

AHRQ Safety Program for Perinatal Care

Monitoring for Perinatal Safety: Electronic Fetal Monitoring

Purpose of the tool: This tool describes the key perinatal safety elements that support the use of electronic fetal monitoring (EFM). The key safety elements are presented within the framework of the Comprehensive Unit-based Safety Program (CUSP).

Who should use this tool: Nurses, physicians, midwives, and other labor and delivery (L&D) unit staff responsible for assessment, interpretation, management, communication, and documentation of fetal heart rate patterns and uterine activity observed through EFM.

How to use this tool: Review the key perinatal safety elements with L&D leadership and unit staff to determine how the elements will be implemented on your L&D unit. Consider any existing unit procedures, policies, or processes related to the use of EFM to support implementation. Consider existing policies, standing orders, or processes that refer to EFM findings that may need to be updated.

Key Perinatal Safety Elements

<i>Standardize When Possible (CUSP Science of Safety)</i>	
Key Perinatal Safety Elements	Examples
Use standard terminology to describe and document fetal heart rate (FHR) and uterine contraction pattern assessment for all patients who are receiving continuous EFM.	<ul style="list-style-type: none">• The 2008 National Institute for Child Health and Human Development (NICHD) Workshop developed nomenclature that has been adopted by several professional organizations as the standard nomenclature for describing FHR and uterine contraction patterns.¹⁻³• Use of the standard NICHD nomenclature for communicating and documenting EFM findings provides a common language for use among providers and staff to decrease variation and provide accurate communication among caregivers.• A complete description of an EFM tracing requires a qualitative and quantitative assessment of the following: uterine contractions, baseline FHR, baseline FHR variability, presence of FHR accelerations, periodic or nonperiodic FHR decelerations, and changes in trend over time.



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Standardize When Possible (CUSP Science of Safety) (continued)	
Key Perinatal Safety Elements	Examples
<p>Use standard terminology to describe and document fetal heart rate (FHR) and uterine contraction pattern assessment for all patients who are receiving continuous EFM. (continued)</p>	<ul style="list-style-type: none"> • Several professional organizations offer EFM training courses or certifications: <ul style="list-style-type: none"> ○ Association of Women's Health Obstetrics and Neonatal Nurses, http://www.awhonn.org Search: "fetal heart monitoring," ○ Perinatal Quality Foundation, http://fmc.perinatalquality.org, ○ GE Healthcare, http://www3.gehealthcare.com Search: "Electronic Fetal Heart Rate Monitoring," ○ Advanced Practice Strategies http://www.aps-web.com/gnosis-for-ob/, ○ National Certification Corporation, http://www.nccwebsite.org/Certification, ○ Local universities, academic medical centers, and research centers may also offer courses and certification programs in EFM.
<p>Use a standard, three-tier system for FHR interpretation for all patients who are receiving continuous EFM.</p>	<p>The 2008 NICHD Workshop also proposed a three-tier system for interpreting FHR tracings. This system is a mechanism for linking observed FHR findings on the current fetal acid-base status and can suggest a general clinical management strategy.^{1,2}</p> <ul style="list-style-type: none"> • <i>Category I</i> FHR tracings are strongly predictive of normal fetal acid-base status. No specific action is required. • <i>Category II</i> FHR tracings are indeterminate. These tracings require evaluation, further clinical correlation, and continued surveillance. • <i>Category III</i> FHR tracings are predictive of abnormal fetal acid-base status. These tracings require prompt evaluation and action to resolve.

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Standardize When Possible (CUSP Science of Safety) (continued)	
Key Perinatal Safety Elements	Examples
Use a standard, three-tier system for FHR interpretation for all patients who are receiving continuous EFM. (continued)	Use of the standard three-tier system for interpreting and communicating FHR tracings provides a common language for use among providers and staff to decrease variation and provide accurate communication among caregivers.
Create Independent Checks (CUSP Science of Safety)	
Key Perinatal Safety Elements	Examples
Provide cognitive aids for standard EFM terminology at the point of care.	Clinician pocket cards and bedside reference aids that describe the 2008 NICHD nomenclature and three-tier system for interpretation can be used to provide quick access for staff reference. A sample cognitive aid with NICHD nomenclature is provided in the Appendix of this tool.
Use uniform parameters for provider notification.	Use of uniform, unit-established parameters for provider notification of EFM findings ensures that signs of potential adverse effects or clinical deterioration are communicated for situational awareness and response if needed.
Use standing nurse orders and rapid response systems for some or all Category III FHR tracings.	Use of unit-established standing nurse orders Category III FHR tracings. Prompt recognition and action may prevent “failure to rescue.” Standing orders for first response may include maternal oxygen, maternal repositioning, discontinuing labor-stimulating agents, and treatment of hypotension with IV fluids. ^{1,2} Standing orders may also include activation of a rapid response when provider is not immediately available, or disagreement among staff regarding EFM interpretation exists. The rapid response may include— <ul style="list-style-type: none"> • calling an in-house maternity care provider when patient’s provider is not immediately available • calling an in-house neonatal provider or neonatal response team • calling a multidisciplinary rapid response maternity care team, which may include an maternity care provider, an L&D nurse, and an anesthesiology provider

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Learn From Defects (CUSP Module)	
Key Perinatal Safety Elements	Examples
<p>Debrief and analyze near misses and adverse events and the contribution of EFM use, EFM interpretation, and communication of EFM findings</p>	<ul style="list-style-type: none"> • Unit can decide its approach to debriefing events based on seriousness of event, expertise available, and data monitoring and tracking capabilities. <ul style="list-style-type: none"> ○ Informal debriefings by clinical team immediately following event using an approach that does not shame or blame individuals. This allows for understanding of what went well, what could have gone better, and what could be done differently next time. ○ Regular forum with a multidisciplinary team can help the unit learn from defects and sensemaking using the following tools: <ul style="list-style-type: none"> ▪ Discovery form ▪ Root cause analysis ▪ Eindhoven model ▪ Failure mode and effects analysis ▪ Probabilistic risk assessment ▪ Causal tree worksheet ▪ Interdisciplinary case reviews
<p>Have a process in place to review severe maternal or neonatal morbidity and mortality events.</p>	<p>Unit can decide its approach to reviewing cases of severe maternal or neonatal morbidity or mortality. This might include an existing medical peer-review process or review by a perinatal safety or quality committee.</p> <p>A sample process and forms for a committee review are available at the Council on Patient Safety in Women’s Health Care.</p> <p>http://www.safehealthcareforeverywoman.org. Select “Get SMM Forms” menu.</p>
<p>Share outcomes or process improvements from the informal (debriefing) and formal analysis with staff to achieve transparency and organizational learning.</p>	<p>Sites can decide how often, how much, and with whom this information will be shared and whether this is specified in a unit policy or is handled more informally.</p>

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Simulation (SPPC Program Pillar)	
Key Perinatal Safety Elements	Examples
<p>Sample Scenarios:</p> <ul style="list-style-type: none"> • Several scenarios include EFM use 	<ul style="list-style-type: none"> • Several of the sample scenarios available through the Safety Program for Perinatal Care can be used to train teams on the key perinatal safety elements related to EFM use, interpretation, and communication. These scenarios reinforce teamwork and communication related to— <ul style="list-style-type: none"> ○ situational awareness; ○ ability to get additional help quickly; ○ use of cognitive aids for nomenclature to use for communicating EFM findings and interpretation; ○ timely use of standing orders for managing Category II or III FHR tracings; ○ communication with rapid responders, ○ communication with patient/family; and ○ use of briefings, huddles, and debriefings.
Teamwork Training (TeamSTEPPS®)	
Key Perinatal Safety Elements	Examples
<p>Have situational awareness during use of EFM.</p>	<p>Situational awareness refers to all staff caring for the patient—</p> <ul style="list-style-type: none"> • knowing what the patient’s plan is through briefings and team management, • being aware of what is going on and what is likely to happen next, • verifying and checking back on information, and • providing ongoing updates. <p>In the context of EFM, situational awareness is particularly relevant for Category II tracings, where continued surveillance is often required before a definitive course of action can be determined, and staff should know what resources are available should a sudden change in patient status occur.</p>

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Teamwork Training (TeamSTEPPS®) (continued)	
Key Perinatal Safety Elements	Examples
<p>Use SBAR (Situation, Background, Assessment, and Recommendation), callouts, huddles, and closed-loop communication techniques.</p>	<p>Use SBAR, callouts, huddles, and closed-loop communication among team members. In the context of EFM, these techniques are particularly useful—</p> <ul style="list-style-type: none"> • for communicating a sense of urgency when requesting other unit personnel and provider for help responding to sudden changes in fetal status (e.g., Category III FHR tracings), • for communicating changes in maternal or fetal status, • when giving and receiving new orders to manage sudden changes in maternal or fetal status, • when briefing new care team members who arrive during a rapid response, and • when regrouping to determine plan of care if patient does not respond to initial measures.
<p>Use a predetermined approach to call for additional rapid assistance.</p>	<p>Unit-established process for eliciting a rapid response for specific Category III EFM findings requiring immediate action.</p> <p>This process may include—</p> <ul style="list-style-type: none"> • calling an in-house maternity care provider when patient’s provider is not immediately available; • calling an in-house neonatal provider or neonatal response team; • calling a multidisciplinary rapid response maternity care team, which may include a maternity care provider, an L&D nurse, and an anesthesiology provider; and • alerting the operating room staff to mobilize for cesarean section.
<p>Communicate during transitions of care.</p>	<p>Use of transition communication techniques assures a shared mental model of plan of care and perceived risks between shifts or between units. This may include bedside review by nursing team of patient’s recent EFM strip, interpretation, and any further evaluation or treatment in response to the strip.</p>

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Teamwork Training (TeamSTEPPS®) (continued)	
Key Perinatal Safety Elements	Examples
<p>Have high-reliability teams.</p> <ul style="list-style-type: none"> • Anyone can sound an alarm, request help, or challenge the status quo. • Hierarchy is minimized. • Communication is continuous, valued, and expected. 	<ul style="list-style-type: none"> • Team members protect each other from work overload, place requests, or offers for assistance in the context of patient safety. It is expected that assistance will be actively sought and offered. • Team members will advocate for the patient when one person’s viewpoint does not coincide with another’s. <ul style="list-style-type: none"> ○ Assert a corrective action in a firm and respectful manner. ○ Use CUS language: “I am concerned. I am uncomfortable. This is a safety issue.” ○ Use the Two Challenge rule, repeat the concern, and inquire whether concern has been heard. ○ Use a predetermined “stop the line” phrase. • Team members manage conflict using a constructive positive approach to emphasize “what is right, not who is right”: <ul style="list-style-type: none"> ○ D: Describe the specific behavior or situation. ○ E: Express how the situation makes you feel or concerns you. ○ S: Suggest other alternatives. ○ C: Consequences stated in terms of team goals, not punishment.
Patient and Family Engagement (CUSP Module)	
Key Perinatal Safety Elements	Examples
<p>Engage patient in decisions to use continuous EFM versus intermittent auscultation in appropriate candidates.</p>	<p>Some units may elect to offer appropriate patients the option of selecting between continuous EFM or intermittent auscultation (IA), or another approach to monitoring. A unit-established process should:</p> <ul style="list-style-type: none"> • Specify patient, nurse, and unit criteria for use of IA. For example, maternal criteria, nurse competency or experience required, unit staffing ratio required for use of IA. • Include a discussion of risks and benefits of using continuous EFM versus intermittent auscultation with patients.⁴

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<i>Patient and Family Engagement (CUSP Module) (continued)</i>	
Key Perinatal Safety Elements	Examples
<p>Communicate with patient and family during episode involving possible fetal deterioration per EFM.</p>	<ul style="list-style-type: none"> • Patient and family are part of the team. <ul style="list-style-type: none"> ○ Ensure a shared mental model with patient and family as well as the clinical team. ○ Have training and policies for L&D staff to provide timely, clear information to patient and family to explain what is happening, what needs to happen next, risks, benefits, and processes for obtaining consent. ○ Provide reassurance continuously.
<p>Disclose any unintended outcomes.</p>	<p>Unit-established process for disclosing unintended outcomes. This may include the following:</p> <ul style="list-style-type: none"> • Prompt, compassionate, and honest communication with the patient and family • Investigation • Ongoing communication with the patient and family • Apology and remediation • System and process improvement • Measurement and evaluation • Education and training

References

1. Macones GA, Hankins GD, Spong CY, et al. The 2008 National Institute of Child Health and Human Development workshop report on electronic fetal monitoring: update on definitions, interpretation, and research guidelines. *J Obstet Gynecol Neonatal Nurs.* 2008 Sep-Oct;37(5):510-5. PMID: 18761565.
2. Macones GA, Hankins GD, Spong CY, et al. 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 Sep;112(3):661-6. PMID: 18757666.
3. American College of Obstetricians and Gynecologists. ACOG Practice Bulletin No. 106: Intrapartum fetal heart rate monitoring: nomenclature, interpretation, and general management principles. *Obstet Gynecol.* 2009 Jul;114(1):192-202. PMID: 19546798. [Reaffirmed 2015]
4. Heelan L. Fetal monitoring: creating a culture of safety with informed choice. *J Perinat Educ.* 2013 Summer;22(3):156-65. PMID: 24868127.

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Appendix

Every effort was made to ensure the accuracy and completeness of this resource. However, the U.S. Department of Health and Human Services makes no warranties regarding errors or omissions and assumes no responsibility or liability for loss or damage resulting from the use of information contained within.

Sample Cognitive Aid for Electronic Fetal Monitoring Nomenclature

Based on 2008 National Institute for Child Health and Human Development Workshop Report¹

Tachysystole: 6 or more contractions/10 min averaged over a 30-min window, either spontaneous or stimulated (do not use “hyperstimulation” or “hypercontractility”).

Normal: 5 or fewer contractions/10 min averaged over a 30-min window.

Baseline FHR: mean FHR rounded to increments of 5 bpm. Must have 2 min of identifiable baseline segments (not necessarily contiguous) in any 10-min window; otherwise, the baseline is **indeterminate**.

Normal baseline 110-160; **Bradycardia** < 110 bpm; **Tachycardia** > 160 bpm.

FHR variability: determine in a 10-minute window, excluding accelerations and decelerations; **absent** is undetectable, **minimal** is detectable but ≤ 5 bpm, **moderate** 6-25 bpm, **marked** > 25 bpm.

Acceleration: onset to the peak in < 30 seconds, and must last ≥ 15 seconds and be ≥ 15 bpm; before 32 weeks, use peak ≥ 10 bpm lasting ≥ 10 seconds.

Prolonged acceleration: ≥ 2 min but < 10 min in duration.

Baseline change: accelerations or decelerations lasting ≥ 10 min.

Prolonged deceleration: decreased FHR ≥ 15 bpm, lasting ≥ 2 min, but < 10 min long.

Recurrent decelerations: occur with $\geq 50\%$ contractions in any 20-min window.

Intermittent decelerations: occur with < 50% contractions in any 20-min window.

Periodic decelerations: associated with uterine contractions.

Episodic decelerations: not associated with uterine contractions.

Variable Decelerations

Appearance: abrupt decrease in FHR with beginning to nadir of < 30 seconds, ≥ 15 bpm, lasting ≥ 15 seconds, and < 2 min in duration.

Timing: may occur with or without contractions.

Late Decelerations

Appearance: symmetrical, gradual (≥ 30 seconds) decrease to nadir and return associated with a uterine contraction.

Timing: In most cases, the onset, nadir, and recovery occur after the beginning, peak, and ending of the contraction.

Early Decelerations

Appearance: identical to late decelerations.

Timing: In most cases the onset, nadir, and recovery of the deceleration are coincident with the beginning, peak, and ending of the contraction.

(Note: early decelerations are not common and are often confused with late decelerations.)

Category I: no specific action is required.

Baseline 110-160 bpm; variability is moderate; accelerations are present or absent; late or variable decelerations are absent; early decelerations may be present or absent.

Category II: indeterminate, requires reevaluation and continued surveillance.

Includes all FHR tracings not categorized as Category I or Category III.

(Note: Category II is very common at some point during labor.)

Category III: abnormal, requires prompt evaluation, maternal oxygen, change in maternal position, discontinuation of labor stimulation, treatment of maternal hypotension.

(Note: may require emergency CS.)

Includes **absent baseline FHR variability** and any of the following: *recurrent late decelerations*, *recurrent variable decelerations*, or *bradycardia*.

Also includes **sinusoidal patterns** (sine-wave-like pattern with frequency of 3-5/min that persists ≥ 20 min).

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Reference

1. Macones GA, Hankins GD, Spong CY, et al. The 2008 National Institute of Child Health and Human Development workshop report on electronic fetal monitoring: update on definitions, interpretation, and research guidelines. J Obstet Gynecol Neonatal Nurs. 2008 Sep-Oct;37(5):510-5. PMID: 18761565.

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