

# Measuring What Matters to Moms Most

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The safety of maternity care in the United States has lagged behind that of other countries and continues to generate a dismal record of maternal and perinatal morbidity and mortality.<sup>1</sup> Investigative reporters recently identified 120 hospitals in the United States where birth complications exceed the national average by more than two-fold.<sup>2</sup> The public, long aware of perinatal harm and unnecessary cesarean delivery, is increasingly focused on the attendant risks of maternal morbidity and mortality, and childbirth advocates now demand accountability from the U.S. health system.

Existing quality measures in obstetrics fail to fully capture safe maternal care and optimal neonatal outcomes. The Joint Commission perinatal care measures focus on elective delivery before 39 weeks gestational age, low-risk cesarean delivery, antenatal steroids, health care–associated bloodstream infections in newborns, and exclusive breastfeeding.<sup>3</sup> None are risk-adjusted, and all are easily dismissed in underperforming hospitals, where poor measurement performance is frequently blamed on the patient population served.<sup>2</sup> The public is skeptical, and now reporters are interviewing women who have suffered irreparable harm and families of those who have died to reveal the extent to which the adverse outcomes reflect failures in clinical care.<sup>2,4</sup>

To address this crisis in public accountability, Glance *et al.*<sup>5</sup> have constructed the first composite measure that integrates risk-adjusted maternal and neonatal morbidity and mortality. Their contribution is presented as the foundation of a suite of measurements that women and families could use to select their hospital for delivery and that government and private payers may use to ensure safety, equity, and value.

To develop this measure, the investigators linked health-care utilization and birth certificate data from California for 2011 to 2012, which included over 800,000 deliveries.



**“[C]urrently, the field of obstetric anesthesiology is bereft of useful quality measures.”**

An International Classification of Diseases, Ninth Revision–Clinical Modification–based algorithm developed by the Centers for Disease Control and Prevention identified deliveries complicated by severe maternal morbidity, and an algorithm developed by the California Maternal Quality Care Collaborative defined cases of severe neonatal morbidity. Using 2011 data, hierarchical logistic regression models were fit to predict severe maternal and newborn morbidity based on maternal characteristics and coexisting conditions. The performance characteristics of these models were then demonstrated in a validation sample of deliveries in 2012, which showed the models to be well calibrated and appropriately discriminative. These regression models

serve as the basis for generating risk-adjusted hospital-level measures of frequency of severe maternal and neonatal morbidity. This risk adjustment approach allows hospitals who care for sick patients, which are thus likely to have higher unadjusted rates of complications, to be compared in a fair way to hospitals whose populations skew healthier.

Maternal health care is unique in that the health outcomes of two individuals are necessarily intertwined, and clinical care afforded to one patient may increase risk for the other. The optimal balance between maternal and fetal risk is unclear, and obstetrical decision-making sometimes requires a tradeoff between these risks (*e.g.*, a cesarean delivery may be necessary for fetal wellbeing but comes with the cost of increasing maternal risk for complications). On average, severe neonatal morbidity is more common than severe maternal morbidity, with overall rates of 3.67% *versus* 1.53%. To place equal value on maternal and neonatal morbidity for the composite measure of hospital performance, the authors selected the geometric mean (rather than simple average) of the risk standardized rate of severe neonatal morbidity and severe maternal morbidity. The result

Image: J. P. Rathmell.

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is a composite measure that places equal weight on risk-adjusted maternal and neonatal morbidity.

Further analysis revealed that there are hospitals where birth outcomes for neonates are excellent, but mothers experience unexpectedly high rates of complications. Conversely, in other facilities, maternal complications are rare, but neonatal outcomes are poor. Across both categories of institution, performance on the composite measure is consistent with average performance. Consequently, the authors recommend that the childbearing public, policy-makers, and clinical leaders should focus on all three outcomes: severe neonatal morbidity, severe maternal morbidity, and the composite measure of the two together. Future studies will need to determine whether and to what extent the institutional cesarean delivery rate mediates the relationship between maternal and neonatal morbidity.

The composite measures of severe neonatal morbidity and severe maternal morbidity are limited by the fact that each is generated using administrative data. Although administrative data certainly have some limitations, measures derived from clinical data are impractical, given the current state of clinical documentation systems. Even administrative data are not universally available because maternity care is funded by a patchwork of private, state, and federal sources. The authors worked with the State of California to link maternal and neonatal billing records with birth certificates to construct a comprehensive data set. Future data linkages will need to be replicated on a state-by-state basis. In addition, coding intensity has been shown to vary among institutions and mediates differences in risk-adjusted composite morbidity.<sup>6</sup> Finally, severe maternal morbidity is dominated by blood transfusion, but it is not possible to distinguish large-volume blood transfusion (more than 4 units of erythrocytes) from smaller volumes. This limitation may prove to be a benefit if the measure encourages implementation of patient blood management principles.

Some readers may wonder why this investigation of measure development for childbirth is being published in the journal *ANESTHESIOLOGY*, as opposed to an obstetrics or pediatrics journal. The answer lies in the fact that currently, the field of obstetric anesthesiology is bereft of useful quality measures. Several measures of obstetric anesthesia care have been proposed, but each suffers from significant limitations. For example, the institutional rate of general anesthesia for cesarean delivery should be low, but measurement could increase harm if it decreases the likelihood that women with failed regional anesthesia will be converted to general anesthesia. Likewise, unintended dural puncture increases suffering and health-care costs, but the techniques needed to avoid dural puncture are poorly articulated, and measurement would reduce the incentive to document the complication. A measure that captures “experience of anesthetic care” could be useful to improve services, but the most commonly distributed measure (*e.g.*, the Healthcare Consumer Assessment of Healthcare Providers and Systems survey) focuses on the overall patient

experience of care and links most directly to obstetric and nursing services. The Anesthesia Quality Institute and the National Anesthesia Clinical Outcomes Registry proposed the use of a pencil-point spinal needle “each time a patient undergoes an obstetric procedure using spinal anesthesia.”<sup>7</sup> This process measure was rejected by Centers for Medicare and Medicaid Services due to high performance rate and lack of variability as a basis for improvement.

The measurement of risk-adjusted severe maternal morbidity and severe neonatal morbidity presents a vision of care in which integrated teams of clinicians, including the anesthesia providers, deliver coordinated clinical services that optimize the balance between maternal and perinatal risk. Excellent obstetric and perinatal care depends on the active involvement of anesthesiologists to optimize not only analgesia and anesthesia, but also antepartum delivery planning, peripartum medical management, and resuscitation. The measure is completely aligned with best practice, and improvements will require intraprofessional collaboration and a team-based response. Clearly more work is needed to link administrative data sources and birth certificates in every state, to update the coding algorithms for the International Classification of Diseases, Tenth Revision, and to establish credibility among stakeholders. However, this is a promising quality measure that has the potential to hold hospitals and clinical teams accountable to achieve the outcomes that every family desires—a healthy mother and newborn.

## Competing Interests

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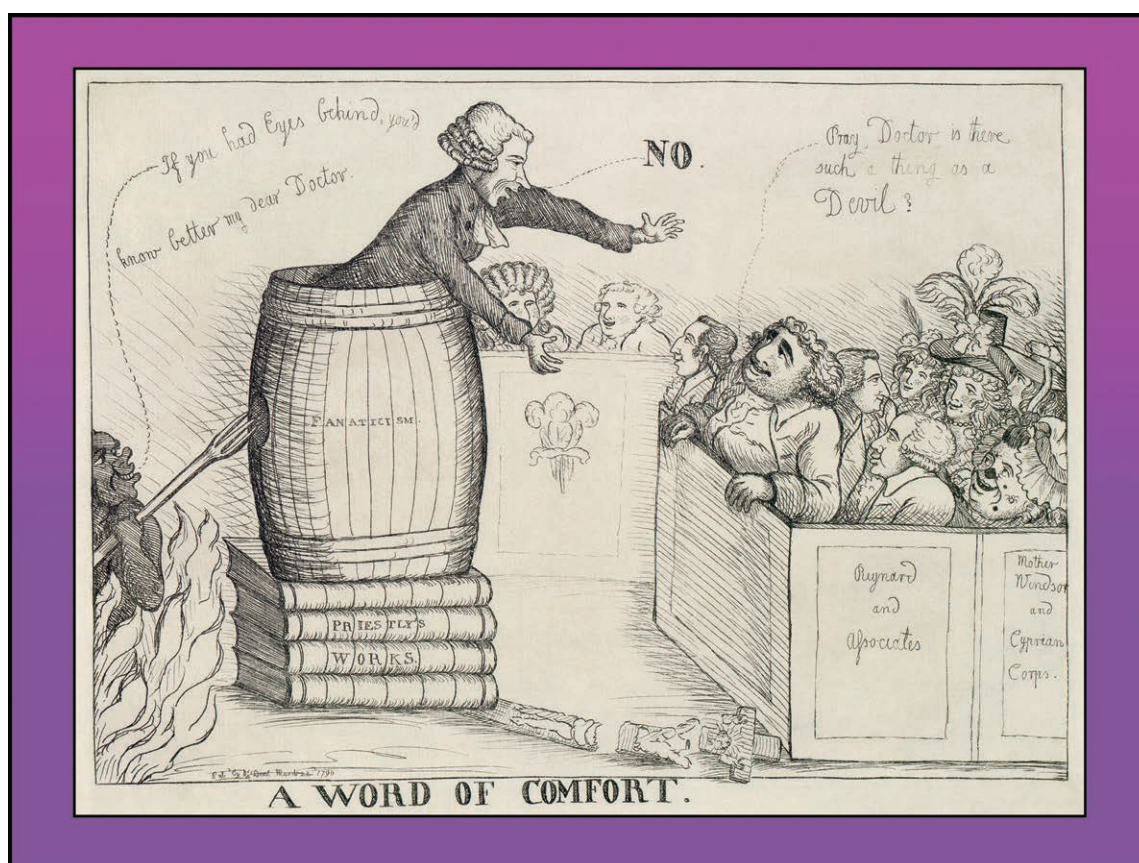
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## ANESTHESIOLOGY REFLECTIONS FROM THE WOOD LIBRARY-MUSEUM

### Joseph Priestley's Retorts: Spirited Dissent and Gaseous Discoveries



Barred from university schooling as a Dissenter (from the Church of England), Joseph Priestley is depicted preaching from a barrel of religious “fanaticism” in this satirical image published in 1790 by London’s William Dent. When questioned (right) as to whether there is “such a thing as a Devil,” Priestley responds with an emphatic “No” as a “Word of Comfort” just before the Devil (left) is about to pitchfork the Separatist clergyman. Although he said “No” to prevailing religious views, Priestley retorted “Yes” to discovering ten gases, including oxygen and nitrous oxide. (Copyright © the American Society of Anesthesiologists’ Wood Library-Museum of Anesthesiology.)

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