial test, online tutorial and finally a post-tutorial test. The outcome measures were: average accuracy score for obtaining the correct anatomical plane, percentage of correctly acquired target planes, average number of movements, time to achieve image, distance travelled by probe and accumulated angling of the probe for each image. An unpaired T test assuming equal variance pre- and post-tutorial test scores was performed.

Results

Mean post-tutorial; test vs. pre-tutorial test aggregate scores were accuracy score: 52.7 vs. 39.5 (p=<0.0001), percentage of correctly acquired target planes: 43% vs. 28% (p=0.0001), reduction in number of movements: 12 vs. 23 (p=<0.0001), user time: 14.3 seconds vs. 21.6 seconds (p=0.001), distance: 14.98 vs. 24.89 cm (p=0.006) and in accumulated angling: 205 vs. 316 (p=0.053).

Conclusion

There was an improvement in all outcome measures following the simulation training session. If further investigation demonstrated that simulation metrics are able to determine differing levels of clinical competence, then simulation in TV ultrasound could provide a valuable adjunct to scanning on real patients for both training and assessment.