

ILLUSTRATION: JOE GORMAN FOR OBG MANAGEMENT

10 tips for overcoming common challenges of intrapartum fetal monitoring

M. Sean Esplin, MD, and Alexandra G. Eller, MD, MPH

➔ Use these expert tips to anticipate and address the common challenges of intrapartum FHR monitoring to improve care of the mother and baby and reduce potential liability. Four clinical case scenarios presented.

Interpreting continuous fetal heart rate (FHR) monitoring is one of the most common tasks obstetricians perform during the course of intrapartum care. Notably, many providers do not seek ongoing training to optimize their ability to reliably and accurately interpret the FHR. Yet FHR interpretation is one of the most frequent causes of litigation in the modern obstetric practice. Failure to interpret continuous FHR monitoring appropriately is estimated to account for 75% of obstetric-related litigation.¹

Continuous FHR monitoring during labor was introduced to identify infants at risk for

developing hypoxic-ischemic encephalopathy (HIE). The rate of HIE has not declined, however, despite almost universal adoption of continuous FHR monitoring.² Numerous reasons account for this failure, including ad hoc interpretation of terminology, lack of standardized protocols for management and intervention, and the oftentimes challenging patterns that must be interpreted.³ The confusion about and dissatisfaction with the current state of FHR monitoring has led to attempts to enhance our ability to identify infants at risk with additional approaches (such as fetal pulse oximetry and fetal ST-segment evaluation), and some have called for a complete overhaul of our approach to interpreting the FHR. Clark and colleagues stated recently, “It is time to start over and establish some common language, standard interpretation, and reasonable management principles and guidelines.”³

We must recognize that, as a stand-alone tool, continuous FHR monitoring is ineffective for avoiding preventable adverse outcomes. It is most likely to be effective when used in accordance with published standard guidelines by professionals skilled in interpretation and when timely, appropriate interventions are performed based on that interpretation.



Dr. Esplin is an obstetrician-gynecologist in the Division of Maternal Fetal Medicine, Intermountain Healthcare, and the University of Utah Health Sciences Center, Salt Lake City, Utah.



Dr. Eller is an obstetrician-gynecologist in the Division of Maternal Fetal Medicine, Intermountain Healthcare, and the University of Utah Health Sciences Center, Salt Lake City.

The authors report no financial relationships relevant to this article.

IN THIS ARTICLE

Signal ambiguity

page 36

Communicate urgency

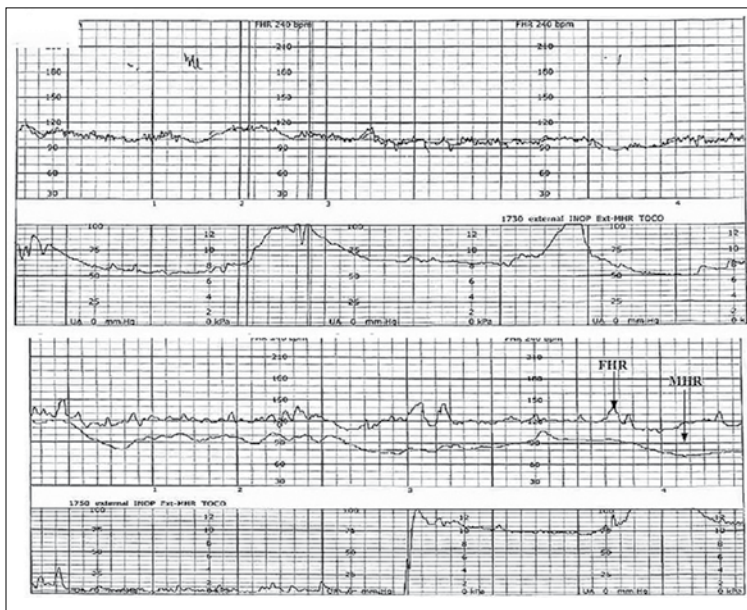
page 39

Situational awareness

page 41

CONTINUED ON PAGE 36

FIGURE 1 FHR tracing indicates signal ambiguity



As described in Case 1, the upper panel of this tracing demonstrates the maternal heart rate confused as the fetal heart rate, while the segment in the lower panel shows a clear distinction between the maternal and fetal heart rates.

Optimal FHR monitoring requires a collaborative perinatal team that performs the monitoring correctly, interprets it appropriately, and communicates the findings effectively, and in a timely fashion, to all members of the care team when a high-risk pattern is detected.

In this article we review some common challenges that clinicians encounter during intrapartum FHR monitoring and we offer 10 simple tips to help overcome these challenges. The clinical scenarios described are derived from published reports in the medical literature, published malpractice claims, and from our personal experience working in a major health care system as part of a team charged with overseeing ongoing certification and training of labor and delivery nurses.

Challenge: Signal ambiguity

CASE 1 Young woman in labor with first pregnancy

A 19-year-old woman presents in spontaneous labor with her first pregnancy, which has

been uncomplicated. During the course of her care, it is noted that the FHR changes to a lower baseline than previously recorded. Evaluation reveals that the external monitor is tracking the maternal heart rate and not the FHR (FIGURE 1). After the monitor is adjusted, both the fetal and maternal rates are documented for a short period. Ultimately, continuous monitoring of the maternal heart rate is discontinued. After delivery of the infant several hours later, it is noted that the FHR continues to register on the monitor, and it is determined that for the last few hours the maternal heart rate has been traced.

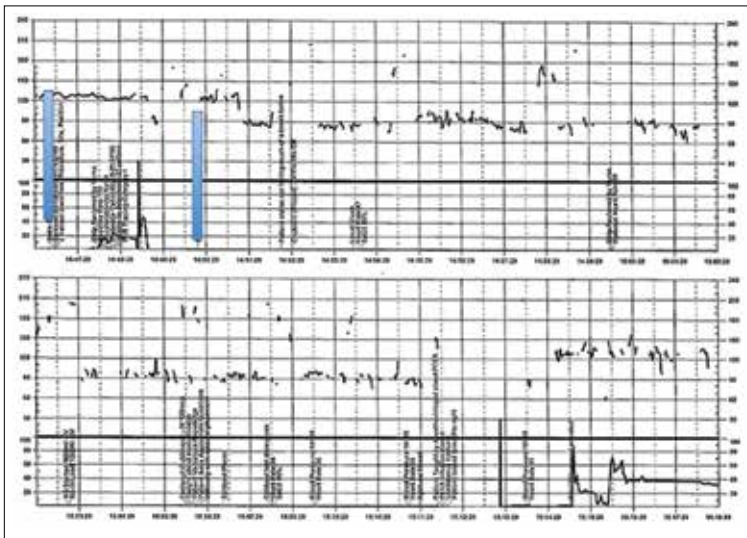
TIP #10: Ensure the FHR monitor is tracking the fetal, not the maternal, heart rate

Confusing the maternal and the fetal heart rate with external cardiotocography is common. When the mix-up is noted and corrected expeditiously, it is unlikely to result in an adverse outcome. Signal ambiguity may arise from faulty Doppler equipment or the inability of the cardiotocograph to differentiate between maternal and fetal heart rates. It commonly occurs after repositioning the patient, after fetal movement, or during pushing in the second stage when the maternal heart rate may increase to a baseline that is similar to that of the fetus.

Signal ambiguity should be suspected when the FHR runs in the low-normal range or when FHR accelerations are noted with greater than 50% of contractions (especially when pushing).⁴ Signal ambiguity also should be ruled out when there is an apparent FHR deceleration to the maternal range that does not recover.

Evaluating for suspected signal ambiguity involves 2 key steps: (1) documentation and verification of the maternal heart rate and (2) definitive documentation of the true FHR. To document the maternal heart rate, manually count the radial pulse for 1 minute or use a pulse oximeter for continuous monitoring. Using a pulse oximeter is a less labor-intensive approach and has the advantage of allowing continuous assessment of the maternal heart rate for comparison. Recording the maternal pulse continuously on the same

FIGURE 2 Inadequate, uninterpretable FHR tracing



This FHR tracing, from the patient described in Case 2, is unusable because of the absence of data.

FAST TRACK

Before you intervene based on an abnormal FHR tracing, make sure the data are adequate for interpretation and represent the actual FHR

screen as the FHR enables ongoing differentiation of the mother and fetus in difficult cases, particularly if internal fetal monitoring is not an option (because of maternal infectious disease, low suspicion for an abnormal FHR pattern, or strong maternal preference against internal monitoring, for example).

When clinically appropriate, use of a fetal scalp electrode (FSE) can document the FHR. If intrauterine fetal death has occurred, however, the FSE may transmit the maternal heart rate.⁵ Using ultrasonography to confirm the FHR prior to placing the FSE is a reliable method of definitive differentiation. If a newly placed FSE shows a clear differentiation of 5 to 10 beats per minute from a continuously assessed maternal pulse rate, then this is also a reliable way to assure that the FHR monitoring represents the fetus, particularly if ultrasonography is not immediately available.

Ultimately, before intervening based on an abnormal FHR tracing, it is paramount to confirm that the data are adequate for interpretation and represent the actual FHR. If signal ambiguity is identified or suspected, correct it by using ultrasonography to locate

the FHR and replace the external monitor until a rate that is at least 5 to 10 beats per minute different from the maternal rate is obtained. Alternatively, this is an indication for internal fetal monitoring with an FSE.

Challenge: Inadequate FHR tracing, poor communication, lack of clinical context

CASE 2 Woman with uncomplicated postdates pregnancy presents for induction

A 28-year-old woman (G3P2) at 41 weeks 0 days of gestation presents to labor and delivery for induction of labor for the indication of postdates. There have been no complications with the current pregnancy. The initial cervical exam reveals 1+ cm dilation, 90% effacement, and -3 station, and the patient is started on oxytocin per the hospital protocol. What is your interpretation of the continuous FHR tracing shown in **FIGURE 2**?

TIP #9: Check that the monitors are providing useful data

The ability to accurately interpret a continuous FHR tracing depends on the quality of data recorded. Unfortunately, the absence of data makes interpretation impossible. This includes both FHR and tocometry data, since both pieces of information are required for appropriate interpretation of a continuous FHR tracing.

Prolonged periods of uninterpretable FHR and uterine activity tracings imply that no one was attending the mother and fetus.⁶ If it is difficult to obtain an interpretable FHR tracing, document in the medical record that you made ongoing efforts to maintain an adequate tracing, including the amount of time spent holding the external monitor, use of ultrasonography to document the FHR, and plans for potential internal monitoring.

CASE 2 Continued

After several hours, the patient requests an epidural for pain management and one is placed without difficulty. She reports adequate pain relief and is comfortable for the next 1 to 2 hours. Subsequently, the patient reports a sudden

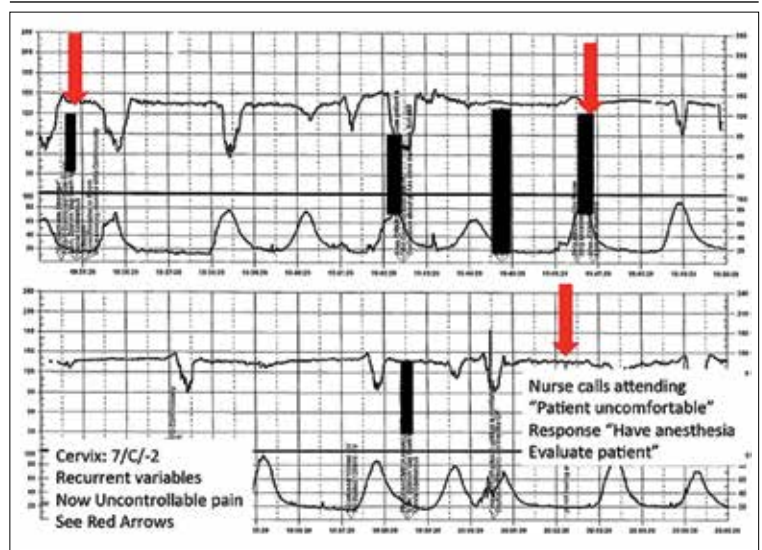
onset of increasing pain that does not respond to additional patient-administered doses of anesthesia over a 30-minute period. The labor and delivery nurse becomes concerned about the patient's pain level and contacts the attending physician to discuss her concerns. The physician, who is currently attending to patients in clinic, listens to the nurse and asks her to contact the anesthesia department with her concerns (FIGURE 3).

TIP #8: Clearly communicate an urgent situation to the care team

Poor communication underlies many preventable adverse outcomes in medicine.⁷ Effective communication requires an adequate description of the clinical scenario or problem. A root cause analysis of a series of intrapartum adverse events involving fetal death or injury showed that poor communication about a concerning FHR tracing played a role in 72% of cases.¹

In this clinical scenario, the nurse believed that the patient's pain level was unusual or more than anticipated. The person who is communicating his or her concern (the sender) must be sure that the person receiving the message (the responder) clearly understands the sender's level of concern. In this case, it would have been appropriate

FIGURE 3 FHR tracing reveals recurrent variables in a patient with evolving clinical concerns



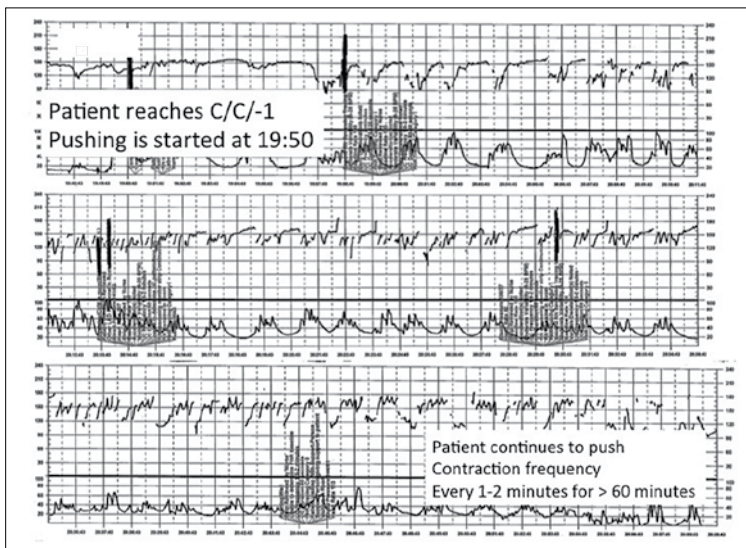
This tracing, from the patient described in Case 2, shows variables in the FHR while the patient experiences increasing discomfort. Each of the red arrows indicates documentation by the nurse of increasing pain reported by the patient. The black bars are used to cover names of caregivers.

for the sender to state clearly that she felt the patient's pain was outside of normal expectations and to request that the attending physician come to evaluate the patient.

Clear and effective communication

This space has purposely been left blank.

FIGURE 4 FHR tracing shows time points for initiation and continuation of pushing



This tracing, from the patient described in Case 3, documents contraction frequency every 1–2 minutes for more than 60 minutes while the patient continues to push. The fetal heart rate demonstrates repetitive moderate variable decelerations with every push.

includes (1) an appropriate description of the urgency of the situation and (2) an indication by the sender as to the desired response to this information (“please come evaluate the patient”).⁸ In all cases, both steps are necessary to elicit an appropriate response.

CASE 2 Continued

Over the next 2 hours, recurrent variable decelerations develop, and then sudden, prolonged fetal bradycardia leads to urgent cesarean delivery. At delivery, a uterine rupture is diagnosed and a fetal hand is observed protruding through a lower-uterine segment defect into the maternal abdomen.

TIP #7: Always consider the entire clinical scenario

In this case, the team caring for the patient was not aware that her previous pregnancy had ended with a low transverse cesarean delivery. How does this information change your interpretation of the clinical scenario? The importance of understanding the entire clinical context when interpreting individual characteristics of cardiotocography cannot

be overstated. For example, the sudden onset of recurrent, significant variable decelerations is more concerning in the context of a prior cesarean delivery, and late decelerations are more concerning in a patient with placental abruption, fetal growth restriction, or poorly controlled maternal diabetes.

An estimated 70% of fetuses will have an indeterminate FHR pattern (category II) at some time during labor.⁹ To appropriately interpret the FHR tracing, it is crucial to know the a priori risk for fetal hypoxia and metabolic acidosis (the precursor of fetal injury) due to such identified clinical risk factors as placental insufficiency, medical comorbidities (hypertension, diabetes), or postdates gestational age.

It is well established that cardiotocography has a good negative predictive value for the *absence* of fetal metabolic acidosis when there is moderate variability and spontaneous or induced accelerations. When attempting to risk stratify the fetus with a category II (indeterminate) FHR tracing, consider these 3 important questions:

1. What are the risk factors for this particular patient and her fetus?
2. What is the state of the fetus right now, and when was the last time metabolic acidosis could be excluded reasonably (by the presence of moderate variability and accelerations)?
3. What is the risk that the fetus will develop acidemia prior to delivery?

The presence of decelerations indicates interruption of oxygen delivery to the fetus, and recurrent decelerations may indicate an evolving process of accumulated oxygen deprivation, hypoxia, and eventually, metabolic acidosis. Most authorities agree that, for the fetus with a previously normal FHR tracing, the onset of significant, recurrent decelerations with slowly cumulative oxygen deficit can lead to fetal acidemia over the course of approximately 1 hour.¹⁰ Of course, acidosis also can occur much more quickly with acute events, such as placental abruption or uterine rupture. In deciding whether or not to intervene based on an FHR tracing, the clinician must take into account the clinical

context to determine if delivery is likely to occur before significant acidemia develops.

Challenge: Lack of situational awareness, failure to address nursing concerns, reluctance to initiate the chain of command

CASE 3 Spontaneous labor in a second pregnancy

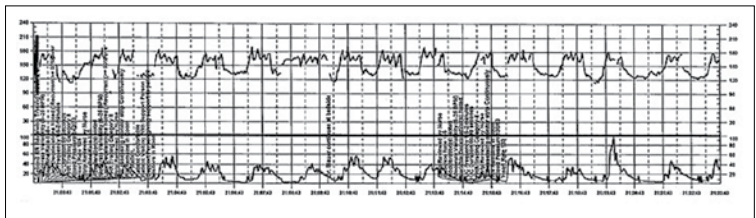
A 28-year-old woman (G2P1) at 40 weeks' gestation presents in spontaneous labor. She has a history of a previous uncomplicated vaginal delivery. After 6 hours she reaches complete dilation with the fetus at -1 station and begins pushing. After 60 minutes, the patient has only progressed to +1 station. She is contracting every 1 to 2 minutes with recurrent variable decelerations (FIGURE 4).

TIP #6: Maintain situational awareness

A state of situational awareness exists when caregivers have a clear understanding of all of the factors at play in a clinical situation.¹¹ This can be lost when caregivers focus too intensely on one aspect of care. It often happens when the patient is pushing in the second stage and the provider, focused on the progress of fetal descent, loses track of the amount of time that has passed without reassuring features (such as variability and induced or spontaneous accelerations) in the FHR tracing. The nurse, seeing the physician at the bedside, presumes he or she is aware of the tracing and is thus reluctant to point out the concerning features for fear of appearing insubordinate.

Situational awareness also may be lost at the time of patient hand off between providers wherein critical information, such as a history of previous cesarean delivery, is not communicated to the next care team. When receiving an intrapartum patient hand off, providers must have heightened vigilance to ensure they quickly reach situational awareness and are cognizant of the entire clinical context. Maintaining an environment in which all members of the care team, regardless of their training level, are encouraged to

FIGURE 5 FHR tracing reveals ongoing repetitive variable decelerations



The nurse repeatedly voiced concerns to the physician regarding the continuous FHR tracings from the patient described in Case 3.

voice their concerns is another way to promote ongoing situational awareness.

CASE 3 Continued

The patient continues pushing for another 20 minutes without delivery, and the nurse raises a concern about the FHR tracing to the physician, who remains in the room but does not respond (FIGURE 5.)

TIP #5: Acknowledge and respond to other caregivers' concerns

A team approach to patient care is essential in all areas of medicine, perhaps none more so than in obstetrics. Each member of the team is engaged in trying to provide optimal patient care and the concerns of every team member—regardless of title or level of training—must be acknowledged and addressed. Good communication requires creating a safe environment wherein each member of the team feels comfortable raising concerns without fear of reprisal. Rather than becoming angry or frustrated when questioned, providers should remain cognizant that these are ongoing efforts to maintain situational awareness and ensure the best possible outcome for mother and baby.

CASE 3 Continued

Pushing continues for another 30 minutes despite the nurse's repeated effort to express concern to the physician about the FHR tracing. After more than 2 hours of pushing, the infant is delivered; Apgar scores are 1, 5, and 7. No cord gas is obtained.



Maintaining an environment in which each team member feels comfortable raising concerns helps promote ongoing situational awareness

CONTINUED ON PAGE 42

FIGURE 6 FHR tracing indicates uterine tachysystole



The patient in Case 4 received oxytocin for induction of postdates pregnancy. The red arrow shown on the FHR tracing points out that oxytocin augmentation continues despite the presence of uterine contractions that are too frequent and initial changes, including subtle late decelerations in the FHR, that suggest early fetal compromise.

TIP #4: Initiate the chain of command when necessary

Any caregiver, regardless of job title, has a duty to initiate the institution's chain-of-command policy and procedure if he or she has a concern about patient well-being that is not being addressed adequately. It can be uncomfortable for a nurse, midwife, or resident physician to question an attending physician, particularly if that person responds in a dismissive, condescending, or angry manner. If a caregiver has made several attempts to engage the attending physician and feels the concerns are being inadequately addressed, then he or she must respectfully initiate the chain of command to seek additional objective review of the clinical situation.

Failure to follow oxytocin protocols, inadequate surveillance, poor documentation

CASE 4 Induction of an uncomplicated pregnancy due to postdates

A 20-year-old woman (G1P0) at 42 weeks'

gestation with an otherwise uncomplicated first pregnancy presents for postdates induction with oxytocin. After 6 hours, she develops uterine tachysystole with recurrent variable decelerations but the oxytocin infusion is continued at the same rate (FIGURE 6).

TIP #3: Manage oxytocin infusion according to protocol

Inappropriate use of oxytocin is common, including the improper management of oxytocin infusion in the setting of uterine tachysystole (defined as the presence of >5 contractions over a 10-minute period averaged over 30 minutes) and/or an abnormal FHR tracing. The mismanagement of uterine tachysystole is cited in more than two-thirds of obstetric malpractice cases.¹²

Uterine contractions alter blood flow through the spiral arteries and transiently reduce placental perfusion. Prolonged uterine tachysystole can lead to fetal oxygen debt and early signs of hypoxia, including the loss of spontaneous accelerations, tachycardia, and reduced variability. Continuing or increasing the oxytocin in the setting of such changes is hard to justify. One study found that the use of oxytocin in the setting of tachysystole was significantly associated with signs of fetal asphyxia (odds ratio [OR], 5.6).¹³ When the FHR pattern suggests significant interruption of fetal oxygen delivery and possible hypoxia, continuing or increasing an oxytocin infusion suggests a lack of understanding of the physiology that is the basis for FHR interpretation.

Appropriate management of tachysystole depends on the accompanying FHR.¹⁴ In the setting of a category I (normal) FHR tracing, tachysystole can be treated first with maternal repositioning (left or right lateral) and administration of a 500-cm³ maternal IV fluid bolus. If uterine activity does not return to normal after 10 to 15 minutes, decrease the oxytocin rate by at least half. If it does not return to normal after another 10 to 15 minutes, discontinue oxytocin until the tachysystole has resolved.

In the setting of a concerning category II FHR tracing, discontinuation of oxytocin

CONTINUED ON PAGE 44

should be the first step along with maternal repositioning and administration of a fluid bolus. If these measures do not improve the FHR tracing and tachysystole persists, administration of an acute uterine relaxant, such as terbutaline, should be considered to slow contraction frequency.

If interventions result in normalization of the FHR tracing and resolution of tachysystole for 20 to 30 minutes, then oxytocin may be restarted if necessary for labor progress at no more than half the rate that produced tachysystole.

TIP #2: Recognize an abnormal FHR tracing—and what it means

Misinterpretation of the FHR tracing occurs when there is a failure to recognize characteristics that should raise concern about fetal well-being. Failure to recognize an abnormal FHR tracing occurred in 77% of sentinel cases involving intrapartum birth injury or death.^{1,12,13} To limit misinterpretation of the FHR tracing, it is critical for nurses and physicians to use standardized terminology for clear, effective communication.

In 2008, the Eunice Kennedy Schriver National Institute of Child Health and Human Development (NICHD) published guidelines standardizing the terminology used to describe cardiotocography and to create consensus around its interpretation.¹⁵ Any description of an intrapartum FHR tracing should include a designation of category (I, II, or III). Fetal well-being is reasonably established with a category I FHR tracing. A category III tracing indicates the high likelihood of fetal acidemia and the need for immediate intervention. A category II FHR tracing is considered indeterminate, and further characterization is required to reasonably exclude fetal metabolic acidosis and a risk of fetal injury.

The presence of moderate variability and fetal response to scalp stimulation are considered reassuring findings that reasonably exclude significant metabolic acidosis. In assessing variability, one pitfall is mistaking the appearance of “variability” within a deceleration (including during return to baseline) for baseline FHR variability. In the event of a persistent category II FHR tracing

This space has purposely been left blank.

(>30 minutes), nursing staff should request direct physician review of the FHR tracing. In any case in which fetal well-being is uncertain, nursing staff should request direct physician evaluation of the mother in person and also the FHR tracing, with clear documentation of the findings, interpretation, and plan of care.¹⁶

TIP #1: Document, document, document

Nursing and physician documentation about the FHR tracing within the patient-specific clinical context is crucial for effective caregiver communication and patient safety. Thoughtful documentation also reduces liability exposure for providers by demonstrating maternal-fetal surveillance, early identification and treatment of an abnormal or indeterminate FHR tracing, and timely intervention on fetal behalf when necessary.

When the medical record aligns with the electronic FHR tracing and includes appropriate descriptions, interpretations, and interventions in line with national guidelines and institutional policy, the record demonstrates that the providers have a thorough understanding of the physiology behind cardiotocography and, more importantly, that they are able to apply that knowledge in clinical practice.⁶

Minimizing missteps

Several straightforward interventions can help clinicians overcome the most common pitfalls during FHR monitoring. These include accurate and high-quality cardiotocography, a collaborative team-based approach

to patient care, and sustained situational awareness among providers. The consistent use of common language for the description and interpretation of FHR monitoring, adherence to hospital oxytocin protocols, and well-defined expectations for fetal surveillance and provider communication are critical to overcoming these challenges. Regularly scheduled nursing and physician education sessions and interdisciplinary case review can promote the adoption and sustained incorporation of these simple techniques into daily practice.³

Some have advocated for an “electronic fetal monitoring bundle,” which would serve as a checklist of clinical evaluation steps that should occur every time a given process occurs.¹⁷ This approach would ensure that all providers on labor and delivery are qualified to read, accurately interpret, and respond to FHR tracings. It would require a credentialing process to confirm the competency of team members and reinforce the presence of a common language. It would also include an explicit escalation policy for rapid initiation of the chain of command in cases wherein there is a disagreement among team members about the FHR interpretation. Finally, each patient would be required to have, at all times, an identified responsible provider capable of a rapid response.

Although continuous FHR monitoring may not effectively reduce intrapartum fetal asphyxia, it is clearly here to stay. Recognizing—and addressing—the most common challenges encountered during intrapartum FHR monitoring may reduce unnecessary morbidity and potential liability for caregivers. 🚫

References

1. Sentinel event alert issue 30—July 21, 2004. Preventing infant death and injury during delivery. *Adv Neonatal Care*. 2004;4(4):180–181.
2. Shy KK, Luthy DA, Bennett FC, et al. Effects of electronic fetal-heart-rate monitoring, as compared with periodic auscultation, on the neurologic development of premature infants. *N Engl J Med*. 1990;322(9):588–593.
3. Clark SL, Nageotte MP, Garite TJ, et al. Intrapartum management of category II fetal heart rate tracings: towards standardization of care. *Am J Obstet Gynecol*. 2013;209(2):89–97.
4. Neilson DR Jr, Freeman RK, Mangan S. Signal ambiguity resulting in unexpected outcome with external fetal heart rate monitoring. *Am J Obstet Gynecol*. 2008;198(6):717–724.
5. McWhinney NA, Knowles S, Green HL, Gordon H. Transmission of the maternal electrocardiograph via a fetal scalp electrode in the presence of intrauterine death. Case report. *Br J Obstet Gynaecol*. 1984;91(10):1046–1048.
6. Simpson KR, Knox GE. Risk management and electronic fetal monitoring: decreasing risk of adverse outcomes and liability exposure. *J Perinat Neonatal Nurs*. 2000;14(3):40–52.
7. Gluck PA. Patient safety in women's health care: a framework for progress. *Best Pract Res Clin Obstet Gynaecol*. 2007;21(4):525–536.
8. Lyndon A, Zlatnik MG, Wachter RM. Effective physician-nurse communication: a patient safety essential for labor and delivery. *Am J Obstet Gynecol*. 2011;205(2):91–96.
9. Jackson M, Holmgren CM, Esplin MS, Henry E, Varner MW.

CONTINUED ON PAGE 46

- Frequency of fetal heart rate categories and short-term neonatal outcome. *Obstet Gynecol.* 2011;118(4):803–808.
10. Parer JT, Ikeda T. A framework for standardized management of intrapartum fetal heart rate patterns. *Am J Obstet Gynecol.* 2007;197(1):26.e1–e6.
 11. MacEachin SR, Lopez CM, Powell KJ, Corbett NL. The fetal heart rate collaborative practice project: situational awareness in electronic fetal monitoring—a Kaiser Permanente Perinatal Patient Safety Program Initiative. *J Perinat Neonatal Nurs.* 2009;23(4):314–323; quiz 24–25.
 12. Jonsson M, Norden SL, Hanson U. Analysis of malpractice claims with a focus on oxytocin use in labour. *Acta Obstet Gynecol Scand.* 2007;86(3):315–319.
 13. Berglund S, Pettersson H, Cnattingius S, Grunewald C. How often is a low Apgar score the result of substandard care during labour? *BJOG.* 2010;117(8):968–978.
 14. Doyle J, Kenny TH, Burkett AM, von Gruenigen VE. A performance improvement process to tackle tachysystole. *J Obstet Gynecol Neonatal Nurs.* 2011;40(5):512–519.
 15. Macones GA, Hankins GD, Spong CY, Hauth J, Moore T. The 2008 National Institute of Child Health and Human Development workshop report on electronic fetal monitoring: update on definitions, interpretation, and research guidelines. *Obstet Gynecol.* 2008;112(3):661–666.
 16. Knox GE, Simpson KR, Garite TJ. High reliability perinatal units: an approach to the prevention of patient injury and medical malpractice claims. *J Healthc Risk Manag.* 1999;19(2):24–32.
 17. Minkoff H, Berkowitz R; Greater New York Hospital Association's Perinatal Safety C. Fetal monitoring bundle. *Obstet Gynecol.* 2009;114(6):1332–1335.
-