Early Hearing Detection and Intervention (EHDI) Initiative

Minnesota Perinatal Quality Collaborative (MNPQC) Report

April 2024

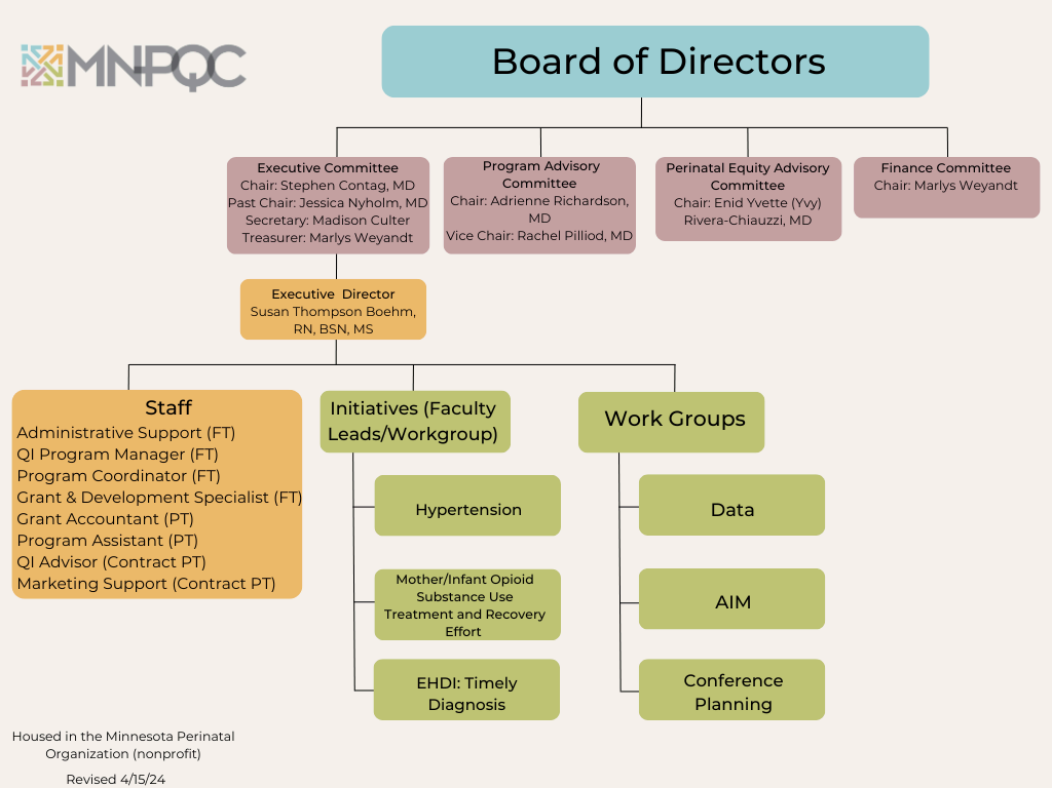
MNPQC Background

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 child 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. MDH continues to be both a critical thought partner and financial supporter of MNPQC.

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, patients, and family 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 figures below depict MNPQC's organizational structure and framework for bringing teams together to plan, develop, launch, and test an improvement project.



MNPQC collaborative structure for initiative design & implementation

Project Workgroup & Content Experts

- Deliver relevant education on monthly calls
- Composed of pediatric audiologists, family medicine providers, nurse managers, department of health representatives, public health professionals, community organization representatives, newborn hearing screening technicians,– all have volunteered their time
- Design initiative, including aims, objectives, and measures
- Deliver relevant education on monthly calls
- Disseminate MNPQC training & resources

Hospital & Birth Center Teams

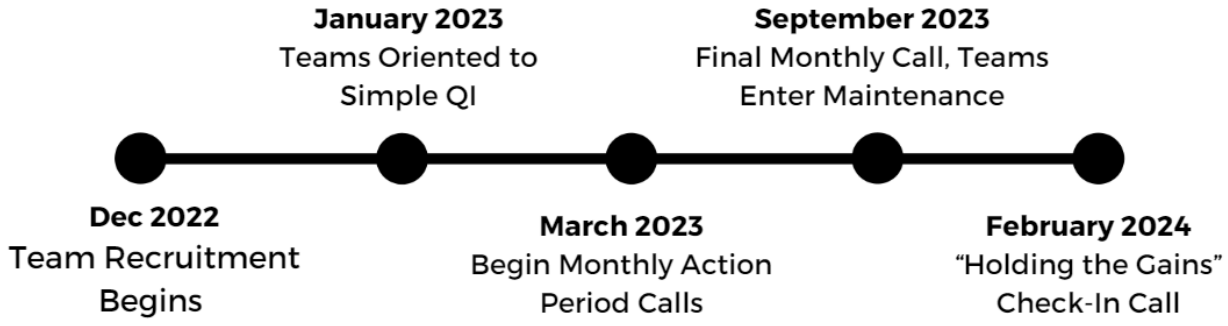
- Clinical or administrative leaders at a hospital or birth center that volunteer for or are nominated by colleagues in the workgroup to champion implementation in their workplace
- Work within their hospital to drive change
- Record collaborative data and share progress updates

EHDI Introduction

The Early Hearing Detection and Intervention (EHDI) initiative started in 2022. According to the Joint Committee on Infant Hearing (JCIH), all infants should receive a hearing screening at no later than 1 month of age, and infants who do not pass their screening should have a comprehensive audiological evaluation at or before 3 months of age. While most infants in Minnesota are screened for hearing loss before 1 month of age, Minnesota falls short of the national target of 85% of infants receiving diagnostic testing before 3 months of age. In 2020, 45.8% of infants who did not pass their hearing screening received complete diagnostic evaluation by 3 months of age.

Timely diagnosis of hearing loss and subsequent enrollment in early intervention have numerous benefits. Children with hearing loss who are diagnosed at an early age and receive timely intervention consistently have language skills at levels comparable to their hearing peers by age 5 to 6 (World Health Organization, 2010). Additionally, intervention by 6 months of age consistently offers advantages leading to better language scores, independent of the mode of communication chosen, the degree of hearing impairment, and socioeconomic status (Neonatal Care Academy, n.d.). Finally, some researchers estimate a reduced cost of greater than $40,000 in lifetime education costs per child with hearing loss when detected through newborn screening and enrolled in early intervention (Grosse, 2007).

The active phase of EHDI implementation concluded in September 2023, and MNPQC connected with teams in February of 2024 for a “Holding the Gains” call.



Aim Statement

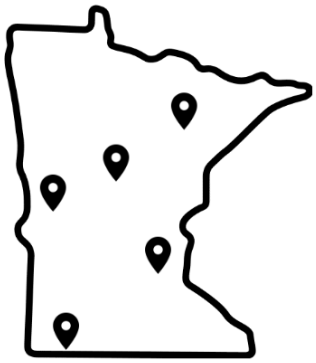
The project workgroup developed the EHDI aim statement: to improve the Complete Audiological Hearing Evaluation (CAHE) of those 3 months or younger who were referred from newborn hearing screening by 25% or more.

Methods

Invitations were extended to each major health system across the state, urging them to designate a representative hospital to participate in the project. This approach aimed to facilitate widespread dissemination of learnings throughout the entire healthcare system, encompassing the majority of hospitals in Minnesota. The team composition was curated to encompass diverse expertise and perspectives, including pediatric audiologists, family medicine providers, physician leaders, nurse managers, hearing screening technicians, administrative representatives, pediatric otolaryngologists, and frontline staff.

With guidance from faculty in monthly Zoom calls, these 5 hospitals championed practice changes.

- North Memorial Maple Grove
- Lake Region Healthcare Fergus Falls
- Lakewood Health Staples
- Sanford Worthington
- Essentia Health Virginia



Tools and Resources:

The workgroup collated evidence, data, and guidelines for early hearing detection and intervention. Additionally, they compiled and collected best practice resources which 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.

To guide efforts toward enhancing outcomes, a theory of change is encapsulated within a driver diagram, empowering teams to target both outcomes and the underlying processes driving performance. Implementation of pivotal change ideas, informed by the Model for Improvement and PDSA cycles, fuels progress. These cycles enable teams to experiment with change ideas, tailor interventions to local contexts, and embrace sustainable improvements. Moreover, teams cultivate the necessary infrastructure to uphold and perpetuate these enhancements over time.

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 EHDI. Theory of change refers to an evidence-based methodology to plan, execute, and evaluate social change and quality improvement.

Driver Diagram & Changes Tested:

Primary Driver	Secondary Driver	Changes Tested
Screening & Referral Process	Follow Up	Discuss and re discuss with families hearing findings (PCP, hospital, staff, audiology)
		The hospital team connects with clinic(s) (pilot or all) on family discussion, follow up, and documentation in medical record
	Prior to Newborn Discharge	Create standard work to notify family of hearing screening results, use family-centered principles
		Discuss screening findings with family
		Document in EHR not just the failed screening or rescreening, but whether a discussion was held with family about its importance
		Inform PCP when newborn does not pass hearing test: use fax, EHR, phone call, or electronic communication

Family of Measures:

To assess hospital team progress and project impact, evaluation measures were established. The MNPQC workgroup defined process measures that were chosen in relation to the changes tested that were selected by hospital teams. Additionally, MDH collected relevant, related measures.

EHDI Family of Measures

Process Measures (data collected by teams)

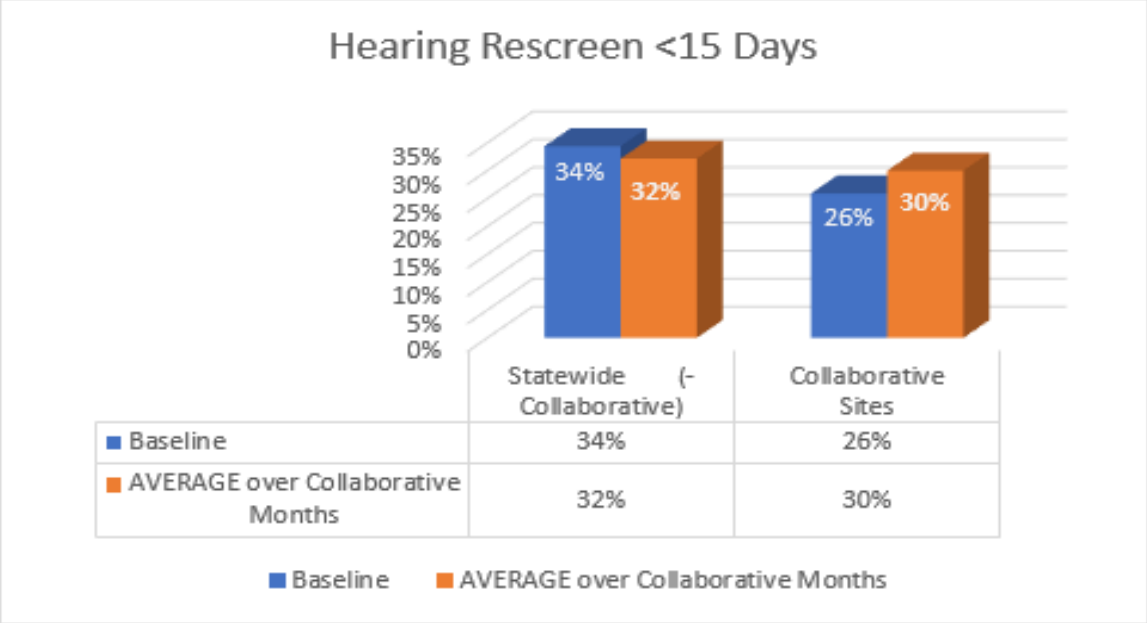
- Percent of families that had newborn hearing screening results and follow-up reviewed/discussed and documented prior to discharge
- Percentage of newborns who did not pass newborn hearing screening and were scheduled for outpatient rescreen (within 15 days) prior to discharge
- Percentage of newborns who did not pass hearing screening and were scheduled for audiological hearing evaluation within 6 weeks
- Percentage of newborns with hearing screening results available at first newborn Primary Care Provider (PCP) visit- regardless of reason for the visit (weight check, bilirubin check, etc.)
- Percent of families where newborn hearing screen results and follow-up were reviewed/discussed and documented at first primary care clinic visit

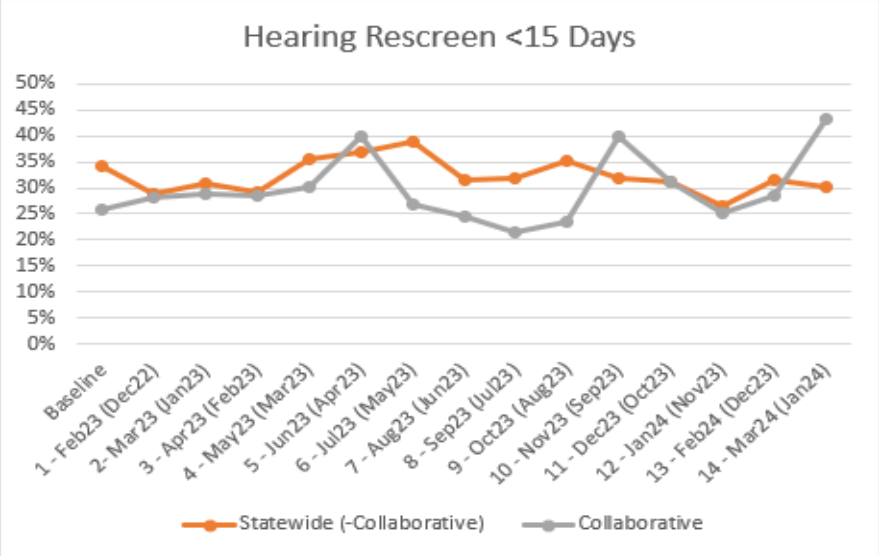
State Measures (collected by MN Dept of Health)

- Outcome Measure: Percentage of newborns screened
- Outcome Measure: Percentage of newborns who did not pass newborn hearing screen and were rescreened within 15 days of discharge from birthing facility
- Outcome Measure: Percentage of newborns referred who received a complete audiological hearing evaluation by 3 months of age
- Process Measure: Percentage of complete audiological hearing evaluation send to MN Dept of Health and PCP within 6 working days of evaluation
- Balancing Measure: Percentage of newborns lost to follow-up

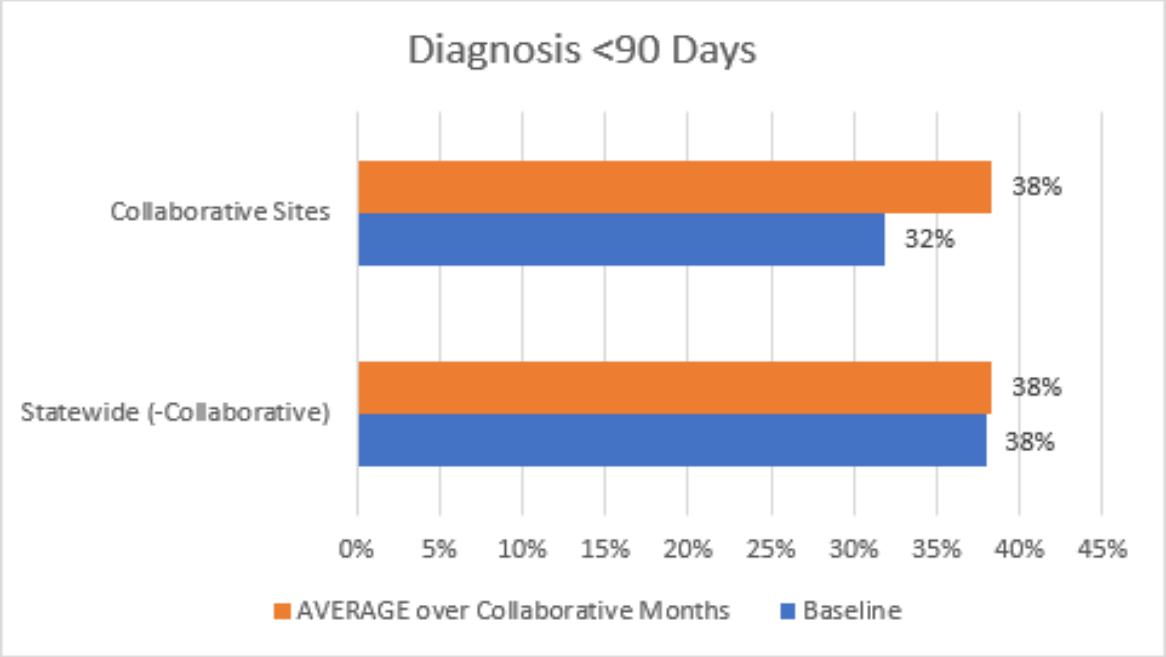
Results

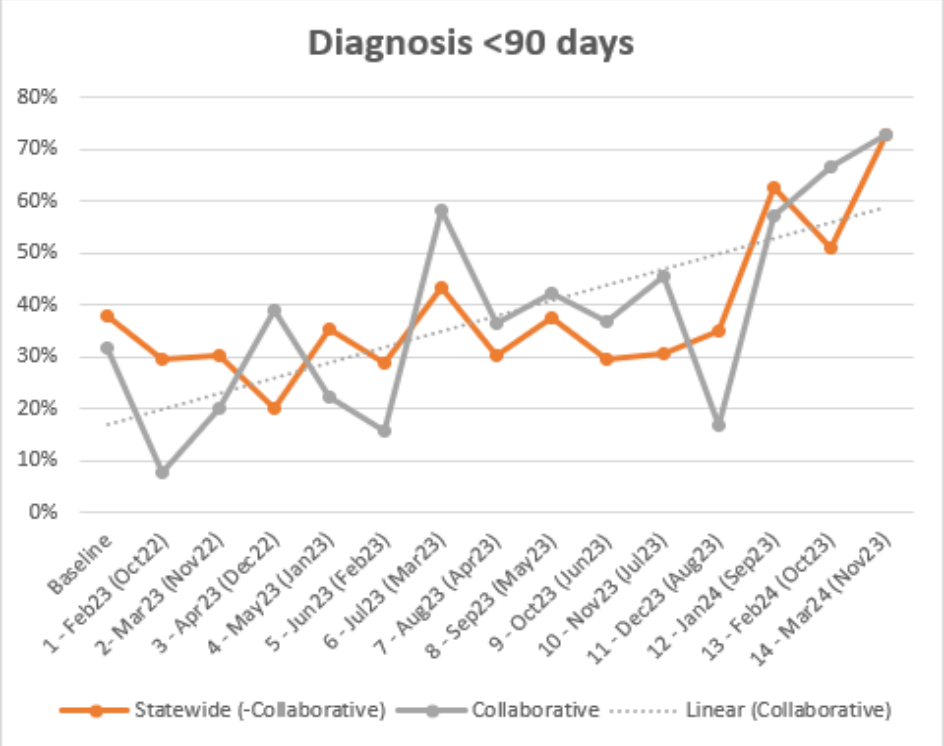
Preliminary results have been provided by the Minnesota Department of Health with more comprehensive results anticipated in the second half of 2024. The data below compares all hospitals across the state to hospitals participating in the EHDI initiative (notated collaborative) that was active from January 2023 to September 2023. There was a 4% improvement from baseline in appropriately obtaining a hearing rescreen by 15 days for the EHDI initiative sites. The statewide demonstrated a decrease in appropriate rescreening. However, the statewide baseline was already higher at 34%, falling to 32%, which is still above the collaborative improvement to 30%.





Additionally, data provided by MDH shows a 6% improvement in diagnosis related to hearing loss by 90 days for the hospital sites participating in EHDI (notated collaborative) relative to the baseline at the start of the initiative. Statewide, the rate of diagnosis related to hearing loss remained unchanged.





Discussion

Thus far, the impact of EHDI is promising, with preliminary data provided by the Minnesota Department of Health showing a modest improvement in two outcome measures for hospitals participating in EHDI compared to all hospitals statewide. Hospitals that participated in EHDI saw a 4% increase in the percent of newborns who did not pass the newborn screening test and were appropriately rescreened within 15 days of discharge. This 4% increase is relative to the baseline collected at the beginning of the initiative. Additionally, there was a 6% increase in diagnosis related to hearing loss by 90 days for the hospital sites participating in EHDI relative to the baseline at the start of the initiative. For both of these outcome measures, the state cohort started at a higher baseline than the EHDI initiative sites. The progress is promising, but there is still room for improvement.

Not all state-collected outcome measures are available at this time, and follow-up results and discussion will be provided in the second half of 2024. The lag of state data was an unanticipated challenge for this initiative, in that hospital teams needed to rely on their internal collection of process measures to see challenges and successes in real-time.

For the hospital teams that consistently reported data, the baseline process measures were already very strong, and thus, there was limited room for improvement of outcome measures. Without the state-collected outcome and balancing measures, the constructive opportunities were limited. Other hospital teams had more room for improvement, but consistent recording of process measures was a challenge that limited our understanding of progress. MNPQC intends to update the results and discussions of this report in June 2024 when state-collected data measures are available.

EHDI elucidated a need for better standardization of data collection. One challenge specific to EDHI was that it spanned the inpatient newborn setting to the outpatient pediatric setting, which often means separate and incompatible electronic health record systems. Thus, it can be difficult for teams to collect follow-up results accurately.

One of the successes of EHDI was that it was a smaller and more focused initiative. After the challenges of the pandemic, it brought hospitals together and encouraged teams to explore and learn from each other’s work and to share resources useful to them amongst each other. We recommend and continue to recommend that teams continue to report/track data internally to understand where they are holding their gains, when they begin to falter, and how they continue to improve.

Next Steps

(1) Currently, MNPQC is developing several Communities of Learning that bring interested hospital teams and birth centers together to learn about and implement best practices on a specific topic. One of these Communities of Learning will build off of EDHI's progress. The hearing screening Community of Learning will be more specific than the EDHI initiative with just 1 project measure: % of newborns who did not pass initial NHS and were scheduled for outpatient rescreening within 15 days before discharge.

(2) We look forward to additional outcome measures collected by MDH that align with the EDHI project timeline to better understand and assess project impact

(3) Hospital teams are encouraged to continue collecting data internally to assess sustainability, identify opportunities for improvement, and celebrate success.

Acknowledgements

We would like to extend our sincere appreciation to all the members of the Early Hearing Detection & Intervention workgroup for their invaluable participation and dedication throughout the duration of this project. Their insights, expertise, and commitment have been instrumental in shaping the work and outcomes presented in this report.

We are also deeply grateful to the Minnesota Department of Health for their unwavering partnership and collaboration. Their support and guidance have been integral to the success of this initiative, and we are thankful for their ongoing commitment to improving early hearing detection and intervention efforts in our community.

We would like to acknowledge the contributions of every individual involved, as their collective efforts enriched the quality and impact of this work.