

Comprehensive audit of estimation of fetal weight in preterm and term population

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Objective

Quality initiative aimed to identify main drivers of error of estimated fetal weight (EFW) by ultrasound in preterm and term populations. Secondly, to identify discrepancies in biometric parameters between populations.

Methods

A retrospective audit was conducted in a tertiary centre in Ottawa, Canada, from August to December 2022. We included all ultrasounds performed from 24 to 41⁺⁶ weeks gestation from singleton pregnancies and reviewed images of those in which EFW error was above $\pm 15\%$ of the actual birth weight. EFW was calculated using Hadlock 3. We excluded fetuses with congenital anomalies. Images obtained within 14 days from delivery were analyzed by 2 independent examiners. Criteria for score-based objective evaluation of quality of biometric measurements from the 2019 ISUOG practice guidelines for ultrasound fetal biometry was used. Each biometric parameter (biparietal diameter [BPD], head circumference [HC], abdominal circumference [AC], and femur length [FL]) scored 1 (presence) or 0 (absence) of anatomical landmarks totalizing a maximum score of 24. Potential confounders as maternal BMI, fetal presentation, amniotic fluid (AF), operator and machine model were analyzed. Fisher's exact or Chi-square tests were used for comparisons. Statistical significance was set at $P < 0.05$.

Results

A total of 112 preterm and 104 term scans and over 1000 images were reviewed. The mean total biometric score was 17.4 ± 2.9 and 16.9 ± 2.9 for preterm and term populations, respectively. In the preterm, head measurements (BPD and HC) were the main parameter driving error (26%), and CSP was missing in 69.6% of the images analyzed. The main drivers of error for HC, AC, and FL were absence of CSP (70%), incorrectly placed calipers (35%), and femur occupying less than half the image (47%), respectively. In the term population, AC was the main parameter driving error (31%), and abdominal symmetrical plane was not captured in 54% of images. The main drivers of error for BPD, HC and FL were absence of CSP (29%), and incorrectly placed calipers (47%), respectively. When comparing error between populations, there were statistically significant differences in quality of HC, AC and FL images. HC and BP were more accurate in the term population while AC and FL were more accurate in the preterm group. No differences were found when adjusted for BMI, presentation, AF, or machine model. When assessing operator, sample size was too small for each individual to draw any conclusions.

Conclusion

EFW directly impacts clinical decision-making; hence, accurate EFW is a quality measure of antenatal care. Despite differences in error distribution among term and preterm fetuses, overall EFW error was comparable between groups. We identified that head measurements were more accurate in the term population while abdomen and femur measurements more accurate in the preterm population. Education and training of operators to improve quality of images and increase accuracy of EFW was rolled out in February 2023. A re-audit of EFW is planned for Summer 2023 as part of PDSA cycle of this quality initiative.