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# Is continuous electronic fetal monitoring useful for all women in labour?

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## Yes— Edward Mullins, Christoph Lees

Electronic fetal monitoring is commonly used during labour to detect fetuses at risk of hypoxia and acidaemia, Interpretation is based on subjective assessment and informed by guidance from the International Federation of Gynaecology and Obstetrics and, in the UK, National Institute for Health and Care Excellence.

A Cochrane review provides clear evidence that neonatal seizures are less common when labour is monitored continuously rather than with intermittent auscultation.[1] Such seizures, which most commonly result from a lack of blood flow and oxygen to the brain (neonatal or hypoxic ischaemic encephalopathy),[2 3] occur in around 1.8-3.5/1000 live births and are associated with a range of long term motor and cognitive sequelae. These affect not only the function and educational attainment of the child but also their carers and those funding services to support them.[4]

### Wrong prioritisation

However, in the UK continuous monitoring is used only for women in high risk labour. This is because 13 trials including more than 37 000 women have not provided evidence that that it confers benefit for uncommon outcomes such as perinatal death and cerebral palsy (roughly 3/1000 live births and 1/1000, respectively).[1] As less than 20% of cases of cerebral palsy occur in children with acute intrapartum hypoxic events[5] and death is uncommon, no randomised controlled trials have examined the effectiveness of intrapartum electronic fetal monitoring in reducing these outcomes. Furthermore, intrapartum monitoring would not be expected to reduce the incidence of cerebral palsy because, contrary to widespread belief, it is rarely linked to intrapartum events.[6]

We should be focusing on other forms of evidence relating to the more common outcome with serious long term implications—namely, neonatal encephalopathy. A Dutch birth cohort of 37 735 showed that the births designated as low risk, with women starting labour in primary care under the supervision of midwives, were associated with significantly greater perinatal morbidity and mortality than births designated high risk, with women starting labour in secondary care under the supervision of obstetricians.[7] Continuous fetal monitoring was a key difference in the management of the two groups, low risk women in the first stage of labour often having fetal heart beats checked only every two to four hours.[7]

A US birth cohort of 1 732 211 showed that continuous fetal monitoring was associated with lower early neonatal and overall infant mortality.[8] It has also been associated with a lower rate of neonates with five minute Apgar scores <4 at all gestational ages.[9]

Electronic fetal monitoring increases the rate of instrumental delivery and caesarean section and is likely to increase the rate of intervention in women at low risk if applied universally,[1] although this was only a marginal effect in the US study [8] However, increased intervention may not be entirely undesirable, given that appropriately timed intervention is likely to avoid neonatal hypoxia, seizures, and perinatal death.

### Working blind

Intermittent auscultation is not adequate for assessing fetal heart rate patterns since listening in every 15 minutes for 1 minute may miss important indicators such as decelerations and variability of the fetal heart rate. Failure to use continuous electronic fetal monitoring amounts to a misguided blinding of the clinician to the clinical state of the fetus. Would we allow a patient with possible ischaemic heart disease to have a treadmill test with electrocardiography every 15 minutes? The comparison is apposite: some 5% of fetuses have growth restriction with insufficient placental function, mostly undetected, and are hence at risk of hypoxia during the stress of labour.

Use of the term "normal" labour—always a retrospective diagnosis—has been brought to the fore with the Royal College of Midwives' change in emphasis from normal births to better births.[10] In this context, intermittent fetal heart monitoring cannot be defended as it is not based on a thorough assessment of the

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evidence. We do not serve low risk unborn babies well and are possibly committing up to 800 every year in the UK to neonatal encephalopathy and its largely avoidable sequelae.[4] It requires a brave stance, however, to reverse the deliberate demedicalisation that clouds this debate.

## No—Peter Brocklehurst

Continuous electronic fetal monitoring during labour is a screening test. It aims to identify fetuses at risk of developing intrapartum hypoxic damage. If the test result is positive (ie, the fetal heart rate is abnormal), then a further screening test can be used (fetal blood sampling, which is not without controversy).[11] Ultimately action is then taken to try to prevent the damage—for example, by expediting the delivery.

As a screening test, electronic fetal monitoring performs poorly. It has a poor positive predictive value, even with computerised interpretation of the fetal heart rate.[12 13] This means that most of the fetuses identified as being at risk of hypoxia are not.

Unusually for a screening test, it has been studied in several randomised controlled trials. A Cochrane review of the data for nearly 37 000 women randomised to electronic fetal monitoring versus intermittent auscultation found no difference in perinatal mortality.[1] The incidence of neonatal seizures in the group given electronic fetal monitoring was lower than in the group that had intermittent auscultation (risk ratio 0.50, 95% confidence interval 0.31 to 0.80), although the overall incidence of seizures in the trials was low (around 1.5-3 per 1000 births). The trial with the highest number of neonatal seizures (12/6530 electronic fetal monitoring versus 27/6554 intermittent auscultation), followed up the babies to the age of 4 years and found no difference in the incidence of cerebral palsy between the groups (12/6527 electronic fetal monitoring *v* 10/6552 intermittent auscultation).[14]

### Risk of harm

Electronic fetal monitoring can lead to harm, with an increased risk of caesarean section (1.63, 1.29 to 2.07), which is not a benign operation. We know that previous caesarean section is a risk factor for uterine rupture, morbidly adherent placenta, massive postpartum haemorrhage, and caesarean hysterectomy.[15-18] Although these are uncommon, they are associated with high perinatal and maternal mortality, and substantial morbidity. Given that electronic fetal monitoring does not prevent perinatal deaths, the excess of subsequent deaths caused by the increased risk of caesarean section is a major concern.

Babies still die or are damaged because of intrapartum hypoxia. And failure to recognise abnormalities of the fetal heart is still implicated in these deaths. But many of these deaths are multifactorial in origin, and focusing entirely on the fetal heart rate without taking account of other relevant risk factors may create a lack of situational awareness and lead to adverse outcomes.[19]

Screening tests work best in high prevalence conditions. The rarer the condition that is being screened for, the less effective the screening test because the number of false positive results increases relative to the number of true positives. Put more simply, using electronic fetal monitoring routinely in women at low risk will lead to many more unnecessary caesarean sections to potentially prevent each neonatal seizure.

### Better strategies

Should we extend the use of electronic fetal monitoring to women at low risk? No. Should we continue to use it as often as we currently do? No. The more we use it, the more harm we do, with little evidence of benefit. Limiting the use of electronic fetal monitoring to the very highest risk labours may be justifiable, but even then the balance of benefits and harms is uncertain.

What, then, should we do? Is there value in continuing to explore the properties of the fetal heart rate to improve the performance of the test? This approach has been tried in more than 54 000 women and has no benefit.[11 12] Surely we should be looking at other ways of monitoring fetal wellbeing during labour? Advances in "omics" technology to identify more reliable fetal biomarkers of hypoxia, along with advances in engineering and imaging, should help us think of new methods of screening for fetal hypoxia.

In the meantime pressure continues from those with vested interests to increase the use of electronic monitoring. Clinicians should act in the best interests of both the women and the fetuses under their care. Routine use of EFM is not in the best interests of either.

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