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## Practice variation in the management of intrapartum fetal distress in The Netherlands and the Western world



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### ABSTRACT

**Objective:** Solid evidence on the effect of intrauterine resuscitation on neonatal outcome is limited, and superiority of one intervention over the others is not clear. We therefore surveyed the clinical practice variation in fetal monitoring and the management of fetal distress during labor, in Dutch labor wards. In addition, we have compared recommendations from international guidelines.

**Study design:** We conducted a survey among all 86 Dutch hospitals, using a questionnaire on fetal monitoring and management of fetal distress. In addition, we requested international guidelines of 28 Western countries to study international recommendations regarding labor management.

**Results:** The response rate of the national survey was 100%. Labor wards of all hospitals use CTG for fetal monitoring, 98% use additional fetal scalp blood sampling, and 23% use ST-analysis. When fetal distress is suspected, oxytocin is discontinued and tocolytic drugs are applied in all hospitals. Nearly all hospitals (98%) use maternal repositioning for fetal resuscitation, 33% use amnioinfusion, and 58% provide maternal hyperoxygenation. Management is mainly based on the Dutch national guideline (58%) or on local guidelines (26%).

Eight international guidelines on fetal monitoring were obtained for analysis. Fetal scalp blood sampling facilities are recommended in all the obtained guidelines. Use of ST-analysis is recommended in three guidelines and advised against in three guidelines. Five guidelines also advised on intrauterine resuscitation: discontinuation of oxytocin and use of tocolytic drugs was advised in all guidelines, amnioinfusion was recommended in two guidelines and advised against in two guidelines, whereas maternal hyperoxygenation was recommended in two guidelines and advised against in one guideline. **Conclusion:** Nationwide clinical practice, and recommendations from international guidelines agree on the use of fetal scalp blood sampling in addition to cardiotocography during labor. The opinion on the use of ST-analysis differs per clinic and per guideline. Discontinuation of oxytocin, administration of tocolytic drugs and maternal repositioning are rather uniform, on national and international level. However, there is a large variation in the use of amnioinfusion and maternal hyperoxygenation, which may be explained by the contradictory recommendations of the different guidelines.

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### Introduction

Non-reassuring fetal heart rate (FHR) patterns frequently occur during labor. They may be indicative for impaired fetal oxygenation, which eventually may lead to fetal asphyxia [1,2]. As fetal asphyxia is associated with hypoxic-ischemic encephalopathy and

even fetal death, timely intervention is important to optimize neonatal outcome.

Intrauterine resuscitation is defined as interventions with the intention to improve fetal oxygenation during labor, in the presence of suspected fetal distress. Depending on the presumable cause of the abnormal FHR pattern, these interventions aim to restore oxygenation of the fetus. Possible actions consist of alleviation of cord compression and/or improvement of uteroplacental blood flow [3,4].

Improvement of the intrauterine condition of the fetus can avoid termination of the delivery, thereby preventing a caesarean section or vaginally assisted delivery. In the case of an emergency

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caesarean section, intrauterine resuscitation may restore fetal oxygenation during the decision to incision time period.

Several techniques to improve fetal oxygenation are used in clinical practice. The most commonly used interventions are discontinuation of oxytocin infusion, maternal repositioning, amnioinfusion, maternal hyperoxygenation, and the use of tocolytic agents. Unfortunately, solid evidence on the effect of each of these interventions on neonatal outcome is limited [5], and superiority of one intervention over the others is not clear. This lack of evidence leads to differences in recommendations in two important guidelines on fetal monitoring during labor and intrapartum management [4,6]. For example, the Practice Bulletin of the American Congress of Obstetricians and Gynecologists (ACOG) recommends maternal hyperoxygenation in the presence of fetal distress, whereas the Royal College of Obstetricians and Gynaecologist (RCOG) in the United Kingdom advises against this intervention [4,6]. The Dutch Society of Obstetricians and Gynecologists (NVOG) is currently working on a recommendation regarding the use of maternal hyperoxygenation for fetal distress [7].

Apparently, different guidelines have different recommendations regarding the management of fetal distress during labor. This may lead to clinical practice variation regarding the management of fetal distress during labor.

We aim to investigate the clinical practice variation in Dutch delivery wards, with specific interest in the local methods used for fetal monitoring, and the actions undertaken in suspected fetal distress. Local guidelines, as well as intervention techniques to improve fetal oxygenation are inventoried. Hence, we conducted a survey among all Dutch hospitals. In addition, we requested the national guidelines from 28 Western countries regarding fetal monitoring and fetal distress.

## Materials and methods

A clinical practice survey was conducted from August to October 2015 in all 86 Dutch hospitals. Also, we aimed to obtain international guidelines of 25 European countries, the USA, Canada, and Australia & New Zealand.

### Survey among Dutch obstetricians

Per hospital, one obstetrician was asked to complete a survey comprising twelve multiple-choice questions on fetal monitoring and common interventions regarding suspected fetal distress (Appendix A, original version in Dutch).

Topics included: methods used for fetal monitoring; classification method of the cardiotocogram (CTG); how to diagnose fetal distress; the indication and use of intrauterine resuscitation techniques and the use of national and/or international guidelines. Respondents were able to give more than one answer to each question and were free to add more options if their answer was not listed. In case of unclear responses, we contacted the respondent to clarify the answers.

In The Netherlands, low risk deliveries are managed by primary care midwives. These primary midwife practices are excluded from this survey, since most resuscitation techniques are not available during home births. Hence, in the presence of fetal distress, the parturient will be referred to a hospital.

### Statistical analysis national survey

After all questionnaires were returned, we analysed the results using SPSS (IBM SPSS Statistics, version 23). Categorical variables were expressed as frequencies and percentages.

### Survey of national guidelines of European countries

We searched the Internet for international guidelines on fetal monitoring and resuscitation of 25 European countries, the USA, Canada, and Australia & New Zealand. If guidelines were not freely available, we approached the corresponding national societies of obstetricians and gynecologists and requested their national guideline on fetal monitoring and/or intrauterine resuscitation during labor.

If a guideline was not available in English, it was translated by a native speaker or by the use of an online translation program. We compared the recommendations as stated in the different guidelines. The following details were abstracted from the guidelines and listed: methods of fetal monitoring systems during labor (intermittent auscultation, fetal heart rate pattern, fetal scalp blood sampling and ST-analysis), the classification system to judge the fetal heart rate pattern, and recommendations on the use of intrauterine resuscitation techniques.

### Ethical considerations

As confirmed by the Medical Ethics Committee of Máxima Medical Center, Veldhoven, The Netherlands, our study does not involve any patient data and imposes no changes in general practice. Therefore, according to the Declaration of Helsinki, no ethical approval was required.

## Results

### Survey among Dutch obstetricians

A total of 86 obstetricians, representing all 86 Dutch hospitals, completed the questionnaire. Hospitals include eight university hospitals, 39 general teaching hospitals, and 39 non-teaching hospitals. The response rate was 100%.

Besides the national guideline on fetal monitoring provided by the NVOG, various local protocols exist on the diagnosis and management of fetal distress during labor. In The Netherlands, the guideline of the NVOG is frequently used (58%), sometimes in combination with a local guideline (26%). In 36% of the hospitals, only local protocols are used. The American guideline, provided by the American College of Obstetricians and Gynecologists (ACOG) is used in one hospital (1%), while the British guideline, provided by the Royal College of Obstetricians and Gynaecologists (RCOG) is used in six hospitals (7%). Results are shown in Fig. 1.

All hospitals used fetal CTG to estimate fetal well being during labor. Besides, in 23% ( $N=20$ ) of the hospitals ST-analysis is used to monitor fetal condition, while in 98% ( $N=84$ ) fetal scalp blood sampling is used in addition to CTG.

In most of the hospitals (95%), the (modified) FIGO classification is used to classify the CTG. In two hospitals the Fischer

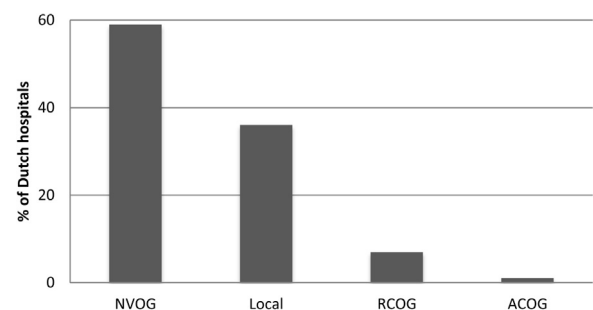


Fig. 1. Percentage of Dutch hospitals using the represented guidelines on fetal monitoring and fetal resuscitation.

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