

Review of TIMMS birthweight centile calculator recommended by MBRRACE to be used with the Perinatal Mortality Review Tool

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The Perinatal Institute has been asked by a number of GAP units about the centile calculator that MBRRACE have recently recommended for cases entered in their Perinatal Mortality Review Tool.

We have investigated this tool, which is based on a publication by Norris et al [1] based on MBRRACE birthweight data collected in 2013/14. We have concluded that we cannot recommend its use, for the following reasons:

1. The GROW standard is recommended by the SGA guidelines of the Royal College of Obstetricians and Gynaecologists (2) and is in use for antenatal as well as postnatal assessment of fetal growth and size in approximately 80% of NHS Trusts and Health Boards.
2. For units that use customised GROW charts, it is completely inappropriate that care is then summarised and evaluated using a completely different standard.
3. GROW applies the same curve and standard to fetal and neonatal weight, so that ultrasound estimated weight and birthweight can be plotted and their centiles calculated according to the same method. This is not the case with the MBRRACE birthweight centile calculator, as it has no fitting equivalent of a standard used antenatally.
4. A fundamental shortfall of the MBRRACE centiles is that they are reference values of a whole population cohort and include pregnancies with pathology. In contrast, GROW sets a standard according to 'optimal weight', based on pregnancies free from pathology and with normal outcome.
5. This distinction has particular relevance in the preterm period, where birthweights are not suitable for defining growth or size standards, as they are clearly not derived from normal pregnancies. It has long been known that babies born preterm - spontaneous or iatrogenic - have a much higher rate of growth restriction [3,4,5], which depresses the curve in the preterm period. This effect can be clearly seen in the curves on which the MBRRACE tool is based – see Norris [1], Figures 1 & 2. Calculating centiles based on preterm curves/tables that have been derived from other preterm births will hide the fact that many are SGA.
6. The MBRRACE tool also does not make adjustment for ethnicity, even though there is ample evidence that even after adjusting for social factors or studying very low risk populations [6–9], significant physiological differences exist. Ethnic specific birthweight distributions in fact improve identification of term newborns at risk of short-term morbidity [9]. Several of the co-authors of the Norris publication have themselves described significant ethnic variation in their own English population [10], so ignoring their own findings now seems surprising and not evidence-based.
7. Other variables which are not adjusted for are maternal height and early pregnancy weight. It has long been known that big mothers have bigger babies, even when the BMI is controlled for. The GROW standard, which is customised for these variables, has been tested and shown to be substantially better than 'one-size-fits all' population-based standard to identify babies at risk of adverse perinatal outcome [11].

8. We are not aware of any such investigations having been undertaken to validate the Norris standard [1] before MBRRACE have decided to recommend it's application. We have therefore conducted a comparative analysis of the MBRRACE tool vs the GROW tool, using the anonymised GAP database which currently includes over 1.5 million births. The results of this analysis have been submitted for publication, and will in essence will show that
 - a. The overall SGA (<10th centile) rate according to the MBRRACE tool was 7.3%, compared to 14.2% according to GROW.
 - b. The additional (approximately half) of cases identified as SGA by GROW had a significantly elevated risk of stillbirth (RR 2.8, CI 2.6-3.0). Some cases were SGA according to MBRRACE only, and these had a risk of stillbirth that was not elevated (RR 1.1, CI 0.9-1.5).
 - c. In the preterm period (<37 weeks), GROW identified 31.8% of birthweights as SGA, compared to 10.4% by MBRRACE's tool which therefore missed to recognise two-thirds of preterm babies that were SGA.

In conclusion, the MBRRACE centile calculator should not be used to assess birthweights in preterm as well as term pregnancies. They represent a backward step as they ignore evidence that a fetal standard should be used that represents normal growth, and that the standard should be adjusted according to maternal physiological / constitutional variation. Its application would miss a substantial proportion of babies at risk of adverse perinatal outcome.

Using the wrong standard will impede efforts of clinicians to try to understand the relevant causes and conditions associated with perinatal deaths.

References

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