

Authors' reply re: Computerised analysis of intrapartum fetal heart rate patterns and adverse outcomes in the INFANT trial. (Response to BJOG-19-1765)

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Dear Editor,

Dr Sholapurkar has drawn attention to the remarkably low perinatal mortality and morbidity in the INFANT trial¹ and we agree that this may in part be due to the Hawthorne effect. The intrapartum stillbirth rate was only 1 in 15,538 compared with 1 in 2,617 in the 1985 Dublin trial² of CTG vs intermittent auscultation and 1 in 5,740 in the UK as a whole in 2015³. Similarly, neonatal deaths up to 28 days were only 1 in 4,661 compared with 1 in 569 in the Dublin trial and 1 in 4636 in the UK up to seven days in 2015. However, the purpose of the INFANT trial was to address the specific hypothesis that some intrapartum care givers are unable to interpret fetal heart rate (FHR) patterns, and this hypothesis was not supported by the results. Moreover, abnormal CTG patterns were common in labours with no adverse outcome (73.9% had at least one yellow alert and 10.5% at least one red alert)⁴. Instead, our review suggests that in most cases of avoidable substandard care, insufficient weight was being given to the interpretation of FHR abnormality in the context of often multiple coexisting risk factors, for example fetal growth restriction, preterm labour, oxytocin administration, meconium staining of the amniotic fluid, prolonged labour, and pyrexia. A fetal tachycardia of 162 bpm with variable decelerations but preserved baseline variability in the context of a rapidly progressing labour with clear amniotic fluid and a maternal temperature of 37°C is more likely to be associated with a good outcome than a similar pattern in a prolonged labour with meconium staining of the amniotic fluid and a maternal pyrexia.

We also agree that artificial intelligence may assist in future by analysing the CTG (both FHR patterns and uterine activity) in the context of accompanying risk factors, but this will require more study of the complex interactions between heart rate changes, meconium staining of the amniotic fluid, maternal temperature, rate of cervical dilatation etc. There have been many studies of these as individual risk factors, but few looking at them in combination. There may also be a role for computerised assessment in low income settings where expertise in CTG interpretation is in short supply; in a recent trip to South Africa PJS was involved in discussions regarding testing such a hypothesis.

Yours faithfully

Reference List

- (1) Brocklehurst P, Field D, Greene K, Juszczak E, Keith R, Kenyon et al. Computerised interpretation of fetal heart rate during labour (INFANT): a randomised controlled trial. *Lancet* 2017; 389(10080):1719-1729.
- (2) MacDonald D, Grant A, Sheridan-Pereira M, Boylan P, Chalmers I. The Dublin randomized controlled trial of intrapartum fetal heart rate monitoring. *Am J Obstet Gynecol* 1985; 152:524-539.
- (3) Alfirevic Z, and the each baby counts team. Each Baby Counts. <https://www.rcog.org.uk/eachbabycounts> [2018
- (4) Steer PJ, Kovar I, McKenzie C, Griffin M, Linsell L. Computerised analysis of intrapartum fetal heart rate patterns and adverse outcomes in the INFANT trial. *BJOG* 2019; 126(11):1354-1361.