Introduction

The Minnesota Perinatal Quality Collaborative (MNPQC) is sponsoring a statewide quality improvement initiative to improve timely diagnosis of hearing loss in newborns. The MNPQC is a network of organizations, medical providers, content experts and community voices led by Minnesota Perinatal Organization (MPO) in partnership with the Minnesota Department of Health (MDH). We seek to improve perinatal and infant health outcomes with an emphasis on improving health equity for all birthing people.

Background

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 targets 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.

Significant disparities in diagnosis by three months of age exist for infants born to mothers of color and by region within Minnesota. In 2018-2019, among infants who referred or went straight to diagnostic assessment, only 25% of infants born to black or African American mothers received a complete diagnostic assessment within three months. Only 22% of infants born to American Indian or Alaskan Native mothers received a complete diagnostic assessment within three months. In 2017-2018, less than 45% of infants born in Central or Northwest Minnesota were diagnosed by 3 months of age.

Infants are considered lost to follow up if they do not receive their recommended care. In 2018-2019, infants born to mothers of color were more likely than their white counterparts to be lost to follow up, with 31% of infants born to American Indian or Alaskan Native mothers lost to follow up. Additionally, in 2017-2018, 17.4% of infants in Northwest Minnesota were lost to follow up. Between 2012 and 2016, infants who lived outside the Twin Cities metropolitan area were significantly more likely to have delayed identification of hearing loss (Meyer et al., 2020).

Timely diagnosis of hearing loss, and subsequently enrollment in early intervention, has 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 the 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).

Program Overview:

Purpose Over the next six months, we intend to improve the percentage of newborns with refer/did not pass newborn hearing screening from birthing facilities and received a complete audiological hearing evaluation by 3 months of age.

Expectations of Birthing Facility

- Approved participation: Support of initiative from relevant leadership in your facility according to your system hierarchy.
- Attend Initiative Activities: All team members actively participate in virtual collaborative activities during the Initiative period (estimated 6-9 months).
    - Learning Session One: February 22nd 12-2pm
    - Monthly Initiative Action Period Calls (APC) for teams the fourth Wednesday of the month, 12-1pm with the first call on March 22, 2023.
    - Learning Session 2 and/or final Learning Session (Dates TBD)
- Regular local team meetings: Commitment to convene team for monthly QI meetings to:
    - Test (PDSA cycles) and learn
    - Implement change ideas
    - Monitor/share initiative progress (data collection, feedback from patients, healthcare team members)
- Monthly Reports: Teams will input data monthly to MNPQC through SimpleQI and use data collection tools to audit up to 30 charts/cases per month.
    - Project measures
    - Present baseline data during Learning Session 1 (Story Board format)
    - PDSA cycles for testing and implementation
    - Assess spread readiness and plans for health system
    - Monthly status report
- Teams agree to allow reporting of aggregate results, lessons learned and recommendations to help increase awareness and share best practice change ideas.
- Data Collection: As a quality improvement initiative, data is gathered to learn and inform PDSA cycle to result in improvement. MNPQC will not request personal health identifiers (PHIs).

Team Members

Minimum of 2 hospital team members:

- Birthing facility leadership champion
- Front line staff, for example those involved in screening and others communicating with family about hearing screening like nurses, providers, etc.
- Discharge planning staff
- Birthing person(s)
- Primary Care Clinic Liaison
- Audiology staff

Overall Benefits for Teams

- Improved coordination for timely diagnosis of infants who did not pass their newborn hearing screen
- Hospitals/Clinics with successful outcomes will be promoted by the Minnesota Department of Health
- Improved care for newborns and family members
- Develop Quality Improvement education and capability as part of each learning collaborative meeting and provided individually, as needed, to teams.
- Certificate of completion

Project Goals

Family of Measures

Stratify by race/ethnicity when possible

Outcome Measure (Data provided by the state):

- Percentage of newborns screened
- Percentage of newborns who did not pass newborn hearing screen and were rescreened within 15 days of discharge from birthing facility
- Percentage of newborns, referred who received a complete audiological hearing evaluation by 3 months of age

Process Measures (Data collected by teams):

- Percent of families that had newborn hearing screen results and follow-up reviewed/discussed and documented (with hospital staff?) 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 first visit, e.g., weight check, bilirubin check
- Percent of families where newborn hearing screen results and follow-up were reviewed/discussed and documented at first primary care clinic visit

- Percentage of Complete Audiologic Hearing Evaluation sent to MDH and PCP within 6 working days of evaluation **(State Provided)**

Balancing Measure (Data provided by the state):

- Percentage of newborns lost to follow up

Appendix 5: Driver Diagram

Theory of Change – The Driver Diagram

Aim	Primary Drivers	Secondary Drivers	Change ideas
By October 2023, we intend 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	Screening and Referral Process	Prior to newborn discharge	Supporting family: Discuss screening findings with family Avoid the message that startle reflex or reacting to sound means hearing is normal Create confidence in screening reliability and measurement reliability among hospital staff Use teach back with parents re importance of CAHE. Make audiology newborn appointment prior to discharge. Outpatient rescreen scheduled and completed within 15 days of discharge Use 2 Motivational Interviewing questions (importance and confidence 0-10) to help families problem solve around evaluation. Identify and document second point of contact for all families Create standard work to notify family of hearing screening results. Use family centered principles. Provide hearing screening results in writing and verbally to family Provide written materials in language spoken at home, to family that is culturally sensitive and directed to local population needs, e.g., migrant workers, rural dwellers, etc. Leverage discharge planning or care coordination services EHR and technology: Update d/c summary with hearing screening finding Consider adding to EHR problem list or health maintenance record for PC provider to facilitate the identification of issues Assign a person in the hospital who takes responsibility for posting hearing screening data in medical record and discusses with family prior to d/c Document in EHR not just the failed screening or rescreening but whether a discussion was held with family about its importance Create a forcing function that a d/c summary cannot be signed without the newborn hearing screen, for each ear. Pt cannot be discharged, or doc cannot be completed

			Use rescreen reminder calls to families. Text reminder day of rescreen **Referral:** Create community mapping resources for referrals (use NCHAM EHDI Pals website lists pediatric audiologists Make referral to audiology within 2 weeks of discharge to evaluate hearing Engage hospital discharge planning in ascertaining insurance coverage for follow up referral(s). Communicate this to family Verify family contact information when scheduling appointment: include mailing address, email, home and cell phone numbers, friend, or relative contact and second family contact. Verify PCP contact with family for follow up Inform PCP when newborn does not pass hearing test: use fax, EHR, phone call or electronic communication
		Infant Well Child Visits (IWC)	Create EHR alert for refer/did not pass hearing screening and referral requirement Review chart for hearing evaluation at first IWC visit Make appointment (same day if possible) for audiology or outpatient rescreen if not completed. The provider or pediatrician who sees the newborn - ensure that the hearing screening process is addressed, messaged to families, referrals made, follow up completed Locate referral audiology clinics sites by searching EHDI Pals by zip code Make referral/appointment within 2 weeks of newborn discharge Use MI questions above and teach back with family about CAHE and next steps Book follow up appointment for post CAHE discussion and importance of early intervention
		Follow Up	Verify newborn screening results as an outpatient Verifying that the child has been rescreened and if a diagnostic test is needed Discuss and rediscuss with families hearing findings (PCP, hospital staff, audiology) Hospital team connects with clinic(s) (pilot or all) on family discussion, follow up and documentation in medical record
		Postpartum Period	Complete initial screen within one-two weeks of birth Complete initial diagnosis prior between 4-6 weeks, prior to end of post-partum period to avoid Loss To Follow Up

	Infant and child development		Respect parental perspectives that hearing is other-abled Communicate the importance of knowing the actual hearing ability of infant/child to provide best childhood development guidance Ask family what matters to them most in follow up and collaborate to meet those intentions