OBSTETRICS

Cross-sectional survey of California childbirth hospitals: implications for defining maternal levels of risk-appropriate care

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OBJECTIVE: Measures of maternal mortality and severe maternal morbidity have risen in the United States, sparking national interest regarding hospitals' ability to provide maternal risk-appropriate care. We examined the extent to which hospitals could be classified by increasingly sophisticated maternal levels of care.

STUDY DESIGN: We performed a cross-sectional survey to identify hospital-specific resources and classify hospitals by criteria for basic, intermediate, and regional maternal levels of care in all nonmilitary childbirth hospitals in California. We measured hospital compliance with maternal level of care criteria that were produced via consensus based on professional standards at 2 regional summits funded by the March of Dimes through a cooperative agreement with the Community Perinatal Network in 2007 (California Perinatal Summit on Risk-Appropriate Care).

RESULTS: The response rate was 96% (239 of 248 hospitals). Only 82 hospitals (34%) were classifiable under these criteria (35 basic, 42 intermediate, and 5 regional) because most (157 [66%]) did not meet the required set of basic criteria. The unmet criteria preventing assignment into the basic category included the ability to perform a cesarean delivery within 30 minutes 100% of the time (only 64% met), pediatrician availability day and night (only 56% met), and radiology department ultrasound capability within 12 hours (only 83% met). Only 29 of classified hospitals (35%) had a nursery or neonatal intensive care unit level that matched the maternal level of care, and for most remaining hospitals (52 of 53), the neonatal intensive care unit level was higher than the maternal care level.

CONCLUSION: Childbirth services varied widely across California hospitals, and most hospitals did not fit easily into proposed levels. Cognizance of this existing variation is critical to determining the optimal configuration of services for basic, intermediate, and regional maternal levels of care.

Key words: childbirth hospital services, hospital staffing, maternal health, maternal levels of care, risk-appropriate care

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Worsening measures of maternal mortality and severe morbidity have begun to gain national attention.[1] From 1987 to 2009, the pregnancy-related mortality ratio rose steadily from 7.2 to 17.8 deaths per 100,000 live births,[2] and recent studies have estimated that at least 40% of maternal deaths appear to be preventable.[3-6]

Recent publications have also recognized steadily increasing rates of severe obstetrical complications[6-9] showing substantial racial disparity, with elevations among African-Americans and women of Hispanic ethnicity.[3,9,10] According to Kuklina et al,[6] renal failure, pulmonary embolism, adult respiratory distress syndrome, shock, blood

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transfusion, and ventilation are all on the rise nationally. Furthermore, rates of severe maternal morbidity appear to vary widely across hospitals.[11]

This year, in an effort to promote benchmarking and improvement, a call was made for the facility-based identification and reporting of women with severe maternal morbidity.[12,13] This call was further supported in February 2015 by the publication of a consensus-based statement from the American College of Obstetricians and Gynecologists and the Society for Maternal-Fetal Medicine that proposed the development of standards for maternal risk-appropriate care.[14]

Given that childbirth is the number one reason for hospitalization in the United States at nearly 4 million births per year,[15] a national strategy is needed to address this observed increase in childbirth-related maternal morbidity.[16] Improved neonatal outcomes have resulted from perinatal regionalization, a term that currently refers to a health care delivery system that optimizes care for preterm newborns,[17-19] and this strategy has prompted policy makers to examine the feasibility of creating maternal levels of care[1] so that mothers with high-risk conditions could be assured delivery at hospitals with the appropriate resources (eg, the availability of subspecialists, specialty intensive care units, blood banking services, and diagnostic imaging equipment.

This initiative requires attention to a stepwise research agenda that includes the following: (1) the development of criteria for defining increasingly sophisticated levels of maternal care; (2) the demonstration that maternal outcomes are improved in women who deliver at facilities that can offer risk-appropriate care; and (3) the elaboration of implementation strategies for such a system. Such an agenda will initially require detailed hospital-level data regarding current configurations of childbirth services, resources and patient care activities, and linkages of these data to childbirth outcomes to identify the factors associated with optimal results. To date, such information has not been available.

The purpose of this study was to collect hospital-level data to document the characteristics of childbirth hospitals. This is in preparation for the development of a foundation for defining and implementing maternal levels of care to maximize both maternal and neonatal safety. Although the achievement of a system for maternal risk-appropriate health services is a national concern, here we focus on the services offered by California childbirth hospitals, which perform more than 500,000 births each year (12.7% of all US births), more than any other US state.[13]

Materials and Methods

This is a cross-sectional assessment of childbirth hospital services designed to determine the extent to which hospitals can be classified by increasingly sophisticated maternal levels of care. Information was obtained from a survey of labor and delivery nurse managers for childbirth hospitals in California that included an array of items regarding hospital services, resources, and patient care activities. The study was approved by the Cedars-Sinai Institutional Review Board (protocol PRO00032669 certified exempt) and complied with all stipulated criteria for participant protection.

Professional standards for obstetrical care services are set out in Title 22 of the California State Code of Regulations[20] and Guidelines for Perinatal Care, published by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists.[21] These publications refer to maternal levels of care but without the specificity needed to define the appropriate setting, provider, or competency required to care for individual patients or to address their pregnancy complications. Several US states have defined such levels, but these definitions vary and are primarily focused on improving neonatal as contrasted to maternal outcomes.[22,23] For these reasons, we used recommended maternal level of care criteria that were produced via consensus at 2 regional summits funded by the March of Dimes through a cooperative agreement with the Community Perinatal Network in 2007 (California Perinatal Summit on Risk-Appropriate Care),[24] which were based on professional standards.[20,21]

Survey development and administration

We devised survey items based on the perinatal summit criteria and categorized them into 5 prespecified domains: hospital structure/context, hospital staffing, hospital clinical resources, and hospital clinical activities. Two interviewers were trained to assure consistent administration of the survey, which they piloted among labor and delivery managers at 5 hospitals to assure face and content validity of the domains and individual items and to assure that these managers would be an adequate and reliable source of information.

Upon finalization of all items, interrater reliability was assessed by having each interviewer conduct 5 interviews in the presence of the other, with each interviewer recording results, and agreement determined between the interviewers for each individual item, using Cohen's kappa for categorical responses and the Shrout-Fleiss intraclass correlation for continuous or mixed responses.

In addition, 10 participants were retested at 3 months to assure concordance with their previous responses using the Shrout-Fleiss intraclass correlation. Survey items that did not have good interrater or test-retest reliability (kappa <0.8 or $<80\%$ agreement) were eliminated. The survey contained 185 questions that resulted in 293 individual items[25] and took approximately 1 hour to complete. Those items that were directly related to the evaluation of meeting the maternal level of care criteria are included in the Appendix (Supplementary Table).

The survey was offered to all nonmilitary California childbirth hospitals, and contact information for labor and delivery managers was obtained through the Regional Perinatal Programs of California. The managers were contacted by phone and an appointment made for the interview. Managers were given a $50 gift card as an incentive. A hard copy of the survey was mailed to the managers in advance to assure familiarity with the questions. All surveys were completed between November 2012 and January 2014.