



MOSTaRE (Mother/Infant Opioid Substance Use Treatment and Recovery Effort) Initiative

Minnesota Perinatal Quality Collaborative (MNPQC) Progress Report

September 2021-September 2023

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Executive Summary

- MNPQC is a nonprofit organization founded in 2018 that brings together hospitals, healthcare centers, academic institutions, professional organizations, local and state agencies, and community groups to improve perinatal health outcomes in Minnesota.
- The MOSTaRE initiative utilized the Alliance for Innovation on Maternal Health (AIM) safety bundle for the care of pregnant and postpartum people with substance use disorder (SUD). Additionally, because this initiative focuses on the maternal-infant dyad, practices for the treatment of infants exposed to opioids and neonatal outcome measures were also incorporated into the initiative. The aim statement of MOSTaRE was:
 - 1. to increase the identification and treatment of SUDs in pregnant people and substance exposure in infants by 50% or more.
 - 2. to increase the use of nonpharmacologic methods for treating infants exposed to opioids and reduce the average length of stay for these infants.
- Nine hospital systems across the state of MN participated in the initiative.
- The first component of the aim statement was achieved based on the data collected from the participating hospital teams. However, consistent data collection was a significant challenge during this initiative. Different sites reported disparate birth volumes each month, and sites had different interpretations for the measures collected. For example, there was some ambiguity in how sites should record the incidence of screening when a validated tool was not used. Collectively, this made conclusive interpretation difficult.
- Hospital teams demonstrated the need for smaller and more focused quality improvement initiatives. As a next step, MNPQC intends to lead two Community of Learnings (COL) that will offer interested hospital teams the opportunity to expand practices on nonpharmacologic methods (primarily eat, sleep, and console) for infants exposed to opioids in utero and develop and improve Plans of Safe Care for families affected by SUD.

MNPQC Background

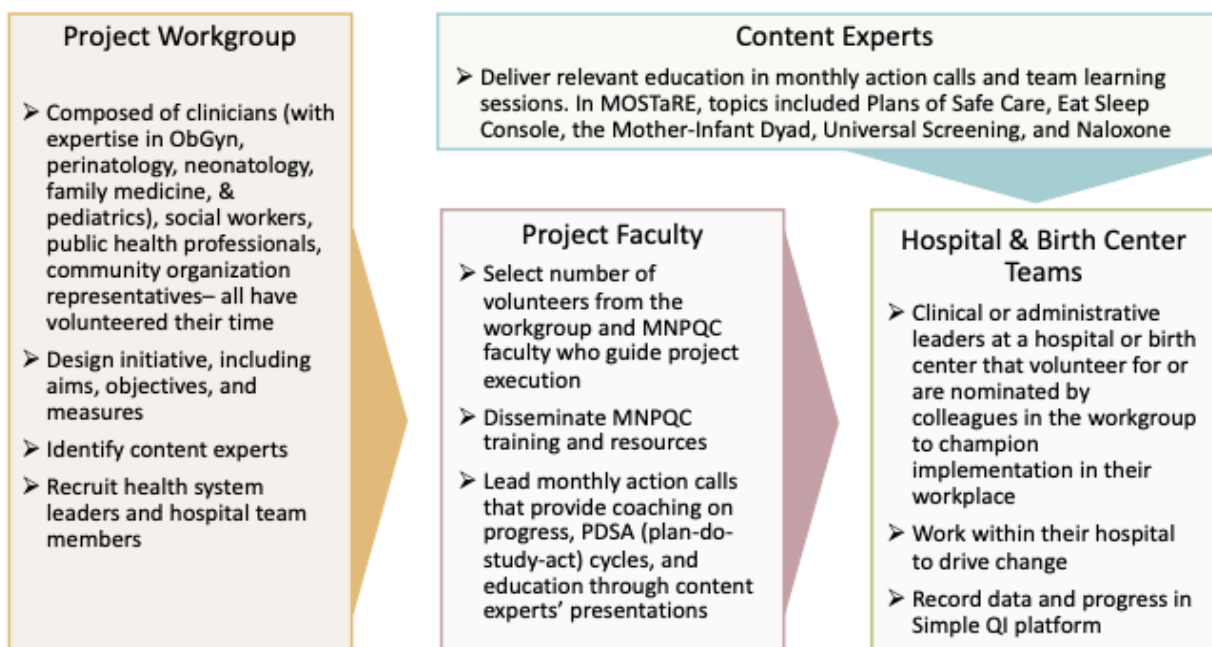
[Perinatal Quality Collaboratives](#) are state or multistate networks supported by the Centers for Disease Control (CDC). PQCs provide infrastructure to bring together local hospitals, clinicians, nurses, patients, public health practitioners, and other stakeholders to drive systematic improvement in maternal and infant health. PQCs use quality improvement science and evidence-based frameworks from the [Institute for Healthcare Improvement](#) (IHI) to guide projects.

In 2018, the Minnesota Department of Health (MDH) and Minnesota Perinatal Organization (MPO) established the [Minnesota Perinatal Quality Collaborative](#) (MNPQC) with a mission of improving perinatal health outcomes for **all** Minnesotans. MNPQC capitalizes on collaboration to fulfill this mission, working with a network of 35 diverse organizations, including hospitals, healthcare centers, academic institutions, professional organizations, local and state agencies, and community groups. While MNPQC now operates under a nonprofit, MDH continues to be a critical thought-partner and financial supporter of MNPQC.

MNPQC joined the [Alliance for Innovation on Maternal Health](#) (AIM) in 2022. AIM is a national quality improvement initiative that develops multidisciplinary, clinical-condition specific patient safety bundles. These bundles can be implemented by PQCs and other organizations to systematically make birthing care safer and improve maternal health outcomes.

Stakeholders within the network of organizations affiliated with MNPQC guide the collaborative's projects and leverage tools and data to foster resource coordination. Clinical champions with medical and nursing expertise in obstetrics, maternal-fetal medicine, family medicine, neonatology, and pediatrics guide MNPQC development and implementation to ensure initiatives are evidence-based and feasible. Additionally, perinatal social workers, MNPQC faculty, maternal-child public health experts, community leaders, and patients/families are all essential contributors to project development and execution. Collectively, these voices ensure that initiatives are designed to drive equitable outcomes improvement and honor MNPQC's commitment to serving all racial and ethnic communities in Minnesota and both rural and urban populations.

The figure below depicts MNPQC's organizational framework for bringing MOSTaRE teams together to plan, develop, and launch the improvement project.

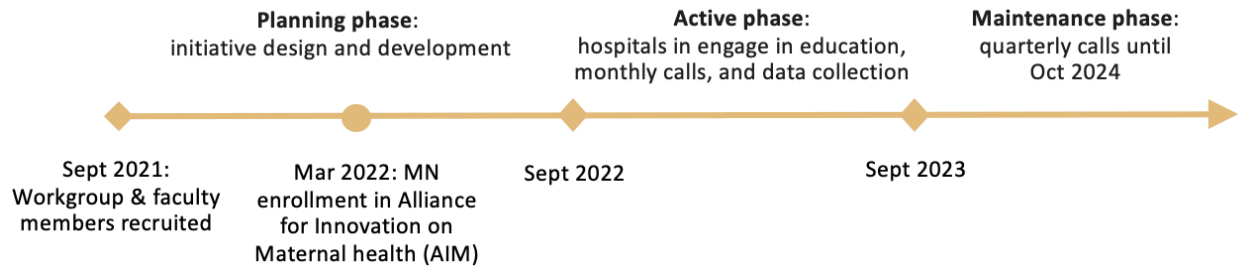


MOSTaRE Introduction:

The Mother/Infant Opioid Substance Use Treatment and Recovery Effort (MOSTaRE) initiative started in 2021. At that time, there was increasing recognition that Substance Use Disorder (SUD) was significantly contributing to maternal mortality, morbidity, and inequitable outcomes in perinatal care at both a national and state level. In the first-ever [Minnesota maternal mortality report](#), reviewing maternal deaths from 2017-2018, substance use was identified as a cause or contributing factor in 31.3% of the pregnancy-associated deaths. Perinatal health advocates in Minnesota were working with state legislators to decriminalize substance use during pregnancy and increase access to treatment. Additionally, the Minnesota Department of Health (MDH) created a [task force](#) on pregnancy health and SUD.

On a national level, the CDC targeted improving perinatal outcomes for people with SUD and provided additional funding to state quality collaboratives. The [Alliance for Innovation on Maternal Health](#) (AIM) created a safety bundle for the care of pregnant and postpartum people with SUD. This AIM safety bundle focuses on maternal outcomes with an emphasis on opioid use disorder (OUD). MNPQC shared this goal with AIM and additionally wanted to consider outcomes for the maternal-infant dyad and address SUD comprehensively, including OUD, in Minnesota. As such, measures, outcomes, and design of the MOSTaRE initiative reflect elements of the AIM safety bundle with additional attention to infant outcomes.

The active phase of MOSTaRE implementation concluded in September 2023, and MNPQC is currently supporting hospital teams through the maintenance phase.



Aim Statement

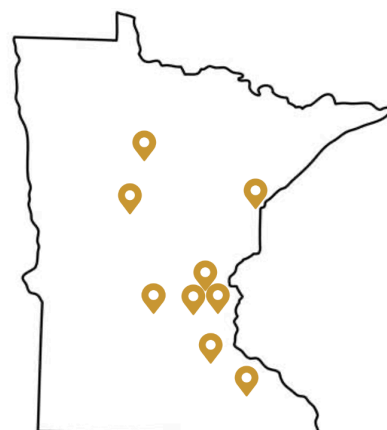
The MOSTaRE aim statement was developed by the project workgroup. The aim was: **1. to increase the identification and treatment of substance use disorders (SUDs) in pregnant people and substance exposure in infants by 50% or more. And 2. to increase the use of nonpharmacologic methods for treating infants exposed to opioids and reduce the average length of stay for these infants.** Using nonpharmacologic methods like eat, sleep, and console for infants experiencing neonatal abstinence syndrome/neonatal opioid withdrawal syndrome is thought to decrease the length of stay, which is a routine and thus feasible measure for hospital systems.

Methods

Hospital Teams:

The MOSTaRE project workgroup reached out to every major health system in Minnesota and invited them to nominate one representative hospital to participate in the project. This recruitment approach ensured that the knowledge gained could later be disseminated across the entire health system and most hospitals in Minnesota could benefit from learnings in this initiative. Nine health systems participated in the initiative with the potential for 16 hospital touchpoints. Hospitals created their team of champions that could include obstetric and NICU clinicians and staff, Labor & Delivery managers, hospital administrators, SUD community treatment and support partners, and quality improvement experts. With guidance from faculty in monthly Zoom calls, teams at these 9 hospitals or health systems championed practice changes.

- Health Partners/Park Nicollet
Hutchinson, Lakeview, Methodist, Regions, Hudson, Amery,
Westfield
- Mayo Clinic
- MHealth Fairview Riverside
- North Memorial/Maple Grove
- Northfield Hospital
- Sanford Health Bemidji
- Sanford Worthington
- St. Luke's Duluth
- Astera Health



Tools and Resources

Faculty and workgroup members collated evidence, data, and guidelines for perinatal and neonatal care related to substance use disorder. Faculty and workgroup members additionally collected and created community [SUD resources](#), specific to Minnesotans. These resources were shared with hospital teams and/or communicated during the learning sessions or monthly action calls.

MNPQC uses Simple QI to record and analyze data. Hospital teams can input their measures, data, narrative reports, and plan-do-study-act (PDSA) cycles into this secure, cloud-based platform. A PDSA cycle is a design method in which teams iterate within their environment to determine if the changes made are accessible, adaptable, adoptable, feasible, and sustainable. MNPQC supports hospital sites by coaching PDSA cycles, monitoring performance, and advising on new ideas. Hospital teams are provided data analysis and benchmarking every month. Simple QI also allows hospital teams to explore each other's progress, see state data, and share learnings.

Theory of Change:

The MNPQC faculty team and improvement advisor integrated clinical evidence and personal experiences to develop a theory of change and [driver diagram](#) for MOSTaRE. Theory of change refers to an evidence-based methodology to plan, execute, and evaluate social change and quality improvement. Driver diagrams are used to identify factors contributing to the aim statement. For MOSTaRE, the aim was to identify and treat SUD and use nonpharmacologic methods to treat infants affected by SUD. Primary drivers identified thus included reducing stigma, enhancing screening and assessment processes, optimizing care management and coordination, increasing education, and promoting family-centered care. Secondary drivers more specifically represent the opportunities for change.

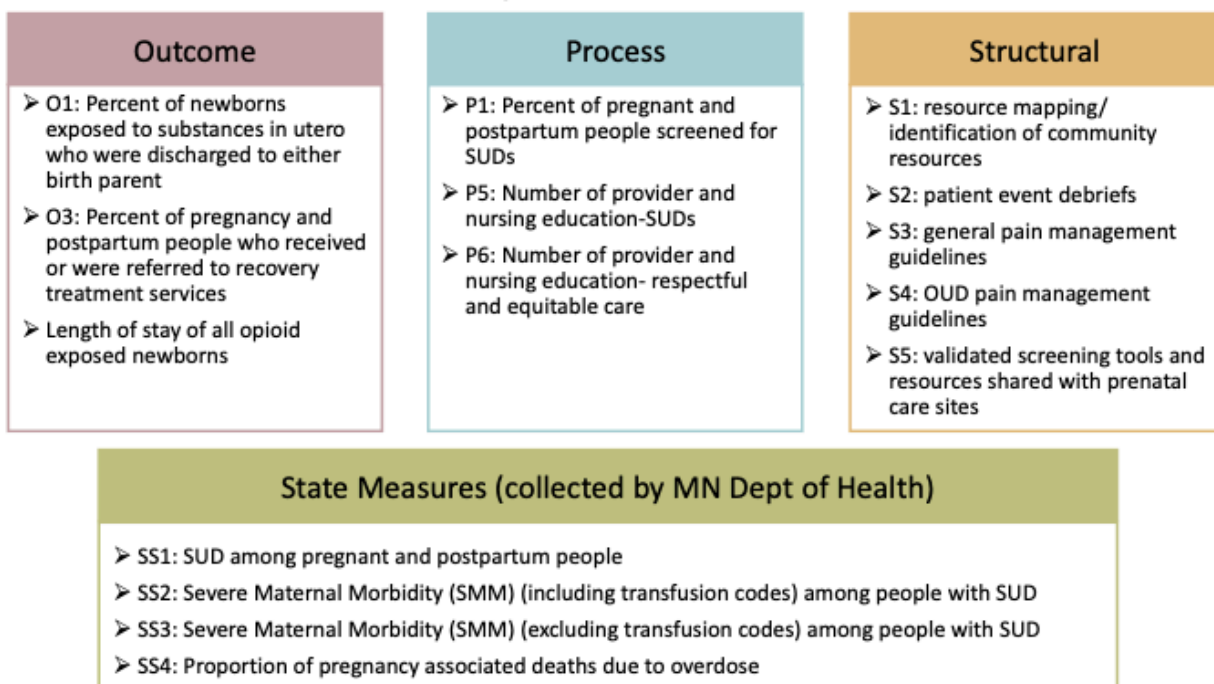
Changes Tested:

Using the driver diagram as a framework, the hospital teams focused on several change ideas to target during this initiative. In Simple QI, hospital teams would select a change from the driver diagram and incorporate these change ideas into their PDSA cycle. The chart below reflects the changes tested by at least one hospital team in the cohort of 16 hospitals. Monthly action calls and bi-annual learning sessions sought to provide education on these topics while also coaching sites on how best to implement these changes in their day-to-day practice.

Primary Driver	Secondary Driver	Changes Tested
Stigma	Education & Awareness	Educate staff, community, clinicians, and birthing people about SUD with specifics on OUD.
		Inform and update staff on mandated reporting requirements and best practices.
Screening & assessment	On admission	Discuss and discourage the use of urine toxicology and other biological testing as screening tools.
		Engage in universal screening for all birthing people for SUD, using validated screening tool: 4Ps Plus, 5Ps, SURP-P. Emphasize informed consent in screening and ask the patient's permission before using screening tools.
Care Management & Coordination	Discharge Planning	Focus on creating a collaborative care team that provides patient and family support (collaboration care and coordination).
Newborn Family Education	During admission	Provide education for staff and families on the Family Care Plan. Emphasize keeping caregiver(s) and infants together, identifying their support system, collaborating on safety planning, anticipating difficult situations that could come up and providing appropriate support from social services (Plan of Safe Care).
Newborn Family Centered Care	During admission	Follow eat, sleep, console.

Family of Measures:

To assess the hospital team's progress and project impact, evaluation measures were established. The AIM bundle on care for pregnant and postpartum people with substance use disorder provided 14 measures. The MNPQC workgroup and faculty narrowed this list to a selected set of measures that included outcome, process, and structural measures. Measures were chosen in relation to the changes tested that were selected by hospital teams. An infant outcome measure was added as well to reflect the change ideas directed at newborn wellbeing. Additionally, MDH collected relevant, related measures. Participating hospitals were also permitted and encouraged to add their own metrics beyond those listed in the figure below.



*Intent to stratify all measures by race/ethnicity where available.

+ Notation of O1, P1, etc. reflects measures that were part of the AIM Safety Bundle for care of pregnant and postpartum people with substance use disorder.

Results

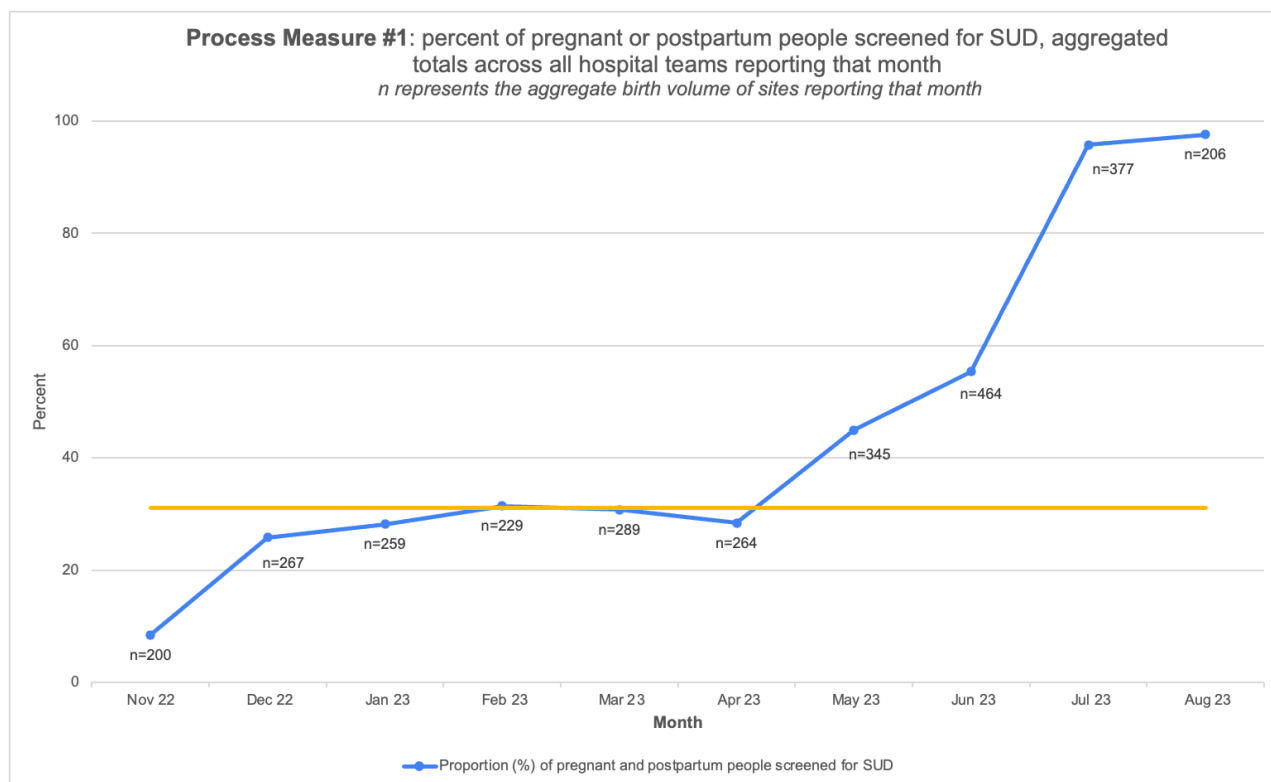
Process Measure #1:

The percentage of pregnant and postpartum people screened for SUD

Hospital teams were encouraged to enter their monthly birth volume and the number of pregnant and postpartum individuals in the corresponding month who were screened for SUDs using a validated screening tool at any time during the pre and post-natal period.

The graph below represents aggregate data across all hospital sites. However, the number of hospital teams reporting each month ranged from 2 to 7. Four months (Aug-Oct 22, Sep 23) that had an aggregate birth volume less than $n=60$ were removed from the data set due to skew. The aggregate birth volume for each month is represented as n in the graph. The yellow line represents the median percent of pregnant and postpartum people screened across all months.

This aggregate data addresses the project's aim of increasing the identification of substance use disorders (SUDs) in pregnant people and substance exposure in infants by 50% or more. Quality improvement theory concludes that if five or more consecutive points are either ascending or descending, a chance occurrence is unlikely. Given the five continuous points of increase in the figure below, a trend towards increased screening of SUD is observed. However, with different sites reporting each month and varying sample size, a clear baseline was not established, and a pre/post analysis was not feasible. In addition, hospital teams throughout the project initially were screening for SUD but not with validated tools (4Ps, Plus, 5Ps, SURP-P). Screening without using the validated tool was recorded by some sites as no screening. Thus, this positive trend is at least partially attributable to the shift towards a validated tool.



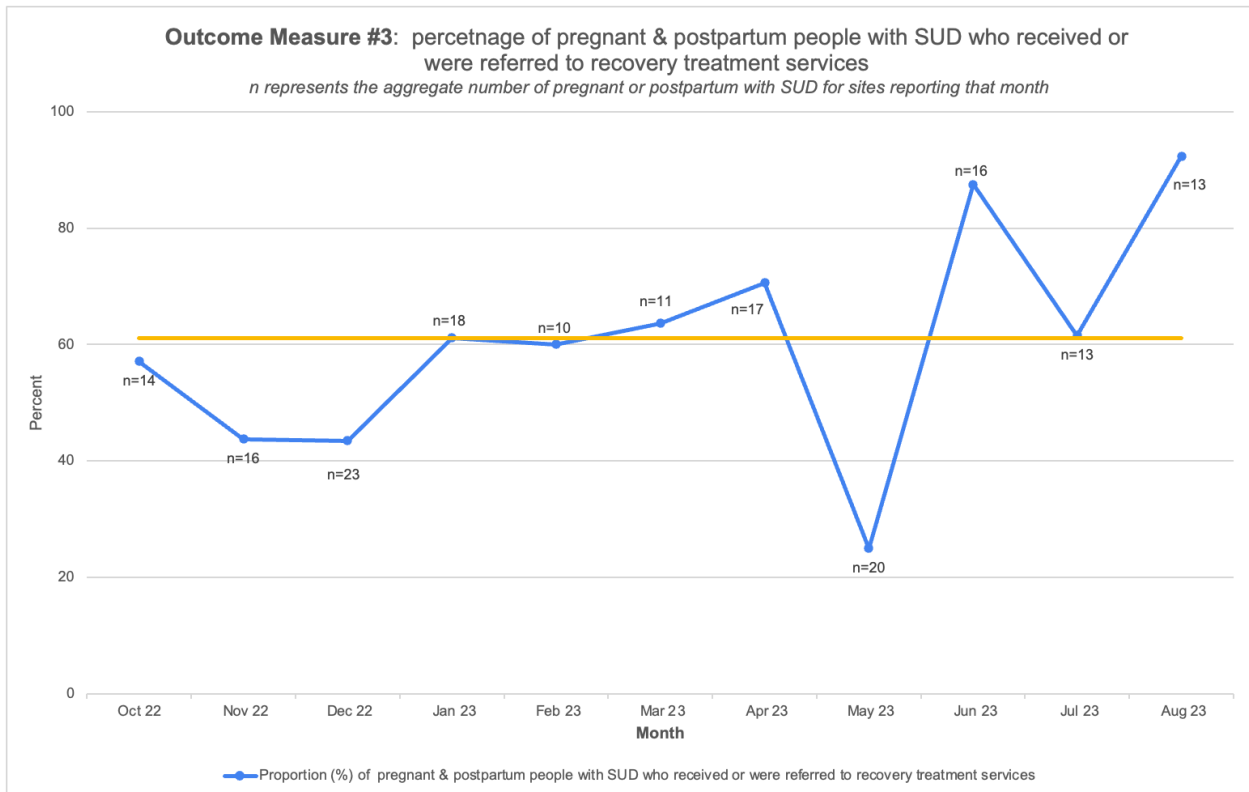
Outcome Measure #3

The percentage of pregnant & postpartum people with SUD who received or were referred to recovery treatment services

Hospital teams were encouraged to enter the total number of pregnant or postpartum people that month with SUD and the number/proportion of those people who received or were referred to recovery treatment services.

The graph below represents aggregate data across all hospital sites. However, the number of hospital teams reporting each month ranged from 3 to 7. Months at the beginning and end of the project timeline in which there were 0-2 hospitals reporting with an aggregate sample of less than 10 pregnant or postpartum people with SUD each month were removed from the dataset. The aggregate number of pregnant or postpartum people with SUD each month is represented as n in the graph.

This dataset reflects the project's aim to increase the treatment of substance use disorders (SUDs) in pregnant people and substance exposure in infants by 50% or more. No trend is visualized, as the data crosses the yellow midline (median) multiple times with no continuous increase of at least 5 data points or a shift above the median of 6 sequential data points. With different sites reporting each month, this aggregate data should be interpreted cautiously. More robust data collection may yield a more conclusive result.

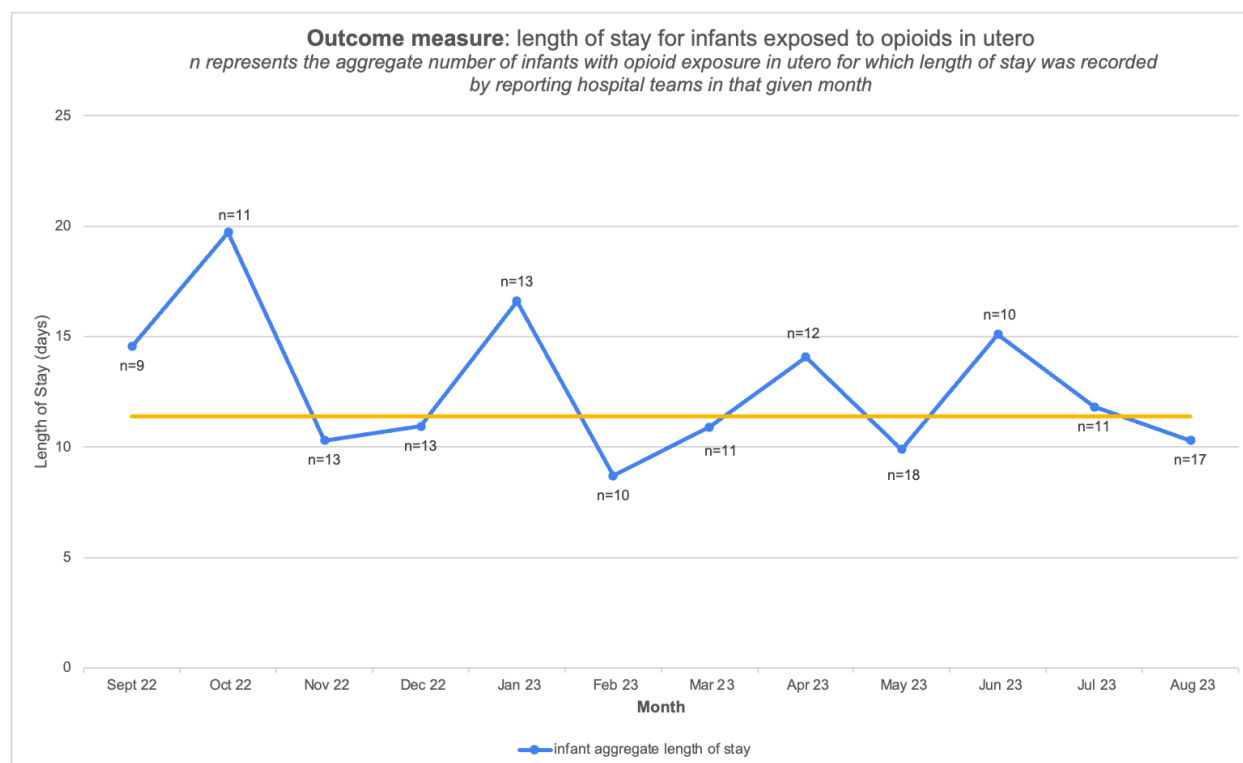


MNPQC Outcome Measure:

Length of stay of all opioid exposed newborns

Hospital teams recorded the duration of the hospital stay for infants who were exposed to opioids while in utero. MOSTaRE education included using nonpharmacologic methods like Eat, Sleep, and Console for infants experiencing neonatal abstinence syndrome/neonatal opioid withdrawal syndrome (NAS/NOWS) after maternal opioid exposure. Length of hospital stay was added by MNPQC to the established AIM bundle outcomes because utilization of nonpharmacologic methods for NAS is thought to be correlated with a shorter length of stay, and length of stay is feasible for hospitals to assess.

The graph below represents aggregate data across all hospital sites. However, the number of hospital teams reporting each month varied from 2 to 5. No trend is visualized, as the data crosses the yellow midline (median) multiple times with no continuous increase or decrease in data points. With different sites reporting each month and a small sample size, this aggregate data should be interpreted cautiously.



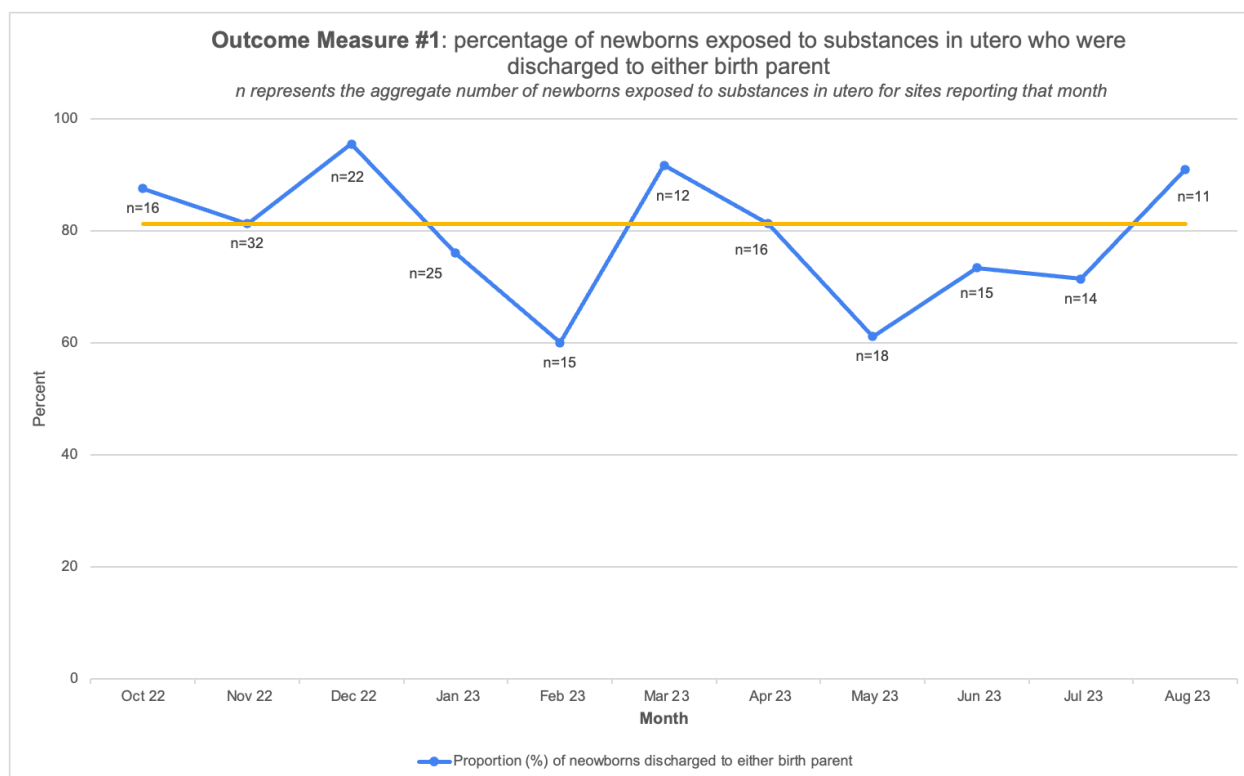
Outcome Measure 1:

The percentage of newborns exposed to substances in utero discharged to either birth parent

Hospital teams were encouraged to enter the total number of newborns in that month who received care for exposure to substances in utero, and the number of those newborns who were discharged to a birth parent (vs. child protective services or other caretaker).

The graph below represents aggregate data across all hospital sites. However, the number of hospital teams reporting each month varied from 3 to 7. Months at the beginning and end of the project timeline in which 0-2 hospitals were reporting with an aggregate sample of less than 10 newborns each month were removed from the dataset. The aggregate number of newborns who received SUD-related care is represented as n in the graph.

This aggregate data addresses the project goal of understanding and assessing outcomes related to the maternal-infant dyad and newborn wellbeing. No trend is visualized, as the data crosses the yellow midline (median) multiple times with no continuous increase or decrease in data points. With different sites reporting each month, this aggregate data should be interpreted cautiously.



Process Measure #5 & #6

P5: Number of provider and nursing education-SUDs

P6: Number of provider and nursing education- respectful and equitable care

For both process measure #5 and #6, a small number of hospital teams reported the percentage of providers engaged in education on the two subjects (SUD and respectful & equitable care) at the beginning or midway in the initiative. However, without follow-up data from hospital teams at or near the end of the initiative, drawing any meaningful conclusions on improvement is not possible.

Structure Measures #1-5

S1: resource mapping/ identification of community resources

S2: patient event debriefs

S3: general pain management guidelines

S4: OUD pain management guidelines

S5: validated screening tools and resources shared with prenatal care sites

Structural measures were evaluated via Likert scale assessment, in which teams could select a value of 1 to 5- 5 indicating the structure evaluated is fully in place, and 1 indicating the structure evaluated is not yet started. Structural measures were collected yearly. Several sites provided Likert data in the first quarter of the initiative, but there is little to no follow-up data from hospital teams at or near the end of the initiative (3rd or 4th quarter). Thus, drawing any meaningful conclusions on structural improvement is not possible at this time. AIM has since revised the structural measures for accuracy and better ease of data reporting.

SSM state measures

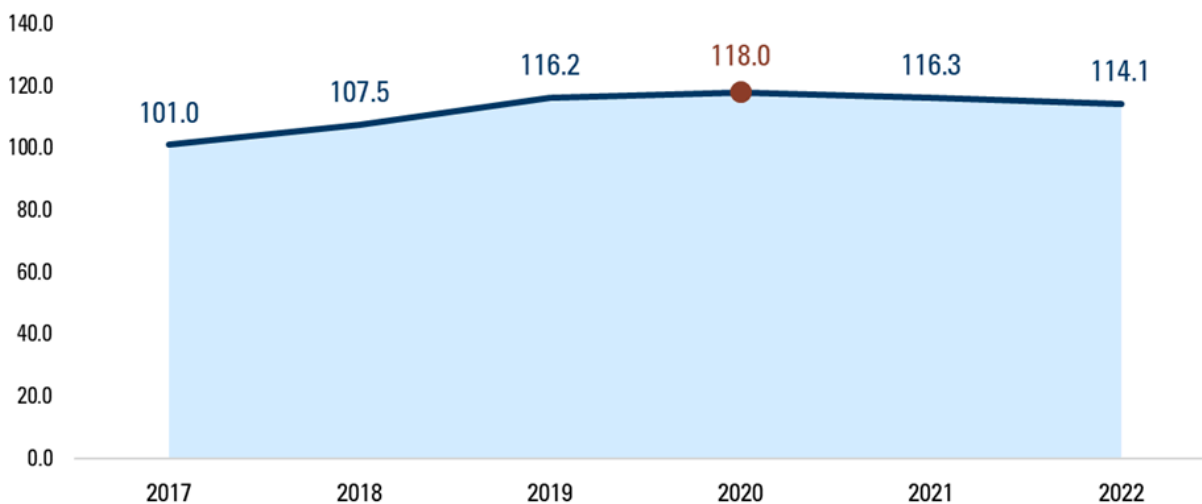
Data collected by MDH and MMRC often takes several years to process and analyze, and thus state data that aligns with the timeline of this project is not yet available.

MDH publicly shared hospital discharge data from 2017 to 2022 that demonstrates sustained incidence of SUD and the continued rise of OUD in the perinatal population in Minnesota. Hospital discharge data only captures the incidence of SUD at the time of hospitalization for delivery. Given that not all births occur in the hospital setting and the perinatal period includes before and after delivery, this data likely under-represents the incidence of SUD in the perinatal period.

The rate of **substance use disorder (SUD)** at time of delivery hospitalization has **increased** since 2017 and **peaked in 2020**.

Rate per 10,000 delivery hospitalizations

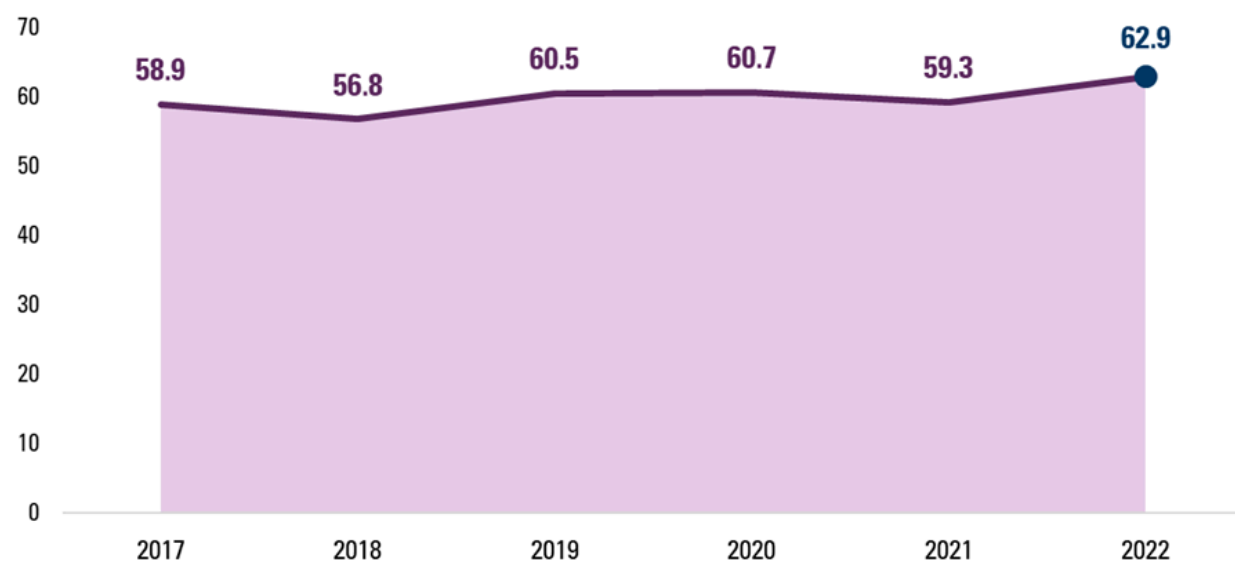
Source: Minnesota hospital discharge data



The rate of **opioid use disorder (OUD)** at time of delivery hospitalization has **increased** since 2017 and **peaked in 2022**.

Rate per 10,000 delivery hospitalizations

Source: Minnesota hospital discharge data



Data & figures via: Hospital Discharge Data, Maternal and Child Health Section, Minnesota Department of Health, 2017-2022.

Discussion

As the third project since the foundation of MNPQC, MOSTaRE offered many learning opportunities.

One of the biggest feats of the project was the multidisciplinary collaboration that spread awareness of best practices for perinatal SUD care across the state. This socialization of recent legislative and clinical practice changes was critical to the initiative and transformative for participating hospital teams. At large academic hospitals, small critical access hospitals, and suburban community hospitals, there was impressive energy and passion to be a part of the solution to the perinatal health challenges that were being elucidated in Minnesota and nationally.

The biggest challenge of MOSTaRE was sustained hospital team engagement and consistent data collection. The majority of workgroup members, experts, and clinical champions volunteer their time and face competing priorities. Engagement through learning sessions and action calls was at times variable. Hospital teams shared that it was harder to engage when they didn't have a finished work-product or positive outcome to share with the team at action calls. For hospitals with small teams in particular, the goals of this project were likely too ambitious. As an organization, MNPQC will apply these internal learnings to future projects to encourage sustainable engagement and continued motivation throughout the project and beyond. For example, in future initiatives, time will be built into the action calls for sites to enter their data. Some teams found data entry to be seamless and quick while other teams had to manually audit electronic health records. Building time into the calls at least initiates data collection and provides space for in-the-moment recognition of data challenges.

The limitations of data collection subsequently made evaluation difficult. As a quality improvement project, the primary utility of data collection is to help hospital teams track their progress and respond in real time to shifts. No statistical analysis was completed for the purposes of research. The most notable learning from the measures collected was that process measure 1 and outcome measure 3 did suggest that MNPQC addressed the aim of a >50% increase in identifying and treating substance use disorders (SUDs) in pregnant people. For process measure 1, different sites reported each month with disparate birth volume, and thus the trend that is visualized may not reflect a true improvement but differential reporting from sites. Further, sites changing their practice and data entry with regards to a validated screening tool at least partially accounts for the impressive increase. Measures related to newborn and family wellbeing did not demonstrate a meaningful trend. For all measures evaluated, different sites reporting each month and small sample sizes were significant challenges.

While stratifying outcomes by race and ethnicity was intended, the sample sizes were not large enough to meaningfully evaluate this stratification. To protect patient privacy and confidentiality, data is not stratified when numbers are small. Additionally, percentages and rates based on small numbers can fluctuate dramatically over time. These differences may appear large but can be due to random variation alone and are not statistically meaningful. To address sample size limitations in the future, white vs. non-white categorization will be considered.

In designing future initiatives, MNPQC will further narrow the scope of perinatal SUD projects to allow sites of all resource settings to build their capacity over time to address these major perinatal health challenges.

Next Steps

- Now in the maintenance phase of MOSTaRE, hospital teams are encouraged to stay engaged through 2024. Quarterly calls bring the hospital teams together to foster continued knowledge exchange and a forum for feedback. MNPQC recommends that hospital teams continue to report and track their data internally to assess progress and identify opportunities for continued improvement.
- MNPQC has been in discussion with the Minnesota Hospital Association to consider incorporating the process and structural measures from this project into MHA's established data collection process. With this infrastructure for data collection, future initiatives on perinatal outcomes related to SUD will be more feasible and sustainable.
- MOSTaRE teams demonstrated the need for smaller and more focused quality improvement initiatives to further address the project's aims and goals. In the near future, MNPQC plans to administer a focused quality improvement Community of Learning opportunity for hospital teams interested in expanding nonpharmacologic methods (primarily Eat, Sleep, and Console) for infants exposed to opioids in utero. MNPQC will also offer a Community of Learning opportunity for hospital teams to connect as they develop processes for improved Plans of Safe Care for their families.
- Hospital discharge data from the Minnesota Department of Health has demonstrated that SUD and OUD continue to be a rising challenge for perinatal health outcomes. MNPQC acknowledges that the MOSTaRE initiative was a first step in our work towards improving outcomes for pregnant and postpartum people with SUD and their newborns and families. Pending funding and stakeholder perspective, additional quality improvement opportunities and/or a second MOSTaRE hospital cohort are anticipated.

Acknowledgments

The MOSTaRE project stands as a testament to the collective effort and dedication of numerous individuals and groups. We extend our deepest gratitude to:

Faculty: We sincerely appreciate the faculty members whose guidance and expertise have been invaluable throughout this endeavor. Our Faculty leads, Dr. Richardson and Dr. Cooper provided visionary leadership and unwavering support throughout this journey. Your guidance, encouragement, and commitment to excellence have been a driving force behind our accomplishments.

Workgroup: The collaboration and commitment of the workgroup has been fundamental to the success of this project. Your contributions have enriched the depth and quality of our work, and we are grateful for your dedication.

Teams: We extend our heartfelt thanks to all the teams involved in various capacities. Your hard work, creativity, and collaboration have been instrumental in achieving our objectives and ensuring the project's success.

To everyone who has contributed to the MOSTaRE project, directly or indirectly, we offer our sincere appreciation. Your collective efforts have made a significant impact, and we are honored to have worked alongside such dedicated individuals.