

Impact of a structured step-by-step 3D gynecological ultrasound workflow on case-based diagnostic performance

Attila Botházi¹, Mathias Gottschalck¹
1. Department of Obstetrics and Gynecology, Regional Hospital Viborg, Denmark.

Objectives
To evaluate whether a standardised step-by-step 3D gynecological ultrasound workflow supported by a pocket guide and instructional videos improves consistent clinical performance and supports secure diagnosis.

Methods
Participants attending a two-day ISUOG-approved 3D gynecological ultrasound course completed case-based exercises using four techniques (Render, OmniView, Z-technique and Fibroid Mapping on GE Voluson systems).

A step-by-step workflow guide with standardised symbols corresponding to the ultrasound interface was placed beneath each monitor. Before each technique, short videos demonstrated how control manipulation affected real-time reconstruction of pre-acquired volumes.

Training was performed in pairs with one instructor supervising four participants. Performance was assessed by comparing participant-uploaded images, captured using their own smartphones, with expert reference images using an automated AI-assisted comparison system (approval threshold ≥70%). Multiple submissions were allowed; final AI-assessed images were independently validated by two expert reviewers. Data were collected via the course website and REDCap.

Step 1: Standardised Tools
Participants utilised a step-by-step workflow pocket guide with standardised symbols, paired with real-time video demonstrations on GE Voluson systems.

Step 2: Practical Execution
Supervised pair-training (1 instructor per 4 participants) executing four specific techniques: Render, OmniView, Z-technique, and Fibroid Mapping.

Step 3: AI-Assisted Benchmarking
Images captured via participants' smartphones were evaluated against expert references using an automated AI-assisted comparison system (approval threshold ≥70%). Multiple submissions were permitted.

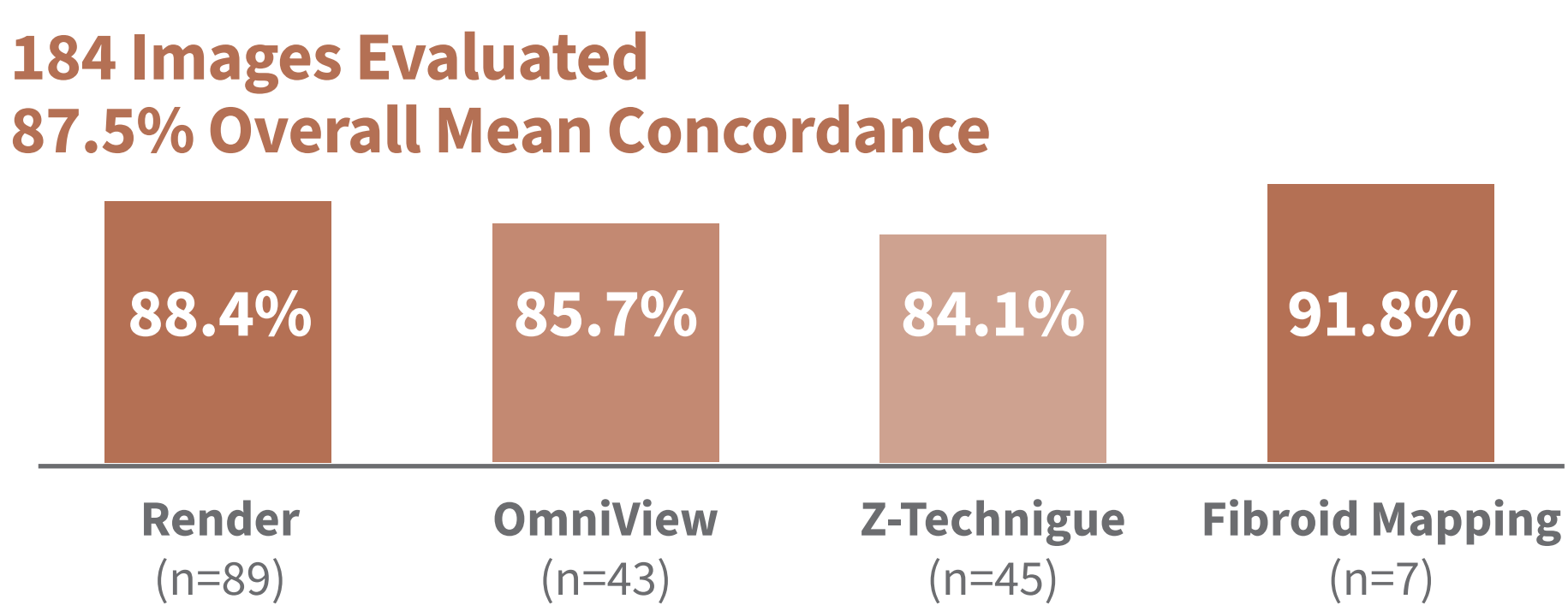
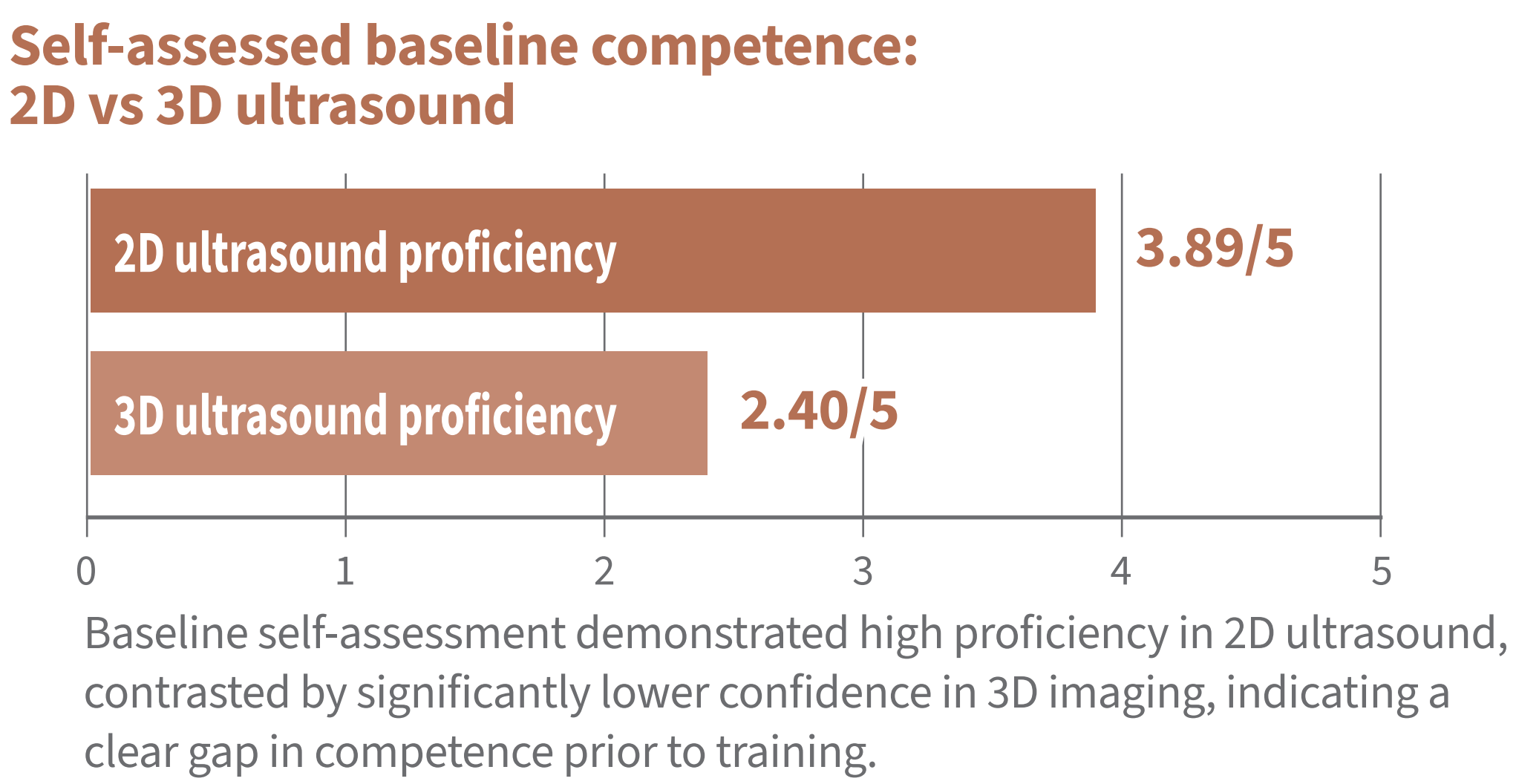
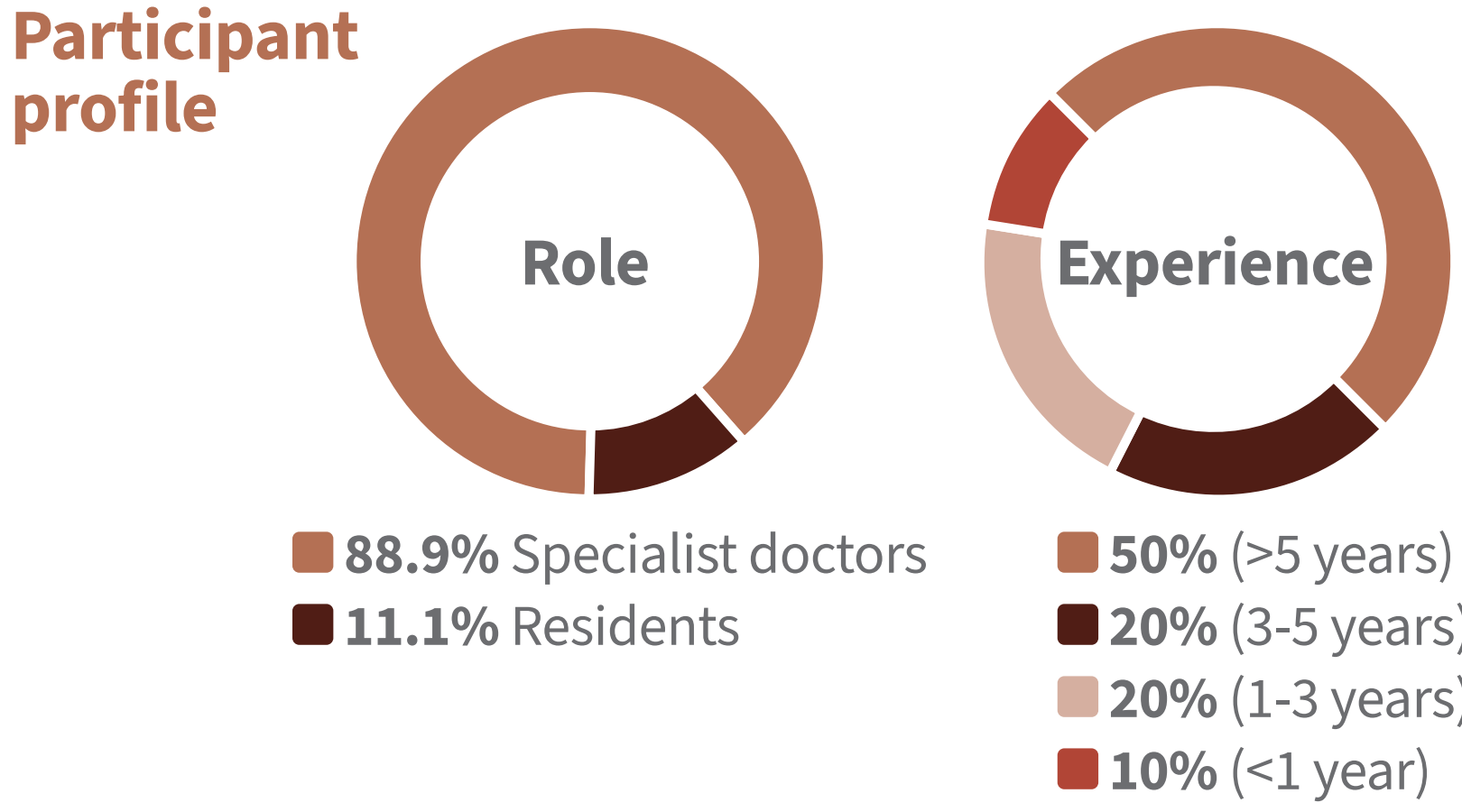
Step 4: Human Validation
Final AI-assessed images underwent independent validation by two expert reviewers. Data collected via course website and REDCap.

Results
Most participants were specialist doctors (88.9%), followed by residents (11.1%). Fifty percent had >5 years of experience, while 20% had 3–5 years, 20% had 1–3 years, and 10% had <1 year.

Participants rated their ability to optimize 2D ultrasound images with a mean score of 3.89/5. Access to 3D/4D ultrasound was reported by 88.9%. Experience with 3D ultrasound was reported by 55.6%, with a mean self-rated proficiency of 2.40/5.

A total of 184 images were evaluated using AI-assisted comparison with expert validation. The overall mean concordance score was 87.5%. Technique-specific scores were:

- 88.4% for Render (n=89)
- 85.7% for OmniView (n=43)
- 84.1% for Z-technique (n=45)
- 91.8% for Fibroid Mapping (n=7).



Conclusion
This structured approach may accelerate learning and improve diagnostic consistency in gynecological ultrasound practice. AI-assisted benchmarking with expert validation appears feasible and provides immediate feedback.

Explore the course concept

