Rural Pediatric Hearing Healthcare Disparity: Factors in Delayed Congenital Hearing Loss Diagnosis and Intervention

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ABSTRACT

Objectives: Congenital pediatric hearing loss is common and early identification and intervention is critical to rehabilitation. Children from rural regions often face challenges accessing hearing healthcare; however, medical and social factors may play a role in delayed diagnosis and treatment. The purpose of this study was to examine medical, social, and geographic factors present in children with congenital hearing loss.

Study Design: Retrospective review from a tertiary medical center.

Methods: We examined geographic data, medical history, and social history from a group of children with congenital sensorineural hearing loss (n=57) and a group of cochlear implant recipients (n=55) from a region of hearing healthcare loss disparity to identify barriers to diagnosis and intervention. Based on the county of origin and the rural status of that county, we compared the data for children from rural counties to those from urban counties. An analysis was performed to determine if there was a significant difference between the two groups.

Results: There were no significant differences in medical and social factors identified that may play a role in the timing of diagnosis and cochlear implantation. There was no statistical difference between rural and urban regions; however, there was a trend of higher incidence of medical problems in children from rural counties. There is linear relationship with distance to the diagnostic center and the timing of diagnosis of congenital hearing loss (p=0.4, p=0.002) and a similar relationship with the rural status and the timing of cochlear implantation (p=0.4, p=0.004).

Conclusions: Children from rural or remote regions with hearing healthcare disparities face many barriers to timely diagnosis and treatment. Social/medical issues may complicate the diagnostic and implantation process. Distance to the diagnostic center and the rural status of the county of origin may also play a role in timely care. Clinicians should be aware of these potential risk factors and be vigilant to intervene for children in areas of healthcare inequity.

INTRODUCTION

Pediatric hearing loss is the most common neonatal sensory disorder in the United States. The sense of hearing is vital during the early years of life for the development of speech, language, and cognition. Delayed in early childhood can result in lifelong learning delay and disability; however, early identification and intervention can prevent educational and social consequences. Newborns who fail their hearing screening or high-risk children undergo an audiological diagnostic assessment that may take several outpatient encounters in order to obtain definitive diagnosis. Such encounters may challenge individuals from rural regions, which typically do not have the health care professionals to provide definitive diagnoses.

The Joint Committee on Infant Hearing has established the gold standard of infant screening, follow-up, and intervention and serves as the standard for this study. To summarize the most recent recommendations, infants are to be screened for hearing loss in the hospital of birth prior to discharge. If either fails the test, an audiologist performs a complete diagnostic evaluation with an auditory brainstem response (ABR) test within 1 month after birth. Subsequent ABRs may be performed in order to confirm a diagnosis of hearing loss and this diagnosis should be made before 3 months of age and intervention with hearing aid amplification occurring prior to 6 months of age. In the event of poor rehabilitation with amplification and continued failed testing, the patient may undergo cochlear implantation at 12 months of age. This early auditory stimulation in children has been widely advocated and as a result the standard of care is to proceed with implantation at the youngest possible age following confirmation of severe to profound hearing loss for children who have already undergone cochlear implantation.

Although high-risk children may undergo periodic audiological assessment, issues such as compliance, socioeconomic factors, and access to care remain major barriers. Appropriate follow-up, through diagnostic and intervention services, for children who do not pass a hearing screening or who are diagnosed with hearing loss has become a major national healthcare concern. Disparities in diagnostic and intervention services for some socioeconomic groups are at a high risk of becoming lost to follow-up. Patients in rural areas face additional access to care barriers that compound these concerns. According to a recent economic report, 85 of Kentucky’s 120 counties are considered rural and approximately 1.8 million people live in these counties. Furthermore, the Appalachian region of Kentucky, which encompasses the Eastern and Southern Central portion of the state, is considered to be mostly rural based on the Department of Agriculture’s Beale code designation. Appalachia is one such region and is recognized nationally as suffering from extreme health disparities and is underserved in healthcare services. The 54 Appalachian counties in Kentucky are plagued by poverty, unemployment, and a shortage of healthcare. Considering the barriers to any type of care in Appalachia, there are multiple points in the diagnostic and treatment algorithm in which children with hearing loss can potentially be lost to follow-up or have a dramatic delay in receiving timely intervention. To develop interventions designed to improve early detection and treatment, we aimed to assess factors that may affect the diagnosis and treatment of congenital hearing loss for children within this rural region.

RESULTS

Factors in Early Congenital Hearing Loss Diagnosis

1) Early Hearing Diagnosis: To assess the factors involved in the congenital hearing loss diagnosis process, we examined the charts of 57 children with severe to profound congenital sensorineural hearing loss diagnosed after 3 months of age. This group of children has been previously examined and we identified a delay in the diagnosis of both groups of children from rural regions having a greater delay. Data Collected: Demographic data including date of birth, county or origin at time of birth based on ZIP code, county of origin, dates of initial and further diagnostic testing via auditory brainstem response (ABR), and dates at which final diagnosis was made. Social and medical history from the multi-disciplinary clinical evaluation was examined. We recorded any evidence of custody problems, prematurity, multiple medical diagnoses, and major surgical procedures in the first year of life, and no-shows to clinical appointments. Distance from the county of origin to the diagnostic center was also recorded. The rural status of each county of origin was determined utilizing the Beale codes of 2003 United States Department of Agriculture Rural-Urban Continuum Coding system. This numerical scale has 12 classifications with the most urban county being 1 with a population of 1 million or more and 9 being completely rural. Analysis: Chi square, multivariate logistic regression and Pearson’s correlation coefficient analysis were performed on this data.

2) Cochlear Implantation: To assess the factors involved in timing of cochlear implantation, we examined the charts of 57 children with severe to profound congenital hearing loss who are cochlear implant recipients. Data Collected: Demographic data including date of birth, county or origin at time of birth based on ZIP code, county of origin, dates implantation were collected. Social and medical history from was examined with the rural status of origin was also recorded. Distance from the county of origin to the diagnostic center was also recorded. Analysis: Chi square, multivariate logistic regression and Pearson’s correlation coefficient analysis.

METHODS

Factors in Cochlear Implantation

1. Medical and social factors are common in children with congenital sensorineural hearing loss and in those with cochlear implants. Children from rural regions may have greater barriers than children from urban regions.
2. Distance from diagnostic/treatment centers is correlated to the timing of diagnosis.
3. Children from rural regions are at risk for delayed cochlear implantation.
4. There is a strong relationship between distance from the diagnostic/treatment center and the rural status of the county of origin.
5. Clinicians should be vigilant to address barriers to hearing healthcare in those from rural regions.

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