

**Advanced Fetal Assessment and Monitoring:** Online Program

Advanced Practice Strategies, LLC

## **Advanced Fetal Assessment and Monitoring: Online Program**

### **Comments from the Authors**

*"As a physician who does a great deal of medical-legal expert work, I find that many physicians and nurses, where a plaintiff verdict or settlement occurs, do not have a good basic understanding of the science behind monitoring and the basis for our understanding with regard to the causation of hypoxic and non-hypoxic damage that follows birth. This often results in inappropriate documentation and lack of significant factors for defense such as saving placentas and getting cord blood gases. The insurance companies should realize that the physicians for which this program is considered too basic may not be the ones that need it. Certainly, this program will be valuable in credentialing physicians and nurses with respect to a basic knowledge that should be a minimum standard for hospitals and insurance companies who share risk with physicians and nurses."*

**Roger Freeman, MD, FACOG**

*"In reviewing the various modules, it is immediately evident that each addresses both basic and advanced concepts pertaining to fetal physiology and EFM. It often is neglect or lack of recognition of the basics which leads to avoidable adverse fetal outcomes, and thus underscores the importance of continuously emphasizing the basics."*

**Gary A. Dildy III, MD, FACOG**

*"The greatest danger that I have experienced over 30+ years now is that 'clinicians do not know what they do not know.' Therefore, they get into trouble and cannot understand why that happened. The same can be said for nurses. There truly is no understanding of the physiology/pathophysiology and when bad outcomes ensue, there frequently is a malpractice action. Upon deposition it is readily apparent that actions are based on 'rote' and not necessarily an understanding of 'why.'... That said, we should not have to 'sell' anyone on this program. To not take advantage of it, for at least a solid beginning for MD competence validation, is a real opportunity missed."*

**Bonnie Flood-Chez, RN, MSN**

## **Advanced Fetal Assessment and Monitoring: Online Program**

### **Comments from the Authors**

*"I believe that physicians have a reflex understanding of FHR monitoring, but if they really understood it, we would have a much smaller bad outcome situation and less malpractice claims and payments. I teach fetal monitoring to various hospitals and physicians practicing in those hospitals and what I have learned is that most doctors do not appreciate or understand the physiology of fetal assessment and they really do not understand when acidosis is developing and they wait too long before delivering. They just do not understand that the baby can be injured without a profound bradycardia. This course would absolutely be necessary for physicians. They need the basics, and then they can apply their other knowledge."*

**John Elliott, MD, FACOG**

*"Anyone who looks at malpractice cases knows that by far and away the most common type of case filed against OBs, and the biggest payouts, are those where FHR monitoring and lack of recognition and understanding of the pattern, and thus failure to get to emergency delivery in a timely fashion, is the issue. And reading depositions of physicians will educate anyone about the lack of understanding of 'basics' of FHR monitoring that so many of these physicians involved in litigation exhibit... I hope when someone actually goes through this program, they would get one of the most important issues we addressed which is to have consistent, understandable terminology and communications between all caregivers re the FHR pattern. This can only happen if all those involved learn the same information and have common understanding of the physiology and management needed. They should also see that from a defense point of view for these cases there is good information about what to do in these cases and what information would be helpful in defending them when they do occur, that physicians don't think about on a daily basis."*

**Dawn E. Collins, RNC, JD**

## Overview

This program focuses on best practices in electronic fetal heart monitoring, a key component of perinatal medicine.

The program is divided into seven modules, each centered on a different area of electronic fetal heart monitoring. All of the modules are case-based and include a wide range of ancillary resources such as expert opinions, links to papers, and animations.

Advanced Fetal Assessment and Monitoring was developed by Advanced Practice Strategies in Boston, Massachusetts and Hospital Corporation of America, under the aegis of the American College of Obstetricians and Gynecologists (ACOG).

## Program Objectives

Upon completion of this program, learners will be able to:

- Define methods of intrapartum fetal assessment with emphasis on electronic fetal monitoring.
- Propose clinical interventions for commonly encountered problematic clinical scenarios.
- Discuss maternal–fetal physiology and pathophysiology in order to better understand clinical management.

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By John P. Elliott, MD, FACOG



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By Scott W. Roberts, MD, FACOG



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By Bonnie Flood Chez, RNC, MSN



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By Winfred Parnell, MD, FACOG



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By Gary A. Dildy III, MD, FACOG



### **Module 6:** Neonatal Encephalopathy

By Roger K. Freeman, MD, FACOG



### **Module 7:** Risk Management

By Dawn Collins, RNC, JD

# Module Summaries

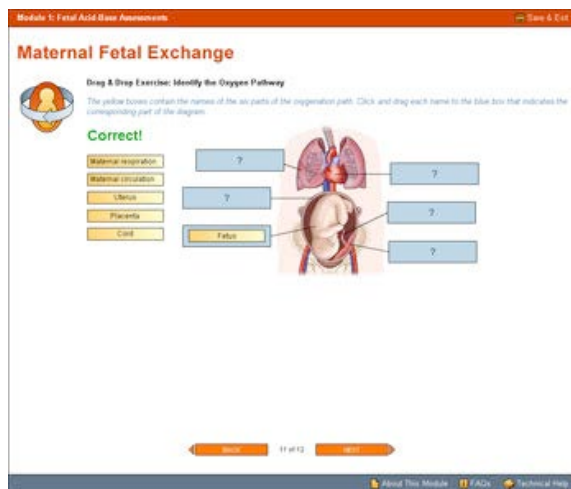


## Module 1: Maternal–Fetal Physiology and Acid-Base Assessment

By John P. Elliott, MD, FACOG

**This module builds a framework for using the fetal heart rate pattern to determine the proper intervention in a given clinical situation.**

The goal of the framework is to avoid the simple “see a pattern, interact” model. Learners are instead asked to consider the physiology behind nonreassuring patterns and the consequences to fetal oxygenation. Then, and only then, should the proper intervention be chosen. The learner is walked through two sample cases before applying the framework to three cases, where they interpret a fetal strip, determine the cause and consequences of the oxygenation issues, and choose the proper intervention. Learner responses in these three cases are used for evaluation.



*Section 1 establishes the foundation of the framework. It begins with an animation that breaks down the fetal oxygenation path into its six components: maternal inhalation, maternal circulation, uterus, placenta, umbilical cord, and fetus. A second animation discusses the effect that uterine contractions have on normal fetal oxygenation.*

*Section 2 extends the framework to inadequate fetal oxygenation. Each component of the oxygenation path is examined in greater depth, including discussions of conditions related to that component, and animations and example strips to clarify the effect of a particular condition on the oxygenation path.*



*Section 3 discusses the physiological basis of metabolic versus respiratory acidosis and the following techniques to evaluate the state of fetal oxygenation: scalp pH, fetal stimulation, and tracking fetal movement.*

*Section 4 creates the framework for proper fetal assessment, using the strip and the patient’s clinical history to pinpoint at what point and for what reason fetal oxygenation has been compromised.*



## Module 2: Electronic Instrumentation

By Scott W. Roberts, MD, FACOG

This module discusses the instruments used to monitor both fetal heart rate and uterine activity.

The module consists of four cases, each of which presents a different clinical circumstance. The learner is presented with clinical information, a fetal strip, and ancillary data, and asked to decide among various courses. After each decision, the learner is presented with the consequences of that choice, in the form of new clinical information, an updated fetal strip, and another choice. Certain choices will bring about the birth of the baby, which is accompanied by an assessment of the outcome and tutoring.

**Module 2: Telemetry Monitor**

Here is the current status of all four patients. Do you want to continue with the same patient or select a different one?

Click on a folder to manage a patient:

- Jones:** You have completed this scenario. Labor Outcome: Baby born by cesarean.
- Cook:** Labor Summary: Waiting for results. Your Last Decision: Insert FSE.
- Lydon:** Labor Summary: Mrs. Joanne Lydon's labor appears to be progressing normally, although there is some difficulty getting a reading.
- Pitche:** Labor Summary: Mrs. Jean Pitche is a large mother: 300 lbs.

My Progress: Jones, Cook, Lydon, Pitche.

Toolbox: Animations, Ask the Expert, Resources.

**Spotlight:** Each case is followed by a spotlight on one of the four electronic instruments used most frequently in fetal monitoring: Doppler ultrasound, fetal scalp electrode, tocodynamometer, and intrauterine pressure catheter. Each spotlight contains information in the following formats: animations, summaries, Ask the Expert questions, and anecdotes.

**Telemetry Page:** Where appropriate, learners are offered the opportunity to leave one case and return to the Telemetry page, from which they can choose to view another case. The Telemetry page shows the status of all four cases.

**Toolbox:** A toolbox is provided containing animations and Ask the Expert questions, and tutoring is provided where necessary on other forms of fetal monitoring.

**Sally Jones: Patient Data**

**Labor Summary:** The SPTC data shows maternal contractions are adequate. The FHR pattern, however, continues to be nonreassuring. An emergency cesarean is indicated.

**Your Last Decision:** Insert SPTC

**Vital Signs:** Blood Pressure: 100/60, Heart Rate: 120 bpm, Temp: 39, Medication: Antibiotics.

**Fetal Strip:** Shows fetal heart rate (FHR) and uterine activity (UA) over time. The FHR shows a nonreassuring pattern.

Click right to view the current patient's strip.

Navigation: back, next.

My Progress: Jones, Cook, Lydon, Pitche.

Toolbox: Animations, Ask the Expert, Resources.

**Summary:** After completing each case and viewing the Spotlight, the learner sees a summary showing all possible choices in that case. Clicking on a choice will show the result and provide tutoring on how effective that choice was. After completing all four cases, the learner is given the option to go back and redo the cases.



## Module 3: Management of Uterine Activity and Labor

By Bonnie Flood Chez, RNC, MSN

This module deals with the impact of uterine activity on the fetus and in labor as a whole.

The module consists of four cases, each of which presents a different clinical circumstance. The learner is presented with clinical information, a fetal strip, and ancillary data, and asked to decide among various courses. After each decision, the learner is presented with the consequences of that choice, in the form of new clinical information, an updated fetal strip, and another choice. Certain choices will bring about the birth of the baby, which is accompanied by an assessment of the outcome and tutoring.

**Spotlight: Misoprostol**

Click the tabs below. After you have explored all sections, click NEXT.

**Misoprostol Overview**

Over the current evidence, intravaginal misoprostol tablets appear to be effective in inducing labor in pregnant women who have unfavorable cervixes. Misoprostol's cost compares favorably with other prostaglandins used for cervical ripening or induction regimens—for example, a 100 µg tablet of misoprostol costs between \$ 20–\$1 20, while PGE2 gel costs \$60–\$75 and a PGE2 insert costs \$155. Further prospective trials are required to define an optimal dosing regimen for misoprostol. This agent is not recommended for patients with prior uterine surgery.

**Audio Controls**

Back Next

My Progress

- Crosby
- Hill
- Clark
- Cheymis

**Spotlight:** Each case is followed by a spotlight on a subject related to the management of uterine activity: misoprostol use, uterine evaluation, assessments of preterm labor, and nonpharmacologic interventions in labor. Each spotlight contains information in the following formats: summaries, Ask the Expert questions, and anecdotes.

**Telemetry:** Where appropriate, learners are offered the opportunity to leave one case and return to the Telemetry page, from which they can choose to view another case. The Telemetry page shows the status of all four cases.

**Tutoring:** Tutoring is provided where necessary on subjects related to uterine activity, such as the definition of hyperstimulation, the effects of oxytocin, and quantitating contraction activity using an intrauterine pressure catheter.

**Dana Crosby: Summary**

Here are the possible decisions and outcomes for Dana Crosby. Click any box below to see a summary of that decision point.

Decision Tree:

- Do not initiate labor
  - Administer misoprostol
    - Administer misoprostol
    - Equipment management
    - Perform cesarean
  - Administer misoprostol
    - Equipment management
    - Administer misoprostol
    - Perform cesarean
  - Begin amniotomy
    - Administer misoprostol
      - Equipment management
      - Administer misoprostol
      - Perform cesarean
    - Continue cesarean
      - Equipment management
      - Administer misoprostol
      - Perform cesarean
    - Reduce/stop oxytocin
      - Equipment management
      - Administer misoprostol
      - Perform cesarean

After completing all four patients, you may try this module again if you would like to explore the effects of making different decisions in the case.

Back Next

**Summary:** After completing each case and viewing the Spotlight, the learner sees a summary showing all possible choices in that case. Clicking on a choice will show the result and provide tutoring on how effective that choice was. After completing all four cases, the learner is given the option to go back and redo the cases.



## Module 4: Pattern Recognition

By Winfred Parnell, MD, FACOG

**This module's goal is to standardize the terminology and nomenclature of fetal heart rate monitoring in the context of a discussion on the various types of patterns seen on fetal strips and their clinical consequences.**

The module is built around example fetal strips. Significant pattern characteristics are shown using animated strips annotated and narrated by Dr. Parnell. Other example strips are also annotated to highlight strip traits that will aid in pattern recognition. Dr. Parnell also provides example cases and "Tales from the Labor Room" to provide a clinical context for pattern recognition.

**Defining FHR Components: Decelerations**

**Late Decelerations**

Late decelerations look similar to early decelerations in shape and consistency, but the timing is completely different. Late decelerations are a response to inadequate oxygen exchange in the intervillous space (placental insufficiency).

Late decelerations can be associated with intrauterine growth restriction (IUGR), chronic hypertension, severe pregnancy-induced hypertension, diabetes, and hyperstimulation.

You need to be aware of the possibility of excessive oxytocin stimulation when you see this pattern.

Click Play to explore this pattern further.

The onset, peak, and recovery of the deceleration occur after the onset, peak, and recovery of the contraction. The delay can be as much as 30 seconds.

Onset of deceleration | Peak of deceleration | Recovery of deceleration

Onset of contraction | Peak of contraction | Recovery of contraction

*Section 1 discusses the four main components of fetal heart rate patterns: baseline, variability, accelerations, and decelerations. Each component discussion ends with a knowledge check.*

*Section 2 places pattern components in clinical contexts, both as individual patterns and as trends over time. There is also a short discussion of unusual patterns. This section ends with three cases, each of which requires learners to determine the characteristics of a fetal heart rate pattern.*

**Recognizing Patterns: Test Your Skills! Case 2**

Define the pattern in this strip.

Use the pull-down menus to define the pattern. Then click SUBMIT.

FHR Baseline: 120-150

FHR Variability: Increased

FHR Accelerations: Present

FHR Decelerations: None

Is this pattern abnormal? No

*Section 3 examines the relationship between patterns and clinical outcomes—noting the difference between reassuring and nonreassuring patterns, and indicating that patterns do not always correlate with outcomes. This section ends with three cases in which learners must determine the characteristics of a fetal strip and whether the strip is reassuring or nonreassuring, and then apply this information to the clinical circumstances to determine the proper intervention in each case.*





## Module 5: Interventions and Ancillary Assessment

By Gary A. Dildy III, MD, FACOG

This module explores the various forms of intervention and assessment.

The module consists of four cases, each of which presents a different clinical circumstance. The learner is presented with clinical information and a fetal strip, and asked to decide among various courses. After each decision, the learner is presented with the consequences of that choice, in the form of new clinical information, an updated fetal strip, and another choice. Certain choices will bring about the birth of the baby, which is accompanied by an assessment of the outcome and tutoring.

**Module 5: Overview**

You are responsible for four patients who are in the early stages of labor. Just as you would a telemetry monitor on the labor floor, use the data shown here to monitor the patients' progress and determine which patient most needs your attention.

Start by selecting your first patient. If you have time during that patient's labor, use this telemetry screen to monitor the other patients.

When you are ready to begin the module, click a patient's labor.

**Lopez**  
Labor Summary: Mrs. Anna Lopez presents with ruptured membranes and frequent spontaneous contractions. She is at 2 cm dilation.

**Chu**  
Labor Summary: Mrs. Dawn Chu presents with ruptured membranes and repetitive variable decelerations. The fetal heart rate baseline is normal, but you identify repetitive variable decelerations. Thick meconium is noted.

**Linden**  
Labor Summary: Mrs. Emily Linden presents with ruptured membranes and has had an epidural injection for pain.

**Fend**  
Labor Summary: Mrs. Laura Fend presents with gestational diabetes and increased amniotic fluid. When you rupture the membranes, the cord prolapses into the vagina and the fetal rate drops to 90 beats/minute.

**Spotlights:** Each case is followed by spotlights on subjects related to fetal assessments and interventions: oxytocin use, amnioinfusion, fetal assessments, intrauterine resuscitative maneuvers, and cord prolapse management. Each spotlight contains information in the following formats: summaries, animations, Ask the Expert questions, and anecdotes.

**Presentation:** Slide presentations discuss various forms of assessment, such as fetal pulse oximetry, scalp pH, auscultation, and spectroscopy.

**Telemetry:** Where appropriate, learners are offered the opportunity to leave one case and return to the Telemetry page, from which they can choose to view another case. The Telemetry page will show the status of all four cases.

**Spotlight: Oxytocin**

Click the tabs below. After you have explored all sections, click NEXT.

Animations | Ask the Expert | Summary | Alerts | Resources

**Ask The Expert**

- What is oxytocin?
- How is oxytocin assessed for administration?
- What is the goal of oxytocin administration?
- What dosing regimens are there for oxytocin?
- What is oxytocin used for?

Click on a question to view expert feedback.

Gary A. Dildy III, MD

My Program

- Lopez
- Chu
- Linden
- Fend

Dashboard

- Animations
- Ask the Expert
- Resources

back next

**Summary:** After completing each case and viewing the Spotlight, the learner sees a summary showing all possible choices in that case. Clicking on a choice will show the result of that choice and tutoring on how effective that choice was. After completing all four cases, the learner is given the option to go back and redo the cases.



## Module 6: Neonatal Encephalopathy

By Roger K. Freeman, MD, FACOG

This module focuses on the fact that only 10% of cases of neonatal encephalopathy can be attributed to hypoxic causes. This is significant, in that malpractice cases can often be defended successfully if intrapartum hypoxia can be eliminated as a cause for birth defects.

This material discusses the effects of hypoxia versus infection on fetal development and stresses the importance of distinguishing between the two—as well as from other causes such as congenital brain disorder, congenital metabolic disorder, and intrapartum drug administration—from a risk management perspective.

The learners are presented with three cases, each of which presents a single clinical situation resulting in neonatal encephalopathy discussed over several “Takes.” The first Take of the first case tests the learner’s knowledge of ACOG guidelines for assigning hypoxia in these cases by having them choose which data they require to determine the cause of neonatal encephalopathy. In subsequent Takes across all three cases, learners must identify the correct cause of neonatal encephalopathy based on new data in the categories identified in the first Take.

Module 6: Neonatal Encephalopathy — Case 3, Exit

### Lecture

Click the tabs below to explore each section, or click NEXT to skip this portion of the Lecture.

Animations

Click a link to view an animation:

- [Endoneurial interstitial hypoxia](#)
- [Cerebral inflammatory infiltration](#)
- [Acute focal \(white matter\) asphyxia](#)

Full Term      Pre-Term

Hypoxic ischemic to cortical areas      Hypoxic ischemic to cortical areas

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My Program

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- Case 1
- Case 2
- Case 3

Toolbox

- Animations
- Tutorials
- Ask the Expert
- Responses
- Guidelines

About This Module      FAQ      Technical Help

**Toolbox:** A toolbox is provided containing animations, Ask the Expert questions, tutoring, and guidelines associated with assigning hypoxia/asphyxia as a cause for neonatal depression.

**Tutoring:** Tutoring is provided to help the learner identify clues related to the correct cause in each Take. This tutoring is provided on the Get Feedback page of each Take, after the learner has attempted to determine the cause. Tutoring for all Takes is accessible through the Toolbox.

**Summary:** Each case ends with a summary of all Takes, and the module ends with a summary of the learner’s performance across all three cases. Areas for improvement and tutoring are provided as part of the Module Summary.

Module 6: Neonatal Encephalopathy — Case 1, Exit

### Case 1: Select the Data

From the list below, select the data you need to determine the cause of the newborn's depression. Click Select Data to continue.

Data Description	Select
Fetal head monitoring	<input type="checkbox"/>
Umbilical arterial blood gases	<input type="checkbox"/>
Rh type and antibody screen	<input type="checkbox"/>
Microscopic evaluation of the placenta and umbilical cord	<input type="checkbox"/>
Maternal diet during pregnancy	<input type="checkbox"/>
History of narcotic use in the hours preceding delivery	<input type="checkbox"/>
History of maternal smoking	<input type="checkbox"/>
Neonatal imaging	<input type="checkbox"/>
Neonatal nursery course	<input type="checkbox"/>
Childhood neurological development	<input type="checkbox"/>

back      select case

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Toolbox

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- Guidelines

Case 1

Case Background

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## Module 7: Risk Management

By Dawn Collins, RNC, JD

This module looks at intrapartum management from a legal perspective.

Concepts discussed in each of the other six modules are shown in the context of medical malpractice cases.

**Rule of Thumb 1: Pattern Recognition**

Misreading the maternal heart rate for the FHR leads to an erroneous recording on the strip and false reassurance by the pattern.

**Expert Commentary**

In this case, an internal electrode was applied when the FHR was thought to be in the 70s by external monitor. Even though they applied the strip electrode and the reading of the FHR was 60-80 bpm, the nurses and physicians questioned the accuracy. They reapplied an external monitor and noted that the internal must have been applied to the mother and noted the recording in the 70s to be maternal by pulse. The mother's vital signs on the strip, however, read the maternal pulse as 110. They mistakenly considered the mother's pulse by external monitor, being taken off the external monitor, for 90 minutes.

The infant was then born severely acidotic, and subsequently died. In the malpractice case that ensued, the expert witness for the plaintiff pointed out that the maternal HR at 110-120 goes along with what is seen on the external monitor for the rest of the tracing. In the jury's mind, it seemed the physicians and nurses just could not believe the internal tracing was in the 60s, even though it shows that on the external monitor just before and it does not match the maternal pulse, and they just look it off as they didn't have to deal with it.

**Rules of Thumb:** These six sections discuss some of the more common malpractice issues: Pattern Recognition, Fetal Status, Documentation, Policies and Procedures, Thirty-Minute Guideline for Emergency Cesarean, and Vaginal Birth after Cesarean Guidelines. Each Rule of Thumb section is subdivided into specific issues, which are reinforced with example strips and case vignettes, often narrated by Dawn Collins, discussing medical issues from malpractice and juror perspectives. The Rules of Thumb are followed by a short knowledge check that is graded for learner evaluation.

**Case Studies:** Each Case Study addresses a different risk management issue: emergency cesarean guidelines, documentation and its impact on malpractice cases, VBAC guidelines, and proving preexisting fetal injury. Within the Case Studies are example strips, sample conversations and documentation, and commentary by Dawn Collins. The learner must answer questions concerning the risk management aspect of each case. At the end of the Case Studies section, the learner's performance on these questions is quantified.

**Case: Kyung-Soon Park, Scenario 2**

Here is an excerpt of the meta's notes

Doctor called to cause for delivery, Dr. notified of patient's status.

**Case Background**

- 30 minutes later: OB assess, FHR is still reassuring with variable decels
- 5 minutes later: OB reviews the FHR strip, disagrees that the strip is reassuring and accuses the nurse of not informing her about the variables, disagreement ensues about severity of variable and the OB writes his version of who said what to whom in the chart
- 10 minutes later: OB delivers infant, there is a nuchal cord times two that is reduced easily. Apgars are 7 and 9. Infant has a normal newborn course and goes home
- 10 minutes later: Diagnosed with cerebral palsy
- 3.5 years later: Lawsuit filed against physician and nurses/hospital and depositions taken

**Current Issues:** This section raises four issues that are currently of major concern: misuse of scalp simulation, fetal pulse oximetry, the application of hospital policy and procedures, and cesarean on demand. The structure of this section is similar to the Case Studies, with example strips and commentary, as well as questions to test learner knowledge. The learner's performance is again assessed at the end of this section.