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State-based perinatal quality collaboratives: Pursuing improvements in perinatal health outcomes for all mothers and newborns

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ARTICLE INFO

Keywords:

Perinatal Quality Collaborative
Quality Improvement
Population Health
Public Health States

ABSTRACT

State-based perinatal quality collaboratives (SPQC) have become increasingly widespread in the United States. Whereas the first was launched in 1997, today over 40 states have SPQCs that are actively working or are in development. Despite great variability in the structure and function of SPQCs among states, many have seen their efforts lead to significant improvements in the care of mothers and newborns. Clinical topics targeted by SPQCs have included nosocomial infection in newborns, human milk use, neonatal abstinence syndrome, early term deliveries without a medical indication, maternal hemorrhage, and maternal hypertension, among others. While each SPQC uses approaches suited to its own context, several themes are common to the goals of all SPQCs, including developing obstetric and neonatal partnerships; including families as partners; striving for participation by all providers; utilizing rigorous quality improvement science; maintaining close partnerships with public health departments; and seeking population-level improvements in health outcomes.

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Introduction

State Perinatal Quality Collaboratives (SPQCs) are networks of perinatal care providers and public health professionals seeking to improve health outcomes for mothers and newborns at the state level through quality improvement. SPQCs have seen increasing success in improving the care of mothers and newborns, and many states have launched SPQCs in recent years. It appears SPQCs have a unique and significant role in perinatal quality improvement beyond existing efforts carried out by hospitals, public health agencies, and other organizations. In

this article, we briefly review the background of SPQCs within the context of quality improvement in general, highlight some of their particular improvement successes, and discuss some common features of SPQC structure and function.

Background of State Perinatal Quality Collaboratives

The Institute of Medicine defined quality as “the degree to which health services for individuals and populations

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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<http://dx.doi.org/10.1053/j.semperi.2017.03.009>

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increase the likelihood of desired health outcomes and are consistent with current professional knowledge”.¹ Published efforts to improve patient care and outcomes have a long and varied history.^{2,3} Applications of standardized improvement methods in health care followed multiple uses of these methods reported by other industries including airlines, nuclear power and automobile manufacturing. Much of this work used the improvement principles put forward by W. Edwards Deming during his tenure in Japan immediately following the end of World War II.⁴ Deming described five elements of improvement: understanding the overall processes involving suppliers, producers, and customers of goods and services (system); understanding the range and causes of variation in quality; understanding the use of statistical sampling in measurements; understanding the concepts explaining knowledge and the limits of what can be known; and understanding concepts of human nature. These principles were further developed and tested in a variety of health care settings by newly formed improvement organizations such as the Institute for Healthcare Improvement (www.ihl.org) and the National Institute for Child Health Quality (www.nichq.org).

Collaborative Improvement

Improvement efforts can be characterized as either independent or collaborative. *Independent* health outcomes improvement efforts tend to be initiated by individual providers, clinics, hospitals or care organizations. In contrast, *collaborative* improvement of system processes and outcomes is designed such that multiple, sometimes competing, organizations share common goals and lessons learned in the application of improvement science principles. Collaborative quality improvement can accelerate the rate of improvement in several ways: allowing shared, simultaneous learning across organizations to occur; encouraging different organizations to improve different aspects of complex systems, including within their different patient populations; and encouraging constructive competition between organizations based on an inherent desire to avoid being “second best” in achieving their shared goals of quality improvement. Both independent and collaborative improvement programs exist, with results reported either anecdotally or more formally, supported by rigorous scientific methods. A 2008 systematic review evaluating collaborative quality improvement programs found that the measurable impacts of such collaboratives were positive but the evidence is limited.⁵ More recent reviews focused on pediatric and perinatal improvement collaboratives have suggested that appropriately designed collaboratives can lead to significant improvements in health outcomes.^{6–9}

State-based improvement collaboratives

State-based, perinatal care and outcomes improvement collaboratives began in 1997 when some of the neonatal intensive care units in California agreed to work together to improve the care of pregnant women and newborn infants.^{10,11} Named the California Perinatal Quality Care Collaborative (CPQCC), these neonatal intensive care units

partnered with the State of California Department of Health Services, Maternal and Child Health Branch to improve perinatal health outcomes in the participating institutions. CPQCC developed a multi-layered data system that included clinical data from participating hospitals, vital statistics from the Department of Health Services, and resource utilization data from Medicaid, and used this database to provide performance benchmarking reports to members. They identified opportunities for improvement through variations in outcomes and processes and built robust toolkits and collaborative quality improvement initiatives to engage members in wide scale improvement efforts.

The methods and achievements of CPQCC were widely disseminated and used by perinatal clinicians and others to build similar SPQCs in North Carolina, New York, Tennessee and Ohio, followed soon thereafter by others. In some states, SPQCs were launched by clinical providers seeking to expand and spread improvement efforts; in other states, SPQCs were launched by public health departments seeking more effective mechanisms for achieving state health goals. National organizations such as the Vermont Oxford Network, the American Congress for Obstetrics and Gynecology, and the March of Dimes provided critical support and encouragement of new SPQCs. In 2011, the Centers for Disease Control and Prevention (CDC) launched a new initiative providing grant support to three SPQCs, and expanded this to six states in 2014. In 2016, the CDC and the March of Dimes launched the National Network of Perinatal Quality Collaboratives (NNPQC), with the goal of encouraging the development of an SPQC in every state (<https://www.cdc.gov/reproductivehealth/maternalinfanthealth/pqc.htm>). Today, over 40 states have formed or are forming a state-based perinatal quality collaborative.

Improvements in care from State Perinatal Quality Collaboratives

Quality collaborative networks in general, and SPQCs in particular, have used a variety of approaches to contribute to improvements in perinatal care. In addition to implementation of interventions to improve perinatal care, SPQCs have contributed to perinatal care improvement by identifying variations in care and outcomes among centers, utilizing large databases to identify clinical risk factors for adverse outcomes, and examining systemic and human factors associated with quality of care. While some of this work has resulted in broadly influential publications in perinatology, in this review, we focus on quality improvement initiatives by SPQCs that target specific improvements in maternal or newborn care.

An important limitation of this review is that only a few SPQCs have published their work in peer-reviewed journals; many other SPQCs have conducted highly successful initiatives that have been shared informally at meetings and conferences and through websites, but have not been published. Therefore, this is not meant to be a comprehensive review of the broad array of initiatives undertaken by all SPQCs, but rather an examination of the more common projects among states. A broader list of topics that have been

Table – Improvement targets for State Perinatal Quality Collaboratives.

Neonatal topics

- Nosocomial infection
- Central-line-associated bloodstream infection
- Human milk use
- Neonatal nutrition
- Delivery room management
- Timed cord clamping
- Neonatal abstinence syndrome
- Safe sleep practices
- Antibiotic stewardship
- Critical congenital heart disease screening

Obstetric topics

- Early elective deliveries
- Preventing preterm birth
- Antenatal corticosteroids
- Maternal hypertension
- Maternal hemorrhage
- Severe maternal morbidity
- Cesarean section rates

Data quality improvement

- Vital statistics and birth certificate data quality

targeted by SPQCs is provided in the [Table](#). Also, in this review, we do not review the important pioneering work done by non-state-based collaborative networks, such as the Vermont Oxford Network, nor the significant successes seen by international perinatal quality collaboratives.

Examples of PQC successes in newborn care

The most common neonatal initiative among SPQCs is reduction of nosocomial infections including central-line-associated bloodstream infections (CLABSIs). Many SPQCs chose this as their first neonatal project, building upon the landmark Keystone Intensive Care Unit Project in Michigan as well as increasing state-based mandatory reporting of CLABSI rates to the National Healthcare Safety Network.^{12–14} SPQCs from California, New York, Ohio, and North Carolina have published their experience in achieving significant statewide reductions in NICU CLABSI and nosocomial infection rates.^{15–21} Numerous other SPQCs have informally reported results of highly successful CLABSI reduction efforts. Reductions in infection rates have ranged from 20% to 71%, with numerous groups showing sustainment of these improvements following completion of the active phases of the projects. Specific methods varied between collaboratives, but in general, the groups used techniques loosely based on the IHI Breakthrough Series Model and now common to SPQCs, including the development of hospital-based improvement teams, data sharing and benchmarking, regular data feedback, collaborative learning through webinars and in-person meetings including sharing of best practices, and support of local quality improvement efforts. Importantly, standardized insertion and maintenance checklists have been a core intervention in many of these CLABSI initiatives.

Beyond infections, SPQCs have addressed a range of important neonatal improvement topics. Numerous states have

improved the delivery room care of high-risk newborns, with some projects having a specific focus such as admission hypothermia or timed cord clamping, and others more broadly addressing the “golden” first hour of care. Common interventions have included the use of checklists and team briefings and debriefings.^{22–27} Many states have undertaken initiatives aimed at increasing human milk use in high-risk newborns, focusing on interventions to support mothers with early initiation of human milk expression as well as long-term sustainment of milk production.^{28–35} Numerous states have active initiatives working to improve the care of babies and families impacted by neonatal abstinence syndrome (NAS), and have shown reductions in need for pharmacologic therapy and length of stay through increased standardization of practices.^{36–41} Notably, for several SPQCs, the NAS initiative was the first to extend beyond level III neonatal intensive care units to level I and level II newborn units.

Examples of PQC successes in obstetric care

Organized efforts to improve obstetric care may have begun in the early 2000s, when numerous groups began to call for wide scale systematic efforts to better understand adverse events in perinatal care and to identify opportunities for improvement. These included the IHI’s development of a perinatal care toolkit and improvement community^{42,43}; an update of the landmark publication “Toward Improving the Outcome of Pregnancy” by the March of Dimes⁴⁴; and a “Call to Action” around quality of care in labor and delivery released by the American College of Obstetricians and Gynecologists and cosigned by six other major national perinatal professional organizations.⁴⁵

Among the improvement initiatives identified by these organizations, significant attention was placed on reducing scheduled deliveries without a medical indication prior to 39 weeks’ gestation, or early elective deliveries.^{46–48} Many SPQCs chose reducing early elective deliveries as their first obstetric quality improvement project and utilized a variety of approaches to reach the common goal. While specifics varied among states, the initiatives generally included some or all of the following approaches: having “champion” leaders at member institutions to get buy-in and participation; providing educational resources to reinforce objectives to improve outcomes; improving documentation of dating criteria and indications for delivery; review of site-specific and aggregate data to review goals and effectiveness of interventions; and troubleshooting of systemic and local issues, including a reassessment of the interventions that have been implemented. There are several reports in the literature documenting the success of SPQCs in reducing elective deliveries before 39 weeks’ gestation, many with success in driving the rates close to and below 5% of all deliveries.^{42,49–51} In part driven by SPQCs, similar trends are being seen nationally. For the fifth year in a row, the average rate of early elective deliveries nationally as measured by the Leapfrog Group has decreased, from a rate of 17% in 2010 to a rate of 2.8% in 2015 (available through www.leapfroggroup.org).

In addition to work to reduce early elective delivery, SPQCs have worked to improve outcomes for pregnancies at risk for preterm birth and for infants born preterm as well.

These efforts have focused on improving the screening, identification, and treatment of women who would benefit from progesterone therapy to prevent recurrent preterm birth, and optimization of antenatal corticosteroid therapy for fetal lung maturation. Progesterone has been shown to reduce preterm birth by more than 30% in women with prior preterm birth and/or short cervix through identification and treatment of appropriate candidates.⁵² SPQC efforts have been successful at improving identification of women who are eligible for progesterone therapy and addressing systems-level barriers that prevent timely receipt of progesterone therapy.⁵³ Antenatal corticosteroids (ANCS) have been shown to reduce the risk of serious health problems and death among preterm infants. While rates of administration are generally high, evidence suggests that ANCS administration rates can and should be optimized as a way to improve outcomes for babies that are born prematurely.^{54,55} SPQCs have been successful at increasing the percentage of pregnant women between 24 0/7 weeks and 34 0/7 weeks' gestation who are at risk of preterm birth who receive ANCS prior to delivery, including efforts to improve accurate documentation of steroid therapy and to better understand factors that drive ANCS compliance.^{55–57}

Because of the steadily rising rates of maternal mortality in the United States, with an increasing contribution of chronic diseases,⁵⁸ obstetric quality improvement efforts are shifting to prevention of maternal mortality and severe maternal morbidity. Opportunities have been identified to target the leading preventable causes of pregnancy-related mortality, which include complications related to preeclampsia and hemorrhage.⁵⁹ In response, numerous resources have been developed to improve and optimize the management of obstetric hemorrhage^{60–63} and to improve the response to and management of preeclampsia.⁶⁴ SPQC efforts addressing the management of preeclampsia have demonstrated reductions of up to 36% in severe maternal complications.⁶⁵ There is a shared sense of urgency in addressing maternal mortality and morbidity, and more SPQCs are taking on this work through use of the resources and toolkits that have been developed and by joining national efforts such as the Alliance for Innovation on Maternal Health (AIM).

Features of SPQC structure and function

State-based, perinatal quality collaboratives vary considerably in design, focus, and accomplishments. This variability is not surprising, given that SPQCs have taken different approaches to virtually all phases of development, from launch to spread to sustainment. These different approaches to development have led to major differences in SPQC structure, with some SPQCs being designed as voluntary collaborations of clinical providers with limited organizational funding, and others representing more formal networks of providers and public health agencies with multiple funding streams. The CDC resource guide for state perinatal quality collaboratives offers a broad and comprehensive survey of the varying approaches currently used by SPQCs in organizational development and function.⁶⁶ Of note, sharing of SPQC experience, through informal networking, through presentations and posters at

meetings and conferences, and through published reports, has shown fairly consistently that many SPQCs have been able to contribute to marked improvements in perinatal care and maternal and newborn outcomes despite significant variability in structure and design.

This success of multiple types of SPQCs suggests that one specific approach to SPQCs is not necessary and may be detrimental. However, several core features of SPQC activities have emerged that are relevant to all SPQCs. Understanding these features may be of benefit to new SPQCs as they consider their approach and may help existing SPQCs achieve greater success in the future.

Obstetric and neonatal partnerships

Health outcomes for both the mother and the newborn are influenced by the pre-pregnancy health of the mother, the quality of prenatal and peripartum services, the risk-appropriateness of the birth hospital, and the care provided in the neonatal and post-neonatal periods. High-quality obstetric and neonatal care is both needed to assure optimal outcomes. However, obstetric and neonatal goals are not always in exact alignment. One example is illustrated by efforts to reduce the frequency of non-medically indicated (or “elective”) deliveries prior to term. From an obstetric perspective, there may be real or perceived benefits to the mother for delivery at 37 or 38 weeks, with the belief that these infants have similar outcomes as infants delivered at 39 or 40 weeks. From a pediatric perspective, infants born at 37 or 38 weeks have a real and non-trivial increased risk of respiratory distress that may require NICU admission and intensive care, and the maternal benefits of earlier delivery are often unclear. From a family perspective, patients and their families may hear contradictory messages from their obstetric and neonatal providers, threatening cooperative working relationships between all of the groups. Achieving optimal outcomes for early term deliveries requires alignment of goals and coordination of care among obstetricians, pediatricians, and families, tasks potentially well-suited to SPQCs. In the case of the Ohio Perinatal Quality Collaborative, obstetrics and pediatrics co-led the early, non-indicated delivery project resulting in a shared definition of the problem, a shared goal, and statewide, population-level, outcomes improvement.⁴⁹ Numerous other SPQCs have since used similar approaches to achieve similar successes.

Currently, SPQCs vary in the extent to which obstetric and pediatric providers are cooperating and collaborating. Some collaboratives have a primary neonatal intensive care focus; some collaboratives have a primary maternal focus; and others include both sets of providers under a single collaborative umbrella. While improvements are undoubtedly achievable with projects focused on only the mother or only the newborn, the most substantial improvements are most likely to be realized by SPQCs that strive for strong collaboration between obstetric and neonatal providers.

Family engagement and leadership

The role of patients and families in quality improvement is now widely recognized, and many institutions have developed mechanisms for actively engaging families in local perinatal

quality improvement efforts. However, the involvement of families in quality networks, including SPQCs, is more limited. While it is clear that families offer perspectives and knowledge different from those of perinatal care providers in their institution, families also offer valuable insights into care decisions that extend beyond one institution and into the scope of SPQCs. An example in which consideration of different perspectives is particularly important is the decision-making around transferring a patient to a different hospital for delivery based on the likelihood of preterm delivery. Clinical evidence supports these transfers to achieve the improved infant outcomes that often result from delivering a very preterm infant in a hospital with a level III NICU. Some SPQCs have chosen “regionalization” of care as an improvement target, addressing provider, financial, and structural concerns. However, families are infrequently included in this specific decision-making process, even though transportation, ease of visitation, and changing caregivers may be significant family concerns. Families have made a major impact on local institution-based perinatal improvement efforts, and they can have similar impacts on SPQC initiatives as well. The Perinatal Quality Collaborative of North Carolina has been a leader in patient and family engagement, including patients and family members in all aspects of organizational development and in all levels of leadership and project structure.⁶⁷ Other SPQCs are beginning to follow suit.

Provider engagement

SPQCs seek to improve outcomes for mothers and newborns across the state, and to this end, strive to engage all maternal and newborn providers in their work. However, it may not be necessary that all providers participate at the outset of an SPQC’s development. Most SPQCs began their first projects with a small group of interested providers, either because of interest and willingness based on past relationships and experience, or because of project design. Many SPQCs, and particularly those with a neonatal focus, chose first projects targeted towards level III perinatal centers such as CLABSI prevention, and later explored projects of interest to level I and level II centers. Virtually all SPQCs have focused largely on the hospital-based care of the mother and newborn, thereby limiting the involvement of outpatient providers. While broader provider engagement is the goal, this approach of selective engagement at the start may have been valuable, as many SPQCs have used these first smaller, more focused projects to develop methods and achieve early successes that have provided a foundation for later expansion. Many SPQCs now target projects with broad applicability for all birth hospitals, such as early term delivery, maternal morbidity, human milk use, neonatal abstinence syndrome, and antibiotic stewardship. Outpatient providers are increasingly being included as well, particularly with obstetric efforts addressing progesterone use for prevention of preterm birth and initiatives focused on neonatal abstinence syndrome and perinatal substance use.

Use of quality improvement science

Use of quality improvement methods and designs also varies among SPQCs. Virtually all SPQCs utilize collaborative quality

improvement (QI) methods at least partly based on the Breakthrough Series model developed by the IHI and utilized successfully by other collaborative improvement networks.^{7,68,69} These collaborative QI methods include selecting a topic with broad impact and appeal, utilizing content experts to create evidence-based improvement goals and interventions, developing local hospital-based multidisciplinary improvement teams with support from leadership, utilizing QI experts to assist improvement teams with QI methodology, conducting data collection and analysis that includes rapid feedback and progress reports, and collaborative learning and sharing through webinars, conference calls, on-line communication tools, and in-person meetings.

Beyond these standard collaborative QI methods, however, SPQCs vary substantially in their use of more rigorous quality improvement methods and more advanced quality improvement science. As mentioned above, only a few SPQCs have regularly pursued publication in peer-reviewed journals as a mechanism for sharing their work. Publication requires rigorous analysis with appropriate statistical confidence, and lack of publication by many SPQCs may limit dissemination and cross-state collaboration based on their work. In addition to insuring rigorous methods and analyses that allow for publications, a few SPQCs are now utilizing their networks to study and learn how collaborative QI can be done better. The California SPQC has analyzed short-term and long-term improvements from hospitals participating in collaborative QI as compared to hospitals doing local QI, showing the benefits of the collaborative model and identifying factors associated with improvement sustainability.^{22,70,71} Other SPQCs have begun to explore the use of advanced methods such as orchestrated testing to better understand the impact of individual improvement interventions. Orchestrated testing is an application of planned experimentation that allows simultaneous examination of multiple practices to determine which intervention or combination of interventions affects the outcome.⁷² While publication should be a standard sought by most if not all SPQCs, the experiences and lessons learned by SPQCs may also provide a valuable framework for significant contributions to improvement science as well.

Involvement of state public health departments

SPQCs have organized at the state level for numerous reasons. For SPQCs that began as voluntary networks of hospitals, targeting hospitals at the state level provided geographic and professional proximity that enabled in-person collaboration. Other SPQCs were initially driven by groups that were already defined at the state level, such as public health departments or state chapters of the March of Dimes or professional organizations. As SPQCs have developed and matured, partnership between clinical providers and public health departments has proven a critical component of SPQC activity. State health departments have the ability and authority to obtain population-based information from core data sets (such as birth and death files), which can be instrumental for the successful functioning of a statewide collaborative. Although most of the work of SPQCs occurs in health care and academic institutions, partnering with public

health professionals in the state health department allows for institutionalizing the efforts of the PQC as a core public health function and allows for oversight and accountability. In addition, collaboration between clinical providers and public health officials allows for SPQCs to better align preventive and public health interventions with clinical improvement efforts. In the United States, public health and preventive services are organized separately from clinical care services, leading to potential malalignment of funding and resources. In perinatal care, examples of this type of malalignment include antenatal corticosteroid use prior to preterm birth and progesterone use to prevent preterm birth. Both interventions can have major impacts on population-based perinatal outcomes, yet are not administered reliably when indicated. Although both are dependent on prescription by clinical providers, it is likely that public health issues such as access to care and insurance coverage are important drivers of this gap between ideal and actual practice. SPQCs that include clinical providers and public health departments may be ideally suited to identify statewide interventions that appropriately bridge clinical care and public health.

A few SPQCs have benefited from involvement and support of their state health departments from their start. For others, this partnership has been fostered by federal funding. In 2011, CDC's Division of Reproductive Health launched a cooperative agreement to support initiatives for perinatal care quality improvement through SPQCs.⁷³ Recognizing that state health departments are uniquely qualified to perform many of the programmatic activities for SPQC projects, a partnership between the state health department and the SPQC was a requirement for program support. Some SPQCs have now collaborated with their state health departments on improvement projects specifically targeting public health activities, such as improvement of the quality of data in birth certificates and vital statistics. SPQCs supported by the CDC cooperative agreement and others have exhibited exemplary partnerships between hospitals, clinicians, and state health department staff, and have demonstrated that the potential for sustainable statewide quality improvement activities is more likely to be realized when they are state-based initiatives with state health department support, rather than initiatives started by individuals or single institutions.⁷³

Population-level improvement

All SPQCs, whether by virtue of including the name of their state in their organizational title or by their explicit mission statements, seek to improve health outcomes for mothers and newborns at the state level. However, few state collaboratives report population-level outcomes, such as outcomes for all births. Rather, SPQCs typically report outcomes for specific populations targeted by their improvement initiatives, which may represent only a portion of mothers or newborns in the state. Some of the barriers to population-level measurement and improvement have been described above, and include a focus on narrow or specific clinical conditions, limited or targeted provider engagement, and incomplete partnerships with public health agencies. Other barriers may be less explicit, such as competition between providers or hospital systems that may restrict data sharing

and transparency, and vital statistics systems that are limited in ability to provide real-time data and trends. These barriers are not insurmountable; a number of SPQCs have successfully engaged virtually all hospitals in their state providing perinatal care, and a few have partnered with their state public health officials to significantly improve the timeliness of vital statistics data. SPQCs have a unique opportunity to seek population-level measurement and reporting as the standard by which to evaluate their impact.

Cross-state collaborations

Several major large quality improvement initiatives have brought together multiple states and SPQCs in collaborative efforts. These cross-state initiatives have provided support and infrastructure for SPQCs that are early in development, and have benefited from the experience of established SPQCs in learning how to implement and spread broader improvement strategies.

Several cross-state initiatives have specifically targeted SPQCs. The Perinatal Quality Collaborative of North Carolina, with support from the Agency for Healthcare Research and Quality, brought together 9 SPQCs in a multi-state neonatal CLABSI initiative.^{74,75} For several of the participating SPQCs, the multi-state CLABSI project provided critical early support for infrastructure development and hospital engagement. The Vermont Oxford Network developed a novel framework for partnering with SPQCs in its improvement effort targeting neonatal abstinence syndrome, providing QI resources for participating states while increasing hospital participation in the national project.³⁸ Numerous SPQCs are now partnering on a collaborative project focused on antibiotic stewardship.

Other national initiatives have been targeted toward state public health agencies, but are increasingly identifying opportunities for collaborations with SPQCs. These include the Healthy Babies Initiative⁷⁶; the Strong Start Initiative⁷⁷; the Collaborative Improvement and Innovation Network to Reduce Infant Mortality (IM CoIN)⁷⁸; and the Alliance for Innovation on Maternal Health (AIM).⁷⁹ While the level of SPQC involvement in these initiatives varies across initiatives and across states, it is likely that greater coordination between the national efforts and SPQCs may increase the ability of these initiatives to achieve their goals.

Conclusions

Perinatal quality collaboratives organized at the state level have undoubtedly demonstrated unique and substantial value in perinatal quality improvement efforts. Despite substantial variability in their structure and organization, SPQCs have successfully developed broad-based networks of health care providers and public health agencies with a unified goal of improving the care of mothers and newborns in the state. The variability between SPQCs may very well be a major driver of their success, as each SPQC adapts itself to meet the needs and context of its environment. While SPQCs should seek to maintain their state-based focus and individual design, the following important principles are common across SPQCs: (1) engaging the full spectrum of providers

from pre-pregnancy to infant care; (2) including patients and families as partners in all improvement efforts; (3) employing rigorous quality improvement science, including sharing learning through publications and developing novel methods for collaborative QI; (4) partnering with public health agencies and other state organizations in planning improvement initiatives and measuring their impact; (5) seeking broad-based transparency to encourage widespread participation and engagement; and (6) seeking population-level improvement by measuring and reporting outcomes for all mothers and newborns in the state. As existing SPQCs grow and mature, and as new SPQCs are launched, these principles may, in the longer run, help all SPQCs achieve the greatest opportunity for sustained improvement.

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