MN Progress Report on Hypertension in Pregnancy and Postpartum Period Initiative

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Background:
Minnesota Perinatal Organization (MPO) is a non-profit organization with the vision of improving perinatal and infant health outcomes throughout the state of Minnesota. MPO was founded in 1974 and is a multi-professional, inclusive association of individuals and organizations. On January 2018, MPO and the Minnesota Department of Health (MDH) partnered to create the Minnesota Perinatal Quality Collaborative (MNPQC). Its membership represents communities across Minnesota (MN) and key perinatal health experts.

Provider champions across health systems and professional member organizations consistently engage in the MNPQC initiative development and quality improvement (QI) projects. MNPQC actively engages community voices and family perspectives on perinatal care and take a thoughtful approach to ensure all members have equitable contributions. Geographically, MNPQC serves all of Minnesota with representation of health care systems, professional organizations, academia, community-led organizations, and state agencies. As a young perinatal quality collaborative, we focus heavily on membership development, leadership structure and implementing multiple MNPQC initiatives on preterm birth, hypertension, and early hearing detection. Our most recent initiative works to address treatment and prevention of substance exposure during pregnancy by emphasizing family-centered care that maintains the maternal-infant dyad.

Minnesota is a recently enrolled state in the patient safety program, Alliance for Innovation on Maternal Health (AIM).

Structure:
The MNPQC Steering Committee is a group of individuals comprised of healthcare organizations, professional leadership, and community partners. The members review current data, trends, and research on best practices to inform QI initiatives, including the selection of AIM bundles. One key function is promotion and support of QI initiatives aimed at reducing inequities. To select a QI initiative, members and interested partners submit a proposal following the Situation, Background, Assessment, Recommendation method (SBAR). When selecting this Hypertension project, the MNPQC used a project decision tool that required vetting available best practices, literature review, data burden, and feasibility to address key perinatal health issues. The QI committee identified a workgroup and project faculty who worked with the Data Committee, Perinatal Equity Committee (PEC) and Community Advisory Council (CAC) to reflect BIPOC communities; patient and family perspectives; and include rural and urban members to accomplish equity-centered and data-driven strategies for the QI initiative. Faculty, workgroup, and content experts have critical leadership roles in our QI initiatives that embed best available clinical evidence and use frameworks from The Institute for Healthcare Improvement (IHI), Associate in Improvement’s Model for Improvement, and Project ECHO.
Project Workgroup: The MNPQC workgroup membership reviews best practices, literature, data on burden, and feasibility to identify QI initiatives. The workgroup designs the initiative, and a faculty team leads the collaborative program. The workgroup is responsible to communicate and recruit team members, identify content experts, and disseminate MNPQC training and resources. Workgroup members include obstetric/perinatology care, pediatric/neonatology care, family medicine, behavioral health, addiction medicine, social work, public health, the Perinatal Equity Committee (PEC) liaison and patient representative.

Project Faculty: Faculty are responsible for implementation of the initiative strategies, including recruitment, identification of speakers for ECHO series, and providing technical assistance. Faculty represents MNPQC members with backgrounds in obstetric/perinatology, pediatric/neonatology, improvement/data, addiction medicine and public health. Faculty includes a chair, vice-chair, improvement advisor, program coordinator and MNPQC leadership as needed.

Content Experts: An important strategy to the MNPQC’s IHI model was to embed a Project ECHO program for participants to access content experts. The ongoing action period calls included open and closed Project ECHOs for the teams participating in the QI initiative. Open ECHO’s feature experts from across the state who provide a didactic and lead discussion on specific topics open to all.

Tools and Resources: Faculty and workgroup identified data collection tools to ensure accurate and meaningful data. They created education tools for provider and patient data that reflect the latest evidence-based interventions. Faculty developed and adapted tools for MN audiences. The Project ECHO series served as a communication platform to share these new and/or existing resources to our target audience working with the perinatal population.

The MNPQC uses rigorous Quality Improvement (QI) methods via a hybrid model that embeds both the Institute for Healthcare Improvement (IHI) approach with The Model for Improvement and the Project ECHO Program. MNPQC delivered Project ECHO for the Hypertension in Pregnancy and the Postpartum Period. The hypertension faculty partnered with participating hospitals and developed metrics to guide the initiative in the Project Echo series. The use of Project ECHO was a critical resource because it allowed accessibility for rural communities to participate in a telehealth education tool - All Teach-All Learn Philosophy. Project ECHO aligns well with MNPQC work as a collaborative approach that uses case presentations on specific topics by attendees and interactive discussions to provide recommendations from the group. This model promotes community of practice, mentorship, and support for all geographic areas in the state along with encouraging all to learn from discussions regardless of expertise in the topic. It also fosters networking within multiple health systems and a diverse group of health professionals and community organizations all working toward a common goal. The MNPQC Project ECHO format gives the opportunity to provide monthly education applicable to health
care professionals across systems. These tailored approaches address communities needs and reach all areas statewide.

Each QI initiative follows a measure strategy that defines primary data sources, clinical processes, outcome data and performance measures. SimpleQI is the current QI platform that centralizes the initiative metrics and performance measures by displaying measures as run charts. It includes the ability to stratify data by race/ethnicity and other subpopulations such as location or language. SimpleQI is a secure, cloud-based platform that provides simplified data entry for participating hospital teams that aligns with the Model for Improvement. This tool allows each team access to input health system measures, baseline/monthly data, narrative progress reports, and PDSA cycles. The MNPQC coordinates the SimpleQI platform in partnership with an improvement advisor who provides technical assistance platform navigation support to teams and provides QI education and develops improvement science capability. Monthly, teams are given data and reporting tools, data benchmarking, and analysis. Data sources include state-level hospital discharge, vital records, and electronic health records. MNPQC program activities also serve as key data sources to monitor performance and impact.

Implementation outcomes are outlined as a theory of action in a driver diagram. The project measures are impacted by implementation of vital change ideas or interventions. Change ideas align with health system outcomes that assess protocols and processes as well as patient-oriented outcomes such as patient experience. MNPQC uses the Model for Improvement and Plan, Do, Study, Act (PDSA) cycles for learning and improvement. PDSA cycles allow teams to assess change ideas within their health systems to determine if they are accessible, adaptable, adoptable, feasible, and sustainable. Repeatedly, this ongoing learning is built to support continuous improvement processes to drive overall systems change.

Project Aim and Goals

The initial Aim of the MNPQC collaborative and its participating partners/members was to develop reliable processes of recognition and treatment of obstetric (OB) hypertension (HTN) during pregnancy and up to six weeks postpartum, by July 2022. We wanted to make a difference to:

- Increase the percentage of those with severe hypertension treated within 60 minutes
- Improve compliance of the HTN recognition tool and OB HTN emergency pathway
- Improve discharge education
- Increase the percentage of patients discharged with a blood pressure cuff
- Increase the percentage of those patients with HTN who receive a blue band
- Improve postpartum discharge follow up rates and time interval from discharge to follow-up visit
- Reduce maternal morbidity and mortality resulting from obstetrical hypertension
Theory of Change

The faculty team and improvement advisor organized a theory of change, a driver diagram that includes the best evidence and experiences in MN so that teams could easily learn what changes would achieve results. The primary drivers include structures, key processes, and norms. The secondary drivers are discrete moments in time when changes need to happen. The change ideas are evidence-based ideas that bring about improved performance when tested and implemented. Note: Due to the national health emergency/COVID-19 Pandemic, continued team interest and enthusiasm to get results, our time frame was expanded for an additional year.

Family of Measures

The family of measures reflect the major areas of team improvement efforts:

- Percent of patients with severe range Blood Pressure (BP) treated within 60 minutes
- Percent compliance with OB hypertension emergency pathway from all hospital points of entry
- Percent of patients with severe hypertension with discharge education
- Percent of patients with severe HTN offered a blood pressure cuff at discharge
- Percent of patients with severe HTN offered a blue band at discharge
• Percent of patients with a hypertensive disorder of pregnancy scheduled for post discharge follow up appointments or home health care within 3-5 days
• Severe maternal morbidity and mortality rates due to severe HTN

Team Composition

We invited each major health system in the state to select one representative hospital to join the project so that learnings could later be spread system wide, covering most hospitals in Minnesota. Team member composition included an obstetrical labor unit nursing leader, physician leader, administrative representative, and front-line staff. Eight teams initially joined the project, six of which shared data. Our final data was gathered from these 6 teams:

- Tri-County Astera
- North Memorial Health
- MHealth Fairview University of Minnesota Medical Center
- Riverwood Healthcare Center Aitkin
- CentraCare - St. Cloud Hospital
- Northfield Hospital

Changes Tested

Assessment and Recognition: Teams worked on early recognition and assessment of HTN including knowledge of risk factors, proper blood pressure measurement technique, using a timer as a reminder, treating HTN as an emergency, and employing a tool for early preeclampsia recognition.

Treatment and Response: Teams conducted drills and simulations in the emergency department to increase treatment and response to OB HTN. They also reduced the time to treat after the second confirmatory severe BP reading. Teams worked on stat lab response and getting medications ready for treatment. They incorporated team debriefs on problematic cases or cases with delayed response and treatment and worked with medical staffs on escalation approaches. Additionally, the teams included work on discharge planning HTN education – signs, symptoms, response; use of BP measurement post discharge, prompt follow up within 3-5 days of discharge, and touch points after discharge for those with OB HTN.

Delay, Denial, and Dismissal: Teamwork for assessment, recognition, treatment, and response informed changing the norm of delay, denial, and dismissal. Working with teams to incorporate escalation policies is also an example of culture change that portrays an intolerance of the concerns of delays, denial, and dismissal. The data collected by teams measuring time to treat/lapsed time between first and second confirmatory BP reading indicated that good systems were in place for timely treatment. In the rare event of a miss, the cases were
investigated for learning and failures to treat often occurred outside the four walls of the hospital- in a community setting.

**Lessons Learned:** At the beginning of the project teams focused on identification of severe hypertension during the birthing hospitalization. As the project matured teams realized that birthing people are at great risk of harm from hypertension in the postpartum period. They turned their attention to follow up post discharge, discharge education, use of medical alert blue bands and working with outpatient providers to eliminate delays in treatment by medication management in the clinic rather than transferring the person to the ED. The driver diagram will be adapted to include these changes.

**Selected Results Data: Aggregate Display of Project Measures**

Below are four Shewhart charts that show some results of the project among the six teams reporting data. The upper and lower limits of the chart signify 3 sigma around the center line or the average of the monthly data. The dashed lines, called the upper and lower control limits, are considered the markers of special cause variation- data points that reflect process variation that does not belong to the system. Points that fall outside these control limits have an assignable cause that does not reflect the variation that exists because of the design of the system. Points outside the control limits may be in the direction of ‘goodness’, that is, they represent a special cause that produces a result that is an improvement; the process would not expect to produce such a data point. Points outside the control limits that are not in the direction of improvement should be investigated to ascertain the reason for the special cause of the assignable factor(s) that should be driven from the system, or they may signal that the process is not stable and will deteriorate. The hallmark of improvement is a data signal that shows the changes teams are making to improve the system are shifting or trending in the right direction.
Percentage of Birthing People with Severe HTN Treated Within 60 Minutes

This Shewhart chart shows that the aggregate baseline of the project was 57%. The data shows a strong signal of improvement with an improved process average. After teams made improvements, the average time patients are treated within 60 minutes of severe range BP reading improved to 71%.
Percentage of Birthing People with HTN Disorder of Pregnancy Sent Home with Discharge Education

Teams intended to improve discharge instructions for those with HTN disorders associated with pregnancy. They reported providing this but not always having a place to document it in their electronic health system. This made data retrieval difficult and not reliably accurate. The data shows that 82% of the time, birthing people with hypertensive episodes received discharge education. The last four data points are above this limit and suggest that changes made could make a lasting improvement by signaling special cause in the positive direction of improvement. However, four more data points are needed that are above the process average to understand whether changes made did create improvement. It will be important to identify what caused the last four data points to be moving in the direction of improvement and ensure these causes are designed into the system of every hospital team.

![Aggregate Percentage of Patients with Severe Hypertension with Discharge Education p Chart](chart.png)
Percentage of Birthing People with HTN Disorder of Pregnancy Discharged with a Blue Band

Two out of the six teams reported on this measure as they had the necessary resources to discharge birthing people with a hypertensive disorder with a blue band bracelet. On average, 77% of the people with HTN were discharged with a blue band. The data represents small numbers in the denominator. Should this work spread more throughout the state, teams will need to engage in this effort to understand whether and how improvement occurs. These two teams’ last three data points suggest that the changes they made began to take hold, but at least five more months of data is needed above the average of 77% to be confident in the results. Further work needs to be done with patients who decline blue bands to better understand their reasons and to develop strategies to reinforce the value of a medical alert signal.
Aggregate Percent of Patients with a Hypertensive Disorder of Pregnancy Scheduled for Post Discharge Follow up Appointments or Home Health Care Within 3-5 Days

Improving follow up touchpoints after discharge with those who experienced HTN disorder of pregnancy included nursing visits, community health worker visits, home visits, provider office visits or virtual visits. The data shows special causes in the last two measurement months. This is an early signal of improvement. Additional data points will strengthen this conclusion.

Aggregate Percentage of Birthing People with a Hypertension Disorder Discharged with a Follow up Within 3-5 Days Post Discharge

p Chart
Note on Measures Not Displayed in This Report:

Percentage of Patients with a HTN Disorder of Pregnancy who were Discharged with a Blood Pressure Cuff

A few teams worked to improve the percentage of patients with a HTN disorder of pregnancy who were discharged with a blood pressure cuff. This was challenging due to supply chain and the incremental cost to hospitals to provide blood pressure cuffs. As the project matured, the MN Department of Human Services authorized Medicaid to offer beneficiaries access to a blood pressure cuff post discharge. This service can now be measured by the state and is no longer a measure used in the project. We expect the number of blood pressure cuffs provided to increase over time.

Adherence to OB HTN Emergency Pathway

Teams sought to increase adherence to an OB hypertension emergency pathway regardless of entry point into the health system, i.e., emergency department or hospital admission. Teams struggled to measure adherence to the pathway outside of the OB department due the complexity of hospital entry points. Hospitals with lower rates of hypertensive cases reported challenges with adequate volume to stay current in response and recognition of OB Hypertensive Emergency and acknowledged lack of funding and critical staffing ratios as barriers to conducting simulation exercises. Micro-drills are an important change idea that needs additional reinforcement.

Severe Maternal Morbidity and Mortality Rates due to Severe HTN

This data is tracked by the MN Department of Health. Mortality data lags approximately three years. The project leadership team attempted to collect more proximal data by working with the MN Hospital Association data. However, the complexity of coding these outcomes, timely reporting, and disaggregating the data by participating hospitals and by race and ethnicity proved daunting. The teams that had very low volume were concerned about protecting anonymity of their patients, especially considering the attempt to look at the data by race and ethnicity. We eagerly await the final data for 2021-2022 when the state completes their analysis to understand the effect this improvement project had on the most important outcomes to birthing people among the participating hospitals.

Discussion

In the aggregate, more patients were treated for hypertension within 60 minutes of a confirmatory blood pressure reading because of this project. In addition, special causes in the direction of goodness emerged in the last months of the project for post discharge follow up, education at discharge, and patients discharged with a blood pressure cuff. The teams in this
learning collaborative persevered throughout the challenges of the public health emergency that put stress on staffing of units and the burden of data collection. Despite distractions from the improvement work, teams continue to report data, work on changes, and attend ECHO calls.

Early intentions of the collaborative included the desire to stratify data by race, ethnicity and language spoken in the home. This presented several system challenges regarding the collection of the data, data entry burden, and small numbers that risk identification of a patient. The lagging nature of obstetrical severe hypertension related mortality and morbidity made looking at the ultimate outcomes of the work impossible. We eagerly await the state data for the participating hospitals to understand how this work impacted the lives of birthing people.

Conclusions and Recommendations for Future Improvement Projects

The format of the learning network enabled hospitals to share best practices and lessons learned. The faculty of physician providers and nurses supported the hospital teams. Experts from around the country contributed to knowledge building during the monthly ECHO calls. The web platform SimpleQI encouraged teams to explore and learn from each other’s work and to share resources useful to them among each other.

We recommend and continue to recommend that teams continue to report data to understand where they are holding their gains, when they begin to falter, and to track how they continue to improve. We recommend the addition of all AIM measures to the platform and the teams entering data on these measures. Teams should continue their engagement in quarterly team sharing calls and to report data. We believe we will see continued improvement as the pandemic wanes and teams can refocus their attention. In addition, we will expand our focus to include the postpartum period and to specify additional changes that can be made to the driver diagram. We are committed to preventing postpartum harm related to hypertension. Finally, we will assess sustainability from OB mortality and morbidity data and continue to work with MHA to understand hospital engagement with the Minnesota Hospital Association’s OB Hypertension roadmap. Based on these efforts, we will assess whether to continue with an additional cohort or a spread project.