Computerized analysis of cardiotocograms and ST signals is associated with significant reductions in hypoxic-ischemic encephalopathy and cesarean delivery: an observational study in 38,466 deliveries.

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ABSTRACT

BACKGROUND:
Intrapartum cardiotocography is widely used in high-resource countries and remains at the center of fetal monitoring and the decision to intervene, but there is ample evidence of poor reliability in visual interpretation as well as limited accuracy in identifying fetal hypoxia. Combined monitoring of intrapartum cardiotocography and ST segment signals was developed to increase specificity, but analysis relies heavily on intrapartum cardiotocography interpretation and is therefore also affected by the previously referred problems. Computerized analysis was developed to overcome these limitations, aiding in the quantification of parameters that are difficult to evaluate visually, such as variability, integrating the complex guidelines of combined intrapartum cardiotocography and ST analysis, and using visual and sound alerts to prompt health care professionals to reevaluate features associated with fetal hypoxia.

OBJECTIVE:
The objective of the study was to evaluate the effect of introducing a central fetal monitoring system with computerized analysis of intrapartum cardiotocography and ST signals into the labor ward of a tertiary care university hospital in which all women are continuously monitored with intrapartum cardiotocography. The incidence of adverse perinatal outcomes and intervention rates was evaluated over time.

STUDY DESIGN:
In this retrospective cohort study, yearly rates of hypoxic-ischemic encephalopathy, instrumental vaginal delivery, overall cesarean delivery, and urgent cesarean delivery were obtained from the hospital's clinical databases. The rates occurring in the period from January 2001 to December 2003, before the introduction of the central monitoring system with computerized analysis of intrapartum cardiotocography and ST signals (Omniview-SisPorto), were compared with those occurring from January 2004 to December 2014, after the introduction of the system. All rates were calculated with 95% confidence intervals.

RESULTS:
A total of 38,466 deliveries occurred during this period. After introduction of the system, there was a significant decrease in the number of hypoxic-ischemic encephalopathy cases per 1000 births (5.3%, 95% confidence interval [4.0-7.0] vs 2.2%, 95% confidence interval [1.7-2.8]; relative risk, 0.42, 95% confidence interval [0.29-0.61]), overall cesarean delivery rates (29.9%, 95% confidence interval [28.9-30.8] vs 28.3%, 95% confidence interval [27.8-28.8]; relative risk, 0.96, 95% confidence interval [0.92-0.99]), and urgent cesarean deliveries (21.6%, 95% confidence interval [20.7-22.4] vs 19.2%, 95% confidence interval [18.8-19.7]; relative risk, 0.91, 95% confidence interval [0.87-0.95]). The instrumental vaginal delivery rate increased (19.5%, 95% confidence interval [18.7-20.3] vs 21.4%, 95% confidence interval [21.0-21.9; relative risk, 1.07, 95% confidence interval 1.02-1.13].

CONCLUSION:
Introduction of computerized analysis of intrapartum cardiotocography and ST signals in a tertiary care hospital was associated with a significant reduction in the incidence of hypoxic-ischemic encephalopathy and a modest reduction in cesarean deliveries.