Critical Illness During Pregnancy
Considerations for Evaluation and Treatment of the Fetus as the Second Patient

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When a critically ill woman is pregnant, clinical interventions for the mother can have a profound effect on fetal status. It is essential that the fetus be considered as the second patient when developing the plan of care. The most practical solution for providing comprehensive care to pregnant women in the intensive care unit (ICU) is a collaborative approach involving members of the ICU and the perinatal team, each contributing their unique knowledge and skills to the care of the mother and her unborn baby. The purpose of this article is to describe a collaborative approach to caring for a pregnant woman in the ICU along with a brief overview of fetal assessment for ICU care providers so that they can become familiar with terms and methods used in assessing fetal status and common interventions that promote fetal well-being.

Key words: critical care obstetrics, critically ill pregnant women, electronic fetal monitoring, fetal assessment, fetal heart rate patterns

A DMISSION of a pregnant woman to the intensive care unit (ICU) presents a unique challenge. Care is required for 2 patients, one of which is unseen, but for whom there are significant implications based on the mother’s condition and clinical interventions. The primary method of assessing fetal status is electronic fetal monitoring (EFM). Because pregnant women are generally young and healthy, they are seldom patients in the ICU. Therefore, knowledge and skills related to fetal heart rate (FHR) pattern interpretation are not expected of ICU care providers. Similarly, perinatal care providers have limited exposure to patients requiring ventilator support or hemodynamic monitoring. The most practical solution for providing comprehensive care to pregnant women in the ICU is a collaborative approach involving members of the ICU and the perinatal team, each contributing its unique knowledge and skills to the care process. The purpose of this article is to describe a collaborative approach to caring for a pregnant woman in the ICU and to provide a brief overview of fetal assessment for ICU care providers so that they can become familiar with terms and methods used in assessing fetal status and common interventions that promote fetal well-being.

COLLABORATION AND PLANNING

Pregnant women rarely develop conditions requiring ICU care. In a recent study analyzing 14 years of data from ICU admissions in the state of Maryland, it was found that ICU admissions of pregnant women were 0.14% of all inpatient births in major teaching hospitals, 0.13% in minor teaching hospitals, and 0.11% in community hospitals. The median length of stay was 2 days, with 45% of women requiring 1 day or less of ICU care. The most common diagnoses for
obstetric admissions to the ICU include (in order of frequency) preeclampsia/eclampsia, postpartum hemorrhage, abruption of placenta/placenta previa, pulmonary complications, infection, anesthesia-related complications, cardiac complications, shock, gestational diabetes, acute renal failure, cerebral vascular accident, and amniotic and/or blood clot embolism.1–4 The unusual nature of this type of admission creates distinct challenges because it is unlikely that team members from either the ICU or the perinatal unit have the dual set of knowledge and skills required to care for both the critically ill mother and her unborn baby. Collaboration between ICU and perinatal care providers is the best approach to promote the most optimal outcome for both patients.

Ideally, a formal plan should be developed by the leadership team of both specialty units. In community hospitals, this plan should involve written criteria for transfer to a higher level of care as appropriate, with agreements with physician specialists in the receiving institution to accept pregnant women who require ICU care. Preferably, a maternal transport team in the receiving institution should be available to assume responsibility for care during transport. In institutions that provide ICU care for pregnant women, a well-coordinated system should be established that involves availability of a team of care providers including members who are competent in fetal assessment, hemodynamic monitoring, and ventilatory support. An on-call system to ensure timely availability of qualified personnel works well. Place of care should be determined on the basis of mother’s clinical condition. If the critically ill woman is nonlaboring, the ICU setting is likely most appropriate, with a labor nurse at the bedside if fetal monitoring is necessary. However, if the woman is in labor, the labor and birth unit may be a more proper setting, with members of the critical care team in attendance to take responsibility for ventilatory support and/or hemodynamic monitoring.

A mutually agreed upon plan should be available on the labor unit and in the ICU. Considerations for developing a formal plan or policy include the following5,6:

- Criteria for admission of a pregnant woman to the ICU
- Under what clinical circumstances should labor and/or birth occur in the ICU?
- Is the best place for this patient the ICU with a labor nurse at the bedside or the labor unit with a critical care nurse at the bedside?
- Who will be ultimately responsible for directing care and treatment?
- Plans for an emergent cesarean birth if indicated
- Plans for attendance of the neonatal resuscitation team at birth
- An on-call or contingency plan to assure availability of appropriate care providers in a timely manner

When a critically ill woman is pregnant, clinical interventions, including medications, can have a profound effect on fetal status. It is essential that the fetus be considered as the second patient when developing the plan of care. Gestational age of the fetus is a significant factor determining how the fetus will be affected by maternal interventions as well as the type of fetal surveillance that is appropriate.6

**PROMOTING FETAL WELL-BEING**

Fetal well-being requires a hemodynamically stable, well-oxygenated mother and a well-oxygenated fetus. To promote fetal oxygenation, essential clinical criteria must be met, including adequate maternal cardiac output, blood pressure, hemoglobin levels, and oxygen saturation; adequate blood flow to the uterus and placenta; adequate placental function; normal uterine activity (in ICU patients, this usually implies no uterine contractions); and uninterrupted umbilical blood flow to the fetus (ie, absence of umbilical cord compression). While many patients in the ICU are supine with the head of the bed elevated slightly, this position is not ideal for pregnant women because it results in aortocaval compression and decreased cardiac
output and blood pressure, leading to a decrease in blood flow to the uterus and placenta and ultimately a negative effect on exchange of oxygen between the mother and the fetus. Aorto-caval compression effectively decreases venous return and increases cardiac afterload, which can result in a decrement of up to 30% in ejection fraction. A lateral position works best to promote maternal-fetal oxygen exchange; however, if this is not feasible given the patient’s condition, at minimum a left or right hip wedge should be used. Maternal hemoglobin levels should be maintained at least to 10 g/dL to be adequate to carry oxygen to the placenta to be transferred to the fetus via passive diffusion. Maternal oxygen saturation should be maintained at at least 95% in order to promote adequate fetal oxygenation. Uterine activity should be minimized and can be controlled with intravenous (IV) fluid volume, terbutaline, or magnesium sulfate as the patient’s condition allows. Umbilical cord compression may be treated with maternal position changes as appropriate to the patient’s condition.

FETAL ASSESSMENT

The following information about fetal assessment is presented to familiarize critical care providers with various methods to assess fetal status, terminology used to describe characteristics of FHR tracings, and appropriate interventions based on FHR data. This brief overview is not meant to provide enough information for ICU providers to interpret FHR tracings, but rather to promote communication with perinatal care providers when caring for a critically ill pregnant woman.

Electronic fetal monitoring

Assessment of fetal well-being at 24 weeks or more of gestation is usually accomplished via EFM. Gestational age of the fetus and the mother’s condition are determinants of whether monitoring is intermittent or continuous. Data can be obtained via external ultrasound or internal fetal spiral electrode, although most women in the ICU will have external monitoring. Internal monitoring is reserved for women in labor with ruptured amniotic membranes. They may require this type of invasive monitoring because of inadequate or equivocal data from external monitoring. Fetal heart rate tracings provide information about ongoing fetal status. Four components of the FHR tracings are included in routine evaluation. These include the baseline rate, baseline variability, and presence or absence of FHR accelerations and FHR decelerations. In 1997, the National Institute of Child Health and Human Development Research Planning Workshop recommended the use of standard terminology to improve agreement in FHR interpretation among members of the perinatal team and researchers studying fetal status. The Association of Women’s Health, Obstetric and Neonatal Nurses and the American College of Obstetricians and Gynecologists recently supported adoption of these recommendations. This terminology includes definitions for common FHR patterns (Table 1).

FHR patterns

The normal baseline FHR is between 110 beats per minute (bpm) and 160 bpm. The baseline rate is evaluated over at least a 10-minute period and is determined by the mean rate rounded to increments of 5 bpm, eg, 130 bpm or 135 bpm (Fig 1). An FHR of less than 110 bpm for 10 minutes or more is considered bradycardia, while an FHR of greater than 160 bpm for 10 minutes or more is considered tachycardia. Fetal heart rate variability is visually assessed by evaluating fluctuations from the baseline (Fig 1). There are 4 categories of variability: absent (amplitude undetectable), minimal (amplitude greater than undetectable but ≤ 5 bpm), moderate (amplitude 6–25 bpm), and marked (amplitude > 25 bpm) (Fig 2). Moderate variability is considered normal. Periodic increases or accelerations of the FHR above the baseline rate are indications of fetal well-being. If the fetus is at term, an acceleration ≥15 bpm above the
Table 1. Fetal heart rate characteristics and patterns∗,†

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline rate</td>
<td>Approximate mean FHR rounded to increments of 5 beats per minute (bpm) during a 10-min segment excluding periodic or episodic changes, periods of marked variability, and segments of baseline that differ by &gt;25 bpm. In any 10-min window, the minimum baseline duration must be at least 2 min or the baseline for that period is indeterminate. In this case, one may need to refer to the previous 10-min segment for determination of the baseline.</td>
</tr>
<tr>
<td>Bradycardia</td>
<td>Baseline rate of &lt;110 bpm.</td>
</tr>
<tr>
<td>Tachycardia</td>
<td>Baseline rate of &gt;160 bpm.</td>
</tr>
<tr>
<td>Baseline variability</td>
<td>Fluctuations of 2 cycles/min or greater in the baseline FHR. These fluctuations are irregular in amplitude and frequency and are visually quantified as the amplitude of the peak to trough in bpm.</td>
</tr>
<tr>
<td>Absent variability</td>
<td>Amplitude range undetectable.</td>
</tr>
<tr>
<td>Minimal variability</td>
<td>Amplitude range &gt; undetectable and ≤5 bpm.</td>
</tr>
<tr>
<td>Moderate variability</td>
<td>Amplitude range 6–25 bpm.</td>
</tr>
<tr>
<td>Marked variability</td>
<td>Amplitude range &gt;25 bpm.</td>
</tr>
<tr>
<td>Acceleration</td>
<td>Visually apparent <em>abrupt</em> increase (onset to peak is &lt;30 s) in FHR above baseline. The increase is calculated from the most recently determined portion of the baseline. Acme is ≥15 bpm above the baseline and lasts ≥15 s and &lt;2 min from the onset to return to baseline. Before 32 weeks of gestation, an acme ≥10 bpm above the baseline and duration of ≥10 s is an acceleration.</td>
</tr>
<tr>
<td>Prolonged acceleration</td>
<td>Acceleration ≥2 min and &lt;10 min duration.</td>
</tr>
<tr>
<td>Early deceleration</td>
<td>Visually apparent <em>gradual</em> decrease (onset to nadir is ≥30 s) of the FHR and return to baseline associated with a uterine contraction. This decrease is calculated from the most recently determined portion of the baseline. It is coincident in timing, with the nadir of deceleration occurring at the same time as the peak of the contraction. In most cases, the onset, nadir, and recovery of the deceleration are coincident with the beginning, peak, and ending of the contraction, respectively.</td>
</tr>
<tr>
<td>Late deceleration</td>
<td>Visually apparent <em>gradual</em> decrease (onset to nadir is ≥30 s) of the FHR and return to baseline associated with a uterine contraction. This decrease is calculated from the most recently determined portion of the baseline. It is delayed in timing, with the nadir of deceleration occurring after the peak of the contraction. In most cases, the onset, nadir, and recovery of the deceleration occur after the onset, peak, and ending of the contraction respectively.</td>
</tr>
<tr>
<td>Variable deceleration</td>
<td>Visually apparent <em>abrupt</em> decrease (onset to beginning of nadir is &lt;30 s) in FHR below baseline. The decrease is calculated from the most recently determined portion of the baseline. Decrease is ≥15 bpm, lasting ≥15 s and &lt;2 min from onset to return to baseline. When variable decelerations are associated with uterine contractions, their onset, depth, and duration vary with successive uterine contractions.</td>
</tr>
<tr>
<td>Prolonged deceleration</td>
<td>Visually apparent decrease in FHR below baseline. The decrease is calculated from the most recently determined portion of the baseline. Decrease is ≥15 bpm, lasting ≥2 min but &lt;10 min from onset to return to baseline.</td>
</tr>
<tr>
<td>Recurrent decelerations</td>
<td>Occurring with ≥50% of uterine contractions in any 20-min segment.</td>
</tr>
</tbody>
</table>

*Adapted from National Institute of Child Health and Human Development Research Planning Workshop.8
†FHR indicates fetal heart rate.
Figure 1. Fetal heart rate (FHR) baseline and variability determination. Mean FHR rounded to increments of 5 beats per minute (bpm) (135). Fluctuations upward and downward from the baseline rate (moderate, 6–25 bpm). This is a reassuring FHR tracing (normal baseline rate and variability; presence of accelerations; absence of decelerations).

baseline rate for ≥15 seconds is considered reassuring, while in the preterm fetus (<32 weeks' gestation) an acceleration of ≥10 bpm lasting ≥10 seconds is considered reassuring.

Decelerations or decreases in the FHR below the baseline rate can suggest fetal compromise. There are 4 types of decelerations: early, late, variable, and prolonged, each with specific defining criteria and clinical implications. Early and late decelerations are identified on the basis of their relationship to uterine contractions. Early decelerations are gradual (≥30 seconds from onset to nadir) decreases in the FHR from the baseline rate that occur in synchrony with contractions and are generally considered to be benign. Late decelerations are also gradual decreases in the FHR from the baseline rate; however, the timing is late with respect to the contraction. Late decelerations usually begin around the peak of the contraction with the nadir and return to baseline occurring after the contraction. These types of decelerations may be a reflex central nervous system response to transient or mild hypoxemia or the result of direct myocardial depression related to ongoing or sustained hypoxemia. Variable decelerations vary in shape, depth, duration, and timing. The decrease in FHR is abrupt (onset to beginning of nadir <30 seconds), ≥15 bpm from the baseline, and lasting ≥15 sec and <2 min from onset to return to baseline. Variable decelerations are usually associated with umbilical cord compression. Prolonged decelerations are also abrupt; however, they last longer (≥2 min but <10 min) from onset to return to baseline than do variable decelerations.

The FHR is interpreted relative to uterine activity. Therefore, interpretation of FHR patterns includes a complete assessment of the 4 components of uterine contractions: (1) frequency, (2) duration, (3) intensity, and (4) the uterine resting tone between contractions. These assessments can be made by palpation, the use of an external tocodynamometer, or the use of an intrauterine pressure catheter (IUPC). Assessment of uterine activity begins with palpation. Contraction frequency is measured from the beginning of one contraction to the beginning of the next and is described in minutes. Duration is the length of the contraction and is described in seconds. Intensity refers to the strength of the contraction. It is described as mild, moderate, or strong by palpation or in millimeters of mercury (mm Hg) if an IUPC is used. Uterine resting tone is assessed in the absence of contractions or between contractions. By direct palpation, resting tone is described as soft or
hard, and via IUPC in terms of mm Hg. As with any procedure, the least invasive approach is preferred unless there is need for more objective data. An IUPC requires ruptured membranes and is reserved for women in labor for whom adequate data regarding uterine activity cannot be obtained via external monitoring.
When the FHR is normal, the term reassuring is often used. A reassuring FHR tracing has a baseline rate within normal limits, accelerations, moderate variability, and no late, variable, or prolonged decelerations (Fig 1). A normal baseline rate with moderate variability, accelerations, and no deceleration is highly predictive of a well-oxygenated fetus. At the other end of the spectrum from normality there are several FHR patterns that are predictive of current or impending fetal asphyxia so severe that the fetus is at risk for neurologic and other fetal damage, or death.8 These FHR patterns include recurrent late or variable decelerations or substantial bradycardia, with absent FHR variability. Many fetuses have FHR tracings that are somewhere between these 2 extremes, and there is no consensus among perinatal experts regarding the presumed fetal condition and clinical management.8 Abnormal characteristics of the FHR include tachycardia, bradycardia, minimal or absent variability, and recurrent late, variable, or prolonged decelerations. The presence of one or more of these characteristics may not necessarily indicate fetal compromise. It is estimated that even the most ominous FHR patterns are associated with at most a 50% to 65% incidence of neonatal depression.11 Electronic fetal monitoring sensitivity (the ability to detect a healthy fetus when it is indeed healthy) is high, while specificity (the ability to detect a compromised fetus when it is compromised and not include healthy fetuses in the criteria) is low.12 Nevertheless, abnormal FHR tracings require interventions as appropriate and careful ongoing evaluation. When the FHR has characteristics that are persistently abnormal, the term nonreassuring is often used (Fig 3).

Clinical implications of nonreassuring FHR patterns

Fetal bradycardia may be caused by fetal conditions such as hypoxemia secondary to an acute decrease in oxygen flow to the fetus, vagal stimulation, and rarely, cardiac anomalies or hypothermia. The duration and presence or absence of baseline FHR variability are critical components in making a clinical association between bradycardia and possible fetal hypoxemia. Fetal tachycardia may be caused by fetal conditions such as infection, hypoxemia, anemia, prematurity (<26–28 weeks’ gestation), cardiac tachyarrhythmias,
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and congenital anomalies or by maternal conditions such as fever, dehydration, infection, or medical problems as in thyroid disease. If fetal bradycardia is noted via EFM, it is important to confirm that the origin of the heart rate being traced is fetal rather than maternal by checking the mother’s pulse. In cases of fetal death, the fetal monitor can detect and erroneously trace the maternal heart rate.

The most common causes of minimal variability not associated with acidemia are centrally acting drugs such as narcotics, tranquilizers, magnesium sulfate, and other analgesics administered to the mother. Minimal (but not absent) variability is also seen in fetuses <26 to 28 weeks’ gestation and during fetal sleep cycles. Loss of variability, especially in the presence of recurrent late or variable decelerations or bradycardia, is a sensitive indicator of fetal metabolic acidemia.

Late decelerations should be evaluated in the context of FHR variability. For example, late decelerations with moderate baseline variability and a stable rate with accelerations are less concerning than are late decelerations in the presence of an abnormal baseline rate, minimal variability, and absence of accelerations. If the FHR pattern had been reassuring prior to the onset of decelerations, an iatrogenic cause, such as maternal hypotension, can be frequently determined. Conversely, late decelerations with absent variability are possible secondary to fetal hypoxemia and are likely to occur when there is chronic placental insufficiency that cannot support the transient hypoxia episodes that occur during normal labor. Variable decelerations may be caused by a uterine contraction pressing the cord against the fetus, by a short or nuchal cord, or by intense vagal stimulation in the second stage of labor. In the case of oligohydramnios (low amniotic fluid volume), the cord is more vulnerable to compression because of the lack of cushioning provided by the amniotic fluid. Prolonged decelerations may be the result of an isolated episode of umbilical cord compression, maternal hypotension, excessive uterine activity, vagal stimulation, and rarely, maternal seizures or maternal respiratory or cardiac arrest.

Interventions for nonreassuring FHR patterns

When the FHR is nonreassuring, interventions are based on the physiologic basis of the patterns’ characteristics. The usual intrauterine resuscitation techniques include lateral position changes, administration of an IV fluid bolus, and administration of oxygen at 10 L/min via a nonrebreather face mask. These interventions promote fetal well-being by maximizing intravascular volume, uterine perfusion, placental exchange, and ultimately, oxygen delivery to the fetus. When a woman is critically ill, oxygen administration may be accomplished by methods other than the nonrebreather face mask depending on the individual’s clinical situation. While it is important to maintain adequate intravascular volume to maximize oxygen delivery to the fetus, IV fluid boluses may be contraindicated in selected clinical conditions. To promote fetal oxygenation, a lateral maternal position is recommended. At times, the clinical condition of the pregnant woman in the ICU may not allow a complete lateral position. In this case, a left or right hip wedge should be used to avoid aorto-caval compression.

Using the FHR to assess fetal status and determine the need for clinical interventions

Experienced perinatal nurses assess FHR tracings for evidence of fetal well-being using a mental checklist that includes the following:

- What is the baseline FHR?
- Is it within normal limits for this fetus?
- If not, what clinical factors could be contributing to this baseline rate?
- Is there evidence of baseline variability?
- If not, does fetal stimulation elicit an acceleration of the FHR appropriate for gestational age?
- What clinical factors could be contributing to this baseline variability?
- Are there accelerations or decelerations?
• If so, what type and what are the appropriate interventions (if any)?
• Does the FHR pattern suggest a chronic or acute maternal-fetal condition?
• Is uterine activity normal in frequency, duration, intensity, and resting tone?
• What is the relationship between the FHR and uterine activity?
• If the FHR pattern is nonreassuring, do the appropriate interventions resolve the situation?
• If not, are further interventions needed?
• Is the FHR pattern such that notification of the primary care provider is warranted?

Ancillary methods to assess fetal status

Occasionally, as the patient’s condition allows, ancillary methods, including real-time ultrasound evaluation, nonstress test (NST), biophysical profile, and umbilical artery Doppler velocimetry, are used to assess fetal status. These methods may be used when data obtained via EFM are inadequate to determine fetal well-being or the data are equivocal. Real-time ultrasonography may be used for a general visualization of the fetus, to measure and compare fetal growth parameters with expected values, to estimate fetal gestational age, to rule out gross fetal abnormalities, and as a component of the biophysical profile.

The NST is based on the premise that the heart rate of a fetus who is not acidotic or neurologically depressed will temporarily accelerate with fetal movement.21 Electronic fetal monitoring is used for the NST. Nonstress test results are defined as reactive or nonreactive, with reactive being considered normal. Generally, to meet criteria for reactive, there must be 2 accelerations of the FHR that peak at least 15 bpm above the baseline for at least 15 seconds within a 20-minute period with or without discernable fetal movement by the mother.21 A nonreactive NST is one that lacks sufficient FHR accelerations over a 40-minute period.21

The biophysical profile consists of 5 variables, including fetal breathing movements (one or more episodes of rhythmic fetal breathing movements of 30 seconds or more within 30 minutes), fetal movement (3 or more discrete body or limb movements within 30 minutes), fetal tone (one or more episodes of extension of a fetal extremity with return to flexion, or opening or closing of a hand), amniotic fluid volume (a single vertical pocket of amniotic fluid exceeding 2 cm), and the NST.21 Each of these variables are assigned a score (2 if previously described criteria are met, 0 if criteria are not met) for a total possible score of 10. A total score of 8 to 10 is considered normal, a score of 6 is considered equivocal, and a score of 4 or less is considered abnormal. Presence of oligohydramnios, regardless of the overall score, is a concerning finding because low amniotic fluid levels are often suggestive of fetal compromise. During periods of fetal hypoxemia, blood flow is redirected to the fetal brain, heart, and adrenal glands. This redistribution of fetal blood flow can result in decreased renal perfusion, leading to oligohydramnios. Thus, oligohydramnios can be a sensitive sign of uteroplacental reserve and evolving fetal deterioration.16

Umbilical artery Doppler velocimetry is a noninvasive technique used to assess the hemodynamic components of vascular impedance.21 In a normal, healthy pregnancy, physiologic conditions of the placenta present an area of low vascular impedance that allows continued blood flow throughout the cardiac cycle. With increases in placental impedance, the most passive blood flow in diastole in the umbilical artery decreases to low, absent, or reversed end-diastolic flow.16 The basis for the test is that flow velocity waveforms in the umbilical artery of normally growing fetuses differ from those of growth-restricted fetuses. Umbilical artery Doppler velocimetry is more of a placental test than a test of fetal well-being; however, it is helpful in identifying fetuses at risk for perinatal morbidity and mortality.16

Special considerations for the preterm fetus

Pregnancy is expected to last approximately 40 weeks (term pregnancy range is
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The age of a preterm fetus then is less than 37 completed weeks of gestation. Fetal viability (the ability to survive if born) is generally thought to be 24 weeks' gestation, although there have been cases where younger fetuses have survived. The younger the fetus, the greater the risk of perinatal morbidity and mortality. While the principles of EFM are the same for the preterm fetus as for the term fetuses, there are differences in FHR patterns of preterm fetuses when compared to those of term fetuses and there are unique clinical implications for interpreting EFM data. Perinatal complications such as preeclampsia, intraamniotic infection, oligohydramnios, umbilical cord compression, placental abruption, intrauterine growth restriction, uteroplacental insufficiency, and multiple gestation are more common during preterm labor. These complications are often associated with nonreassuring FHR patterns. There is evidence to suggest that nonreassuring FHR patterns have greater significance for outcomes for the preterm fetus. At term, approximately only 20% of infants with nonreassuring FHR patterns will be neurologically depressed, whereas in preterm infants less than 33 weeks' gestation, approximately 70% to 80% of infants with nonreassuring FHR patterns will be neurologically depressed, hypoxicemic, or acidemic

The preterm fetus is more susceptible to hypoxic insults and more likely to develop and die from complications of prematurity if born depressed, hypoxicemic, or acidemic. An abnormal or nonreassuring FHR pattern (minimal to absent variability, late decelerations, recurrent variable decelerations, tachycardia) is predictive of perinatal asphyxia and long-term neurological outcome for the preterm fetus. Compared to the term fetus, the progression from reassuring to nonreassuring status occurs more often and more quickly. Thus, timeliness of identification and initiation of interventions for nonreassuring FHR patterns is more critical and of more lasting consequences when the fetus is preterm.

MEDICAL RECORD DOCUMENTATION

Because the fetus is a distinct patient requiring assessments, interventions, and evaluation, documentation of nursing care is required. A separate medical record is not necessary; fetal data is included in the mother's medical record. Ideally, the medical record component for the fetus should have cues and adequate space to prompt documentation of comprehensive care, including characteristics of the FHR tracing, uterine activity, and nursing interventions directed at promoting fetal well-being. If the critically ill pregnant woman is cared for in the ICU setting, it is unlikely that the electronic surveillance and documentation system used in the labor unit is available. A stand-alone electronic fetal monitor is usually borrowed from the labor unit. Therefore, the paper version of selected medical record forms, usually reserved for the electronic system "downtime," may be required. Data from the fetal monitor is not likely to be displayed in the ICU monitoring system available for viewing remote from the patient's room. If continuous EFM is used, the labor nurse should remain at the bedside to evaluate the FHR.

Care should be taken to save the original fetal monitoring tracing as part of the medical record if it is not downloaded to the electronic archival system. The ink on most fetal monitoring tracings is at risk for fading over time. To prevent deterioration of this important component of the medical record, the original paper tracing should be stored in a zip-lock plastic bag within an opaque envelope in a cool place to deter damage from heat, light, and air. Alternatively, a copy or microfilm of the tracing may be made and stored with the mother's medical record.

When collaborating with perinatal care providers, it is helpful to be familiar with the language used to describe maternal-fetal status and the normal parameters of FHR tracings. Common abbreviations used in documenting care of pregnant women are included in Table 2. This list may be helpful in deciphering portions of the patient's
Table 2. Common terms and abbreviations used to describe maternal-fetal status in the medical record

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB</td>
<td>Abortions (elective or spontaneous)</td>
</tr>
<tr>
<td>AFI</td>
<td>Amniotic fluid index (measurement of amniotic fluid in each of 4 abdominal quadrants)</td>
</tr>
<tr>
<td>AFV</td>
<td>Amniotic fluid volume (measurement of single vertical pocket of amniotic fluid)</td>
</tr>
<tr>
<td>AROM</td>
<td>Artificial rupture of membranes</td>
</tr>
<tr>
<td>BOW</td>
<td>Bag of water</td>
</tr>
<tr>
<td>BBOW</td>
<td>Bulging bag of water</td>
</tr>
<tr>
<td>BPD</td>
<td>Bipartial diameter (fetal head measurement by ultrasound)</td>
</tr>
<tr>
<td>BPP</td>
<td>Biophysical profile (test of fetal well-being)</td>
</tr>
<tr>
<td>CST</td>
<td>Contraction stress test (test of fetal well-being)</td>
</tr>
<tr>
<td>C/S</td>
<td>Cesarean section (cesarean birth)</td>
</tr>
<tr>
<td>EDC</td>
<td>Estimated date of confinement (due date)</td>
</tr>
<tr>
<td>EDD</td>
<td>Estimated date of delivery (due date)</td>
</tr>
<tr>
<td>EDB</td>
<td>Estimated date of birth (due date)</td>
</tr>
<tr>
<td>EFM</td>
<td>Electronic fetal monitoring</td>
</tr>
<tr>
<td>EFW</td>
<td>Estimated fetal weight</td>
</tr>
<tr>
<td>EGA</td>
<td>Estimated gestational age</td>
</tr>
<tr>
<td>FHR</td>
<td>Fetal heart rate</td>
</tr>
<tr>
<td>FSE</td>
<td>Fetal spiral electrode</td>
</tr>
<tr>
<td>G</td>
<td>Gravida/Gravidity (number of times the woman has been pregnant)</td>
</tr>
<tr>
<td>IUFD</td>
<td>Intrauterine fetal death</td>
</tr>
<tr>
<td>IUP</td>
<td>Intrauterine pregnancy</td>
</tr>
<tr>
<td>IUPC</td>
<td>Intrauterine pressure catheter</td>
</tr>
<tr>
<td>LGA</td>
<td>Large for gestational age</td>
</tr>
<tr>
<td>LMP</td>
<td>Last menstrual period</td>
</tr>
<tr>
<td>LBW</td>
<td>Low birth weight</td>
</tr>
<tr>
<td>NST</td>
<td>Nonstress test (test of fetal well-being)</td>
</tr>
<tr>
<td>NVD</td>
<td>Normal vaginal delivery (vaginal birth without complications)</td>
</tr>
<tr>
<td>P</td>
<td>Para/Parity (the number of pregnancies that resulted in birth after 20 weeks' gestation, whether alive or stillborn; not the number of babies)</td>
</tr>
<tr>
<td>PH</td>
<td>Pregnancy-induced hypertension</td>
</tr>
<tr>
<td>PROM</td>
<td>Premature rupture of membranes</td>
</tr>
<tr>
<td>PPROM</td>
<td>Preterm premature rupture of membranes</td>
</tr>
<tr>
<td>PTB</td>
<td>Preterm birth (before 37 completed weeks of gestation)</td>
</tr>
<tr>
<td>PTL</td>
<td>Preterm labor (before 37 completed weeks of gestation)</td>
</tr>
<tr>
<td>ROM</td>
<td>Rupture of membranes</td>
</tr>
<tr>
<td>SGA</td>
<td>Small for gestational age</td>
</tr>
<tr>
<td>SROM</td>
<td>Spontaneous rupture of membranes</td>
</tr>
<tr>
<td>UC</td>
<td>Uterine contractions</td>
</tr>
<tr>
<td>VE</td>
<td>Vaginal examination</td>
</tr>
<tr>
<td>VLBW</td>
<td>Very low birth weight</td>
</tr>
</tbody>
</table>

*Adapted from Simpson.20

medical record that were documented by perinatal care providers.

SUMMARY

A collaborative approach between perinatal and ICU nurses and physicians to caring for critically ill pregnant women works best to promote the best possible outcomes for mothers and babies. The fetus must be considered as the second patient since the maternal condition and treatments have the potential to profoundly affect fetal status.
REFERENCES


