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The impact of a computer assisted learning programme on the ability to interpret cardiotochography. A before and after study

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ABSTRACT

Objective: To evaluate if a computer assisted learning programme could bring about a higher degree of individuals who correctly classified cardiotochography (CTG) recordings in a non-selected population of midwives and physicians.
Study design: A before and after study.
Setting: Södersjukhuset, Stockholm, Sweden.
Subjects: One hundred and thirty midwives and 49 physicians at the maternity unit, September 2009–April 2010. A computer assisted learning programme for interpreting CTG patterns has been created. All 179 individuals included made the first interpretation and the 135 individuals also completing the education made the second interpretation. A third randomly selected interpretation was performed immediately following the second; permitting two participants to classify a CTG together. Comparison between the before and after-test was based on the Fisher exact test.
Main Outcome measure: The proportion of individuals who correctly classified CTGs before and after the training.
Results: Sixty four percentage of the individuals classified the CTGs correctly before and 66% after the training ($P = 0.76$). There was no difference between the two professional groups. Normal CTGs were correctly identified by 36% of the individuals before and in 80% after the training ($P = 0.065$). Corresponding figures for pathological CTGs were 83% and 85% ($P = 1.00$), respectively.
Conclusion: We found no improvement in the proportion of individuals who classified CTGs correctly after the completion of a computer assisted learning programme in fetal monitoring. The baseline level of competence was higher than expected.

Introduction

Fetal surveillance with cardiotochography (CTG), introduced during the 1970s, is widely used although the method is both non-specific and highly dependent on subjective interpretation. Thus the correlation between non-reassuring CTG and bad outcome is low and, in addition, the method is difficult to learn and the inter-observer as well as intra-observer agreement considerably low [1–4]. Additionally, the different CTG patterns seem to be variably difficult to interpret i.e. the inter-observer agreement is good for normal and pre-terminal patterns whereas for intermediary and pathological patterns, a disagreement of up to 50% exist between different interpreters [3,4]. A limitation of these reports is the small study population of selected senior obstetricians and midwives.

Studies on the effects of educational efforts made to improve knowledge on CTG interpretation among obstetric caregivers show positive results [5,6]. Others have compared learning by computers versus teacher-guided lectures in a strategy for teaching fetal monitoring, concluding that neither method is superior to the other [7]. To the best of our knowledge, no study has reported the effects on the ability to interpret CTG after having completed a computer

Abbreviations: CTG, cardiotochography; FIGO, The International Federation of Gynecology and Obstetrics.

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assisted CTG learning programme in a non-selected population representing both midwives and physicians, at all levels, in a large maternity unit.

A national intervention, Safe Delivery Project, aimed at improving patient safety at delivery, was initiated in September 2007 and is now engaging all maternity units in Sweden (http://www.patientforsakring.se/Saker-forlossningsvard.html). Among several measures of improvements the intervention includes the development and implementation of a computer assisted CTG learning programme. The purpose of this study was to evaluate if the CTG learning programme could bring about a higher degree of correctly classified CTG tracings among midwives and physicians all working at the same maternity unit.

Materials and methods

During the working process of the Safe Delivery Project, the need for a learning programme in fetal monitoring by CTG became obvious and a computer assisted programme for interpreting CTG patterns was therefore created. The programme, which constitutes theoretical information, interactive training and a final examination, intends to offer all physicians and midwives involved in fetal surveillance a possibility to improve their competence and skills. The training part covers basic fetal physiology and fetal monitoring with CTG, including classification and interpretation as well as clinical application. It also contains excerpts from authentic CTG recordings that can be scrolled back and forth as illustrations to the text. Moreover, the training part consists of a great number of CTGs with questions and answers about interpretation and clinical application. The examination part comprises questions about fetal physiology, development of fetal hypoxia and five interactive cases including several CTG recordings. To pass the examination, the programme requires 70% correct answers in the theoretical part as well as in the part with interactive cases. The programme was launched in September 2009 and is provided free of charge to all maternity units in Sweden, (http://www.ctgutbildning.se/Course/indexLogin.php). The study was executed at Södersjukhuset (South General Hospital), Stockholm, Sweden; a city hospital comprising about 7000 deliveries per year.

The CTG recordings were selected in the following way. Firstly, we received 55 intrapartal CTGs from a CTG database (Neoventa Medical, Gothenburg, Sweden). The composition of the different subgroups was based on the finding that intermediary and pathological CTGs seem to be more difficult to interpret than the normal and preterminal ones and we therefore requested a selection of a larger proportion of the former [2–4]. Secondly, four experts (two obstetricians and two midwives) individually classified the 55 CTGs according to the Swedish modified version of the FIGO classification (Fig. 1). The 40 CTG recordings that were interpreted with a 100% inter-individual agreement were accepted as the gold standard and constitute the final CTG pool. Five of these tracings were assessed as normal, 13 as intermediary, 17 as pathological and five as preterminal.

We hypothesized that the learning programme would affect the ability to classify CTG. Therefore the sample size was calculated to allow for the detection of a 20 percentage point difference in the proportion of individuals who correctly classified CTGs before and after the training (specifically 50% before versus 70% after the training). A baseline of 50% correctly classified CTG-recordings has been reported previously [2–4]. A total of 103 individuals were

CTG classification	Baseline of fetal heart rate	Baseline variability/ Accelerations	Decelerations	Contractions
Normal	• 110-150 beats/min	• 5-25 beats/min • ≥2 accelerations/60 min	• No decelerations • Uniform, early decelerations • Variable, uncomplicated decelerations with a duration < 30 sec and amplitude < 60 beats	• 5 or less contractions /10 min
Suspicious	• 100-110 beats/min • 150-170 beats/min • <100 beats/min for ≤3 min	• <5 beats/min > 40 min without accelerations • >25 beats/min (saltatory pattern/increased variability) • <2 accelerations/60 min	• Variable uncomplicated decelerations with duration 30-60 min and/or amplitude > 60 beats	• >5 contractions/10 min
	With a combination of 2 or more suspicious/abnormal factors the CTG is classified as suspect pathological			
Pathological	• >170beats/min • <100 beats/min for > 3min	• <5beats/min for 60 min without accelerations • Sinusoidal pattern	• Variable complicated decelerations with duration > 60 sec • Uniform late decelerations • Combined decelerations	
Preterminal	No variability (<2 beats/min) without accelerations regardless of decelerations/heartbeat			

[2]FIGO= the International Federation of Gynecology and Obstetrics

Fig. 1. Swedish modified version to the FIGO classification.