Virtual Mentor
American Medical Association Journal of Ethics
September 2013, Volume 15, Number 9: 786-790.

MEDICINE AND SOCIETY

The Difference between Science and Technology in Birth

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Medicine is not a science; ordinary clinical care is not (and should not be) experimentation with the goal of discovering general principles. But a contemporary physician's professional duty includes an orientation towards science—a willingness to consult, to know, and to appropriately employ available evidence in the practice of medicine. Sackett defines evidence-based practice as "the integration of the best research evidence with clinical expertise and patient values" [1]. To use evidence properly, clinicians need to share evidence with patients so that they can make well-informed choices about their care. Evidence is ethically essential to informed consent, and employment of evidence is an ethical duty of the clinician.

Nevertheless, in many U.S. hospitals today, the management of labor and delivery doesn't look very evidence-based. Many well-intentioned obstetricians still employ technological interventions that are scientifically unsupported or that run *counter* to the evidence of what is safest for mother and child. They do so *not* because a well-informed pregnant woman has indicated that her values contradict what is scientifically supported, a situation that might justify a failure to follow the evidence. They do so out of tradition, fear, and the (false) assumption that doing something is usually better than doing nothing [2]. These problematic motivators are not unique to obstetrics, but obstetrics seems to be particularly resistant to the evidence, perhaps because of the emotional climate surrounding pregnant women and babies.

Here are but a few examples of common disjunctures between evidence and practice in obstetrics:

- Although we still see external continuous fetal monitoring employed in many low-risk pregnancies, "as a routine practice [it] does not decrease neonatal morbidity or mortality compared with intermittent auscultation.... Despite an absence of clinical trial evidence, it is standard practice in most settings to place internal scalp electrodes and intrauterine pressure catheters when there is concern for fetal well-being demonstrated on external monitoring" [3].
- Some obstetricians still routinely employ episiotomy although it "is not recommended due to increased rates of third and fourth degree perineal trauma and no evidence to support decrease rates of subsequent organ prolapse and/or incontinence" [3].
- The use of a trained doula (labor support person) has been repeatedly shown to increase likelihood of spontaneous vaginal birth, to shorten labor, to reduce C-section rates, and to reduce use of intrapartum analgesia [3]. In spite of the fact that this intervention is remarkably effective and safe, few American

obstetricians prescribe doulas. (DONA International, "the oldest, largest, and most respected doula association in the world" has 7,000 members [4], and there are approximately 10,000 births a day in the U.S. [5])

- Epidural analgesia increases risk of maternal hypotension, maternal fever, and C-section for fetal distress [6]. Epidurals also increase odds a child will be born with fever, which in turn may lead to more interventions and thus more risks [3]. Yet few women who "choose" epidurals seem to understand—or even know—the risks, nor have they been first provided the benefit of nonpharmacological pain management, e.g., doulas.

We could go on and on; for low-risk pregnancies, many routinely employed medical interventions are not supported by the evidence. Why does this pattern persist? Presumably because many pressures—economic, cultural, psychological—continue to impel clinicians to intervene. Part of the problem may be terminological. Low-intervention births are often labeled "natural," something that sounds more foolishly romantic than medically sensible. For this reason, we believe it would be better to think of childbirth not in terms of "natural versus medical" but rather "scientific versus unscientific."

We offer our own experiences to illustrate the differences between technology and science in birth. When one of us (AD) became impregnated by the other (ACS) for the second time, we consulted the Cochrane Collaborative for guidance. The outcome we valued was safety for mother and child, and thus we wanted to know (as most pregnant women and obstetricians would) which interventions would increase or decrease likelihood of that outcome.

A previous pregnancy had resulted in a miscarriage at 7 weeks; our obstetrician's nurse had insisted that, if AD had consulted the obstetrician earlier in the pregnancy, this miscarriage might have been prevented. Needless to say, early miscarriage in a first and low-risk pregnancy is not known to be preventable by an obstetrician; early miscarriages are generally due to chromosomal anomalies and are therefore not preventable [7]. The unscientific attitude of this nurse and the office in general led us to seek out a midwife who would practice evidence-based medicine for our second pregnancy. Cochrane suggests that use of a midwife will not increase risk of harm and might decrease it [8]. Interestingly, one retrospective cohort study of about 4,800 low-risk births also showed that women attended by family physicians were less likely than those attended by obstetricians to have their labors induced and less likely to receive oxytocin augmentation, epidural anesthesia, episiotomies, or C-sections [3].

With our midwife, we followed the evidence: during pregnancy, maternal urine, blood pressure, and fetal growth and presentation were regularly checked to monitor for a high-risk pregnancy. We opted out of a prenatal sonogram because it would not improve maternal or fetal outcome in our low-risk pregnancy. [9] During labor, we employed a doula. The midwife conducted intermittent fetal monitoring. We

declined all interventions that would increase risk without improving outcomes, including medical analgesics (e.g., epidural) and episiotomy.

When the amniotic fluid showed thin meconium, sometimes assumed within obstetrics to be a potential sign of fetal distress and a potential cause of pneumonia after birth, our midwife was forced by hospital policy to employ continuous fetal monitoring, an intervention that was unscientific, uncomfortable, and restrictive. The presentation of meconium also meant our midwife was required to have pediatricians ready to suck out the baby's windpipe after birth. In theory, this was to prevent pneumonia. A few months later, we learned that a randomized controlled trial had showed that clearing of the trachea via intubation, which happened for our baby, does not improve outcomes for a vigorous child like ours [10]. (In the trial, "vigorous" children were defined as having a heart rate above 100 beats per minute, spontaneous respirations, and good muscle tone 15 seconds after delivery. [10]) This, then, was yet another intervention that could increase risk without benefit.

In spite of this, our desired outcome was achieved: mother and child suffered no harms other than a small maternal perineal tear, which we knew the evidence suggested would heal better than a surgical cut would have [11]. Although our primary goal was safety, we were both satisfied with the birth experience, with ACS's respect for AD increased not only by her scientific attitude, but also by her ability to birth without medication when normally she whines about the smallest headache.

The science behind the hands-on surveillance and hands-off management of this birth makes it impossible to think of it as "natural." This birth was much more *scientific* and indeed more *ethical* than many in America, because all of the participants in it (except the baby) were fully informed of the facts and were making decisions based on "the integration of the best research evidence with clinical expertise and patient values" (except when hospital policy prevented us from doing so). The decisions made respected the patient and her baby by respecting the evidence.

A medical student witnessing unscientific pregnancy or labor management in a clinical setting may not have the ability to do much for a woman caught in a poor practice system, given power differentials, myths around pregnancy and birth, and time constraints. But students can consult the literature and ask their attending physicians reasonable questions about the evidence. They can and indeed should bring the literature to discussions with medical personnel and patients. They can also learn by watching the cascades of risk that can result from a single unsupported intervention.

They can then apply that understanding to their own practice, no matter what specialty they ultimately pursue. William Osler, the Canadian founder of American medicine, famously opined in his day, "He who knows syphilis knows medicine."

We would argue that, in our day, he who knows birth knows evidence-based and ethical medicine.

Few experiences before medical school prepare a person for what it means to act on the principle "First, do no harm." In most areas of life, action is more highly valued than nonaction. Yet birth offers an opportunity to appreciate the importance of clinical humility and of living by the motto, "Don't just do something—stand there." To be a good doctor means to stand there until you know that intervention is likely to be best *for the patient,* even when that may be the most harrowing for your own psyche.

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Acknowledgment
The authors wish to thank Kepler Domurat-Sousa for his contributions to this article.

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