PROMOTING ANTENATAL STEROID USE FOR FETAL MATURATION: RESULTS FROM THE CALIFORNIA PERINATAL QUALITY CARE COLLABORATIVE

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Objective **The California Perinatal Quality Care Collaborative (CPQCC) was formed to seek perinatal care improvements by creating a confidential multi-institutional database to identify topics for quality improvement (QI). We aimed to evaluate this approach by assessing antenatal steroid administration before preterm (24 to 33 weeks of gestation) delivery. We hypothesized that mean performance would improve and the number of centers performing below the lowest quartile of the baseline year would decrease.**

Study design **In 1998, a statewide QI cycle targeting antenatal steroid use was announced, calling for the evaluation of the 1998 baseline data, dissemination of recommended interventions using member-developed educational materials, and presentations to California neonatologists in 1999–2000. Postintervention data were assessed for the year 2001 and publicly released in 2003. A total of 25 centers voluntarily participated in the intervention.**

Results **Antenatal steroid administration rate increased from 76% of 1524 infants in 1998 to 86% of 1475 infants in 2001 ($P < .001$). In 2001, 23 of 25 hospitals exceeded the 1998 lower-quartile cutoff point of 69.3%.**

Conclusions **Regional collaborations represent an effective strategy for improving the quality of perinatal care.** ***(J Pediatr 2006;148:606-12)***

The development of effective strategies for improving the quality of care is an important challenge in perinatal medicine. Antenatal steroid administration before preterm delivery is a recognized beneficial intervention; however, its use remains variable and suboptimal at some perinatal centers.[1,2] A 1994 National Institutes of Health (NIH) Consensus Conference initiated a campaign by perinatal leaders to increase antenatal steroid use for fetal maturation.[1-3] Subsequently, both research and practice collaboratives reported an approximate 3-fold rise in administration rates between 1991 and 1999.[4,5] Two recent trials addressed methods to facilitate translation of perinatal research findings into practice. Leviton et al [6] reported that an active, focused dissemination effort to promote antenatal steroid use significantly increased the effectiveness of usual dissemination methods, but noted "radically" variable initial and response rates. Horbar et al [7] successfully promoted early use of surfactants for preterm infants using a multifaceted QI intervention that included attendance at a 2-day workshop. The purpose of this study was to test the hypothesis that the California Perinatal Quality Care Collaborative (CPQCC), a statewide consortium, would be able to improve the rate of antenatal steroid administration in very low birth weight (VLBW) infants born at member hospitals using a strategy based on QI principles.

CCS	California Children's Services	NIH	National Institutes of Health
CPQCC	California Perinatal Quality Care Collaborative	PQIP	Perinatal Quality Improvement Panel
CQI	Continuous quality improvement	QI	Quality improvement
NICU	Neonatal intensive care unit	VLBW	Very low birth weight
		VON	Vermont-Oxford Network

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Table I. Recommendations for the use of antenatal steroids for promoting fetal maturation to improve perinatal outcomes[1,2]

1. All pregnant women between 24 and 34 weeks of gestation who are at risk of preterm delivery should be considered candidates for antenatal treatment with a single course of corticosteroids.
2. A full treatment course consists of 2 doses of 12 mg of betamethasone given intramuscularly 24 hours apart or 4 doses of 6 mg of dexamethasone given intramuscularly 12 hours apart.
3. Because treatment for less than 24 hours is still associated with significant reductions in neonatal mortality, respiratory distress syndrome, and intraventricular hemorrhage, antenatal steroids should be given unless immediate delivery is anticipated.
4. In preterm premature rupture of membranes at less than 30 to 32 weeks gestation in the absence of clinical chorioaminionitis, antenatal steroid use is recommended.
5. In complicated pregnancies where delivery before 34 weeks of gestation is likely, antenatal steroid use is recommended unless there is evidence that corticosteroids will have an adverse effect on the mother or delivery is imminent.

METHODS

The California Perinatal Quality Care Collaborative

The CPQCC was created by a consortium of stakeholders comprising public and private obstetric and neonatal providers, health care purchasers, public health professionals, and private sector health industry specialists, in collaboration with the Vermont-Oxford Network (VON),[8] as described previously.[9] Membership in the CPQCC was offered to any California hospital providing more complex perinatal services than well-mother, well-baby care during the years addressed by this report, on a completely voluntary basis. CPQCC membership confers simultaneous membership in the VON for a single fee. The CPQCC's Perinatal Quality Improvement Panel (PQIP) designs and manages continuous quality improvement (CQI) cycles.

The CPQCC analyzes the identical clinical data collected for and submitted to the VON for all infants born weighing 501 to 1500 g cared for by its members to determine potential QI initiatives. Using a facilitative, interactive process for identifying candidate topics,[9] the PQIP selected antenatal steroid use before preterm delivery as the focus of its first QI cycle.

Antenatal Steroid Recommendations

The process of developing a recommendation was shaped by the experience and issues that had emerged in the years after the first NIH Consensus Conference on the Effect of Corticosteroids on Fetal Maturation.[1,2] The PQIP then adopted these recommendations (Table I). Implementation of these recommendations in practice necessitated addressing 3 additional issues. First, these recommendations envision treatment of 100% of eligible mothers, but appropriate exclusions and rapid deliveries inevitably reduce the actual numbers of mothers treated. In the absence of an established target rate, we sought to establish a target rate on an empirical basis.

Second, in 1999 there was controversy regarding the administration of repeat courses of steroids.[3] In accordance with its commitment to evidence-based guidelines and in the absence of prospective randomized controlled trial results, the PQIP opined that repeat antenatal steroid dosing could not be recommended outside of a randomized clinical trial. Subsequently, the 2000 NIH Consensus Conference and the American College of Obstetrics and Gynecology's Committee on Obstetric Practice made a similar recommendation.[10,11]

Third, the PQIP had to resolve the ambiguous term "between 24 and 34 weeks gestation." Whereas some have interpreted the upper limit as 34-6/7 weeks,[6,12-15] the PQIP followed the American Academy of Pediatrics/American College of Obstetrics and Gynecology specification of 33-6/7 weeks.[16,17]

Dissemination Strategy

The CPQCC's dissemination process was developed in accordance with the principles of "change agency" previously validated as effective in influencing physician and nursing behaviors.[18] Program components simultaneously addressed 3 needs: (1) the use of predisposing strategies, such as enlisting locally recognized maternal-fetal specialists to highlight authoritative practice reviews and opinions, thereby addressing the evidence basis for the desired change; (2) the use of practice-enabling strategies, such as developing effective training and implementation tools like those of the American Academy of Pediatrics/American Heart Association's Neonatal Resuscitation Program;[19,20] and (3) the use of feedback strategies that facilitate self-actualization stemming from self-analysis. To facilitate self-analysis and local QI development, the PQIP developed an antenatal steroid QI toolkit that included (1) an executive summary; (2) a rationale for the recommended intervention, drawn primarily from authoritative practice guidelines and meta-analyses; (3) benchmarking methods and results, preferably from both CPQCC and VON reports; (4) sample methodologies for auditing charts and processes to identify care delivery problems; (5) sample methodologies for organizing specific QI activities; and (6) sample documents, such as policies and procedures, order sets, staff education materials, and staff competency tests, contributed by CPQCC member hospitals (available at http//www.cpqcc.org). Workshops and presentations were held at the California Association of Neonatologists' annual meetings to introduce, reinforce, and distribute these materials. Participants were invited to attend as multidisciplinary groups. They were presented with a summary of the evidence-based effectiveness of antenatal steroids by a recognized authority and encouraged to ask questions to help resolve any issues impeding local change. In addition, participants engaged in small group discussions addressing barriers and ways to overcome