

Perinatal-Neonatal Quality Improvement Network of Massachusetts

Final Performance Report

Grant Number 5 NU58DP006371

Grant Period: 9/30/17 to 9/29/22

On behalf of the Perinatal-Neonatal Quality Improvement Network of Massachusetts (PNQIN), we submit this final performance report for funding received under the State-based Perinatal Quality Collaboratives CDC-RFA- DP17-1702. The main report on pages 1-29 summarizes our Perinatal Opioid Project, the primary project supported by this grant. This includes activities supported by supplemental funding received in 2019-2020 that also focused on perinatal opioid use. Activities supported by supplemental funding received in 2021-2022 focused on COVID-19 improvement efforts are summarized on pages 30-36.

FINAL REPORT: PERINATAL OPIOID PROJECT

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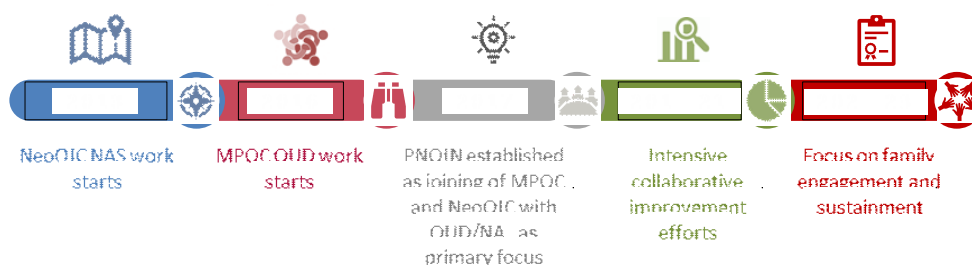
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Impact Statement

In 2017, with support from the CDC perinatal quality collaborative (PQC) grant program, PNQIN launched our Perinatal Opioid Project (POP). This initiative brought together previous efforts around maternal opioid use disorder by the Massachusetts Perinatal Quality Collaborative (MPQC), our state maternal collaborative and efforts around neonatal opioid withdrawal

syndrome (NOWS) and neonatal abstinence syndrome (NAS) by our state Neonatal Quality Improvement Collaborative (NeoQIC), as shown in the project timeline in **Figure 1**.

Figure 1: Timeline of PNQIN and the Perinatal Opioid Project



To a large extent, while MPQC and NeoQIC had both already proven to be effective quality collaboratives, the perinatal opioid project helped make PNQIN into a true statewide PQC. First, this project brought NeoQIC and MPQC together in a formal quality improvement initiative targeting care of the family, rather than the mother or newborn specifically. Second, while earlier NeoQIC and MPQC initiatives enjoyed participation generally by the bigger hospitals in the state, POP reached virtually all perinatal and pediatric centers. At its peak, over 40 hospitals in the state (out of 47) were actively engaged. Third, the POP project cemented partnerships between PNQIN and multiple state and community organizations, including the Department of Public Health, the Massachusetts Health Policy Commission, the Betsy Lehman Center, the Department of Children and Families, the Bureau of Substance Abuse Services, Early Intervention, and more. These partnerships have already impacted multiple other PNQIN efforts.

With our POP project, we have seen numerous important, measurable, and sustained improvements in clinical care provided to newborns, birth parents, and families impacted by perinatal opioid use. We have helped increase workforce capacity, providing training in treatment of opioid use disorder as well as stigma, bias, and trauma-informed care. We have targeted population-level improvements, while partnering with multiple community organizations and state agencies to link quality improvement, public health, and policy interventions. We have brought together a broad and diverse community committed to common goals, with our project summits attended by hundreds of dedicated nurses, social

workers, physicians, community representatives, families, counselors, and more. We highlighted the lived experience of families at our summits and webinars and have progressively involved families in all levels of the project. Our project community has consistently praised the impact of these stories to change attitudes and move care forward.

POP has also seen important challenges. Most measurable improvements in clinical care have been within the domain of in-hospital care of the newborn and family; improvements have been more difficult to achieve in the upstream care of a parent with opioid use disorder (OUD) during pregnancy and in the downstream care of the family following hospital discharge. While hospital engagement was robust at the start of the project, it has been difficult to sustain, between the COVID-19 pandemic and the need for hospitals to focus on new initiatives and improvement targets. While as with most PQC's, we have experience examining and improving clinical care, the many critical policy, legal, and social aspects of care of these families have been more challenging to address. We have found evidence of significant inequities in care of perinatal opioid use related to race/ethnicity and have worked to understand and address these inequities and will continue to do so, with a long-term goal of achieving equity for all people in Massachusetts.

Project Highlights

Selected highlights of the project are described below. Of note, this is not meant to be a comprehensive summary of all project components.

Core database and progress reports

Data and measurement have been a core foundation of the POP project. Since 2017, we have supported a core database of process and outcome measures related to the hospital-based care of mothers with OUD and newborns at risk for NAS, including maternal medication treatment, non-pharmacologic care of the newborn, and discharge coordination. The database is used to generate a monthly statewide progress report and quarterly hospital progress reports. The reports show progress over time on key performance measures, as well as comparative performance between hospitals. Control charts are used for time-series data

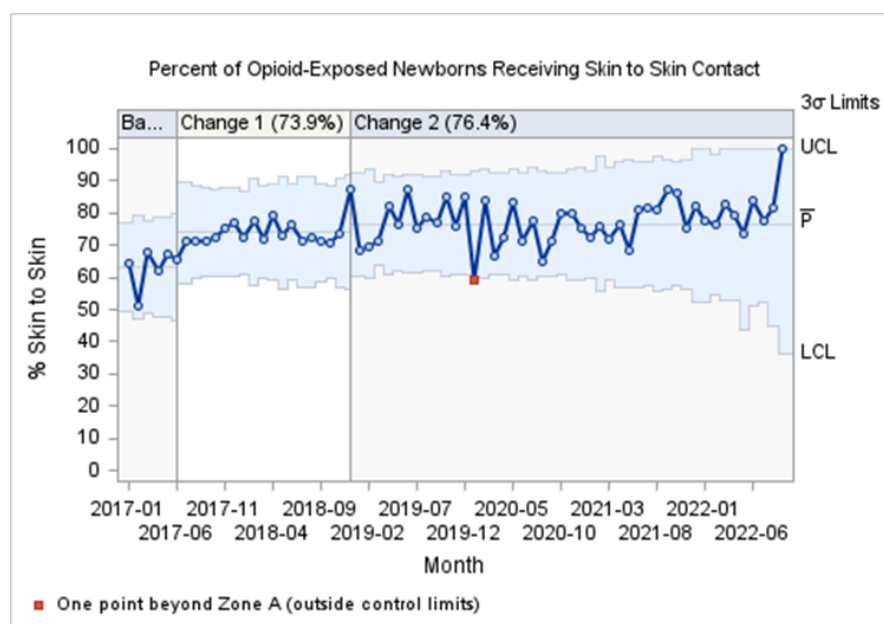
analysis on the statewide reports and run charts on the hospital reports. Data are shared with participating hospitals quarterly, and with the broad community at the summit and through annual summaries. Many hospitals have commented that the data reports, including the comparative graphs and the time-series data analyses, have helped drive their local improvement efforts.

From January 2017 to October 2022, data on over 4000 dyads were entered into the database. Selected demographics for this population are shown in **Table 1**.

Table 1: Demographics, PNQIN POP Core Database		
All Infants born beginning 1/1/17		
Sample Size	4217	--
Mother and infant characteristics	N	%
Maternal Race/Ethnicity		
Hispanic	339	8.0
Non-Hispanic black	160	3.8
Non-Hispanic white	3467	82.2
Other/unknown	251	6.0
Infant gender		
Male	2163	51.3
Female	2034	48.2
Unknown	20	0.5
Location of birth		
Inborn	3985	94.5
Outborn	214	5.1
Unknown	18	0.4
Term >= 37 weeks		
Yes	3414	81.0
Gestational age, weeks		
Mean SD	37.9	2.2

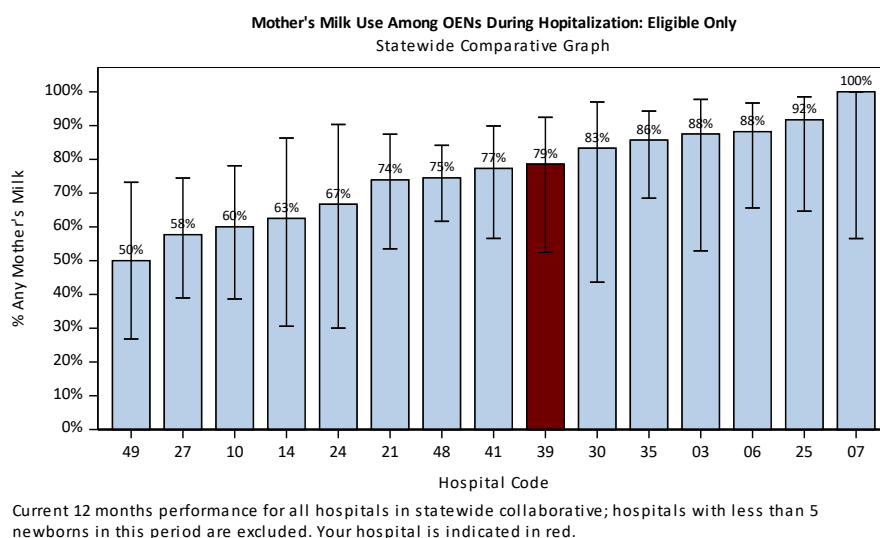
An example of a control chart from a recent statewide report showing performance on the metric of skin-to-skin contact in the first 24 hours of life is shown in **Figure 2**. This chart shows that skin-to-skin rates increased significantly over the course of the project, from 64% to 74% to 76%, and that this improvement has been sustained.

Figure 2: Control Chart, Skin-to-Skin Contact in First 24 Hours, July 2022 Statewide Report



An example of a comparative graph from a recent hospital report showing performance on mother's milk use among eligible opioid-exposed newborns is shown in **Figure 3**.

Figure 3: Comparative Graph, Mother's Milk Use Among Eligible OENs, July 2022



Although the primary goal of the database has been to support hospital-based improvement efforts, we have also used the database to conduct multiple secondary analyses that have

informed clinical care and ongoing quality improvement efforts, and to support the creation of a perinatal opioid equity dashboard. Several of these analyses have led to publications; a list of publications that have used this database is provided below on pages 26-27. The equity dashboard based on the database is described further on pages 12-13.

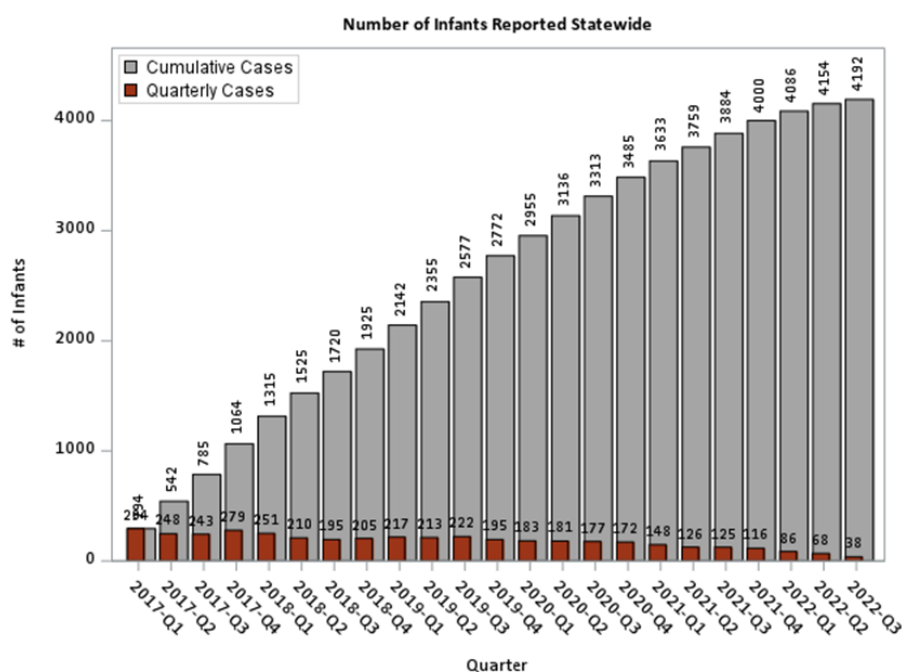
As an example of a secondary analysis, the database was used to examine predictors of the use of pharmacologic therapy for treatment of NOWS (Singh et al, J Perinatology, 2021). Results of a multivariable logistic regression model from this analysis are shown in **Table 2**. This analysis showed that exposure to medications for opioid use disorder, as compared to exposure to illicit opioids alone, was associated with a higher likelihood of needing pharmacologic therapy for NOWS. This finding has notable implications for our counselling around maternal treatment and our view of NOWS as a negative outcome; to a large extent, we should view an infant that develops NOWS due to maternal treatment with medications for OUD as a positive outcome.

Table 2: Factors Associated with Pharmacologic Therapy for NOWS, Multivariate Logistic Regression				
	aOR*	95% CI*		p value
In-Utero Opioid Exposure				<0.001
MOUD Alone	Ref			
MOUD and Non-prescribed Opioids	1.47	1.12	1.93	
Non-prescribed Opioids without MOUD	0.60	0.42	0.85	
Other Prescribed Opioids	0.17	0.09	0.32	
Other In-Utero Exposures				
Tobacco	1.33	1.08	1.63	0.008
SSRI	1.68	1.22	2.31	0.001
Benzodiazepine	1.71	1.30	2.25	<0.001
Year of Birth				<0.001
2017	Ref			
2018	0.71	0.57	0.90	
2019	0.46	0.36	0.59	
Male Sex	1.35	1.11	1.63	0.002
Inborn at hospital	0.29	0.16	0.51	<0.001
Received Skin to Skin in first 24 hours of life	0.75	0.57	0.98	0.036
Roomed-in for at least one night prior to maternal discharge	0.32	0.23	0.44	<0.001
Any mother's milk during hospitalization				<0.001
Yes	0.80	0.61	1.06	
No	Ref			
Ineligible	1.42	1.03	1.95	

*Adjusted for other variables in this table and random effects of site.

Importantly, hospital participation in this database has been voluntary, and has waned over the course of the project. In 2017 and 2018, the majority of perinatal hospitals in the state were submitting data, including most of the larger delivery centers. Thus, the database was a reasonable reflection of population-level outcomes. Submission of data has decreased since that time, as hospitals have had to divert attention to other priorities. Submission of data into the database over time is shown in **Figure 4**.

Figure 4: Dyads Entered into Database by Quarter



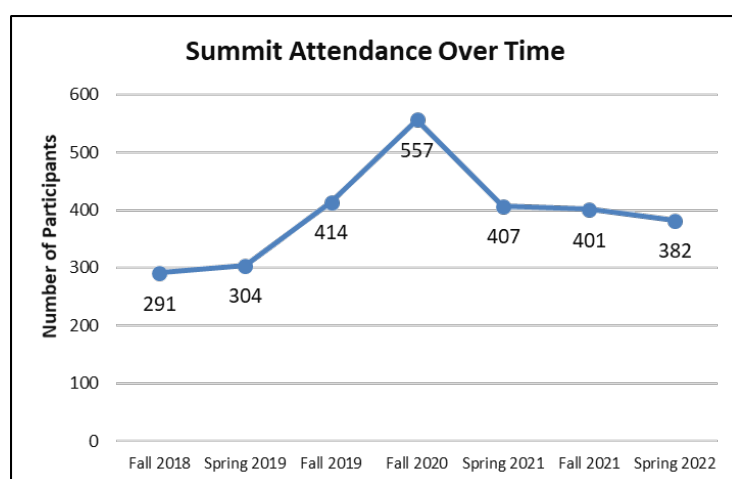
Summits

An anchor of the POP project has been twice-yearly project summits. These meetings bring together hospital teams, state organizations, community agencies, and families, and have attracted participation by hundreds of dedicated nurses, social workers, physicians, community representatives, alcohol and drug counselors, family members, and more. Perhaps more than any other component of the project, the summits served to bring together a broad and diverse

community committed to the common goal of improving care of families impacted by perinatal opioid use.

During the peaks of the COVID-19 pandemic, the summits went virtual, which enabled broader participation including by attendees from across the country. We evolved to a hybrid in-person format in spring of 2022, and we were excited to see a large turn-out with the same energy, commitment, and collaboration that has been present throughout. The attendance at the spring 2022 summit exceeded pre-pandemic levels, showing that despite other evidence of decreasing hospital engagement with the project, interest from the broader community persisted. Summit attendance over time is shown in **Figure 5**.

Figure 5: Participation at POP Summits Over Time



Content of the summits has ranged from clinical care to community-based interventions to public health initiatives to policy. Summits typically featured an external nationally known featured speakers, but most sessions were led by experts within Massachusetts. Many of the summits highlighted the increasing development of integrated care models at centers throughout the state, with longitudinally coordinated care beginning as early in pregnancy as possible and extending through post-discharge follow-up. These integrated care models were initially typically supported by grant funding, with hospitals more recently working towards developing approaches that would allow them to be sustained as usual clinical care.

As part of these summits, and the project overall, we have continually worked toward highlighting the lived experience of families. Summits early in the project featured a ‘family voice’ as the first presentation, setting the tone for the meeting. Over time, families have increasingly become teachers and experts, participating as speakers or panelists in sessions throughout the day. In the last summit in spring 2022, speakers with lived experience were in seven of the seventeen presentations. We received regular feedback that if the summits only consisted of family stories and experiences, that would be enough to change how teams and organizations cared for families impacted by perinatal opioid use.

We also used the summit as an opportunity to celebrate outstanding leaders and champions. PNQIN honored Dr. Hafsatou Fifi Diop, Director of the Division of Maternal and Child Health Research and Analysis, at the Massachusetts Department of Public Health, as the inaugural recipient of the eponymous 2020 PNQIN Diop Award. This award recognizes a dedicated person or team working with PNQIN MA to improve outcomes and achieve health equity through quality improvement, collaboration and partnership. PNQIN named this annual award in honor of Dr. Diop because she has been a steadfast and visionary national leader in Maternal Child Health and has significantly developed and advanced the mission and goals of PNQIN. She has a talent for forging partnerships and inspiring others to excel and has championed key PNQIN issues, such as OUD/NAS, maternal morbidity and mortality, neonatal morbidity, preterm birth, hospital engagement and notably health equity.

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Eat-sleep-console

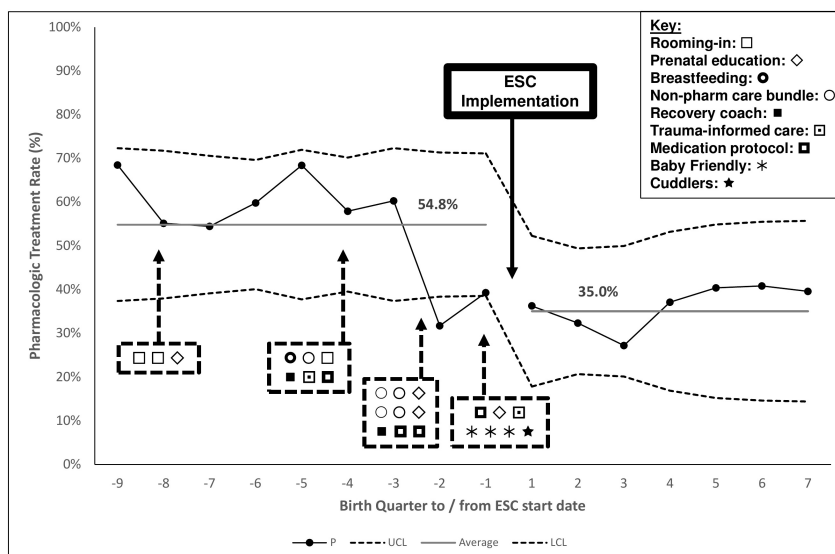
“Eat-sleep-console” (ESC) has become increasingly popular as an approach to care of infants at risk for NOWS centered on family involvement and non-pharmacologic management. Initially pioneered at Yale, ESC was then adopted at Boston Medical Center led by Dr. Elisha Wachman and at Dartmouth Medical Center led by Dr. Bonnie Whalen. Working with the team at Yale, Dr. Wachman and Dr. Whalen developed a robust ESC toolkit, including resources for teaching and training. As more PNQIN hospitals began to explore in ESC, Dr. Wachman offered support for interested teams through workshops, webinars, and training. Importantly, teams joining

the PNQIN ESC effort were asked to participate in the core database as well as a supplemental ESC database, which allowed for the collection of important data on this innovation.

The initial PNQIN ESC efforts including 11 hospitals were described in a 2020 publication (Wachman et al, J Perinatology, 2020). A control chart from that publication showing the impact of ESC implementation on use of pharmacologic therapy for NOWS is shown in **Figure 6**. Of note, this figure shows a similar pattern as has been reported in other ESC publications, that the improvements in outcomes often precede the adoption of the ESC scoring tool, and may be more related to the implementation of other non-pharmacologic interventions such as rooming-in, appropriate use of breastmilk, and family-centered care.

The ESC initiative has attracted national attention. Many other hospitals and numerous other state collaboratives have asked to use the materials and toolkit developed by Dr. Wachman and our team, have joined in PNQIN ESC workshops and webinars. Dr. Wachman continues to support PNQIN teams that have or are seeking to implement ESC, and this will be one of the elements of the project that continues in sustainment.

Figure 6: Need for Pharmacologic Therapy for NOWS, Pre-and Post-ESC Implementation



SUD in pregnancy webinar series

PNQIN hosted a monthly, year-long webinar series for teams implementing the AIM patient safety bundle focused on SUD in pregnancy. Each hour-long webinar included a 20-minute QI training module, discussion by participating teams about their work, and a 30-minute presentation by a guest presenter on topics key to SUD care in pregnancy; many of these presentations were delivered by participating hospital and community health center teams. Speakers represented a range of disciplines and institutions, as well as family members, including: Dr. Nicole Smith (Brigham & Women's Hospital, BWH), Latisha Goullaud (Lynn Community Health Center), Linda Burke, RNC-OB (Beth Israel Deaconess Plymouth Hospital), Lindsey Jeffs, RN (Sturdy Memorial Hospital), Dr. Katherine Callaghan (UMass Memorial Medical Center), Dr. Emily Reiff (BWH), Dr. Wendy Timpson (Beth Israel Deaconess Medical Center), Dr. Leena Mittal and Gina Gallagher (BWH), Dr. Kelley Saia (Boston Medical Center, BMC), Alexandra Heinz and Alissa Cruz (BMC), and members of the PNQIN Team, Dr. Audra Meadows, Bonnie Glass, MSN RN, and Dr. Ron Iverson. QI topics included: AIM OUD Bundle Components Overview; Engaging Stakeholders; Developing a Project Aim Statement; Measures for Improvement; Key Driver Diagrams; Developing Interventions; Understanding Run Charts; Understanding Data Control Charts; Using the PDSA Cycle; Making Adjustments after PDSA; Scale and Spread Up; and Sustainability. Guest presentations included: OUD Screening Options; Plans of Safe Care; Caring for Patients with OUD; Linkages to Care; Equity Considerations in OUD Care; Centering Patient Voice; Hospital Team Presentations; OUD SMM Data; SBIRT; Pain Relief During Pregnancy, Labor, Surgery, and Post-Op; and Early Head Start.

Twenty-one hospital teams participated in the first webinar series from July 2019 to September 2020 (with a 4-month hiatus due to the COVID-19 pandemic) and 10 additional teams in the second series from July 2020 to May 2021. Webinar recordings, slides, and accompanying resources are posted on the PNQIN website. PNQIN learned much about webinar content and production, further refined our QI training slide sets (which are in process of becoming a video series), and how to help our teams collaborate and connect outside of monthly presentations.

Targeting equity: Equity Dashboard and Project INSPIRE

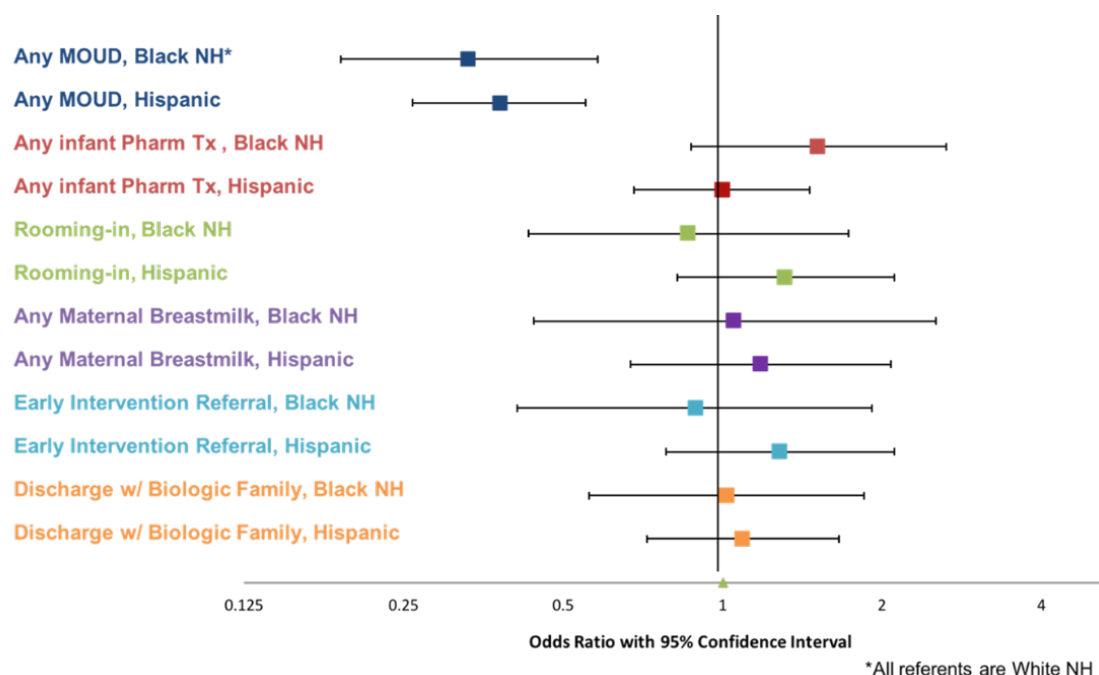
Targeting equity has become foundational for all PNQIN projects. Equity-focused efforts related to POP began with introduction of the AIM bundles; the AIM OUD bundle was the first implemented in Massachusetts as part of the POP project. Initial equity-focused efforts centered on awareness, with a panel presentation during the Massachusetts AIM kick-off conference in 2019 (**Figure 7**). Efforts then broadened to include equity trainings specific to OUD (SPEAK-UP trainings, described in more detail below) as well as multiple summit presentations focusing on inequalities in systems, care delivery, and outcomes.

Figure 7: Equity Panel at Massachusetts AIM Conference, 2019



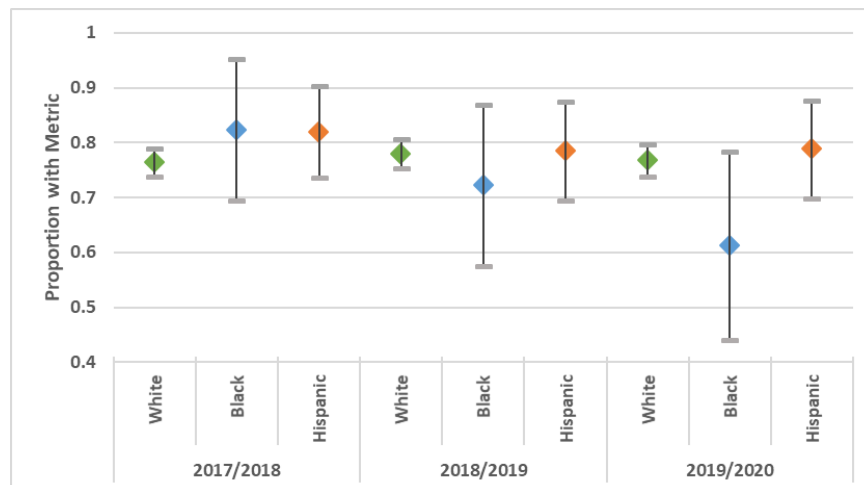
Equity efforts continued with a secondary analysis of the core database led by Dr. Davida Schiff that showed Black and Hispanic mothers were less likely to be receiving medication for opioid-use disorder as compared to white families (Peeler et al, AJPH, 2020). Results of the logistic regression model from this analysis are shown in **Figure 8**. Notably, other outcomes did not differ by race or ethnicity, suggesting that a particular barrier existed to entry and retention into care for women of color.

Figure 8: Adjusted Odds Ratios of Outcomes by Race and Ethnicity Among Dyads with Perinatal Opioid Use



This analysis spurred two initiatives. First, we developed an “equity dashboard” using the core database, stratifying key measures by race and ethnicity and tracking performance over time. Due to small numbers of Black and Hispanic families, the dashboard used two-year moving averages. An example from the dashboard, any mother’s milk among eligible newborns, is shown in **Figure 9**. The patterns suggest fairly consistent performance for white and Hispanic dyads, but a potentially concerning decreasing trend for Black dyads.

Figure 9: Any Mother's Milk Among Eligible OENs, Rate and 95% CI, 2-year Moving Averages



Second, with funding support administered from the Department of Public Health's Bureau of Substance Addiction Services and shared via the Health Policy Commission, Dr. Schiff launched a qualitative research study focused on identifying drivers of disparities in care. Project INSPIRE (Inventing Narratives of SUD treatment in the Perinatal period: a focus on Race and Equity) targeted community-based participatory research with peer-led interviews of parents of color with substance use disorder. The project was guided by an advisory board composed of content experts from a variety of backgrounds, including academia, clinical medicine, public health and families with lived experience. The project is currently analyzing the findings from the interviews, with plans for structured dissemination of results in 2023.

Family Engagement Pilot Project

The critical importance of family engagement in improvement efforts has been made clear by numerous project activities. In 2022, with support from the state opioid-response funds administered by the Bureau of Substance Addiction Services at the Massachusetts Department of Public Health and provided to the Health Policy Commission, we launched a small pilot project to support hospitals to engage families with lived experience in their local quality improvement efforts related to perinatal opioid use. In addition to involving families in their improvement teams, hospitals were asked to explore collection of family-reported quality

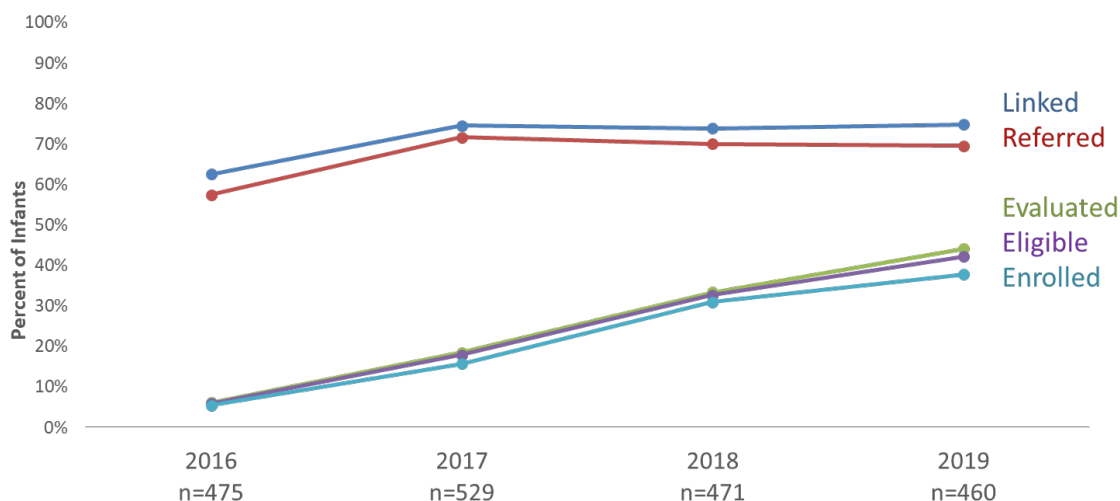
measures. Four hospitals participated in this pilot; we hope to continue this work during the sustainment phase of the initiative.

Early Intervention Data Linkage Project

From project launch, improving follow-up of newborns at risk for NOWS has been one of the primary goals of the initiative. For this goal, we have been focused on improving engagement with Early Intervention (EI). The EI community has been a key partner throughout the project, with regular presentations by EI representatives at our summits and the organization of additional workshops specifically focused on increasing EI enrollment.

This partnership has led to several notable results. First, based on input from our collaborative, the state expanded automatic eligibility for EI from infants with NOWS to all substance-exposed infants. Second, over the course of the project, we have developed an innovative “EI Linkage” project, with participation by nine hospitals. These nine hospitals send lists of their opioid-exposed newborns to the state, and then receive reports showing rates of EI referral, EI evaluation, and eventual EI enrollment. This linkage project has effectively made EI data into quality improvement data and allows hospitals to examine their processes around discussing and referring families to EI in order to improve the eventual goal of EI enrollment. Initial aggregate results from this linkage project are shown in **Figure 10**.

Figure 10: EI Referral and Enrollment among NOWS/OEN Infants at Participating Hospitals

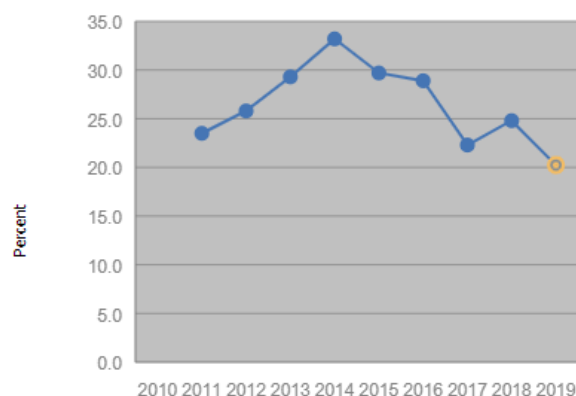


Notable findings include a steady increase in the percentage of opioid-exposed newborns that were enrolled in EI, with nearly all infants evaluated for EI subsequently enrolled; this suggests a significant barrier to enrollment is between referral and evaluation, a potential improvement target for hospital teams and our community.

State population-level NAS dashboard

A notable project innovation led by the Massachusetts Department of Public Health was the development of a population-level “Neonatal Abstinence Syndrome Dashboard” (<https://www.mass.gov/guides/neonatal-abstinence-syndrome-dashboard>). Utilizing population-based data sources, the dashboard provides statewide performance on nine key indicators related to perinatal opioid use. Data can be examined for the state overall, as well as by maternal race/ethnicity, education, age, insurance coverage, and state region. An example of a measure from the dashboard is shown in **Figure 11**, illustrating the decrease in care for infants with NOWS in intensive care settings over the course of the initiative and helping to demonstrate the population-level impact of the PNQIN collaborative.

Figure 11: Infants with NAS (NOWS) Receiving Care in SCN or NICU



SBIRT training

A key component to caring for families affected by SUD in pregnancy is identification and treatment initiation for those who need to be served. Universal outpatient screening with a verbal or written tool has been identified as essential to all prenatal care. Screening is built

into a larger process called Screening, Brief Intervention, and Referral to Treatment (SBIRT). Implementing this process in an outpatient setting, whether in a private office or larger clinic setting, feels overwhelming for some teams. To help hospital teams approach these systematic improvements, PNQIN has facilitated 116 SBIRT meetings or trainings by MASBIRT (Massachusetts SBIRT) with 20 unique organizations and hospitals (including PNQIN Leadership and Substance Exposed Newborns of Southeast Massachusetts) throughout the Commonwealth. We promoted these trainings on our website, at summits and in the SUD webinar series and helped teams find collaborators as they worked on processes within this action. Our PNQIN system and MASBIRT recognized this as a mutually beneficial collaboration and we continue work together.

MOUD waiver training

One barrier that many systems faced as they tried to begin caring for families affected by SUD in pregnancy was a dearth of providers with the ability to prescribe and manage Medications for OUD (MOUD). A specific waiver needs to be obtained by providers in order to prescribe MOUD. PNQIN worked with OBAT (Office Based Addiction Treatment) program to arrange three trainings throughout the state. All trainings, two in person and one virtual, occurred in 2020 with a total of 50 providers trained. PNQIN's ongoing relationship with OBAT helped spur the production, promotion and distribution of the Boston Medical Center Project RESPECT Guidelines for Treating Opioid Use Disorder in Pregnant and Parenting Patients. Our providers and teams continue to refer to OBAT and now each other as MOUD in pregnancy evolves.

Stigma, bias, and trauma-informed care training

Because of the extremely high rate of trauma in the population of people affected by SUD, Stigma, Bias, and Trauma Informed Care (SBTIC) is the model of recommended for all interactions. As there were few resources or trainings available to our teams for SBTIC training, PNQIN worked with the Coordinated Approach to Resilience and Empowerment (C.A.R.E.) Clinic team at Brigham and Women's Hospital to develop a SBTIC training module specifically for pregnant people and newborns affected by SUD/NAS. The group, comprised of Dr. Annie

Lewis-O'Connor and her staff, was funded by the Robert Woods Johnson Foundation, and consulted with PNQIN to train 15 hospital teams (185 participants) between July and October 2020. In addition, the C.A.R.E. team recorded the SBTIC training, which is posted on the PNQIN website; individuals may earn 1.5 CEU or CME credits through the Boston University School of Medicine when they do these training. Since posting the recording in February 2021, 375 nursing and obstetric providers have taken the training and claimed credits. PNQIN has found that our website is an excellent way to sustain the efforts of the BWH team for continued use; the SBTIC training is available through February 2023 with the potential to renew accreditation as funding allows.

Equity trainings

In order to address the racial inequities in screening and treatment of families with SUD, PNQIN contracted with the Institute for Perinatal Quality Improvement (PQI) to train providers and teams on obstetric racism. This collaboration and the trainings, as with the ESC and INSPIRE programs above, are supported by state opioid-response funds administered by the Bureau of Substance Addiction Services at the Massachusetts Department of Public Health.

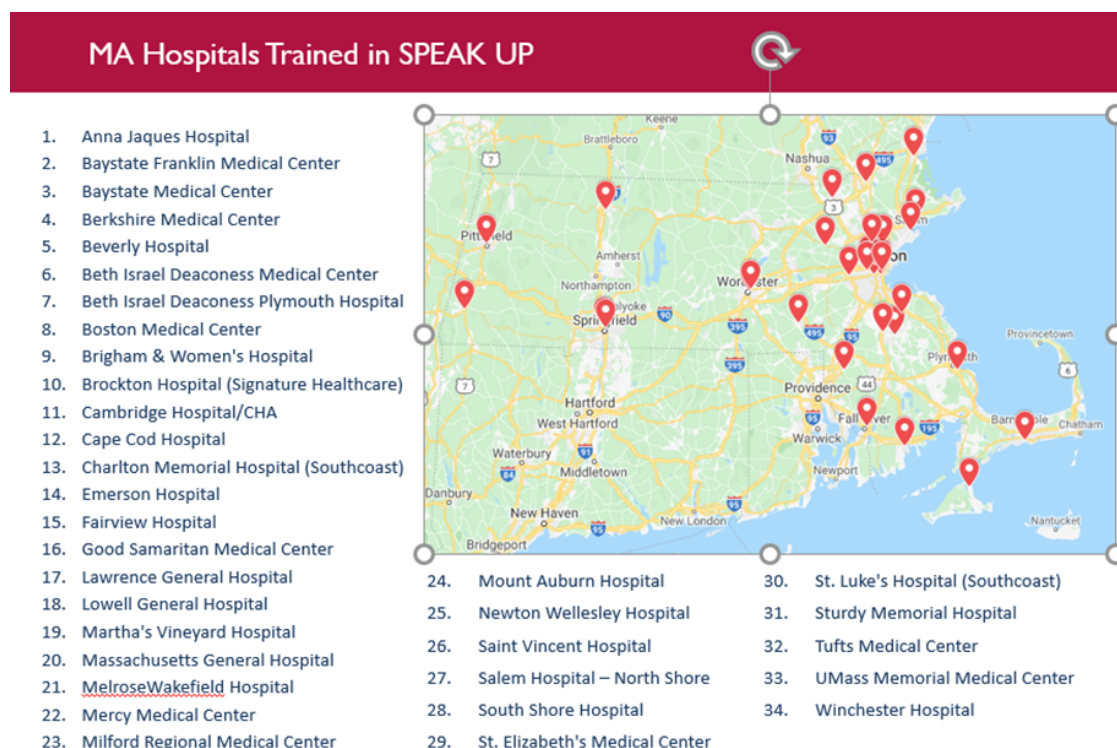
PQI's SPEAK UP Against Racism Quality Improvement Initiative and Action Pathway is a program based on quality improvement methods and tools. The pathway is action-oriented and supports individuals and groups to develop and implement action plans outlining strategies on working as individuals and within organizations and groups to dismantle racism, provide respectful care that is equitable and of the highest quality, and eliminate perinatal health disparities.

Dismantling Racism is a journey not a sprint. As such, the core training consists of 8 hours of intense education and moderated conversation to explore and understand how racism has been built into and affects obstetric care; PQI also hosts quarterly check-in calls for past participants to meet and discuss their experiences and progress.

The SPEAK UP program was launched in 2017. As of February 15, 2022, approximately 1172 perinatal health professionals have completed SPEAK UP Champion education. Over one third

of these (N = 404) are Champions from Massachusetts, representing 34 birthing hospitals in the State (**Figure 12**).

Figure 12: Massachusetts Hospitals Participating in SPEAK UP



PNQIN regularly provides feedback and support to the PQI team and all of our leadership team members have participated in the training. We also ask all new PNQIN staff and project leads to take SPEAK UP training as part of their onboarding. PNQIN has continued our relationship with PQI and the SPEAK UP trainings as we consider the effects of racism in all of our projects, specifically in our rollout of the PNQIN Maternal Equity bundle. Additional SPEAK UP trainings are scheduled throughout 2023 and 2024.

Boston University School of Public Health student projects

PNQIN initiated and sustains a relationship with the Boston University School of Public Health (BUSPH) to facilitate student teams in evaluating questions raised within our state regarding care for people affected by SUD in pregnancy. Through this course, MC802 Implementing

Community Health Initiatives: A Practice-based Course in Leadership and Consultation, PNQIN has guided the following projects:

- Addressing Stigma and Bias in SUD care during pregnancy: In 2019, five BUSPH students worked with the RESPECT clinic ((Recovery, Empowerment, Social Services, Prenatal care, Education, Community and Treatment) at Boston Medical Center to better understand stigma and bias within its own program and during pregnancy care at BMC. Through literature review, patient and provider interviews and direct observation, the student team developed a report on stigma and bias experienced by patients and suggested recommendations to address these issues through tools like marketing and changes to the clinic environment. This report was delivered to the BUSPH class and members of the RESPECT team.
- Addressing Racism affecting SUD care during pregnancy: In 2019, four BUSPH students worked with the RESPECT clinic to understand how racism affects care within the BMC and RESPECT systems. Through literature review, provider interviews, patient focus groups, and direct observation, the student team developed a report on racism experienced by patients affected by SUD and suggested recommendations to eliminate racism through program improvement and maintenance activities. This report was delivered to the BUSPH class and members of the RESPECT team. The student team also presented their findings and recommendations during both waves of our SUD in Pregnancy webinar series (Wave 1 in February 2020 and Wave 2 in November 2020).
- Sustainment of the POP work in PNQIN: In 2021, five BUSPH students worked with PNQIN to develop a plan for sustainment of our Perinatal Opioid Project. Through review of the POP activities, literature review, interviews with PNQIN leaders and leaders in other Perinatal Quality Collaboratives, the student team developed a report with recommendations for sustainment of the PNQIN work on SUD in pregnancy and NAS. Process measures to follow, methods for continuing to offer the materials generated during the POP project, and ongoing actions were discussed. This report was delivered to the BUSPH class and to PNQIN POP leadership.

Key Partnerships

More than any other PNQIN project, the perinatal opioid initiative resulted in robust partnerships with numerous state agencies and community organizations. These partnerships have strengthened our state perinatal quality collaborative immeasurably and will undoubtedly impact future project positively for years to come.

These partnering organizations have included:

- Department of Public Health (DPH), including the Bureau of Substance Abuse Services (BSAS), Early Intervention (EI), and Title V;
- Department of Children and Families (DCF);
- Moms Do Care (MDC);
- Health Policy Commission (HPC);
- McPAP for Moms;
- Massachusetts Health and Hospital Association (MHA);
- Betsy Lehman Center (BLC);
- March of Dimes (MOD);
- Institute for Health and Recovery (IHR);
- Institute for Perinatal Quality Improvement (PQI);
- Alliance for Innovation on Maternal Health (AIM);
- Early Head Start
- Attorney General's Office
- And more.

Performance Evaluation

We can evaluate the impact of POP on multiple metrics, including clinical performance measures selected for this project and process and outcome measures outlined in the initial funding opportunity announcement. Many of these metrics are included in the Performance

Progress and Monitoring Report (PPMR) submitted at the end of September 2022. Selected metrics are highlighted below.

At project launch, we identified three broad clinical improvement goals structured around a life-course model, as shown in **Table 3**.

Table 3: PNQIN POP Project Goals	
Pregnancy	Identify opioid-use-disorder in pregnancy and ensure women are in treatment, including MOUD
Hospital	Strive for family-centered care in the hospital, including rooming-in and non-pharmacologic care
Post-discharge	Improve support and follow-up after discharge, including enrollment in Early Intervention

These broad goals led to 22 specific metrics that were included in the core database.

Performance on these metrics was examined monthly in statewide progress reports and quarterly in hospital progress reports, as described above. Statewide performance over the course of the project on specific measures is included in the submitted PPMR; the final statewide progress report can also be shared if desired.

Clear improvements were seen in several measures, including increased use of the plan of safe care, increased non-pharmacologic care routed in eat-sleep-console (skin to skin, rooming in for families), reduction of use of medications for neonatal abstinence syndrome, reduction of length of stay, and increased referrals to early intervention. Notably, improvement was not seen in multiple other key measures, including use of medications for opioid use disorder in mothers of opioid-exposed newborns, antenatal or prenatal consultation with neonatology or pediatrics prior to birth, use of mother's milk, and discharge home to biologic parent. In general, improvement was seen in measures most directly assessing hospital-based care, with improvement in measures assessing upstream care during pregnancy and downstream care after discharge being more difficult to achieve.

Performance on several selected clinical measures is shown in the figures below. The percent of mothers of opioid-exposed newborns receiving medications for opioid use disorder remained stable at 79% (**Figure 13**). The percentage of opioid-exposed newborns receiving

pharmacologic therapy for NOWS decreased from 52% to 37% (**Figure 14**). The percentage of opioid-exposed newborns with a plan of safe care documented by time of hospital discharge increased from 36% to 52% (**Figure 15**).

Figure 13

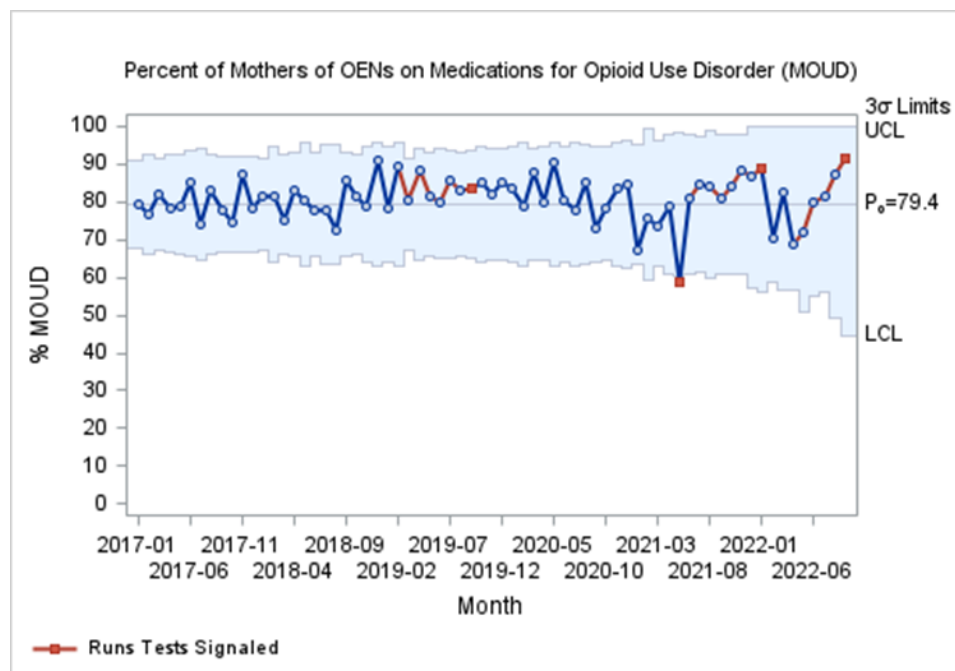


Figure 14

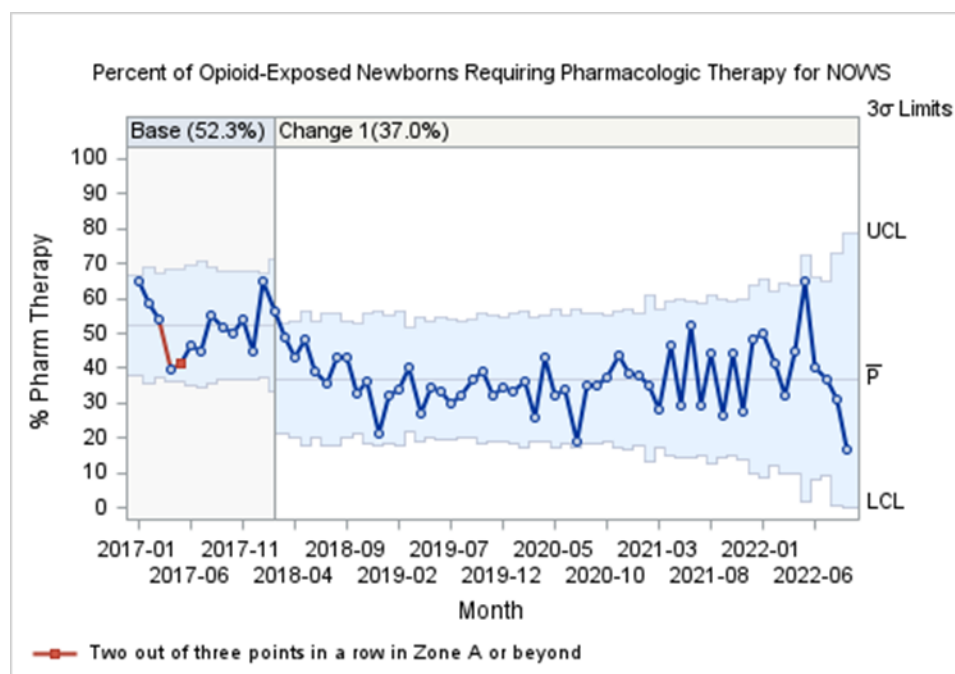
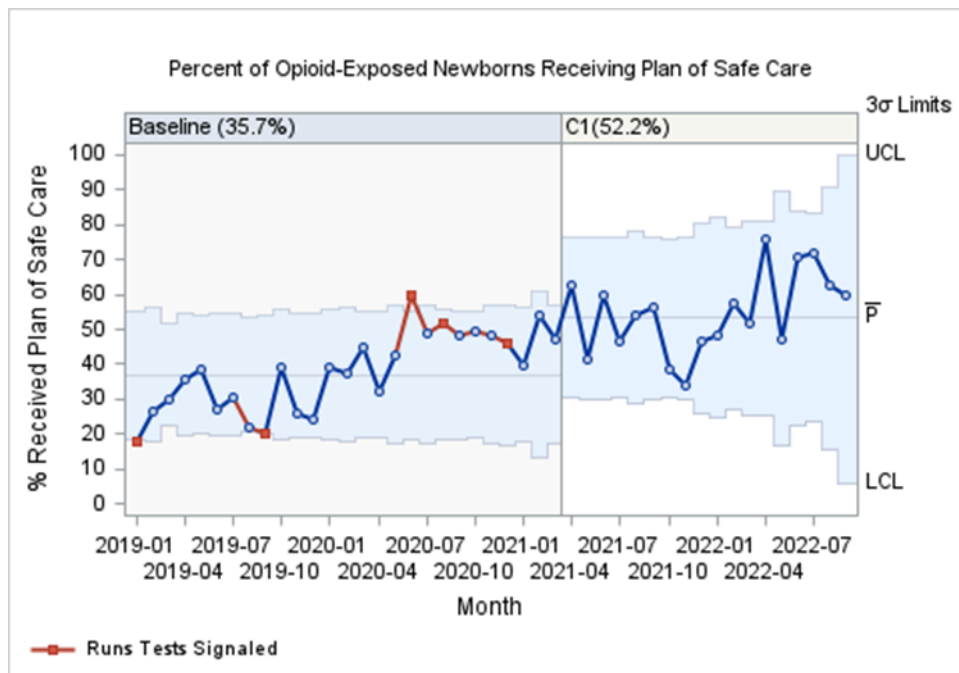


Figure 15



Performance on process and outcome measures related to activities and outcomes outlined in the initial funding announcement are also in the recently submitted PPMR, and are summarized in **Table 4**.

Table 4: PNQIN Performance on Process and Outcome Measures from Initial Funding Announcement		
Activities	Process Measures	PNQIN Performance
Identify and validate perinatal quality measures to be used and how data will be collected.	Number of clinical and general measures, with data sources documented with user guidance documentation.	22 clinical performance measures were created with definitions and documentation, and tracked within the core database. Additional measures were created for supplemental efforts as needed (for example, for ESC and EI projects).
Do rapid-cycle collection analysis, and feedback of perinatal data.	Number of initiatives with active data collection, analysis and feedback to member facilities. Time from data collection to feedback to member facilities	PNQIN POP project continued with active data collection, analysis, and feedback throughout the initiative. Hospitals received quarterly performance reports. Of note, other PNQIN projects not described in this report also included active data collection and feedback, such as the AIM maternal morbidity and mortality initiatives.

Use quality improvement (QI) science and methods to examine and improve data quality and identify service delivery issues and opportunities for improvement.	Number of initiatives contributing to the improvement of data quality (including medical records, administrative claims, and vital records data) Number of hospitals participating in in-person learning sessions Number of hospitals participating in action period calls Number of hospitals participating in webinar trainings	Data quality was an important early goal of the POP project. Clinical chart-abstracted measures were piloted, tested, and refined, with development of clear operational definitions and data forms. DPH performed extensive data analysis and linkages to create the population-level NAS dashboard and the EI linkage project. Hospital participation in the opioid project can be measured differently based on the various project activities. Overall, defining engagement as substantial involvement in at least one project activity, between 29 and 38 hospitals have been participating, with 38 meeting engagement criteria in January 2022. If engagement is defined as submitting data into the core database, participation has decreased from 25 hospitals in 2018 to 12 hospitals in 2022.
Do active recruitment of hospitals across the state.	Number of hospitals invited to participate in QI initiatives	Out of 47 perinatal or pediatric hospitals in the state, 43 were invited to participate in the opioid project.
Outcomes	Outcome Measures	
Increased participation of hospitals throughout the state in the PQC.	Number and proportion of hospitals that are participating in statewide maternal QI initiatives Number and proportion of hospitals that are participating in statewide neonatal QI initiatives	31 of 40 delivery hospitals participated in the maternal-focused activities in the POP project from 2019 to 2021. 34 of 43 perinatal or pediatric hospitals were participating in at least one neonatal-focused activity in the POP project in 2022.
Fully functioning statewide perinatal quality collaborative actively disseminating data and improvement projects.	PQC has implemented at least one continuous quality improvement initiative with statewide participation (all state regions represented, with at least 50% of maternity and/or neonatal units participating)	This was achieved.
Service delivery improvements made statewide	Intervention-specific measures are to be incorporated as appropriate, based on the initiative and the interventions selected by the awardee.	Specific measures related to delivery of care are described above, in the PPMR, and in the final statewide progress report.

Improvements in perinatal measures	Intervention-specific measures are to be incorporated as appropriate, based on the initiative and the interventions selected by the awardee.	Specific measures related to clinical outcomes are described above, in the PPMR, and in the final statewide progress report.
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Data Management Plan

Our **data management plan** was organized by the two general types of data: (1) hospital-based data that includes clinical measures abstracted from medical records related to maternal, neonatal, and EI initiatives, as well as survey data from providers measuring attitudes and knowledge; and (2) administrative data obtained from state datasets that are used to support the statewide dashboard as well as the EI initiative. Additionally, structural measures collected through periodic hospital surveys were also an important aspect of our initiative.

Details of our data management plan were provided in earlier annual reports, including description of data elements, standards used in generating and collecting data, and data archiving and storage. Plans for ongoing data collection and storage are summarized below.

- Core database: Data for 22 performance measures are abstracted from charts by participating teams and submitted to a REDCap database at Beth Israel Deaconess Medical Center (BIDMC). Patient-level data is submitted without identifiers other than month of birth. Participating hospitals completed a data use agreement with BIDMC. This database will be maintained for hospitals that choose to continue participation. Each hospital has access to their own data; access to the overall database is limited to a project lead based at BIDMC (Munish Gupta) and a statistician based at BIDMC (Anna Modest). Statewide and hospital progress reports will continue to be generated during project sustainment. This data is stored on secure BIDMC servers indefinitely.
- AIM OUD process measures: Participating hospitals submitted data on AIM OUD process measures to a REDCap database maintained by the Betsy Lehman Center (BLC) which serves as the data repository for PNQIN's maternal initiatives. This is aggregated, de-

identified data. Participating hospitals completed a memorandum of understanding (MOU) with BLC. BLC will store hospital data for seven years.

- EI linkage projects: Participating hospitals received local IRB approval for data sharing with DPH. Hospitals periodically submit lists of newborns with NOWS securely to DPH, and then receive reports showing EI evaluation and enrollment after their data has been linked with EI data. Data is stored by each participating hospital. This data linkage will continue based upon ongoing interest by participating hospitals.
- NAS dashboard: The population-level NAS dashboard is maintained by DPH utilizing state databases, including the Pregnancy to Early Life Longitudinal (PELL) data system. The data is stored on secure DPH servers. At present, we plan to continue to update the NAS dashboard annually.

Publications

Publications arising directly or indirectly from the PNQIN POP project are listed below.

- Wachman EM, Houghton M, Melvin P, Isley BC, Murzycki J, Singh R, Minear S, MacMillan KDL, Banville D, Walker A, Mitchell T, Galimi-Hayes R, Jorgensen S, Remy Gomes D, Hodgins F, Whalen BL, Diop H, Gupta M. A Quality Improvement Initiative to Implement the Eat, Sleep, Console Neonatal Opioid Withdrawal Syndrome Care Tool in Massachusetts' PNQIN Collaborative. *J Perinatol*. 2020 Oct; 40(10):1560-1569.
- Peeler M, Gupta M, Melvin P, Bryant AS, Diop H, Iverson R, Callaghan K, Wachman EM, Singh R, Houghton M, Greenfield SF, Schiff DM. Racial and Ethnic Disparities in Maternal and Infant Outcomes Among Opioid-Exposed Mother-Infant Dyads in Massachusetts (2017-2019). *Am J Public Health*. 2020 Dec; 110(12):1828-1836. PMID: 33058701.
- Singh R, Houghton M, Melvin P, Wachman EM, Diop H, Iverson R, Picarillo A, Rhein L, Gupta M. Predictors of Pharmacologic Therapy for Neonatal Opioid Withdrawal Syndrome: A Retrospective Analysis of a Statewide Database. *J Perinatol*. 2021 Jun; 41(6):1381-1388.
- Schiff DM, Work EC, Foley B, Applewhite R, Diop H, Goullaud L, Gupta M, Hoepfner BB, Peacock-Chambers E, Vilsaint CL, Bernstein JA, Bryant AS. Perinatal Opioid Use Disorder

Research, Race, and Racism: A Scoping Review. *Pediatrics*. 2022 Mar; 149(3):e2021052368.

- Morrison TM, MacMillan KL, Melvin P, Singh P, Murzycki J, Van Vleet MW, Rothstein R, O'Shea TF, Gupta M, Schiff DM, Wachman EM. Neonatal opioid withdrawal syndrome: a comparison of as needed pharmacotherapy. *Hosp Pediatrics*. 2022 May; 12(5):530-538.
- MacMillan KDL, Morrison TM, Melvin P, Diop H, Gupta M, Wachman EM. Impact of Coronavirus Disease-2019 on Hospital Care for Neonatal Opioid Withdrawal Syndrome. *J Pediatr*. 2022 Jun; 245:47-55.
- Diop H, Cui X, Nielsen T, Peacock-Chambers E, Gupta M. Length of Stay for Infants with Neonatal Abstinence Syndrome and Risk of Hospital Readmission. *Maternal and Child Health Journal*. 2022. Epub ahead of print.

Sustainment

We are committed to continuing elements of the initiative during a sustainment period.

- We will continue to maintain the core database for interested hospitals, and generate monthly statewide and quarterly hospital progress reports. This activity requires a statistician; at present, we have funding for our statistician through the summer of 2023, and we are exploring options for continuing that support.
- We will continue to support hospital teams that have implemented or are seeking to implement eat-sleep-console. This is largely driven by Dr. Wachman, who will now be receiving a small amount of support for this work from PNQIN organizational funds.
- We will continue with Project INSPIRE, with ongoing activities focused on project evaluation and then dissemination of results. This work is led by Dr. Schiff, and will be partially supported by Massachusetts state opioid response funds through the Department of Public Health and the Health Policy Commission.
- We will continue with the family engagement pilot project, seeking to support interested hospitals in furthering family engagement in local quality improvement efforts. This work will now be led by Dr. Schiff, and will be partially supported by

Massachusetts state opioid response funds through the Department of Public Health and the Health Policy Commission.

- We are engaging a new lead for the maternal component of the POP project, with the goal of continuing to convene our participating teams to exchange ideas and process improvement. This sharing/collaboration has been key to development of the many sites throughout the state of exceptional care for families affected by SUD in pregnancy.

FINAL REPORT: COVID-19 VACCINATION SUPPLEMENTAL FUNDING PROJECT

Background

Since the start of the pandemic, PNQIN provided accurate, up-to-date guidance and resources for counseling and administration of the COVID-19 vaccine to pregnant, postpartum people in MA and their families. We promoted COVID-19-related trainings and webinars within our provider network and had dedicated space on our websites for COVID-19 practice advisories and resources. In collaboration with the Betsey Lehman Center (BLC) and the MA COVID-19 Maternal Equity Coalition, PNQIN co-hosted a community town hall on June 9, 2021 to highlight the experiences of people who gave birth during COVID-19 and reflect on ongoing efforts to improve the care of people who gave birth and their families during the pandemic. This town hall brought together 82 stakeholders including providers, patients and families, and policy makers to define key considerations for care of people who gave birth moving forward.

While Massachusetts was (and continues to be) a national leader in COVID vaccination rates, stark inequities persisted. When this grant application was originally submitted, data as of May 6, 2021, showed 71% of those fully vaccinated were White non-Hispanic (WNH), 7% were Black non-Hispanic (BNH) and 12% were Hispanic. Of nearly 5 million WNH residents in MA, 2.8 million (56%) had received at least one dose. Comparatively, less than half of BNH residents and approximately one-third of Hispanic residents and American Indian/Alaska Native residents had received at least one dose. At that time, data regarding the pregnancy status of vaccinated individuals were not available. The purpose of this grant application was to increase COVID-19 education and vaccination among pregnant and postpartum people with a specific focus on addressing these disparities.

Performance Measures and Evaluation

PNQIN identified three key initiatives for this time period (September 30, 2021 – September 29, 2022):

1. Improve provider capacity for equitable delivery of SARS-CoV-2 vaccination to pregnant and lactating people and their families by:
 - a. Developing an educational program based on current evidence that employs principles of motivational interviewing to improve provider knowledge and to strengthen respectful patient-provider communication regarding SARS CoV-2 vaccination; and
 - b. Delivering the educational program to improve provider capability to address SARS-CoV-2 vaccine hesitancy.
2. Increase the number of birth facilities with protocols for SARS-CoV-2 screening and vaccination provision for pregnant and lactating people and their families by:
 - a. Providing sample protocol resources, education and training on updated SARS-CoV-2 vaccination guidance;
 - b. Using improvement science to support and measure site protocol uptake and implementation; and
 - c. Engaging the 13 hospitals among the 40 that account for more than 50% of births to BNH and Hispanic residents. We gave particular attention to supporting Boston Medical Center, Lawrence General Hospital, Caritas Good Samaritan Medical Center, Cambridge Health Alliance, Caritas Holy Family Hospital and Medical Center, North Shore Medical Center, Brockton Hospital, Mercy Medical Center, and Baystate Medical Center, Brigham and Women's Hospital, Beth Israel Deaconess Medical Center and UMass Memorial Hospital.
3. Increase the number of pregnant and lactating people with clinical-community linkages in response to SARS-CoV-2 by:
 - a. Partnering with MA DPH community liaisons and stakeholders in the hardest hit communities to improve SARS-CoV-2 vaccination access in communities for pregnant and lactating people and their families; and
 - b. Respectfully address vaccine hesitancy by providing standardized educational materials, in partnership with community stakeholders, to

ensure that front line staff in community vaccination sites are adequately prepared to address frequently asked questions regarding vaccination during pregnancy and lactation in all languages.

Goal 1: Improve Provider Capacity

Goal 1.1 Improve provider capacity for equitable delivery of SARS-CoV-2 vaccination to pregnant and postpartum people and their families by developing an educational program based on current evidence and the principles of motivational interviewing to improve provider knowledge and to strengthen respectful patient-provider communication regarding SARS CoV-2 vaccination.

Performance Measure:

By November 2021, PNQIN will develop a curriculum (in collaboration with the UMass Center for Integrated Primary Care and community members) for maternal health care providers on successful strategies for motivational interviewing for vaccine hesitancy in pregnant and lactating people.

Evaluation results:

A curriculum was developed that consisted of a 75-minute training titled “Communication Skills Training for Clinicians Discussing COVID-19 Vaccination” in collaboration with UMass Center for Center for Integrated Primary Care and community members. This training was designed to improve the counseling skills of Massachusetts clinicians for discussing COVID-19 vaccination with pregnant and postpartum people, parents and caregivers of young children, and families. The training also focused on addressing vaccine hesitancy and eliminating racial disparities in rates of COVID-19 vaccination.

Goal 1.2 Improve provider capacity for equitable delivery of SARS-CoV-2 vaccination to pregnant and lactating people and their families by delivering an educational program to improve provider capability to address SARS-CoV-2 vaccine hesitancy.

Performance Measure:

- Between November 2021 and July 2022, PNQIN and UMass will host 4 virtual trainings with continuing education credits available and train 250 maternal health care providers.
- By September 2022, maternal and neonatal health care providers will report increased self-efficacy from baseline to successfully use motivational interviewing to address vaccine hesitancy in pregnant and lactating people.

Evaluation results:

- Between November 2021 and July 2022, PNQIN and UMass hosted 4 virtual trainings based on the curriculum developed in Goal 1.1. Continuing education credits were offered for all MA providers who participated (1.25 CE for MDs, APs, NPs, RNs, and SWs). 202 providers completed the training and submitted documentation for CE credit. This training remains available on our PNQIN website and CE credits remain available through April 2023.
- Of the participants who completed an evaluation after the training, 76% reported that the training content was very or extremely useful; 22% said content was moderately useful.

Challenges:

Our goal was to have 250 providers complete the training. However, the only way we were able to track this was with applications for CE credits. We believe there are some providers who may have completed the training but did not apply for CE credits. We also received feedback from providers/staff that as rates of COVID vaccination increased in general for all patients, both hospital and clinical priorities shifted and there was less time or prioritization on COVID vaccination.

Goal 2: Protocol Implementation

Goal 2 Increase the number of birth facilities with protocols for SARS-CoV-2 screening and vaccination provision for pregnant and lactating people and their families by providing sample protocol resources, education and training on updated SARS-CoV-2 vaccination guidance and using improvement science to support and measure site protocol uptake and implementation.

Performance Measure:

- By early 2022, in conjunction with an OB-SARs Co-V expert and using nationally approved guidance, will develop an evidence-based protocol for SARS-CoV-2 screening and vaccination provision for pregnant and lactating people and their families.
- Percent of MA hospitals with a best-practice protocol in place by September 2022.

Evaluation results:

- A best practice protocol and resource guide was developed with input from OB and Infectious Disease subject matter experts. This received final approval and was disseminated April 2022 as well as posted to the PNQIN website: [COVID provider best practices](#)
- MA birthing hospitals were surveyed to determine if they had: a protocol(s) for screening & respectfully addressing vaccine hesitancy & to provide other vaccination counseling; and/or a protocol for screening and administration of COVID-19 vaccination among pregnant/postpartum people & their families.
- 33 of 40 hospitals answered this question; among these hospitals, 60% had at least one of the above protocols in place (with the majority of those having both protocols in place). Forty percent of hospitals who answered had neither protocol in place.

Goal 3 Improving Clinical-Community Care Linkages

Goal 3.1 Increase the number of pregnant and lactating people with clinical-community linkages in response to SARS-CoV-2 by partnering with MA DPH community liaisons and stakeholders in the hardest hit communities to improve SARS-CoV-2 vaccination access in communities for pregnant and lactating people and their families.

Goal 3.2 Respectfully address vaccine hesitancy by providing standardized educational materials, in partnership with community stakeholders, to ensure that front line staff in community vaccination sites are adequately prepared to address frequently asked questions regarding vaccination during pregnancy and lactation.

Performance Measure:

- PNQIN, in collaboration with the MA DPH Community Liaisons program, aimed to engage the 20 communities most affected by COVID 19 and partner with local stakeholders to create/adapt/provide online and print materials and resources about the SARS-CoV-2 vaccine.
- Six (3 online and 3 print) resources will be co-created with communities, in all available languages, to address SARS-CoV-2 vaccination during pregnancy and lactation. There will be a distribution focus on the 20 communities that have been identified as the hardest hit by COVID-19.

Evaluation Results:

- PNQIN members attended 43 community events in 13 of the 20 priority communities.
- Multiple resources (> 6) were co-created with MA DPH, including multilingual handouts on COVID-19 vaccination for pregnant and postpartum people, parents and caregivers of young children, and families in the following languages: English, Albanian, Arabic, Cape Verdean, Simplified Chinese, Traditional Chinese, Haitian Creole, Khmer, Portuguese, Somali BFHN, Spanish, and Vietnamese. All patient-facing materials can be found on the PNQIN website: [PNQIN COVID Patient Hub](#).

Challenges:

- As overall COVID vaccination rates increased across the state, there were less opportunities to join COVID-specific events. DPH and PNQIN did continue to attend events organized by the community but there were few participants that engaged with the PQNIN team or requested resources.

- Though all 20 priority communities listed in the grant application were approached to consider collaboration, only 13 communities responded and hosted events which PNQIN and DPH team members attended.

Impact/Results/Success Stories

Among people who delivered between May 1, 2021 – March 31, 2022 (previously, estimates were available through September 30, 2021), just 37% received one or more doses of COVID-19 vaccines during pregnancy though the percentage increased over time between May 2021 and March 2022 (**Figure 14**). When examining the data by race/ethnicity and over time, there were increases in rates of vaccination uptake among all groups. However, striking inequities remain. Among people who delivered during January – March 2022, vaccination uptake before or during pregnancy was still lowest among pregnant people who identify as non-Hispanic American Indian or Alaska Native (30%), Hispanic (34%), or non-Hispanic Black (38%) and highest among those who identify as non-Hispanic White (56%) or non-Hispanic Asian/Hawaiian/Pacific Islander (67%).

Figure 14 (Courtesy of Massachusetts DPH)

1. Among people who delivered between May 1, 2021 and March 30, 2022 (n=66,450) 37% received ≥1 doses of COVID-19 vaccine before or during pregnancy.

Month of Delivery	May 2021	Jun 2021	Jul 2021	Aug 2021	Sep 2021	Oct 2021	Nov 2021	Dec 2021	Jan 2022	Feb 2022	Mar 2022	Weighted Avg.
Proportion Vaccinated (Receipt of 1 Dose) Before or During Pregnancy	22.0%	26.2%	28.8%	30.7%	34.5%	40.6%	41.9%	43.9%	47.4%	49.8%	50.6%	37.3%

Data Source: Massachusetts Immunization Information System, Bureau of Infectious Diseases and Laboratory Sciences (current through March 31, 2022) & Registry of Vital Records and Statistics (current through March 31, 2022).
Analyses conducted by Massachusetts Department of Public Health COVID Pregnancy Surveillance Team.
*Data are restricted to May 1, 2021-March 31, 2022 because vaccinations were not widely available in MA until April 16, 2021.

4. Vaccination uptake before or during pregnancy was lowest among pregnant people who identified as non-Hispanic (NH) American Indian/Alaska Native (AI/AN) (n=459), Hispanic (n=19,457), NH Black (n=9,832), or NH Other/Unknown (n=2,025).

