OBSTETRICS

Introduction of an obstetric-specific medical emergency team for obstetric crises: implementation and experience

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OBJECTIVE: We describe the implementation and experience with adding an obstetric-specific medical emergency team (called Condition O for obstetric crisis) to an existing rapid response system at Magee-Womens Hospital.

STUDY DESIGN: In response to deficits identified during patient safety review of adverse obstetric events in 2004 and 2005, the hospital administration decided to add a crisis team with expertise specifically designed for maternal and/or fetal crises.

RESULTS: During the first 6 months, staff rarely called Condition O (14 per 10,000 obstetric admissions). After reeducation efforts, use of Condition O increased to 62 per 10,000 obstetric admissions during 2006.

CONCLUSION: We outline our hospital's experience with implementation, efforts to address low utilization, and 1.5 years of Condition O event data. Condition O is a work in progress. In light of this, we discuss the challenges of measuring its patient safety outcome, considerations for team size and composition, and our efforts to determine an optimal Condition O rate.

Key words: Condition O, fetal crises, maternal crises, medical emergency team, obstetrics, patient safety, rapid response system

Cite this article as: Gosman GG, Baldisseri MR, Stein KL, et al. Introduction of an obstetric-specific medical emergency team for obstetric crises: implementation and experience. Am J Obstet Gynecol 2008;198:367.e1-367.e7.

Rapid response systems have been introduced by many hospitals to improve the care of in-hospital patients. Among hospitalized patients who experience medical crises, 66-84% have signs of clinical deterioration within 6-8 hours preceding the crisis or cardiopulmonary arrest event.[1-3] A rapid response system is designed to encourage recognition of patient clinical deterioration and promptly mobilize personnel and resources to optimize patient outcome. The American College of Obstetricians and Gynecologists, the Institute for Healthcare Improvement, and the American Medical Association have endorsed the rapid response system approach.[4-6]

The premise underlying rapid response systems is that in crises, patient outcomes can be optimized with a timely response that matches resources (appropriate crisis team personnel and equipment) to new patient needs.[7-10] The team is summoned with a single call, saving time for the front-line caregiver (who might otherwise issue sequential stat pages) and eliminating personnel and equipment delay.[11] The rapid-response system concept has applicability to inpatient obstetric care. This report is a description of the obstetric-specific medical emergency team response, implementation process, and utilization at Magee-Womens Hospital (referred to as the hospital) of the University of Pittsburgh Medical Center (referred to as the health system).

We use definitions described by the First Consensus Conference on Medical Emergency Teams.[6] A rapid-response system describes an entire system to detect and treat patients in crisis and prevent adverse consequences. A rapid response system has several components: (1) case detection that triggers a medical crisis team response; (2) a medical crisis team response available at all times; (3) an evaluation and process improvement system; and (4) an administrative structure to support items 1-3. The term medical emergency team (MET) describes a particular type of medical crisis team. A MET is a crisis team with full critical care capabilities. Specifically, the team has members who can prescribe therapy, perform advanced airway management, establish central vascular lines, and begin an intensive care unit level of care at the bedside. The term rapid-response team refers to a crisis response team that does not have all of the MET capabilities and generally requires fewer personnel. The rapid response team model consists of lower-level caregivers who can ramp up the response to include additional responders if indicated. At our hospital, we opted for a MET team for our obstetric crisis response team. We describe our rationale below.

Rationale for an Obstetric MET

The hospital's obstetric adverse event reviews during 2004 and 2005 suggested

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Received March 1, 2007; revised April 3, 2007; accepted June 29, 2007.

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0002-9378/$34.00

doi: 10.1016/j.ajog.2007.06.072

TABLE 1
Team composition of medical emergency teams at Magee-Womens Hospital

Responder	Condition A (cardiopulmonary arrest)	Condition C (medical crisis)	Condition O (obstetric crisis)
Critical care medicine MD	X	X	X
Anesthesiology MD or nurse-anesthetist	X		X
Emergency medicine MD		X	
Resident on service		X	
In-house obstetrician			X
Obstetrician/gynecologist resident (fourth year)			X
Respiratory	X	X	X
Patient's nurse	X	X	X
Administrative clinician (nurse)	X	X	X
Intensive care unit nurse	X		
Emergency department nurse	X	X	
Telemetry unit nurse		X	
L&D clinician or manager (nurse)			X
L&D charge nurse			X
Lab personnel	X		
Pharmacist	X		
Safety/security officer	X	X	

L&D, labor and delivery; *MD*, medical doctor.

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that adding an obstetric-specific MET could potentially improve care. Based on this and the success of the medical crisis MET (Condition C) in the health system, the hospital's Patient Safety Committee and Quality Management Department recommended that obstetrical services implement an obstetric-specific MET, called Condition O for obstetric crisis.

Setting and Patient Population

Magee-Womens Hospital is the women's hospital of the University of Pittsburgh Medical Center health system and the University of Pittsburgh School of Medicine. The hospital is a 267-registered-bed hospital. The hospital has 63 neonatal intensive care unit beds and 82 obstetric beds. Labor and delivery has 20 labor and delivery rooms; the triage unit has 10 rooms. In 2006 the hospital performed 8782 deliveries.

Implementation of an Obstetric MET: Initial Efforts

The Obstetrical Services Committee designated a task force of crisis response and obstetric care experts at the hospital to design and implement Condition O. The task force evaluated existing policies for crisis response at the institution, including Condition A for cardiopulmonary arrest and Condition C for medical crisis. Obstetric staff is not part of the Condition A or C teams (Table 1). Based on the rapid response system literature, the health system's Condition A and C experience, the obstetric crisis literature, and hospital-specific obstetric crisis data, the task force defined criteria for calling Condition O as follows:

> An obstetric emergent condition or potentially emergent condition. Acute situations that the physician or nurse believes immediate evaluation is needed to avoid fetal or maternal harm (examples: acute vaginal bleeding, severe abdominal pain, difficulty documenting fetal heart rate, fetal bradycardia, fetal distress, inability to complete delivery, severe intrapartum bleeding, eclampsia).

The group then defined the team of responders and described their roles (Table 2). The Condition O policy was approved by the appropriate institutional committees in May 2005.

Condition O is initiated by a call to the emergency operator. The operator issues a Condition O alert via the radio pager system to all potential responders. The operator also announces the Condition O and location overhead through the hospital public announcement system. This announcement is preceded by a tone alert that signifies a condition is about to be called. Any staff member can call Condition O. Based on Condition A and C calling patterns, we anticipated that nursing staff would make most calls. Condition O does not replace Condition A and C if they are needed for an obstetric patient.

The monitoring and reporting procedure for Condition O parallels the process used for Condition A and C. A quality management coordinator and a physician review every Condition O. They collect data on the characteristics of the event, the patient, the fetus, and the neonate (if applicable). They also evaluate the records for evidence of adherence to medical care, supervision, and documentation standards, appropriate communication between members of the health care team, and process improvement ideas. Reviewers present their findings to the hospital's Code Response Committee and Patient Safety Committee.

The hospital conducted education prior to implementation of Condition O (Table 3). This included education of all of the potential Condition O responders about team goals, potential scenarios, their role on the team, and core aspects of team function. In situ drills of Condition O scenarios were performed to al-

TABLE 2
Condition O (obstetric crisis) responders and their roles

Responder	Role
Critical care medicine MD	Team leader (if appropriate): assess team organization/composition, assess data, direct treatment, set priorities, triage, debrief team after event
In-house obstetrician (MFM or hospitalist)	Team leader (if appropriate): assess team organization/composition, assess data, direct treatment, set priorities, triage, debrief team after event
Obstetrician/gynecologist resident (fourth year)	Perform procedures, examine patient
Anesthesiology MD/nurse-anesthetist	Assess and provide analgesia, perform respiratory and airway management, assess volume status and resuscitate as needed
Respiratory	Assist with airway
Patient's nurse	Stay by patient, assess venous access, administer medications
Labor and delivery clinician/manager (nurse)	Documenter or runner
Labor and delivery charge nurse	Documenter or runner
Administrative clinician (nurse)	Nursing leader: help assess team, make required team personnel changes (excuse/invite personnel), brief personnel who arrive later, get results, facilitate equipment acquisition, ensure documentation is complete after event

MD, medical doctor; *MFM*, maternal fetal medicine.

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low teams to practice and troubleshoot prior to full-scale implementation. Obstetrical services staff, attending obstetricians, anesthesiology personnel, obstetrics and gynecology residents, and neonatal intensive care unit staff and physicians were educated about the Condition O process.

We focused on several core objectives for these groups that included the following: (1) Health care providers of any level are encouraged to call Condition O if they perceive an obstetric crisis; (2) those who call Condition O must not experience negative feedback for doing so;

TABLE 3
Educational measures for Condition O (obstetric crisis)

Measure	Audience	Time frame
Initial Condition O education (staff meetings, department meetings, resident education sessions)	Condition O potential responders	May 2005
	Obstetrical services staff and attendings Obstetrician/gynecologist residents Anesthesiology providers	June 2005
	NICU physicians and staff	May 2005
Hospital newsletter	Hospital employees	May 2005
Physician newsletter	Staff physicians	May 2005
Postings on patient care units	Hospital employees	May 2005
Condition O added to back of employee identification badges	Employees receiving new badges	October 2005
Repeated postings on patient care units	Hospital employees	November 2005
Follow up Condition O case-based education (staff meetings, department meetings, resident education sessions)	Condition O potential responders; obstetrical services staff and attendings; obstetrician/gynecologist residents; anesthesiology providers; NICU physicians and staff	December 2005 through January 2006
Teamwork and patient safety conference	Hospital employees	February 2006
Simulation-based team training	Condition O potential responders	November 2005-present

NICU, neonatal intensive care unit.

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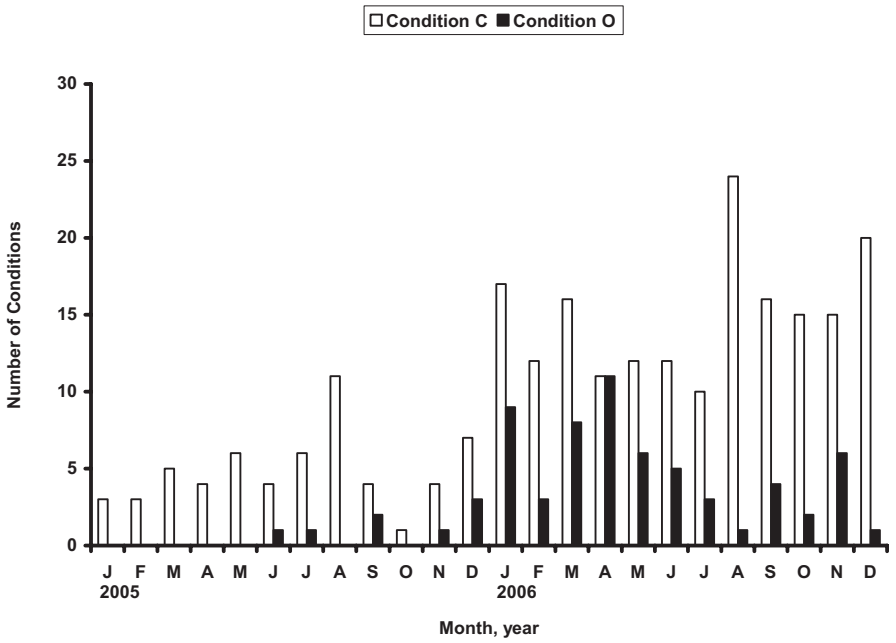
FIGURE
Number of Condition O (obstetric crisis) and C (medical crisis) events



Number of Condition O (obstetric crisis) and C (medical crisis) events at Magee-Womens Hospital by month, January 2005 through December 2006. *Black bars* represent Condition O events; *white bars* represent Condition C events.

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TABLE 4
Indications for Condition O (obstetric crisis), June 1, 2005, through Dec. 31, 2006

Indication	Number of events
Nonreassuring fetal heart rate (bradycardia, decelerations, nonreassuring pattern)	17
Shoulder dystocia	10
Seizure	8
Imminent or precipitous delivery	8
Imminent delivery of fetus with malpresentation (footling breech, face)	2
Difficult delivery during cesarean section	1
Syncope	4
Cord prolapse	3
Preterm labor	3
Abruption	2
Rupture of membranes in ultrasound department	1
Hemorrhaging placenta previa	1
Postpartum hemorrhage	2
Wound separation with hemorrhage	1
Patient unresponsive	1
Maternal respiratory distress	1
Possible intravenous injection of epidural medications	1
Hypotension and chest pressure after epidural	1
Total	67

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(3) Condition A, C, and O have different purposes and team composition; and (4) if 1 type of condition (for example, Condition O) is called, those present can always request an upgrade to a different Condition (Condition C or A) and/or request that additional personnel and/or equipment be obtained.

Measures to address low utilization and improve team function

During the first 6 months, staff rarely called Condition O (event rates reported in the following text). Furthermore, case review revealed suboptimal team dynamics. The hospital implemented further educational efforts to address these problems (Table 3). Early Condition O experience showed that staff initiating a Condition O experienced negative feedback and that responders needed additional training to function optimally as a team. Case-based discussions of actual Condition O events were used to emphasize the learning objectives listed previously. In February 2006 the hospital sponsored a day-long teamwork and patient safety conference for nurses, physicians, administrators, and other staff. This is now an annual event. Simulation-based team training was initiated at the Peter M. Winter Institute for Simulation, Education and Research for potential Condition O team members.[12]

Rapid response system utilization for obstetric care

Prior to the introduction of Condition O, obstetric staff rarely utilized the rapid-response system (Condition C) for maternal medical crises. Condition C was implemented at the hospital in March 2004. From that time until June 2005, Condition C was called 10 times (9 per 10,000 obstetric admissions) for obstetric patients, compared with 60 times (119 per 10,000 nonobstetric admissions) for nonobstetric patients. Since implementation of Condition O in June 2005 through Dec. 31, 2006, staff members have called Condition O 67 times (44 Condition O alerts per 10,000 obstetric admissions). During this time period, Condition C was called 33 times for obstetric patients (21 per 10,000 obstetric admissions). The Figure shows the number of Condition O alerts and C alerts by month since implementation.

As described in the previous section, from June through December 2005, staff called 8 only Condition O alerts (14 per 10,000 obstetric admissions) and 9 Condition C alerts on obstetric patients (16 per 10,000 obstetric admissions). By contrast, 32 nonobstetric Condition C alerts were called in that time period (119

TABLE 5
Indications for Condition C (medical crisis in obstetric patients), June 1, 2005, through Dec. 31, 2006

Indication	Number of events
Syncope or lightheadedness	12
Seizure	9
Postpartum hemorrhage	3
Incomplete abortion with hemorrhage	3
Respiratory distress	2
Trauma or fall	2
Anaphylaxis	1
Patient found unresponsive	1
Total	33

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per 10,000 nonobstetric admissions). After reeducation efforts, staff called Condition O 59 times (62 per 10,000 obstetric admissions) and Condition C 24 times (25 per 10,000 obstetric admissions) during 2006.

The following results report on Condition O events from June 1, 2005, until Dec. 31, 2006. The majority of Condition O events have been called for threats to fetal well-being, particularly during labor and/or delivery, 47 (70%). However, a substantial minority has been called for maternal indications, 20 (30%). Table 4 lists the indications and frequency for Condition O events. Table 5 lists the indications and frequency for Condition C events on obstetric patients.

The majority of Condition O alerts have been called from labor and delivery, 34 (51%). The next most common unit for Condition O is the triage unit, 21 (31%). Condition O calls came from the emergency department 4 times (6%), postpartum unit 4 times (6%), antepartum unit 3 times (4%), and ultrasound department 1 time (2%). The median gestational age of patients with a Condition O event was 37 weeks (range 19-41). In women who experienced a Condition O, 62 (93%) were delivered during the same hospital admission. Of these women, Condition O was called 6 times (10%) for a postpartum problem. Of the remaining 56, 53 (95%) had a live-born viable infant, 3 (5%) had a previable infant, and no women delivered a dead fetus or a fetus that died before discharge. Among women who had live-born, viable infants, 23 (43%) had infants who required neonatal intensive care unit admission.

TABLE 7
Obstetric events used in the Adverse Outcome Index

Index measures	Weighted score
Maternal death	750
Intrapartum and neonatal death 2500 g or more	400
Uterine rupture	100
Maternal admission to intensive care unit	65
Birth trauma	60
Return to operating room/ labor and delivery	40
Admission to NICU 2500 g or more and for more than 24 h	35
Apgar less than 7 at 5 min	25
Blood transfusion	20
Third- or fourth-degree perineal laceration	5

NICU, neonatal intensive care unit.
From Joint Commission Resources: Mann S, Pratt S, Gluck P, et al. Assessing quality in obstetrical care: development of standardized measures. Joint Commission Journal on Quality and Patient Safety 2006; 32:497-505. Reprinted with permission.

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The following results report on Condition O events from Jan. 1, 2006, until Dec. 31, 2006. The median time from initiation to the completion of Condition O was 6 minutes (range, 1-41). The team leader was not identifiable on record review in 3 of the events (5%). Condition O frequency did not differ by nursing shift, night vs day, or weekdays vs weekends.

Several obstetric crisis situations warrant a crisis team response in a substantial proportion of instances: severe shoulder dystocia, maternal seizure, and obstetric hemorrhage. From June 1, 2005, through Dec. 31, 2006, there were 271 deliveries complicated by shoulder dystocia and 10 Condition O events. There were 109 maternal seizures with 8 Condition O alerts and 9 Condition C alerts. There were 114 patients who received blood transfusions with 6 Condition O alerts and 6 Condition C alerts for obstetric hemorrhage.

TABLE 6
Quality improvement as a result of case review of Condition O (obstetric crisis) events

Issue identified	Quality improvement response
Incomplete Condition O documentation by nurses and physicians	Staff education about crisis documentation
Attempts to retract Condition O once called	Education of condition operators and staff that conditions cannot be retracted
Incorrect Condition O location stated to operator	Staff education about calling a condition
Condition O used for precipitous deliveries on labor and delivery	Staff encouraged to call the designated attending to stand in for precipitous deliveries
Task overload of obstetric nursing during preparation for emergent cesarean section	Task force convened to create algorithm for team roles for emergent cesarean section
Cesarean section delay resulted in fetal bradycardia and Condition O	Task force convened to improve process of cesarean section
Portable ultrasound unavailable	Purchase of additional portable ultrasound with designated storage site

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Quality improvements as a result of Condition O case review are presented in Table 6.

DOES CONDITION O MAKE A DIFFERENCE IN PATIENT OUTCOME?

We do not currently have patient outcome statistics to make this determination. With Condition C (medical crisis), this was a much easier question to answer. Usage of Condition C resulted in a decrease in cardiopulmonary arrest.[8] Optimal patient safety performance measures for obstetric care have not been developed, agreed on, and validated. The hospital submits data to the National Perinatal Information Center/Quality Analytic Services. This organization calculates a weighted composite obstetric outcome score for participating institutions, called the Adverse Outcome Index.[13] This score's algorithm calculates the frequency of 10 adverse obstetric events and weights them according to severity (Table 7).

This composite scoring methodology is at the cutting edge of patient safety monitoring in obstetrics; however, it is not optimal for detecting the specific impact of an obstetric MET. The composite measures include events that a MET would not impact, such as severe obstetric lacerations, uterine rupture, and birth trauma. The neonatal death category does not include unexpected stillbirths. The low Apgar category does not exclude anomalous newborns. The adverse outcome index scoring system assumes that fewer events in all categories is better. However, in the categories of blood transfusion and maternal transfer to intensive care, for example, fewer events may not represent better care.

Methodologies that are precise enough to distinguish poor obstetric care from good obstetric care, and thus richly inform the continuous quality improvement process, must be developed. We are currently developing a more detailed approach to monitor the effectiveness of Condition O. We plan to identify patients with selected diagnoses appropriate for summoning a MET (Condition O or C). For patients with these events, such as maternal seizure or stat cesarean section, we plan to compare outcomes, documentation, and quality parameters of the events for which a Condition was called to those for which one was not called.

There are multiple potential benefits of implementing a MET for obstetric care. Condition O and the simulation-based team training course provide opportunities for close interdisciplinary cooperation. Staff may use communication, organization, and teamwork skills developed in these intense teamwork experiences during the course of less emergent patient care. As discussed above, Condition O review has resulted in process improvement in patient care (Table 6).

RAMP DOWN VS RAMP UP: APPROPRIATE RESPONSE TEAM SIZE AND COMPOSITION

The hospital opted to use the MET (larger team) model for Condition O, creating a team with full medical and obstetric critical care capabilities (Tables 1 and 2). The hospital modeled this response on the Condition C team in widespread use in our health system. Optimal team size and composition is likely institution specific, based on such parameters as the proximity of caregivers, patient volume, and complexity of case mix.

Our large team response is considered a ramp-down response. A large team responds, and if manpower and/or expertise are not needed for the task at hand, the team dismisses unnecessary responders. This was most appropriate on the basis of our hospital's characteristics and our health system's crisis team philosophy. This also best addressed the communication and manpower problems identified in the hospital's adverse event analyses that led to Condition O. The large team ensures that key personnel resources are immediately available to address both fetal and maternal obstetric crisis scenarios. The large team also includes an obstetrics/gynecology resident, enhancing his or her training in crisis response and team skills. For 17 of the Condition O events (Table 4), the critical care physician was a valuable member of the team. The task force still considers this a worthwhile individual to include. However, if Condition patterns evolve and this individual is needed less frequently, the task force will change the team composition.

The large size of the response team has several disadvantages. Condition O takes a large number of providers away from routine patient care duties. The actual duration of Condition O is quite brief. After this, the entire team stays to do a team debriefing. Participants estimate that team debriefing takes approximately 10-30 minutes. The majority of the team then disbands. Several team members take additional time to document the event and the findings of the debriefing. Participants estimate that this requires several minutes for the physician team leader and 5-30 minutes for the nursing administrator. With the current frequency of Condition O, this has not had a detectable impact on the care of other patients. Another disadvantage of the large MET team is that team leaders often must dismiss unnecessary personnel to function effectively. Staff members have questioned whether the large Condition O team frightens patients and their visitors. We plan to systematically collect data on this issue.

THE OPTIMAL RATE AND INDICATIONS FOR MET USE IN OBSTETRIC PATIENTS

We have demonstrated that Condition O is producing a culture change at our hospital in the way personnel respond to the medical care needs of many patients with obstetric crises. After the initial 6 month period, obstetric staff called both Condition O and Condition C for maternal and/or fetal crises at a substantial rate. It is important to note that initial implementation of Condition O did not immediately result in widespread use.[8,14] Substantial follow-up education was required to achieve more frequent use of this patient crisis resource. General hospital data indicate that rapid-response systems tend to be underutilized.[15]

In obstetrical services at our hospital, we are not sure what the optimum rate of

Condition O is. For obvious Condition O-type scenarios such as severe shoulder dystocia, maternal seizure, and obstetric hemorrhage, Conditions (O and C) are currently being called at a relatively low rate. Quality management performs surveillance for adverse events in which a Condition should have been called and was not. Since the introduction of Condition O, 3 such obstetric events with adverse outcomes or near misses have been identified.

The Condition O task force defined vague criteria for calling this crisis response. Because of the novelty of the obstetric-specific response team, the task force hesitated in the face of few data to assign specific vital sign and/or fetal monitoring parameters that must trigger a call. The task force opted instead to evaluate the usage data for Condition O and then reconsider the best way to modify calling criteria. For example, based on Condition O usage data and medical records data, we will likely change the policy to reflect that maternal seizure is a criterion for Condition O and not just a suggestion.

Table 4 demonstrates an indication for which Condition O was not the optimal patient care resource. Staff called Condition O 8 times for imminent or precipitous delivery. Several of these cases had no complicating factors meriting the resources of Condition O. Staff received reeducation on the existing, more streamlined procedure for ensuring that an attending obstetrician attends uncomplicated precipitous deliveries. This feedback and staff education was given in a manner that still encouraged staff to call Condition O for precipitous deliveries with complicating factors related to the patient, fetus, and/or location of the patient at the time of delivery (eg, locations other than the labor and delivery or triage units). ■

ACKNOWLEDGMENTS

The authors thank Dennis English, MD; Michael A. DeVita, MD; Ellen McBride-Valizadeh, RN, BSN; Constance Timko, RN, BS, CCM; and Christine Manges, MD.

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