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ogy and anesthesiology physicians, nurse leaders, hospital administrators, risk managers, and representatives from liability insurance companies.

An education and practice committee was formed to review and recommend educational modules for physicians and staff, to research and develop protocols on best practices, to review practice patterns and recommend changes, to establish a simulation lab, and to implement emergency drills.

A data committee was established to identify retrospective and prospective variables for data collection, as well as data collection methods. Its members were also assigned the jobs of conducting patient and physician satisfaction surveys and of developing a system to collect, report, and debrief faculty and staff on reported near-misses.

Members of the technology committee led an effort to identify and develop technology that would improve patient safety at labor and delivery.

### Building the Program

A critical look at all available protocols is a key component of a safety initiative. Simplifying and standardizing the oxytocin order set, for instance, was something we did early on.

It's important to ensure that everyone is speaking the same language. We were particularly struck by the importance of common language and common understanding in fetal heart rate monitoring. For example, early on we surveyed EVMS residents and labor and delivery nurses about how they defined uterine tachysystole. Responses were all over the board, with more than 20 different definitions.

Without a common definition, we realized, we would have not only varying recognition of the problem at labor and delivery, but also poor communication among health team members and the potential for harming the patient.

To prevent errors of mistaking fetal heart rate for maternal heart rate during labor, we adopted the National Institute for Child Health and Human De-

Categories Developed Under the OB Right Patient Safety Program		
Category	Timing	Examples
Category 1 (Stat)	Delivery to be accomplished immediately because of risk of morbidity/mortality to mother and/or fetus.	Cord prolapse Uterine rupture Ominous fetal heart rate pattern
Category 2 (Urgent)	Delivery to be accomplished in a timely fashion in first available room; should be expedited to avoid increasing risk to the fetus.	Failed vacuum or forceps Nonreassuring fetal heart rate pattern
Category 3	Early delivery needed; time to be determined by consultation between obstetrician and anesthesiologist.	Prolonged second stage Arrest of descent
Category 4 (Elective)	Generally scheduled in advance and categorized as nonurgent/elective, without immediate risk of maternal or fetal harm insofar as timing is concerned.	Elective repeat cesarean section

Source: Dr. Abuhamad

velopment's definitions of uterine tachysystole and fetal heart rate patterns. This was an important precursor to the development of protocols for addressing tachysystole and enhancing communication.

We also established universal monitoring of maternal and fetal heart rates. The maternal heart rate is continuously displayed on the fetal heart rate monitor, which substantially reduces the chance for error.

In addition, we studied our cesarean section response time and developed new response time guidelines that enabled us to clearly and efficiently communicate with anesthesiology regarding the various levels of urgency involved. Ultimately, we created four cesarean section categories that provided clear communication among health care teams and allowed for data collection and review. (See box above.)

To significantly reduce unnecessary prematurity and its associated morbidity, we implemented elective induction and cesarean section bundles that require either a gestational age of at least 39 weeks or documented fetal lung maturity.

These criteria are currently part of the national voluntary consensus standards for perinatal care in 2008 that were developed by a committee of the National Quality Forum.

Following much debate, we also implemented, at both hospitals, the universal collection of arterial and venous cord pH with every delivery. We have found this practice to be cost effective and to provide objective documentation of fetal intrapartum oxygenation. It also identifies neonates for targeted resuscitation and is a mechanism for continuous quality improvement. Given its potential controversy, however, this practice should not be at the top of the list for safety initiatives at labor and delivery.

Plans in the immediate future include a focus on shoulder dystocia, operative delivery, and triage of patients at labor and delivery.

Given the early success of OB Right, we decided to expand this program to the five other Sentara Healthcare hospitals that provide obstetric services in southeastern Virginia.

In order to achieve this goal, we have created a Clinical Effectiveness Council with physician/nurse team representa-

tion from each of the hospitals. The council meets monthly and is currently in the process of implementing key components of the OB Right program.

### Keys to Success

We have learned that "buy-in" is key to an effective patient safety initiative. Hospital administration must devote the resources necessary for the success of the program, and both physicians and nurses must be at the table together and be involved as a team with a common safety goal.

A clinical safety coordinator is also essential to the success of a program. This person provides the consistency required and plays a critical role in communicating with the staff in the trenches.

Additionally, it is important to establish methods of communication early on, and to deliver and communicate tangible successes as soon as possible.

The OB Right program communicates with the health care team through posters on labor and delivery, and a newsletter that reports every 3 months on the issues and successes of the program. It also has a Web site with educational modules, near-miss reporting, meeting schedules and minutes, and other interactive tools.

Since OB Right began, we've almost eliminated elective deliveries at less than 39 weeks' gestation, and have achieved an almost-universal compliance with simultaneous maternal and fetal heart rate tracing and measurement of arterial and venous cord pH at both hospitals.

One of the major liability insurance companies sends a representative to the OB Right steering committee meetings and provides premium discounts for physician participation in the OB Right program.

As reported in the Institute of Medicine report "Crossing the Quality Chasm: A New Health System for the 21st Century," the biggest challenge to moving toward a safer health system is changing the culture from one of blaming individuals for errors to one in which errors are treated not as personal failures but as opportunities to improve the system and prevent harm. ■

## Early, Late Preeclampsia May Be Hemodynamically Distinct

BY SUSAN BIRK  
Contributing Writer

CHICAGO — A retrospective study of 1,300 women at 24 weeks' gestation suggests that early preeclampsia and late preeclampsia may be two different hemodynamic forms of disease.

Early preeclampsia was associated with normal prepregnancy BMI, high total vascular resistance (TVR), and bilateral notching of the uterine artery on Doppler evaluation, and late preeclampsia was associated with high prepregnancy BMI and low TVR, Dr. Barbara Vasapollo of University of Rome Tor Vergata reported in a presentation at the World Congress on Ultrasound in Obstetrics and Gynecology.

"This is not the first study to suggest that early and late preeclampsia are two different entities, but it is the first to demonstrate that they are two different hemodynamic entities in the latent phase," Dr. Vasapollo said in an interview.

Researchers reviewed data on 1,345 nulliparous normotensive women who had undergone uterine artery Doppler and maternal echocardiography to determine TVR at 24 weeks' gestation between 1999 and 2007.

Of these patients, 155 had bilateral notching of the uterine artery, and 107 of this group developed preeclampsia (defined as blood pressure greater than 140/90 mm Hg and proteinuria greater than 300 mg/dL).

Thirty-two patients developed late preeclampsia (more than 34 weeks' gestation), and 75 developed early preeclampsia (less than 34 weeks' gestation).

Significantly more early preeclampsia patients (60%) showed bilateral notching of the uterine artery than late preeclampsia patients (15.6%) at the 24 weeks' examination.

TVR was significantly lower in the group who subsequently developed late preeclampsia than in the group who developed early preeclampsia (741 dyn-

/cm<sup>5</sup> vs. 1,605 dyn-s/cm<sup>5</sup>). Prepregnancy BMI was significantly higher in the late preeclampsia (28) group than in the early preeclampsia group (24).

Dr. Vasapollo said the findings are consistent with other research that links late preeclampsia with maternal constitutional factors such as BMI and early preeclampsia with defective trophoblast invasion (Hypertension 2008; 51:970-5, 989-90).

TVR appears to be one of the most reliable predictors of early or late preeclampsia, she said.

"The ROC curves built to predict early and late preeclampsia show a very good sensitivity and specificity," according to a study by Dr. Vasapollo and her colleagues. "When considering early severe complications, almost all preeclamptic women show a TVR of greater than 1,400," she noted (Hypertension 2008; 51:1020-6).

Dr. Vasapollo and her colleagues plan to investigate a preventive pharmacologic approach to treatment that is guided by maternal hemodynamics. ■