

Survival Without Major Morbidity Among Very Low Birth Weight Infants in California

Rates of survival without major complications have improved for the smallest babies born in California, according to a study led by researchers at Stanford School of Medicine and the [California Perinatal Quality Care Collaborative](#) (CPQCC). Authors credit biomedical science, real-time data measurement, and quality improvement initiatives with helping to advance this promising trend in neonatology.

Analyzing data from 49,333 infants born at CPQCC's 143 member hospitals revealed rates of survival without major morbidity improved from 62.2% to 66.9% from 2008 to 2017. Criteria for survival without major morbidity was defined as the absence of the following: death during birth hospitalization, chronic lung disease, severe peri-intraventricular hemorrhage (IVH), nosocomial infection, necrotizing enterocolitis (NEC), severe retinopathy of prematurity (ROP) or related surgery, and cystic periventricular leukomalacia (PVL).

[Full findings](#) were published online in *Pediatrics* on June 18 (e-pub ahead of print). [Henry C. Lee, MD](#), is the lead author, and [Jeff Gould, MD, MPH](#), is the senior author.

“It may be hard to see, day-to-day,” said Dr. Lee. “But as we look at our overall collaboration, there has clearly been improvement in the health of our preterm babies across the state.”

The study focused on very low birth weight (VLBW) infants born between 401 and 1500 grams or at a gestational age of 22 to 29 weeks. Infants born at <25 weeks gestational age and 25-27 weeks gestational age showed the greatest improvement. Among specific outcomes, reductions of necrotizing enterocolitis and nosocomial infection were most pronounced. There were also significant reductions in severe IVH, severe ROP, and ROP surgery, while rates of chronic lung disease and PVL remained unchanged.

A welcome surprise and room for growth

Today, babies are able to survive at smaller weights and lower gestational ages; the age of viability now hovers at around 22 to 23 weeks. While previous studies have investigated improvements in survival and individual morbidities over a limited number of years, this is the first study to address a range of outcomes over a longer period of time.

“The nice surprise was that even with the increased survival, overall morbidities were still decreasing over time,” Dr. Lee explained of the study population. “We were not creating a situation in this



population where there was a higher likelihood of morbidities, but in fact, there was a lower chance of morbidity even in those that survived.”

Researchers found that the rate of multiple complications significantly decreased from 2008-2017. The rate of infants with ≥ 4 morbidities dropped by 40.2% during the 10 years. Similarly, the rates of infants with 3 and 2 morbidities also declined by 40% and 18.7%, respectively. At the population level this translates to a significant number of babies, Dr. Lee said.

The study also identified a group of hospitals that delivered consistently better outcomes than the rest of the state. Researchers estimate an additional 621 babies could have survived without major morbidity each year if all hospitals performed as well as the top quartile over the most recent years of study, 2015-2017. This indicates a potential goal for the state to reach during the next decade.

The impact of quality improvement projects

Since CPQCC was established in 1997, the organization has aimed to standardize care across centers by disseminating population-based data and evidence-based best practices. To that end, the study showed a significant decrease in variation between CPQCC member hospitals during the study period. Variation also decreased significantly for adjusted hospital rates of all specific morbidities except chronic lung disease.

During the study period, CPQCC devised and implemented five [quality improvement projects](#) for groups of member hospitals who elected to participate. The projects targeted antibiotic usage, optimization in length of NICU stay, management of high-risk deliveries, breastmilk nutrition, and healthcare-associated infections. Two additional collaboratives have recently concluded and one is currently ongoing.

[Robert Posen, DO](#), is the director of the NICU at Saint Bernardine Medical Center, a community Level III NICU with a maximum census of 20 beds. Since arriving at the hospital in 2011, he has encouraged his team to participate in many of CPQCC’s quality improvement projects.

“In the past, every practitioner that would go through the unit would do their own thing from how they think treatment should be done,” Dr. Posen said. “Participating in these projects has helped standardize what we do, which is better for the patients. It’s better for the nursing staff to know how we’re proceeding. And it’s also better for the parents because they also have a more standardized idea of what we’re doing for their child in the NICU.”

Dr. Posen is particularly interested in nutrition, and his NICU participated in CPQCC’s “[Grow, Babies, Grow!](#)” project. Using CPQCC’s feeding guidelines to regulate care, Dr. Posen has observed that babies at Saint Bernadine are switching sooner from intravenous nutrition to enteral feedings and are going home at higher weights after shorter hospitalizations.

Soon, CPQCC will announce four more quality improvement projects planned for 2021. Looking even further ahead, Dr. Lee speculates that future projects could target chronic lung disease, as the



Pediatrics paper showed that rates across NICUs remained stagnant during the study period. He also shared that CPQCC intends to design collaboratives tackling longer term neurologic outcomes post discharge. This will require further analysis of data collected from California's [High Risk Infant Follow-up](#) (HRIF) Program; co-author [Susan Hintz, MD, MS Epi](#), serves as CPQCC's HRIF Medical Director.

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