we cannot hide it: Fetal injury that is related to emergencies like shoulder dystocia is a potential source of medical malpractice lawsuits and one that we can minimize by reinforcing and maintaining our skills through simulation.

Today's Simulators

Obstetricians worry about how they can do a simulation. Many think of simulators as too big, too expensive, and not lifelike. Some worry about doing a simulation in front of others and are too intimidated to try.

Some of the simulators available today are expensive. A full-body, high-fidelity obstetric simulator with all the bells and whistles—touch-screen computer technology that enables manipulation of the labor course, for instance, and varying vital signs and fetal heart rhythms—can cost up to $40,000.

These expensive models are often purchased by academic institutions that are interested in simulation for a multitude of purposes, including team training, but such models are not necessary to simulate at least several obstetric emergencies, including vaginal breech delivery, shoulder dystocia, and the use of forceps.

For these situations, low-fidelity simulators—which may be just a model of the pelvis through which a model baby can be manually pushed—are perfectly fine. They can be purchased for $2,000-$3,000, stored in a closet, and placed in an extra exam room where physicians can practice, either with a mentor or expert or by themselves.

Nothing is as real as a true patient or a real-life situation, of course, but many of these mannequins are surprisingly lifelike, with features like an anatomically correct bony pelvis, a stretchable perineum, and a silicone pelvic-floor musculature. A mannequin's cervix, for instance, really feels like a cervix.

When I was in resident training, I practiced using the forceps on a high-fidelity mannequin. This gave me an opportunity to practice all the necessary maneuvers and to know whether I performed all critical tasks, from inserting the posterior blade first, for instance, to holding the left blade of the forceps with my left hand while using my right hand as a guide.

Later, when I was in a real and urgent situation requiring forceps, I knew just what to do. It worked like clockwork. Simulation on a low-fidelity mannequin, if that was what my institution had had, would have been just as beneficial.

Simulation also provides opportunities to create protocols. In the middle of a forceps delivery simulation, for instance, you may realize that "this needs to be done all the time just like this." Alternatively, you may think, "Let's not do it this way next time."

Similarly, simulation affords us opportunities to practice and fine-tune communication and teamwork.

Improved Competence

I recently oversaw a resident who had previously done simulation training with high-fidelity mannequins as part of her curriculum at the Washington Hospital Center, and was now in a real and difficult delivery involving shoulder dystocia.

She performed the recommended initial maneuvers—like placing the patient in the McRobert's position and applying suprapubic pressure—but without success. She then immediately proceeded, without any prompting, to deliver the posterior arm, which relieved the shoulder dystocia. Afterward, the resident told me that "if I hadn't done the shoulder dystocia simulation lab, I would not have known to do that." I hear such stories often.

Studies are beginning to document the effects of obstetric simulation training on competence and performance.

In a study published several years ago, for instance, residents at Georgetown University in Washington and the Uniformed Services University of Health Sciences in Bethesda, Md., were randomized to receive training on shoulder dystocia management using a high-fidelity obstetric simulator or to receive no special training. Each resident was subsequently tested without prior notice in another simulation scenario.

Those who had practiced shoulder dystocia management on mannequins completed more critical tasks and had significantly higher scores on timeliness of their interactions, proper performance of maneuvers, and overall performance (Obstet. Gynecol. 2004:103;1224-8).

Although not randomized, another more recent study at Georgetown University showed that high-fidelity simulation training improved resident performance of vaginal breech delivery. Residents were more likely after simulation training to perform critical maneuvers correctly and to deliver in a safe manner than they were before the training (Obstet. Gynecol. 2006:107;86-9).

Research from the University of Bristol (England) is also yielding interesting results. Investigators there have reported, for instance, that obstetric emergency training courses using simulation were associated with a significant reduction in low 5-minute APGAR scores and lower rates of hypoxic-ischemic encephalopathy (BJOG 2006;113:177-82).

Key Points on Simulation

1. Simulation can be used to practice classic obstetric skills and high-risk, low-frequency obstetric emergencies.
2. Simulation is not only for those in academic medicine but also for those in private practice.
3. Low-fidelity simulators can be just as useful as high-fidelity simulators.
4. Simulation is becoming the norm in residency training programs.

Another study of shoulder dystocia has shown that, whereas training with high-fidelity mannequins provides additional benefits, training with low-fidelity mannequins is also effective in improving management of the obstetric situation by obstetricians and midwives (Obstet. Gynecol. 2006;108:1477-85).

A study from the Bristol investigators in which participants were tested on a standardized simulation before a simulation workshop, and then at 3 weeks, 6 months, and 12 months afterward, shows that improved performance appears to be sustained. Those who were proficient 3 weeks after the training retained their skills at the later dates. The researchers concluded that annual training may be adequate for some physicians, whereas others may need more frequent practice (Obstet. Gynecol. 2007;110:1069-74).

Soon-to-be-published research that we have recently completed at Georgetown University and the Washington Hospital Center similarly indicates that obstetricians generally should strive for continuing simulation training at least once a year. Residents in our study who were initially taught on the simulator scored higher when tested a year later than did residents who received no simulation training. Overall, however, everyone's scores declined.

Obstetric simulation is part of our future. New physicians of the future will enter practice having done simulation training in a variety of high-acuity, low-frequency scenarios—rather than learning solely through lectures and impromptu teaching after events have occurred—and those of us already in practice will likely find that working occasionally with low-fidelity mannequins enables us to provide better, safer patient care while reducing our liability risk. ■

DR. AUGUSTE *reported that she has no financial conflicts of interest related to this article.*

Gestational Age, Four Other Factors Influence ICU Outcomes

BY MARY ANN MOON
Contributing Writer

Female sex, exposure to prenatal corticosteroid therapy, singleton birth, and increased birth weight (in 100-g increments) each improve an infant's chances of a positive outcome with intensive care.

The magnitude of the benefit is similar to that of an extra week of gestational age, Dr. Jon E. Tyson and his associates at the National Institute of Child Health and Human Development (NICHD) wrote in the April 17 New England Journal of Medicine.

Decisions about admitting extremely premature infants to intensive care are "highly controversial," with most centers in the United States selecting patients solely on the basis of gestational age thresholds. "Such care is likely to be routinely administered at 25 weeks' gestation but may be provided only with parental agreement at 23-24 weeks, and only 'comfort care' may be given at 22 weeks," the investigators noted.

The researchers assessed a cohort of 4,446 infants born at 22-25 weeks' gestation at 19 medical centers in the NICHD's neonatal research network between 1998 and 2004. At a corrected age of 18-22 months, 49% of the study subjects had died, and 61% had died or sustained profound impairment.

In assessing outcomes, the authors included factors such as treatment cost, resource use, parental distress, and infant suffering due to painful procedures and prolonged intubation.

Factors that might contribute to outcome were examined, and the four listed above were found to significantly improve the rates of survival and survival without impairment. The improvements were equivalent to a 1-week increase in gestational age, said Dr. Tyson of the University of Texas at Houston and associates.

"For example, among infants born midway between 24 and 25 completed weeks of gestation, the estimated likelihood of death or profound impairment was 33% for a 750-g, appropriate-for-gestational-age female singleton who received prenatal corticosteroids, but 87% for a 525-g, small-for-gestational-age male twin who did not receive prenatal corticosteroids," they wrote.

Even among the highest-risk infants—those born before 24 weeks with a birth weight of 600 g or less—outcomes varied considerably according to these four risk factors. The maximum potential rate of survival without profound impairment was as low as 5% for boys weighing 401-500 g born at 22 weeks, but as high as 38% for girls weighing 501-600 g born at 24 weeks (N.Engl. J. Med; 358:1672-81).

Nevertheless, in actual practice it turned out that girls were less likely than boys and that singletons were less likely than multiples to receive intensive care when they had the same likelihood of a favorable outcome.

Weighing the additional four factors into the decision "is likely to promote treatment decisions that are less arbitrary, more individualized, more transparent, and better justified than decisions based solely on gestational-age thresholds," the investigators said.

To assist physicians faced with such decisions, the authors provided a Web-based tool (www.nichd.nih.gov/neonatal estimates) that helps estimate the likelihood that a given infant will benefit from intensive care.

Dr. Tyson and associates added that in assessing outcomes, they included factors such as treatment cost, resource use, parental distress, and "infant suffering due to painful procedures, prolonged intubation, and such complications as intracranial hemorrhage, necrotizing enterocolitis, and recurrent episodes of hypoxia."

"Barring major therapeutic advances, our findings indicate that extending intensive care to all of the most immature infants would entail considerable suffering, resource use, and cost in order to benefit only a small proportion of infants," they noted. ■