

TECHNOLOGY UPDATE

# AirStrip OB<sup>®</sup> in Perinatal Care: New Technology for Remote Patient Monitoring

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## Case

8 a.m. A 36-year-old woman, gravida 1, para 0, is admitted at term in latent labor by a staff nurse. The antenatal course was unremarkable and the patient has no significant risk factors. The initial fetal heart rate (FHR) tracing indicates a baseline of 140 beats per minute.

The obstetrician is off-site preparing to do a laparoscopic tubal ligation. As he begins to scrub, he is paged by the nurse in labor and delivery (L&D) informing him that she is concerned about the tracing.

The patient's membranes have ruptured and pain medication has been requested. Intravenous pain medication is administered. The nurse, newly assigned to L&D, is concerned about interpreting variable decelerations on the FHR printout. She tries unsuccessfully to describe to the obstetrician the fluctuations in the tracing.

The obstetrician orders a hold on intubating his surgical patient. Within 30 seconds, he is logged into the hospital's L&D monitoring system using a hand-held Smart Phone equipped with AirStrip OB<sup>®</sup>. As he views the near real-time and historic tracing, he sees that the FHR is repeatedly bradycardic and he is very concerned about the tracing. He cancels his surgery, orders L&D to prepare for a cesarean delivery, and heads for the hospital.



imagination at work

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Failure to accurately interpret and communicate electronic fetal monitoring (EFM) patterns threatens fetal well-being and results in costly litigation.<sup>1</sup> Electronic fetal monitoring is used in 85% of the 4 million live births in the United States annually to detect changes in the heart rate indicative of hypoxia.<sup>2</sup> This approach to monitoring became the standard of care after long-term studies indicated that intrapartum fetal deaths decreased as use of EFM increased.<sup>3-5</sup> However, the ability of an obstetrician to act on signs of fetal distress depends on close monitoring and quick communication about potential problems.<sup>6</sup>

The reality of obstetrical care necessitates the periodic absence of the obstetrician from labor and delivery (L&D). In some circumstances understaffed hospitals, nurses with minimal training in EFM, and terminology differences between nurses and physicians can create an environment for increased liability risk for the obstetrician and the hospital.

AirStrip OB<sup>®</sup>, an FDA-approved software system, is a valuable technology that allows obstetricians to coordinate decision-making in real-time from a distance, eliminating potentially inadequate verbal descriptions of visual charts and tracings. Using a hand-held PDA or Smart Phone, obstetricians can remotely access virtual real-time, high-resolution fetal heart rate (FHR) tracings, maternal contraction patterns, and other critical data from L&D units. Interfacing with the hospital's GE Centricity<sup>®</sup>

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## KEY POINT

**Preventing  
adverse events  
during delivery  
requires an  
integrated team  
approach and  
accurate  
interpretation of  
information**

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**FIGURE** Quick reference guide to remote information available using AirStrip OB®**MEDICAL INFORMATION:**

- ▶ Virtual real-time and historical FHR pattern
- ▶ Virtual real-time and historical maternal contraction pattern
- ▶ Intrauterine pressure
- ▶ Cervical exam status: dilation, effacement, station
- ▶ Vital signs: blood pressure, pulse
- ▶ Nursing notes
- ▶ Membrane status and time of rupture
- ▶ Gravity and parity
- ▶ Maternal SpO<sub>2</sub>
- ▶ Fetal SpO<sub>2</sub>



The Dual Strip Chart feature is shown on the high-resolution screen of an AirStrip OB® hand-held PDA. This displays near real-time and historical FHR tracing and maternal contraction patterns in graph form. The graphs can be zoomed out to view up to 13 minutes of the strip on the same screen and can be scrolled back up to 4 hours. This information includes the fetal electrocardiogram waveform and intrauterine pressure. Icons provide easy interface for selecting patient chart information and vital signs.



A pull-down menu provides instant access to vital statistics for each patient. Behind the menu are complete nurse annotations and patient chart updates. Patient identification information includes patient name, room number, physician, unit location, and hospital.

FHR, fetal heart rate; SpO<sub>2</sub>, oxygen saturation by pulse oximeter

**KEY POINT**

From a distance, obstetricians can proactively monitor patients in labor and reactively review a nonreassuring tracing

Perinatal (formerly QS) centralized monitoring system over a cell phone network or wireless Internet, AirStrip OB® provides access to patient history and exam records including cervical exam, membrane status, vital signs, and nurse notations (FIGURE).

With the ability to transform communication about a patient in labor, AirStrip OB® technology allows obstetricians and members of the L&D team to coordinate care and provide optimum patient outcomes. Reacting to concerns from the L&D team, obstetricians can respond as problems arise, reducing the impact of complications and lowering the risk of adverse events associated with delivery. Most important, clinicians gain the ability to proactively review tracings and ensure that their patients are receiving the care that the specific situation requires.

### Fetal hypoxia: The importance of immediate intervention

The primary purpose of EFM is early identification of fetal hypoxia to prevent intra-

partum fetal asphyxia. Relative to weight, fetal oxygen consumption is twice that of an adult, and the fetus' oxygen reserve will only meet its metabolic needs for 1 to 2 minutes. Without adequate oxygen supply, the fetus will quickly develop hypoxia. Subsequent anaerobic metabolism leads to production of lactic and pyruvic acids and the development of acidosis. Alterations of the fetal heart tracing reflect fetal distress due to the loss of biochemical homeostasis.

The earlier the signs of fetal distress are recognized on the FHR tracing, the more likely it is that brain damage due to intrapartum asphyxia can be prevented. Obstetric conditions that can cause asphyxia are well known, but as many as 63% of asphyxia cases have no known risk factors.<sup>7</sup> Up to 50% of perinatal morbidity and mortality occurs in pregnancies identified as "normal" at the point of onset of labor.<sup>8</sup>

With AirStrip OB®, an off-site obstetrician can view the tracing and immediately interpret the variable decelerations that reflect cord compression and late decelera-

## Technology and Security: Who can use AirStrip OB®?

Any hospital using Centricity Perinatal (formerly QS)—the GE system for centralized monitoring in labor and delivery (L&D)—can purchase the AirStrip OB® system and equip its obstetricians with mobile hand-held devices that run Windows Mobile. Wherever there is a cell phone connection or wireless Internet service, obstetricians can receive patient data directly from the hospital. With GE Centricity Perinatal present in the majority of birthing hospitals, AirStrip OB® is poised to become a standard of care for L&D. The software also works with Wi-Fi and Bluetooth.

In generally less than 20 seconds, a physician can log into L&D and have virtual real-time and historical data downloaded onto 240x240 or 240x320 QVGA (Video Graphics Array) screens on high-end phones and PDAs. The software downloads 4 hours of the patient's strip chart. Zooming out can provide up to 13 minutes of historical tracing on screen, while zooming in highlights the smallest fluctuations in tracings. The image maintains appropriate mathematical aspect ratios at all zoom levels.

AirStrip OB® frees off-site obstetricians from having to access L&D data via desktop computer and is far more versatile in function than desktop applications. Medical history, vital signs, cervical exam results, and patient history can be accessed; logging into several different hospitals allows physicians to monitor multiple patients simultaneously. No other product is available yet that offers the same breadth of information and technological scope for analyzing data instantly.

AirStrip OB® is fully compliant with HIPAA (US Health Insurance Portability and Accountability Act) rules governing hand-held devices. Each physician is assigned a user ID and password. Patient information is encrypted for secure transmission.

AirStrip OB® does not permit the physician to modify or alter any of the data and does not allow access to the actual monitoring device in the hospital.

Patient data can only be viewed during an active session. After 15 minutes of inactivity, all patient information is removed from the hand-held device.



This menu allows obstetricians to easily choose which patient's data to access and allows them to quickly identify patient location. Icons at the bottom of the screen guide the users to tracings, chart information, and patient history.

tions that indicate uteroplacental insufficiency. The L&D team can then quickly intervene to optimize the outcome for the fetus.

### EFM data: Reducing the risk of inaccurate interpretations

When the course of labor is progressing normally, clinicians have a high degree of accurate assessment of EFM data. However, a survey of 118 obstetricians and experts in EFM showed that interpretation of compromised readings varies greatly from individual to individual.<sup>9</sup> A later investigation showed that the same clinicians will give different interpretations of the same strip at different times.<sup>10</sup> Unsurprisingly, most communication problems and disagreements arise when the fetus is in trouble.<sup>11</sup>

Research shows that interpretation of a tracing is best done by a team approach, rather than by an individual. AirStrip OB® allows the obstetrician to be an active participant in the team decision-making process, affecting communication, assessment, and minute-to-minute management in a positive way.

In teaching facilities, AirStrip OB® can be a valuable tool for instruction. Residents and nurses receive immediate feedback and guid-

ance during real obstetrical events, improving their ability to manage patients in labor.

### Risk management and the use of technology

It is well recognized that L&D units carry a significant risk of liability. Common allegations in lawsuits often focus on EFM, including failure to accurately assess, communicate, and respond to a nonreassuring FHR pattern. Often those lapses occur when obstetricians are absent and staff miss or misinterpret data.<sup>1</sup> A thorough analysis must take into account baselines, variability, accelerations, and decelerations analyzed over time.<sup>5</sup> Physicians with the ability to easily access the FHR tracing can meet this important standard and improve patient safety.

The advantages that physicians gain with AirStrip OB® have been met with enthusiasm from risk managers as well, who see the opportunity to reduce the liability of these high-risk units with this preventive health care measure. The avoidance of one lawsuit—with its median \$2.5 million award—makes the potential cost savings far outweigh the investment.<sup>12</sup>

### KEY POINT

Direct access to EFM data enhances a physician's ability to make decisions that improve patient outcomes and reduce L&D liability

### Case: Academic Training

An increase in cesarean and vaginal operative deliveries has been noted with the use of electronic fetal monitoring.<sup>1</sup> However, when experienced physicians are able to review the cases of their obstetric residents, it may be possible to avoid unnecessary surgical interventions.

A clinical faculty member at a large residency training program is in charge of supervising resident staff covering labor and delivery (L&D). While she is covering the off-site resident clinic, she is paged by a second-year resident.

The resident reports that his patient is not progressing and that he is ready to order a cesarean delivery. The attending physician, in a teaching effort, reviews the fetal heart rate tracing using AirStrip OB® on her PDA with 3 residents in the clinic. Together, they calculate that she is at 120 Montevideo units. The faculty member tells the resident in L&D to augment labor with pitocin and continue to monitor the patient. Following pitocin augmentation, the patient has an uneventful delivery within the hour.

With AirStrip OB® technology, the attending physician was able to guide the resident at the hospital through a challenging case, providing optimum care for the mother. Additionally, residents at the clinic participated in real-time training in an actual case.

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### Improving compliance with industry guidelines

AirStrip OB® technology facilitates compliance with industry guidelines for management of a patient in labor. The American College of Obstetricians and Gynecologists recommends the FHR tracing be viewed every 30 minutes in the first stage of labor and every 15 minutes during the second stage if the patient is healthy. If there are complications, the tracing should be viewed every 15 minutes in the first stage and every 5 minutes in the second. High-risk patients should be monitored continuously.<sup>5</sup> The majority of this monitoring may be done by nurses in L&D; however, off-site obstetricians gain the freedom to proactively review the tracings of a patient when they are concerned about the course of events.

Additionally, a key goal of the Joint Commission on Accreditation of Healthcare

Organizations (JCAHO) 2007 guidelines is to “improve the effectiveness of communication among caregivers,” because ineffective communication is the most frequently cited category of “root causes of sentinel events,” according to JCAHO.<sup>13</sup> The clarity and precision with which information is relayed through AirStrip OB® supports this goal, meeting and surpassing patient safety standards.

### Conclusion

There is no substitute for a physician's presence in a high-risk situation. The sophisticated technology of AirStrip OB® is not intended to replace bedside care. However, this valuable tool improves communication and, consequently, optimizes patient management. By increasing the accuracy of communication between L&D staff and the obstetrician, improved outcomes are the logical sequelae. AirStrip OB® may increase the time the obstetrician spends viewing FHR tracings and facilitates critical decision-making, saving crucial minutes that can affect overall outcome.

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### KEY POINT

When real world demands necessitate a physician's absence from L&D, tools to improve communication can optimize patient safety