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PRESIDENTIAL ADDRESS

The future of intrapartum care: navigating the perfect storm—an obstetrician's odyssey

Lawrence D. Devoe, MD

Fellow officers, members, and guests, it is a humbling privilege to address you as the 71st president of this venerable society. Although I wear size-12 shoes, I am following in the very large footprints of the eminent presidents who have preceded me. 2009 will be a significant year in my life. It will mark my 40th year as a physician and my eligibility for Medicare and Social Security. By year's end, I will retire from the full-time practice of obstetrics and will deliver the last of thousands of babies. I have watched the evolution of "modern obstetrics" and the birth and death of technologies intended to make the birth process safer for mothers and infants. The timeliness

of this talk is highlighted by a recent review of 41 common practices in labor and delivery.¹ Only 4 had strong evidence based on data from scientific trials to support their recommendation while the vast majority either lacked supportive data or should not be offered based on available trial outcomes. I will now take you on an obstetrician's odyssey during which we will encounter the "perfect storm" of current intrapartum care.

The most hazardous journey that most of us will take in our lifetimes occurs during parturition. While birth has become less dangerous for the fetus, peripartum death rates still occur in 4 of 1000 deliveries and asphyxial brain injury affects approximately 1.6 of 1000 deliveries. Safe, modern intrapartum care began with the institutionalization of birth, largely a 20th century phenomenon. The founding of dedicated maternity hospitals gave mothers and infants access to qualified and professional oversight of parturition.

A landmark in modern intrapartum care was the development of electronic fetal monitoring (EFM), largely credited to Drs Edward Hon in the United States and Kurt Hammacher in Germany. I touched my first EFM in 1968. It was the size of a large refrigerator and was permanently located in a delivery room. The patient could not move from her

stretcher while being monitored, but this machine revealed continuous details of fetal heart rate (FHR), intrauterine pressure, and maternal vital signs that I had never before seen. EFM technology became smaller and more user friendly. By the early 1970s, it migrated into the labor rooms of teaching hospitals. Unfortunately we did not fully understand how to apply these observations to assess fetal status. Consequently, innocent perturbations of FHR often led to operative interventions. Many startled but otherwise healthy infants were, in the words of Shakespeare, ripped untimely from their mothers' wombs.

About 10 years after its introduction, the long arm of evidence-based medicine reached out in a first critical view of EFM by Banta and Thacker.² It was discouraging to find that, when EFM was compared with standard fetal heart auscultation, it provoked higher cesarean delivery rates but did not improve perinatal outcomes.

In the next decade, computerized analytic systems began to focus on evaluation of FHR patterns. One such system, developed by a fetal physiologist, Dr Geoffrey Dawes, and an internist, Dr Christopher Redman, was applied successfully to antenatal assessment. Unfortunately, this system did not perform well in the intrapartum environment.³

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More unfortunately, further efforts in applying computerized analysis of FHR to aid intrapartum care have been slow in coming.

Deficiencies in the interpretation of EFM and its role in labor management were considered to be significant contributors to the continued rise in cesarean delivery rates. In the mid-1990s, I participated in an EFM expert panel, convened by the National Institute of Child Health and Human Development (NICHD).⁴ This group was charged with developing consensus guidelines for the interpretation of FHR patterns. These new guidelines were first published > 10 years ago and appeared in an American College of Obstetricians and Gynecologists (ACOG) practice bulletin 4 years ago.⁵ Although these newer FHR interpretative guidelines have been revised subsequently, such guidelines have had little measurable impact on intrapartum care to date.

Further randomized controlled trials of EFM against standard FHR auscultation continued to show its inability to improve perinatal outcomes.⁶ Appraisals of adjunctive methods of assessing intrapartum fetal health, such as fetal scalp blood sampling, have been performed. At present, scalp blood sampling has been largely abandoned. More recently, clinical investigators advanced the concept of assessing fetal status by using a reflectance oximetry probe to measure oxygen saturation. An initial randomized trial of fetal oximetry showed that, when added to standard EFM, cesarean birth for nonreassuring FHR patterns was less likely than with EFM alone.⁷ However, overall cesarean delivery rates and infant outcomes were similar in both study and control groups. After Food and Drug Administration approval, the installation of fetal oximetry systems went forward very slowly. The NICHD Maternal Fetal Medicine Units Network performed a larger randomized clinical trial and found no differences in any of the major birth outcomes, regardless of the availability of oximetry data.⁸ This sounded the death knell for fetal oximetry in the United States.

In Sweden, a novel fetal monitoring system incorporating high-level fetal

electrocardiographic analysis has been developed. This system, named "STAN" for its focus on automated fetal ST-segment analysis, received 2 large randomized trials in the United Kingdom and Sweden.^{9,10} The addition of ST-segment analysis to standardized assessment of intrapartum FHR patterns had some very positive results: (1) lower rates of neonatal metabolic acidemia; (2) lower rates of operative vaginal delivery; and (3) lower rates of neonatal hypoxic encephalopathy. STAN systems have been used in many European obstetric units. STAN systems are being introduced gradually in the United States but only time will tell if and how they will impact our practices.

Perhaps my concerns about intrapartum care may be unimportant ultimately when considered in the context of the growing cesarean delivery pandemic. I completed my residency in an institution with an overall cesarean section rate of 7%. Indications for cesarean deliveries were very limited, being primarily reserved for: (1) prior cesarean patients; (2) placenta praevia (when diagnosed); (3) prolapsed cord; (4) nonprogressive labor; and (5) "fetal distress" (whatever that was). About 1 in 3 term births involved operative vaginal delivery. Three of 4 term breech infants were delivered vaginally.

In the 1980s, the tide began to turn and operative vaginal deliveries began a slow inexorable decline. Surveys of teaching institutions and practitioners showed the growing dichotomy of exchanging forceps deliveries for vacuum deliveries and mid-pelvic deliveries for cesarean deliveries.¹¹ It did not take clairvoyance to realize that fewer operative vaginal deliveries during residency would result in a generation of practitioners with less skill, confidence, and ability to pass on these interventions to the next generation. Further, a highly publicized report correlated adverse neonatal outcomes with mode of delivery in nulliparas.¹² Fortunately, this study did support the safety of spontaneous vaginal delivery. However, significant concerns were raised about the safety of operative vaginal delivery and its association with intracranial hemorrhage and other birth

injuries. Such events were rare, but the subsequent publicity following this report almost certainly set back the cause of operative vaginal delivery from which it has never fully recovered.

Routine vaginal delivery of term breech infants persisted into the early 1980s. A few underpowered US trials indicated that this was still a relatively safe option for frank breeches. However, the final nails were hammered into the coffin of term vaginal breech delivery by a large international multicenter trial by Hannah and colleagues¹³ published in 2000.

With rising cesarean section rates and adherence to the dictum of "once a section, always a section," a need was felt for a traffic cop at the intersection since most of the cesarean section increase was attributable to repeated cesarean births. Vaginal birth after cesarean (VBAC), successfully practiced throughout the world, arrived on the shores of the United States in the 1980s. Enthusiasm for VBAC grew rapidly with third-party payers encouraging physicians to offer this option as the preferred mode of delivery for prior cesarean birth patients. It took more than a decade for the pendulum to swing forward and then back when clinical data were acquired.

Although the risk of a VBAC-related disaster was low, a study examining birth records of a single state achieved considerable status due to its publication in the *New England Journal of Medicine* in 2001.¹⁴ A thoughtful accompanying editorial did nothing to offset the concern that uterine rupture was a disaster that, while rare, was unpredictable and led to perinatal death and disability.¹⁵ One could almost date the decline in VBAC to that watershed report. Coupled with the requirement for readily available obstetricians and anesthesiologists in the hospital, use of VBAC has since declined markedly in the United States.

The emergence of synthetic oxytocin and our consequent ability to enhance uterine activity at will was a by-product of the last half of the 20th century. Numerous protocols for oxytocin infusion were conceived. The practice of active management of labor (AML) was

spawned in the environment of a busy obstetric unit whose bed and staff capacity was challenged daily by a high census. The early 1980s saw the institutionalization of a protocol for AML in Ireland where primigravid patients received relatively high rates of oxytocin infusion to shorten the time interval from admission to delivery and to maintain a low rate of cesarean delivery.¹⁶ AML appeared promising but when tested in large obstetric units in the United States, the same encouraging results were not consistently replicated.¹⁷

A monograph on induction of labor published by ACOG addressed contemporary practices for labor induction.¹⁸ In the 1990s, the rate of induction of labor doubled for a variety of indications that the ACOG publication had not entirely anticipated, such as logistic indications. Logistic indications could be broadly construed and included getting baby-sitters, military deployment, days off, and the ability of the primary physician to be present. We long suspected but now know that induction of labor is also a risk factor for cesarean delivery. Increased use of these 2 modalities literally walked down the aisle hand in hand.

Most recently, a National Institutes of Health-sponsored initiative, "Consortium on Safe Labor," was launched to re-evaluate our concepts of labor progress. Its goals are to determine what constitutes normal and abnormal labor courses as well as optimal timing of cesarean delivery. While the findings of this observational study are some years away, they may be quite important for future intrapartum care providers. However, this endeavor may be more than a day late and millions of dollars short.

As the apparent cesarean section epidemic grew, ACOG engaged a task force on evaluation of cesarean delivery.¹⁹ This group issued a report that suggested target rates for cesarean delivery and VBAC. The report recommended more training in operative vaginal deliveries and offering of VBAC to appropriate candidates. While other initiatives were also described, a growing problem was highlighted for many busy US obstetric units: the inability to provide one-to-one nursing for laboring patients on a consis-

tent basis. This well-intended evidence-based review had no lasting effect on practice trends. Cesarean delivery rates continued to rise as more and more obstetricians abandoned VBAC and operative vaginal deliveries.

A 2001 ACOG presidential address by Dr Harer²⁰ raised our collective consciousness to the concept of cesarean delivery on maternal request. In part, this practice had been growing slowly in the United States after a paper touting its potential benefits was published in 1985.²¹ Since the Harer²⁰ address, a flurry of editorial opinions appeared in our professional journals. A concern arose that the continued increase in cesarean birth rates would gather unprecedented momentum if the practice of cesarean delivery on maternal request went unchecked. A multidisciplinary NICHD state-of-the-science panel was convened. This panel examined the risks and benefits of cesarean delivery on maternal request and, more importantly, indicated areas in which knowledge was lacking, such as prevention of pelvic floor disorders and reduction in perinatal mortality and morbidity.²² For now, the jury is out on whether maternal request cesarean delivery is a good or bad idea. Regardless of how this plays out, such patient-physician discussions will become more frequent, at least until the recommended studies have been completed and published. In other words, we should not hold our collective breaths for definitive answers any time soon.

As obstetricians, are we now entering the perfect storm on the seas of intrapartum care? What is a perfect storm? A perfect storm is the combination of elements that individually would be far less likely to cause disastrous outcomes. Perfect storms are rare, and even a small change in any 1 contributing element could mitigate its influence. In this analogy, a perfect storm in the labor environment can lead to perinatal injury or death. The perfect storm elements in intrapartum care include the following:

1. Unpredictability of the process and risk of parturition and its outcome.
2. Expectation of 0 defects in the term neonate.

3. Premature introduction of EFM coupled with failure to demonstrate its benefits.
4. A lack of adjunctive intrapartum assessment measures, most of which have failed or been abandoned, while others are still works in progress.
5. Shortcomings in our teaching of obstetric staff to use available intrapartum assessment tools as intended or supported by scientific data.
6. Growing ignorance in the management of enhanced or induced labor coupled with its increased usage by prescription.
7. Decreasing skills in operative vaginal delivery.
8. Abandonment of vaginal breech delivery at term.
9. Increase in primary cesarean delivery, possibly fueled by maternal request.
10. Decreasing practice of VBAC.
11. Decreased staffing of obstetric units by experienced obstetric nurses.
12. Adverse medicolegal climates in the area of proposed birth injuries.

I have touched on most of these elements already; however, the last one is clearly important. A thoughtful commentary, "Who will deliver our grandchildren?" by MacLennan et al²³ suggests that the medicolegal climate has endangered obstetricians as a species. The changes recommended in their article include arbitration rather than litigation and better oversight of our practitioners and expert witnesses. While these measures might remedy the situation, their implementation has proceeded at a glacial pace.

Can we obstetricians avoid the perfect storm and make the hazardous voyage for the fetus safer in the future? I think that we not only can do this, we must do this. No matter how high our cesarean birth rate climbs, it will never reach 100%. We will continue to provide intrapartum care. We will need to provide this care at the highest quality. How do we navigate this perfect storm situation and arrive safely in port?

Here are my modest proposals. First, we must focus more time and effort on teaching intrapartum care to all provid-

ers: nurses, midwives, students, residents, and attending physicians. This includes EFM, the proper use of oxytocics, and clinical drills that simulate obstetric disasters. I have taught intrapartum care for most of my professional life. I have authored and administered instructional guides and courses. This type of activity alone is not sufficient. Those who will work in labor units must assume the responsibility for continuing self-instruction. Teaching a nurse or resident to turn on an electronic monitor box or to connect transducers is not teaching the principles of maternal-fetal monitoring. Producing a prescriptive protocol for pitocin is not teaching the pharmacology of oxytocin or physiology of labor. Fortunately, educational resources are now more readily available than they ever were during my formative years. Intrapartum education must be linked to a recurring certification process akin to basic cardiac life support or advanced cardiac life support to demonstrate continued mastery of this clinical activity. Such documented competence should be required for all providers who work in a labor unit.

Second, we must understand that our technologies, while improving, are still limited. We can always hope that intelligent machines will appear eventually to assist diagnosis; however, developing technologies have very long gestations. More importantly, technologies such as central monitoring stations were not intended to replace human vigilance. The real fetal monitor is the nurse or doctor observing the patient, not the machine chucking out raw data. We must ensure the ready availability of skilled and competent clinical staff to review monitoring data, and, most importantly, to respond promptly to problems. Otherwise, machines become irrelevant.

Third, we must acknowledge that delivery practices will continue to evolve. I cannot guarantee the demise of operative obstetrics or VBAC, but I anticipate that it will happen. I can see the writing on our walls: *mene, mene tekel, parsin*—“you have been weighed in the scales of judgment and found wanting.” Scientific evidence notwithstanding, it is our patients not we physicians who will ulti-

mately adjust these scales. We need to get over it.

Fourth, we must address the issue of elective cesarean delivery on maternal request without obvious obstetric or medical indication. Many obstetricians may consider this practice to be frivolous and potentially harmful. However, at this time, we cannot, as a group, assume the ostrich position. I am certain that this will be an uncomfortable subject for many obstetricians. We do not have definitive answers today. Better-quality evidence will appear, albeit gradually. In the interim, we must engage in dispassionate and supportive dialogues with our patients.

Fifth, we must look critically at the staffing of obstetric units. The cumulative shortage of skilled and experienced obstetric nurses will continue into the foreseeable future. We should make every effort to improve this situation in collaboration with our hospitals' administrations. The use of properly trained patient care assistants and doulas is a stopgap measure that should not be dismissed out of hand. Human support of laboring patients is a contributor to better obstetric outcomes. It was 1 of the 4 practices strongly recommended by the evidence-based labor management review that I cited earlier.¹ Nonmedical support personnel are not replacements for our nurses but may assist this already overstressed provider group.

Sixth, we must improve our communication about patient care. The Institute of Medicine issued a report on patient safety, “To Err Is Human,” about 10 years ago.²⁴ Preventable medical errors may result from the failure to communicate adequately important patient care items such as allergies, medications, or special requirements. Although many hospital units now have computerized entry of patient data and orders, the actual physical process of face-to-face communication remains essential. In case you missed it, we are in an era of increasing shift work. This does not apply exclusively to nursing staff. Residents in training have specific work-hour restrictions that mandate rotating day and night shifts. I do not think that limitation of work hours for their senior physicians

can be far away. All labor units should have a formal reproducible process of sharing pertinent patient information among all physicians and nurses who will play a role in specific patient care.

Finally, we should consider the concept of the laborist.²⁵ I grew up at a time when attending obstetricians actually sat with their laboring patients. Evolving practice patterns, requiring clinical multitasking, have made this practice largely unfeasible. There are limited but growing data to suggest that a laborist, working on an assigned shift basis, can avert an acute disaster, and provide a go-to person for questions about FHR tracings or changes in maternal status. Although high-quality studies of this practice mode in obstetric care are lacking, I believe that more obstetric units will recruit such individuals who are usually the older, more experienced clinicians that you want to have around anyhow.

In closing, I appreciate the opportunity permitted to me by the South Atlantic Association of Obstetricians and Gynecologists to share my personal voyage through 4 decades of obstetric care. It has been an exciting trip during a time of substantial change in our profession. I will certainly miss the thrill of participating in the birthing process. On the other hand, I will begin to savor more unencumbered time with my wife whose love and wisdom have provided an unwavering compass through my journey. I plan to continue to contribute to our worthy vocation through my writings and teaching activities if not as much through hands-on clinical care. For my younger colleagues, I hope that they will still be allowed to experience the sheer joy that I have been privileged to experience through all of the long days and longer nights—the joy that is ushered in by the primal cry of a healthy newborn infant.

Thank you for your kind and patient attention. ■

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