Overcoming Pediatric Hearing Healthcare Barriers in Rural Communities: A Quality Improvement Study

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Objective:
Children who are deaf/hard of hearing require timely access to audiology diagnostic and intervention services to optimize educational outcomes. Unfortunately, research shows that children and families from rural communities are faced with additional barriers in accessing those services. Lack of timely and proximal access to diagnostic hearing evaluation using ABR testing hampers the effectiveness of Early Hearing Detection & Intervention (EHDI) programs in the United States. This research measured the impact of a state-based quality-improvement (QI) project that provided diagnostic auditory brainstem response (ABR) equipment and training to educational audiologists distributed throughout Iowa in regional special education hubs. Results presented will center around changes in timeliness of access to diagnostic services, distance traveled by families, and changes in on-guideline care for these children and their families.

We sought to answer three primary questions:
1) How has the QI Project (expansion of regional educational audiology services to include diagnostic ABR) changed average age at diagnosis, compared to pre-project Baseline?
2) How has the QI Project changed the average distance that families travel for diagnosis, compared to pre-project Baseline?
3) How has the QI Project impacted the quality of diagnostic practices infants receive compared to pre-project Baseline?

Method:
We analyzed infant records during a Baseline and a QI Project time interval, using data tracked by the state Iowa Department of Public Health (IDPH)/EHDI program. A dataset of de-identified records after completing a data-sharing agreement with the IDPH EHDI. Data was split into two groups: pre- and post-onset of our QI project ("Baseline" and "QI Project"). We included all infants born within participating AEA regions who failed a newborn hearing screening, including those who were eventually identified as having typical hearing after diagnostic testing. We then compared ages at first diagnostic exam as well as distance traveled for that exam across groups. We also calculated the odds that infants would receive on-guideline care (following national guidelines) between both groups.

Results/Conclusion:
1) Average age at first diagnostic exam dropped significantly from an average of 95 days of life (SD = 103) to an average of 67.8 days in the targeted AEA regions (SD = 75.4; $p = 0.0014$).

2) Following the implementation of our QI project, the average distance traveled dropped from 97.8 miles (SD =58.9) to 75.3 miles (SD =53.6; $p < .0001$).
3) Infants born during the QI Project were 2.52 times more likely to receive an ABR at their first exam compared to infants born during the Baseline period (95% CI: 1.68-3.76). This advantage was statistically significant ($p <.0001$). This exemplifies an increase of on-guideline care.

Overall, the project showed potential for reducing the geographic burden of rurality for families with children who are deaf/hard of hearing. Children in this project had greater odds of receiving care that complied with national recommendations. By using an existing infrastructure of educational audiologists distributed throughout our testing regions, we were able to increase essential access to diagnostic hearing testing for infants of all socio-economic backgrounds. This project also expanded service access to rural families without the use of additional staff, thus potentially increasing the efficacy of our state Early Hearing Detection & Intervention (EHDI) program.