Prognostic value of the labour admission test and its effectiveness compared with auscultation only: a systematic review
Blix E, Reinar L M, Klovning A, Oian P

CRD summary
This well-conducted review assessed whether the labour admission test (cardiotocography) improves outcomes for the mother and child compared with auscultation only. There was no evidence that the labour admission test is beneficial in low-risk women and the test was found to be a poor predictor of adverse outcomes. The conclusions are likely to be reliable.

Authors' objectives
To assess whether the labour admission test improved outcomes for the mother and child compared with auscultation only, and to assess the test's prognostic value in predicting adverse outcomes in labour.

Searching
MEDLINE, PREMEDLINE, EMBASE, CINAHL, SweMed and the Cochrane CENTRAL Register were searched from inception to 2004; the search terms were reported. In addition, the reference lists of relevant articles were checked and experts in the field were contacted in an attempt to identify unpublished and ongoing studies. Language restrictions were not applied.

Study selection
Study designs of evaluations included in the review
RCTs and observational studies were eligible for inclusion in the review.

Specific interventions included in the review
Studies that assessed the labour admission test were eligible for inclusion. The test comprised a 20- to 40-minute cardiotocography (CTG) carried out at admission to a labour ward. Randomised controlled trials (RCTs) had to compare the labour admission test with auscultation of foetal heart rate on admission to be included in the review. In the included RCTs, the patients in the intervention group received a 20-minute CTG at admission, whilst those in the control group received auscultation using a hand-held Doppler device during and immediately after a contraction, or had auscultation immediately after early amniotomy on diagnosis of labour.

Reference standard test against which the new test was compared
Observational studies were required to report the following pregnancy outcome measures, which were treated as the reference standard: Apgar score less than 7 at 5 minutes, arterial cord pH less than 7.05, resuscitation of infant, admission to neonatal unit, thick meconium-stained amniotic fluid, operative delivery (Caesarean, forceps or vacuum) for foetal distress, or changed or ominous foetal heart rate changes.

Participants included in the review
Studies of pregnant women in labour were eligible for inclusion. The RCTs were conducted in hospitals in Scotland and Ireland in low-risk populations. The observational studies were conducted in hospitals in Norway, Singapore, the USA and the UK in mixed populations or low-risk populations.

Outcomes assessed in the review
Observational studies had to report sufficient data to construct 2x2 contingency tables for each pregnancy outcome reported to be eligible for inclusion in the review; likelihood ratios were the main calculated outcome measure reported in the review. Where stated, the assessments were performed by an independent observer.

RCTs were eligible for inclusion if they reported the following outcome measures: perinatal mortality, Apgar score less than 7 at 5 minutes, arterial cord pH less than 7.05, resuscitation of infant, admission to neonatal unit, thick meconium-
stained amniotic fluid, neonatal seizures, operative delivery, interventions in labour and foetal distress.

How were decisions on the relevance of primary studies made?
One reviewers assessed titles and abstracts for eligibility. Studies that were deemed potentially relevant were ordered as full papers and were assessed for inclusion independently by two reviewers. Any disagreements were resolved by consensus, or were taken to a third reviewer where necessary. The reviewers were not blinded to the authors or journal of publication.

Assessment of study quality
Quality was assessed using the Consolidated Standards of Reporting Trials (CONSORT) criteria for the included RCTs and the Quality Assessment of Diagnostic Accuracy Studies (QUADAS) tool for the included observational studies. The overall quality of each study was assessed as good, moderate or poor. Two reviewers independently assessed the quality of the included studies. Inter-rater reliability was assessed using the kappa statistic.

Data extraction
Two reviewers independently extracted the data from each study. When required, the authors of the primary studies were contacted for additional information. In cases where labour admission tests were assessed by midwives, physicians-in-charge and independent experts, the results for the assessment by independent experts were used.

The data were entered into 2x2 contingency tables. In the case of a value of zero, 0.5 was added to each cell to avoid computational problems. For RCTs, the participants were classified according to the presence of an outcome measure in the intervention and control groups. For observational studies, the participants were classified according to the result of the labour admission test and to the presence or absence of an outcome measure.

Methods of synthesis
How were the studies combined?
For RCTs, the raw data for each outcome measure were pooled using a random-effects model to generate relative risks (RRs) and 95% confidence intervals (CIs) for each outcome measure. For observational studies, the sensitivity, specificity, positive and negative predictive values, and likelihood ratios were calculated for each data set, along with 95% CIs, and the results were presented in a narrative summary and tables.

How were differences between studies investigated?
For RCTs, the RRs and CIs were presented in forest plots to visually assess the presence of heterogeneity. The I-squared statistic was also calculated to assess the extent of heterogeneity.

Results of the review
Three RCTs (n=11,259) and 11 observational studies (n=5,831) were included in the review.

RCTs.

There were no disagreements between reviewers in the assessment of study quality. One RCT met all the quality criteria and was classified as being of good quality; the other two were classified as being of moderate quality. The results of the quality assessment were reported in full. Significant heterogeneity was present for the outcomes of operative delivery (I-squared 59.9%), augmentation (I-squared 55.6%) and continuous electronic foetal monitoring (EFM) (I-squared 77.6%). For all other outcome measures, I-squared was zero or was not calculable.

Women who received the labour admission test were more likely to have a minor obstetric intervention, such as epidural analgesia (2 studies; RR 1.2, 95% CI: 1.1, 1.4), continuous EFM (3 studies; RR 1.3, 95% CI: 1.2, 1.5) or foetal blood sampling (3 studies; RR 1.3, 95% CI: 1.1, 1.5), than women who had auscultation. There were no statistically significant differences between the two groups for other outcomes: operative delivery, operative delivery for foetal distress, Caesarean section, Caesarean section for foetal distress, augmentation, perinatal mortality, resuscitation of infant, neonatal seizures, Apgar score less than 7 at 5 minutes, or admission to a neonatal unit.
Observational studies.

In terms of agreement between the reviewers for study quality, the weighted kappa was 0.7 (95% CI: 0.4, 1.0); disagreements were only minor and were easily resolved by consensus. All 11 observational studies were assessed as being of moderate quality, and the results of the quality assessment were reported in full.

The diagnostic performance of the labour admission test for predicting pregnancy outcomes was generally poor. The sensitivity ranged from 5 to 83% for the various outcomes, and specificity ranged from 78 to 98%. Positive likelihood ratios were above 10 for only two outcomes and between 5 and 10 for six outcomes. Negative likelihood ratios were between 0.4 and 1.0 for all outcomes but one, in which it was 0.2 (95% CI: 0.0, 1.2); the 95% CIs crossed 1.0 for 19 of the 28 data sets.

**Authors' conclusions**

There was no evidence that the labour admission test was beneficial in low-risk women and that the test was a poor predictor of adverse outcomes. In settings where a high proportion of labour admission test results were assessed as abnormal, its use led to more obstetric interventions without improvements in neonatal outcomes.

**CRD commentary**

The review question was clear in terms of the study designs, participants, intervention, reference standard and outcomes of interest. The authors searched several relevant electronic databases without language restrictions and sought unpublished data from experts in the field, thus reducing the potential for publication or language bias. Two reviewers independently carried out the study selection (based on full papers), data extraction and quality assessment processes, which helps reduce errors and reviewer bias. The level of agreement between reviewers for the assessment of study quality was reported and was acceptable. The studies were assessed for quality based on appropriate criteria and the full results of the quality assessment exercise were reported. None of the included studies were assessed as being of poor quality, which increases the reliability of the review findings.

Adequate details of the included studies were reported. Heterogeneity was assessed and the methods used to combine the studies appear to have been appropriate. This was a very well-conducted systematic review and the authors' conclusions are likely to be reliable. However, it should be borne in mind that the RCT results were derived from only 3 studies.

**Implications of the review for practice and research**

Practice: The authors stated that there was no evidence supporting the use of the labour admission test in low-risk women, and there was scarce scientific evidence to recommend its use for screening for adverse outcomes in high-risk women.

Research: The authors stated that future research should emphasise the most appropriate method of foetal surveillance in high-risk women.

**Funding**

Northern Norway Regional Health Authority; Nordic School of Public Health, Gothenburg.

**Bibliographic details**


**PubMedID**

16305561
DOI
10.1111/j.1471-0528.2005.00766.x

Indexing Status
Subject indexing assigned by NLM

MeSH
Auscultation /standards; Diagnostic Tests, Routine /standards; Female; Humans; Obstetric Labor Complications /prevention & control; Pregnancy; Pregnancy Outcome; Prenatal Diagnosis /methods; Prognosis; Randomized Controlled Trials as Topic

AccessionNumber
12005008562

Date bibliographic record published
31/03/2006

Date abstract record published
31/03/2006

Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.