Quality Improvement and Antenatal Steroids

This excellent epidemiologic data report from the California Perinatal Quality Care Collaborative evaluates the effects of antenatal corticosteroids (ACS) for births from 2005 to 2016, a total of 28 252 infants.[1] The use of ACS increased from 80.1% to 90.3% with the primary outcomes for in-hospital death and severe intraventricular hemorrhage (IVH) modeled for individual risk factors or with a predicted probability factor for each time interval of analysis. Overall, as use of ANS increased over the time interval, mortality decreased (from 12.8% to 9.1%) and severe IVH decreased (from 11.5% to 8.8%). When stratified by exposure group, there were no changes in these rates for preterm births not exposed to ACS. The women not exposed to ACS had a high-risk profile.

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The authors called this increase in the observed benefits of ACS with increased use of ACS a "population improvement bias." As the use of ACS increases to >90%, the no ACS comparison population shrinks and concentrates the most problematic patients, those with no prenatal care, growth restriction, location of birth, multiple gestations, and low birth weight, as noted by Norman et al.[2] It is surprising that these outcomes did not increase in the infants who did not receive ACS, given the increased concentration of maternal risk factors known to impact survival and pregnancy outcomes.[3]

A limitation of the study is that the authors did not have granular data about steroid dosing and the interval from treatment to delivery. In the secondary meta-analysis of the Roberts and Dalziel 2006 Cochrane Review[4] that also is detailed in the World Health Organization recommendations,[5] the interval from maternal treatment to delivery was available for some of the randomized controlled trials. In a subgroup analysis of trials with information on the interval from study entry to delivery, the effects on outcomes differed; for example, the incidence of respiratory distress syndrome was significantly reduced after treatment intervals of 24 hours to 7 days between dosing and birth, and the benefit for death occurred <48 hours after dosing. The benefit for IVH was not seen at <24 hours but was noted at <48 hours through >7 days.

As Lee et al have noted, the observed associations between the use of ACS and neonatal outcomes may reflect unidentified factors that also may influence outcomes. For example, relative to the Roberts and Dalziel meta-analyses of 18 studies completed before 1993, the use of ACS appears to be less effective now than before 1993, when the risk rate for death was 0.69 (95% CI, 0.58-0.81).[4] Why this is so is unclear; those early trials were conducted before the widespread use of continuous positive airway pressure or modern neonatal ventilation or surfactant, all of which should decrease respiratory distress syndrome-associated mortality.

Another variable minimally discussed with ACS is the magnitude of benefit for outcomes.[5] A large placebo-controlled trial of ACS was recently reported by the World Health Organization with funding from the Gates Foundation in reasonably well-resourced hospitals in India, Kenya, Nigeria, and Pakistan.[6] The risk ratio for the death benefit from ACS was 0.84 (95% CI: 0.72-0.97; $P = .03$), a modest but significant effect. The conclusion that ACS prevents death in low- and medium-resource countries is not supported by the trial, as these trial sites were well-resourced to support delivery and some level of newborn care.

To better understand the unidentified factors that may lead to "population improvement bias" described in this study and to identify the optimal use of ACS, the following questions remain:

1. Do ACS have benefits in very low resource environments where most of the infant mortality occurs? A problem is that modeling for death benefits in the low resourced medical environment uses the Roberts and Dalziel risk ratio, which is probably unrealistic today.[7]
2. What are the optimal dosing strengths and duration of fetal exposure for ACS?[8]
3. What is the risk of neurodevelopmental impairment after ACS exposure? New population-based data from Finland report neurodevelopmental problems for infants exposed to ACS at preterm gestational age who then deliver at term, which occurred in 45% of the population.[9] ■

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ACS Antenatal corticosteroids
IVH Intraventricular hemorrhage

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Trends in Pediatric Endoscopic Retrograde Cholangiopancreatography and Interventional Endoscopy

The application of endoscopic retrograde cholangiopancreatography (ERCP) for the pediatric population is expanding, drawing upon the experience of adult ERCP applications during the last 50 years.[1-4] In the past, indications for and perceived utility of ERCP in pediatric patients were restrictive. The historical performance of pediatric ERCP procedures had been consigned to adult gastroenterology practitioners because of the paucity of pediatric gastroenterologists with interventional endoscopy training. This practice pattern has changed within the last 10-15 years corresponding to a growing number of pediatric-trained interventional endoscopists who can perform ERCP safely and effectively.[4,5] Yet despite this greater availability of the interventional pediatric gastroenterologist, there are regions within the US with limited or no availability of a pediatric-trained interventional endoscopist, resulting in a lack of exposure to these advanced techniques in general pediatric gastroenterology training and practice.

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Due to the expanding interest of pediatric gastroenterology providers in interventional endoscopy, specifically ERCP, new training opportunities have arisen within the last few years. This includes the establishment of dedicated pediatric gastroenterology interventional endoscopy advanced fellowships with combined adult and pediatric training, and in 2020 the availability of an annual training grant award offered by the North American Society for Pediatric Gastroenterology, Hepatology and Nutrition for fellows pursuing advanced fellowship in pediatric endoscopy.[6] With the advent of these training opportunities, combined with other nontraditional or formal adult advanced fellowship training programs pursued by some pediatric gastroenterologists, the field will continue to further evolve.

Interventional endoscopic procedures and therapies in pediatric cohorts have generally been published as case series and single institution, retrospective reviews.[4,7,8] In 2014, Troendle et al initiated the pediatric ERCP database initiative, a multicenter prospective database to evaluate indications, safety, and outcomes of ERCP in pediatric patients.[3,9] The pediatric ERCP database initiative has served as the basis for investigations into pediatric ERCP safety and efficacy, however, this database captures data from a limited number of large, tertiary care institutions and, thus, may not be completely representative of universal practice patterns and procedure-related outcomes. A more comprehensive assessment of the utilization of pediatric ERCP at a national level occurred in 2014, with trends from 2000 to 2009 showing increased utilization of therapeutic interventions.[2] This is re-visited in the present volume of *The Journal*, in which Barakat et al analyze US population level outcomes and utilization trends in pediatric ERCP.[10]

This study was a retrospective analysis of hospitalized patients ≤20 years old undergoing ERCP; the authors utilized the National Inpatient Sample (NIS) and the National Readmission Database from 2005 to 2014 and from 2010 to 2014, respectively. Within the study period from the NIS database query, over 11 000 hospitalized pediatric patients underwent ERCP with a predominance of procedures performed in adolescents (84% of patients were 14-20 years old) and in female patients (81%). A biliary indication accounted for nearly one-half of all procedures (48%), followed by the indication of acute/chronic pancreatitis (29%), with endoscopic therapy being performed in 85% of the cases. From the National Readmission Database, the rate of readmission within 30 days following a hospitalization where an ERCP was

ERCP Endoscopic retrograde cholangiopancreatography
NIS National Inpatient Sample

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