Advanced Fetal Monitoring

A Multidisciplinary Approach

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Disclosure

In the interest of full disclosure, I wish to disclose my relationship with Clinical Computer Systems, Inc., as a consultant and co-developer of their “E-Tools” software.

I am also on the medical advisory board of LifeWave, Inc., a company developing a new external fetal monitoring modality.

Disclaimer

• Although I am a member of the Illinois State Bar Association and a licensed attorney in the state of Illinois, I am here today as a nurse educator, not a lawyer.
• Nothing in the program should be construed as legal advice. In other words, if you need legal advice, retain a practicing attorney!

Additionally, I am co-author of two EFM textbooks - Mosby's pocket guide: “Fetal Monitoring: A Multidisciplinary Approach”, and “Fetal Monitoring” by Lippincott

How did you do?

• Did you have any difficulty?
• How did you compare to the sample group?
• Do you think these are things clinicians using EFM should know?
• How well would you do in a deposition where EFM issues were the crux of the case?
• Should we simplify our approach?

What’s the point?

• I don’t ask all questions to torture clinicians
• The point of the exercise is not simply that nurses, midwives, and physicians don’t all select the CORRECT answer
• The point is that they do not all select the SAME answer
• Anonymous questioning clearly demonstrates that, whether we like it or not, we do not all have a “shared mental model” when it comes to EFM.
Creating a Shared Mental Model

• My goal today is to provide a quick review in the hopes that we can move towards a shared mental model in EFM interpretation and management. Ensure we are all on the same page when it comes to EFM.
• The NICHD terminology, including summary terms like the categories for FHR and the terms tachystystole and normal for uterine activity are just the starting point.
• Today’s review will move beyond terminology, and we will focus on standardized interpretation and management, which is crucial to patient safety.

EFM Deconstructed - 3 Questions

• What do we call it?
• What does it mean?
• What should we do about it?
These are the three questions clinicians are faced with every time they look at a FHR tracing. Standardizing our approaches to these questions is crucial to multidisciplinary teamwork, and it will be our focus now.

Standardizing EFM for clinicians

✓ What do I call it?
   Standardized NICHD terminology & categories
• What does it mean?
   Standardized principles of interpretation
• What do I do about it?
   Standardized multidisciplinary management using a simple series of questions designed to reduce the risk of error and based on EFM’s strength - negative predictive value related to metabolic acidemia

Intrapartum FHR monitoring is intended to assess

fetal oxygenation

Fetal oxygenation involves the transfer of oxygen from the environment to the fetus...

And the subsequent fetal physiologic response if oxygen transfer is interrupted...
What does the fetal heart rate tracing reveal about this pathway?

Start at the top
What information does the FHR tracing provide regarding oxygen transfer?

Interruption of the oxygen pathway by compression of the umbilical cord can result in a variable deceleration

Interruption of the oxygen pathway at the level of the uterus or placenta can result in a late deceleration

There is nothing inherently "ominous" about a late deceleration and there is nothing inherently "benign" about a variable deceleration - but both are significant when it comes to the oxygen pathway!
All FHR decelerations that have any potential clinical significance have the same common trigger...

Interruption of oxygen transfer from the environment to the fetus at one or more points along the oxygen pathway

So, when we see a late, variable, or prolonged decel, we can agree that the oxygen pathway has been interrupted at one or more points...

Principle #1
Variable, late or prolonged decelerations signal interruption of the oxygen pathway at one or more points

The second half of the pathway
What information can the FHR tracing provide regarding the fetal response to interruption of the oxygen pathway?

The 2008 NICHD consensus statement identified two fetal heart rate characteristics that reliably predict the absence of fetal metabolic acidemia at the time they are observed

But the converse is NOT true:

- Minimal-absent variability **DOES NOT** reliably predict the presence of metabolic acidemia
- The absence of accelerations **DOES NOT** reliably predict the presence of metabolic acidemia or hypoxia
What is the physiologic significance of excluding metabolic acidemia?

The publication was endorsed by:

1. American College of Obstetricians and Gynecologists
2. American Academy of Pediatrics
3. Centers for Disease Control and Prevention
4. Child Neurology Society
5. March of Dimes Birth Defects Foundation
6. National Institute of Child Health and Human Development
7. Royal Australian and New Zealand College of Obstetricians and Gynecologists
8. Society for Maternal-Fetal Medicine
9. Society of Obstetricians and Gynaecologists of Canada

Metabolic acidemia

is one of the prerequisites to intrapartum hypoxic neurologic injury

(pH < 7, BD ≥ 12 mmol/L)

Standard Definitions

We have achieved consensus in the United States on the terminology used to describe the five components of a FHR tracing and use a 3-tiered Category approach

Standard interpretation

Three central principals of FHR interpretation are evidence-based and reflect consensus in the literature
## Standardizing EFM for clinicians

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## What do we do about it?

- The objective of a “standardized management” protocol is to minimize the opportunities for preventable error
- Risk factors for error include clinicians relying on random recall (memory will fail you), lack of a checklist, unnecessary complexity, and lack of a shared mental model among team members
- Additionally, even the best scenarios for practice cannot prevent all poor outcomes - in those cases, the obstetric team must be able to articulate the rationale for their actions in order to defend their practice.

## A Standardized Intrapartum FHR Management Model

### Four Central Concepts

**“ABCD”**

- A – Assess the oxygen pathway/review differentials
- B – Begin conservative corrective measures
- C – Clear for delivery (the 5 “p”s)
- D – Decision to delivery time

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## Does this mean you need to use all seven conservative corrective measures in every case?

Of course not

Use the conservative corrective measures that you deem appropriate for the clinical situation

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## For example, amnioinfusion might be helpful in the setting of frequent variable decelerations due to cord compression

But it would not be expected to be beneficial in the setting of recurrent late decelerations

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## If a tracing remains in Category II after conservative corrective measures, how do you decide whether it is safe to continue labor?

Why not exclude metabolic acidemia?  
*(moderate variability and/or accelerations)*

And exclude significant interruption of oxygenation?  
*(no significant decelerations)*
What if I’m not sure about the variability or I can’t decide of the deceleration frequency and depth are clinically significant?

If you have *any question* about the correct answers to these questions...

If you have *any question* about the clinical significance of a deceleration, the presence of moderate variability or accelerations, the safest approach is to proceed to the next step in standardized management.

A Propose Standardized Intrapartum FHR Management Model

Four Central Concepts

“ABCD”

A – Assess the oxygen pathway & other causes
B – Begin corrective measures
C – Clear obstacles to rapid delivery

Clear obstacles to rapid delivery

If conservative measures do not correct the FHR tracing, it is prudent to plan ahead for the possible need for rapid delivery.

*This does NOT commit the patient to delivery*

It simply identifies common sources of unnecessary delay in a systematic way so they can be addressed in timely fashion.

By doing this, it demonstrates reasonableness and prudence, two elements that define the standard of care.

Clear obstacles to rapid delivery

These simple precautions are not often emphasized in a systematic way.

But failing to address them can be a major source of criticism in the event of an untoward outcome.

“Common sense is not that common”

Is vaginal delivery likely to occur before the FHR tracing loses the ability to exclude metabolic acidemia?
USE INDIVIDUAL CLINICAL JUDGMENT TO ESTIMATE:

Time until vaginal delivery

Metabolic acidemia

Vaginal delivery

How in the world do you do that?

USE INDIVIDUAL CLINICAL JUDGMENT TO ESTIMATE:

Time until the onset of metabolic acidemia

Normal fetal heart rate tracing

Recurrent decelerations

Minimal-absent variability

60 – 90 minutes

Metabolic acidemia and potential injury

This is sometimes a very tough decision to make

No matter our decision is, we’ll never be able to guarantee a good outcome

Having a bad outcome despite a well-thought out plan is not necessarily unreasonable

It is much more difficult to convince someone that our actions were reasonable if we neglect to make a plan... fail to make a decision at a critical point

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