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DIVISION 15 POLICY BRIEF

MOVING BEYOND NEONATAL HEARING SCREENINGS:

POLICY RECOMMENDATIONS AND WAYS TO REDUCE THE RISK OF LANGUAGE DEPRIVATION IN CHILDREN

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THE PROBLEM SPACE

When left undetected, hearing loss can have permanent negative effects on children's speech and language acquisition, academic performance, health outcomes, and interpersonal relationships[1-5]. Despite the well-documented relation between hearing ability and successfully navigating a predominantly "hearing world", thousands of children who are deaf or hard-of-hearing (DHH) still go undetected, and in many cases must endure the permanent negative sequelae that accompany language deprivation. Hearing screenings during childhood are essential for the early identification and management of hearing loss.

What Screenings are Currently Provided?

Improvements have been made around early identification and treatment of children with hearing loss. In 1999, the American Academy of Pediatrics (AAP) recommended universal newborn hearing screenings[6] and the majority of the United States enacted legislation to mandate such programs. Federal funding also became available to initiate and develop statewide, universal, newborn hearing screening and intervention, also known as Early Hearing Detection and Intervention (EHDI) programs. Currently, in the United States, neonatal hearing screenings are conducted before infants leave the hospital, typically within 1-2 days of birth. The CDC has shown that the number of children that were identified at birth as being DHH increased from 2,634 in 2005 to 6,291 infants in 2020, demonstrating the benefits of neonatal screenings[1]. However, whether there is follow-up after children leave the hospital varies greatly across the country.

Beyond Neonatal Hearing Screenings

While neonatal hearing screenings are essential, so is surveillance of hearing beyond the newborn period. A significant number of children (3 per 1000 children) will become DHH in the early years of life and later in childhood[7, 8]. The most common causes of late onset hearing loss include genetic deafness, congenital cytomegalovirus (cCMV) virus infection, and ear infections[2, 6]. This is particularly problematic for children 0-3 years of age, given that there is a "critical period" for language learning[2]. Hence, waiting until children enter school to follow up is too late. Existing recommendations put forth by the AAP9, which promote (i) ongoing risk assessment (based on family history and health profile) and subjective evaluations (based on developmental milestones) during the first 4 years of life, and (ii) periodic objective (technology-based) screenings from age of 4 through the teenage years, are often not followed. Subsequent hearing screenings are rarely conducted. Only 34 out of 50 states (and DC) require school-based hearing screenings later in childhood[10]. Furthermore, without a national standard for school-based screenings, each state determines when and which hearing screenings are implemented[11, 12]. Historically, school-based hearing screenings have relied on testing the ability to hear the lower frequencies involved in speech perception[10, 13]. However, more recent data have revealed that hearing impairment in the extended high frequencies is also common in children[14-16].

Several systemic barriers contribute to delays in the diagnosis of children with hearing loss – including: (a) lack of service capacity (i.e., insufficient screening equipment and pediatric audiologists), (b) lack of provider knowledge, (c) challenges to families obtaining services (e.g., need to travel long distances for evaluation, insurance requirements), and (d) information gaps[17]. This means that there is an alarming number of children who are not being provided with the appropriate resources to achieve typical language development, and who will experience long-lasting struggles. Special education for a child with hearing loss who fails to receive the appropriate early intervention costs schools an additional $420,000, with a lifetime cost of over $1 million per individual[18]. If the expense charged to local, state, and federal governments is not enough of an incentive to conduct hearing screenings, consider the wasted talent of someone who might have made amazing contributions to society if they had received the appropriate intervention!

Pre-K to12 School Supports

Access to education is a fundamental right and all children must have equitable opportunities to learn and succeed. For infants and children 0 through 35 months of age who are DHH, enrollment in Individuals with Disabilities Education Act (IDEA) Part C Early Intervention is recommended[19]. Furthermore, DHH children who are 36 months and older qualify for school-based Part B services or a 504 Plan[20]. These laws are in place to ensure rights and protections for children, in collaboration with educators, parents, and other stakeholders. Critically, they are meant to ensure that personalized developmental and academic goals are set in place, and that specialized services and accommodations to children with disabilities are outlined (to help them achieve those goals). However, without proper identification, DHH children and their families are unable to trigger the necessary supports.

The good news is that there are quick, effective, and low-cost options available that could make postnatal childhood screening programs a success (see Table 1). Positive screening results would lead to referrals for further testing by an audiologist with more detailed measures.

TABLE 1: PEDIATRIC HEARING SCREENING OPTIONS

	Otoacoustic Emission	Pure Tone Audiometry
Age	All ages	4 yrs+
Time	~10 minutes	~20-30 minutes
Type	Physiologic, measuring cochlear response to sounds	Behavioral, measuring auditory thresholds
Advantages	Ease of use (requires small low-cost machine), quick, does not rely on child responses	Measures functional hearing
Limitations	Child must be relatively still, does not measure eighth cranial nerve or auditory cortex function	Relies heavily on child responses

Note. Otoacoustic Emissions (OAE) hearing screenings are noninvasive hearing tests that measure the sounds emitted by the inner ear in response to external stimuli (e.g., clicks or tones). Pure Tone Audiometry hearing screenings involve presenting tones of varying frequencies (e.g., low and high pitches) and levels of intensity to assess hearing thresholds.

HOW TO MOVE FORWARD & POLICY RECOMMENDATIONS

Despite decades of national experience with newborn hearing screening programs, and advocacy groundwork in different states related to childhood hearing health, identifying hearing loss beyond the newborn period will require additional protocols. The following questions then arise: (i) What should be done to follow up a failed newborn screening? (ii) What are the optimal ages for hearing screenings? (iii) What auditory screening tools should be used? (iv) Should the implementation of screening programs fall on schools or someone else (e.g., primary care providers, state programs)? (v) Do our states have a sufficient number of health professionals to provide the necessary follow-up care to DHH children?

To build momentum for ensuring children's hearing health and to generate the changes that are needed, four critical areas must be considered:

1. **Commitment to an evidence-based approach**
   Policy makers should make it a priority to allocate funds for programs of research that will help develop solid evidence in the areas of identification, effective treatment, service delivery, and prevention of hearing loss.
2. **Centralized registry for hearing health**
   One key challenge associated with tracking hearing health is storing and managing information in a way that will be useful to policy makers, health professionals, and communities. Currently, there is no central mechanism to systematically capture data. Specifically, there is a need to track outcomes and measure progress on an individual and population level. Countries like Australia have begun to make progress in this area by creating a national database for DHH children aged zero to 18 years[21], that aims to map hearing-specific services and datasets nationally and by state, while providing proof-of-concept answers to key research questions. This is a prime model and must be implemented to help our children maximize their potential and contribute to our society.
3. **Education and awareness**
   Previous research suggests that the current "lost to follow-up" rate after a failed newborn hearing screening is 34.4%, and that lack of parental and primary care provider (PCP) awareness are significant contributors to this rate[22]. This means

that one third of children who failed their initial screening do not receive the care they need in the critical window for language learning. Policy makers should allocate funding to create public service announcements about hearing loss to help the public become aware of the importance of hearing over the lifespan. PCP's and other healthcare professionals should be provided with the equipment and training needed to effectively carry out hearing screenings and review results with families. Furthermore, school boards should allocate funding to conduct training programs for school nurses and school SLPs who may be able to conduct routine hearing screenings for children in schools.

4. **Collective effort from academics, clinicians, schools, governments, and communities**
   Improving hearing health for children across the country is a big task, and as such will require strong commitment from multiple stakeholders. Researchers can help lead the way in gathering the necessary data to support evidence-based changes. Policy makers and school districts must make funding for hearing health a priority. We must find those states that have made progress in identification and treatment and develop a national plan. States such as Colorado found that conducting routine hearing screenings in schools is essential to provide the best support to their students[23].

   It is critical to empower communities and to educate caregivers not to wait if they think their child has a hearing problem[24]. Waiting to discuss a concern with a doctor robs the child of important exposure to language during a critical period. Parental concerns and school hearing screenings are the most common indicators of a change in children's hearing abilities[25]. In fact, caregiver concerns might have greater predictive value than the informal behavior examination performed in a physician's office, which means parents may be as much as 12 months ahead of physicians in identifying a child's change in hearing status. We can change how our country addresses hearing loss and reduce the risk of language deprivation and its lifelong consequences.

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