



Danish Hip Screening Project

Pubo-femoral distances measured reliably by midwives in hip dysplasia ultrasound



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Objective

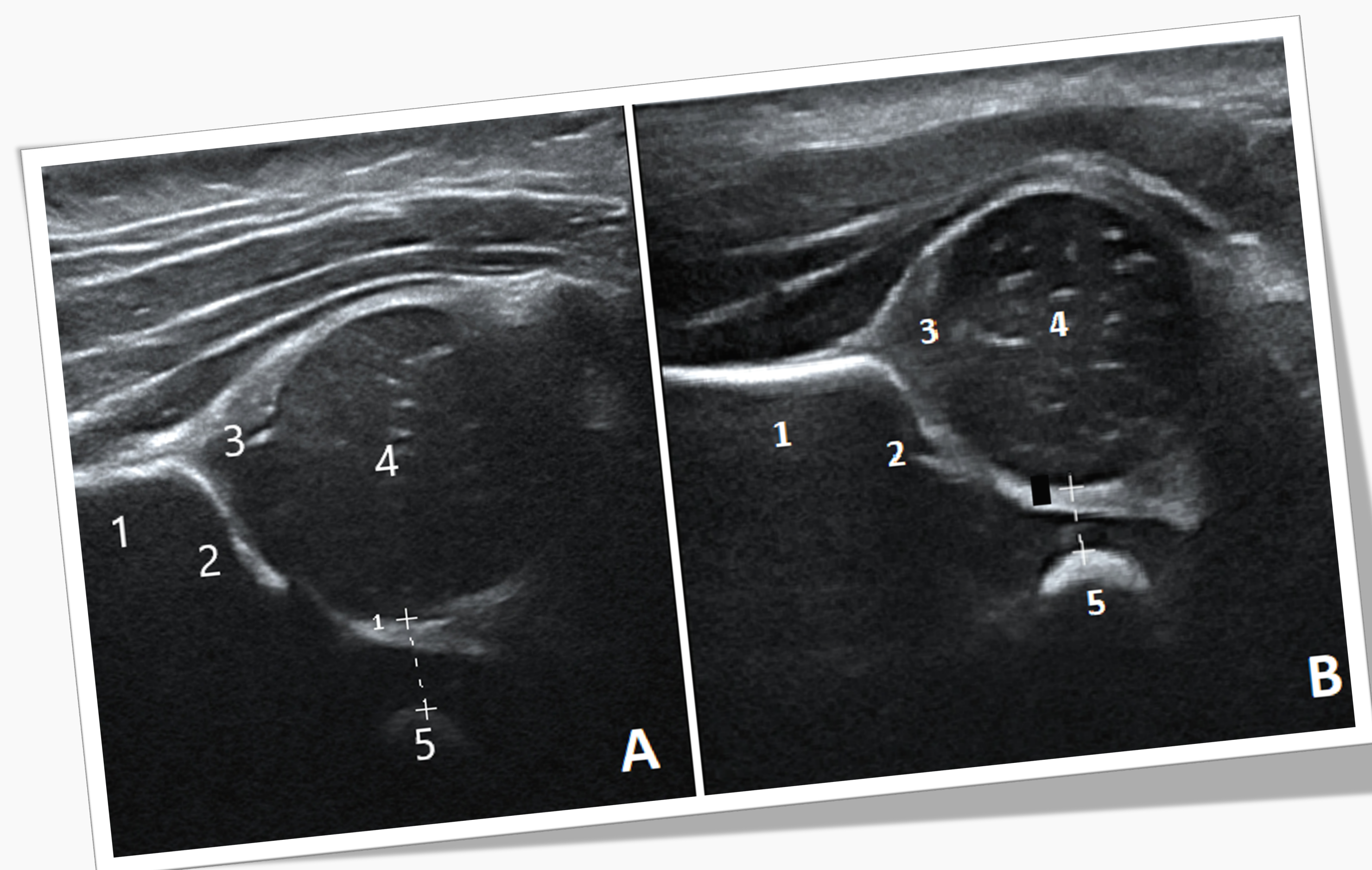
To examine if **novice ultrasound users**, undergoing minimal training, could **reliably perform** paediatric hip ultrasound and pubo-femoral distance (PFD) measurements in **hip dysplasia screening**.

Methods

- Eight midwives were recruited for training in pediatric hip ultrasound.
- The midwives participated in:
 - **Two rounds of independent blinded PFD measurements** on 15 static ultrasound images
 - **Four live scanning sessions** supervised by a musculoskeletal radiologist.
- The midwives were compared to a group of three experienced musculoskeletal radiologists.

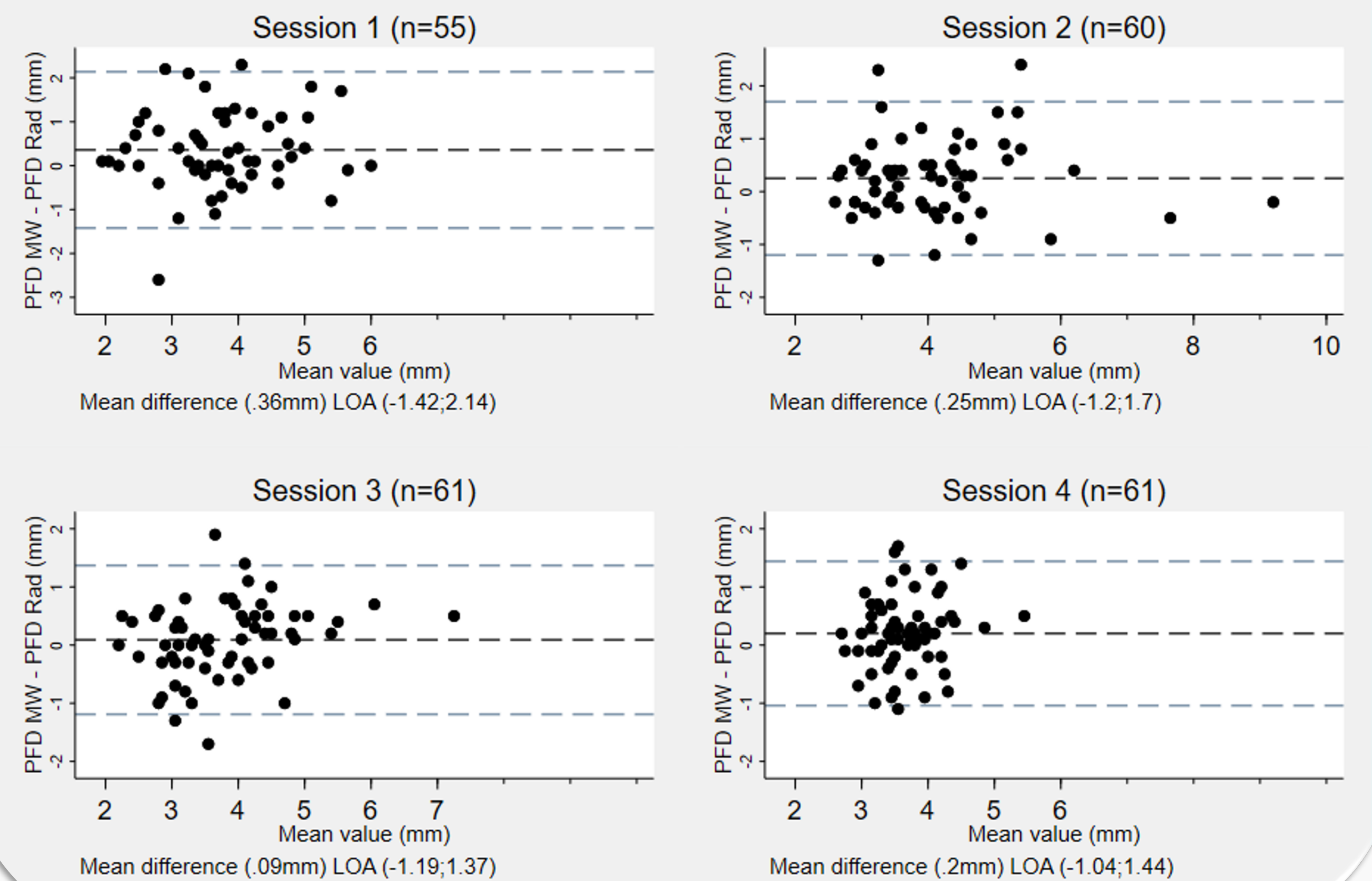
Statistics

- Agreement was evaluated using inter-rater correlation coefficients (ICC). Linear regression was used to quantify the learning curve of the midwives as a group with absolute differences between midwives and radiologists as a function of number of scans.



Ultrasound images of two newborn hips obtained by a musculoskeletal radiologist (A) and a midwife (B) depicting the quality criteria for the PFD measurement: A horizontal ilium (1), the bony (2) and cartilaginous (3) acetabular roof, the femoral head (4) and the lateral epiphysis of the pubic bone (5). The PFD is the minimal distance between the medial femoral epiphysis and the pubic bone (dotted line). PFD = Pubo-femoral distance.

BA plot of PFD MW - PFD RAD over four sessions



Bland Altman plot of differences in PFD measurements between radiologists and midwives across four sessions of supervised pediatric hip scans. PFD = Pubo-femoral distance, MW = Midwife, RAD = Radiologist, LOA = Limits of agreement.

Results

There was **near complete agreement** (ICC > 0.89) on static ultrasound images across both rounds of rating and across midwives and radiologists.

The midwives scanned a mean of 29 hips (range 24-35). There was a **clinically insignificant mean difference** between midwives and supervising radiologists at **0.36mm** 95% CI (0.12-0.61) for the first session, which **decreased to 0.20mm** 95% CI (0.04-0.37) in the final session.

Agreement between midwives and supervising radiologists in the live sessions increased from mediocre (ICC=0.59 95% CI (0.37-0.75)) to good (ICC = 0.78 95% CI (0.66-0.86)) with progression in sessions.

Conclusions

Midwives **reliably perform PFD measurements** in ultrasound of pediatric hips with minimal training, and with **clinically insignificant differences** compared to experienced musculoskeletal radiologists..