

## Early Hearing Detection and Intervention Literature Review Table

This literature review table\* outlines recent data, and seminal literature pertaining to Early Hearing Detection and Intervention (EHDI), specifically for the field of pediatrics. This summary includes articles focused on the role of the primary care pediatrician in addressing EHDI within the medical home model; a focus on EHDI systems of care; as well as articles focused on advancing health equity.

\*The articles, background, and key findings/recommendations in this literature review table reflect those of the author and do not represent the official view of, nor are an endorsement of the American Academy of Pediatrics.

*The Early Hearing Detection and Intervention Program is a component of the National Resource Center for Patient/Family-Centered Medical Home which is supported by the Health Resources and Services Administration (HRSA) of the US Department of Health and Human Services (HHS) as part of an award totaling \$4,100,000 with no funding from nongovernmental sources. The information or content are those of the author(s) and do not necessarily represent the official views of, nor are an endorsement, by HRSA, HHS, or the US Government.*

Yr	Reference	Background	Key Findings/Recommendations	Key Words
2019	<p><b>Year 2019 Position Statement: Principles and Guidelines for Early Hearing Detection and Intervention Programs.</b> <i>Journal of Early Hearing Detection and Intervention</i>, 4(2), 1-44. doi: 10.15142/fptk-b748</p>	<p>Universal newborn hearing screening has resulted in significantly lowering the average age of identification. Screening is a necessary first step but does not ensure the next steps of: timely identification and diagnosis of children who are deaf and hard of hearing (D/HH), amplification, and referral to early intervention, all with the goal of promoting language development.</p> <p>Early Hearing Detection and Intervention (EHDI) activities have positively impacted outcomes for children who are D/HH and their families throughout the world. The goal of EHDI is to assure that all infants are identified as early as possible, and appropriate intervention initiated, no later than 3–6 months of age.</p> <p>This statement, from the Joint Commission on Infant Hearing (JCIH) explored the remaining areas of improvement within the EHDI system to</p>	<p>The 2019 statement built on prior Joint Committee on Infant Hearing (JCIH) publications. Best practices are updated through literature reviews and expert consensus opinion on screening; identification; and audiological, medical, and educational management of infants and young children and their families.</p> <p>The statement addressed: 1) Global Benchmarks and Rationale; 2) Newborn Screening; 3) Diagnostic Audiology and Audiological Interventions; 4) Early Intervention and Family Support; and 5) Medical Considerations.</p> <p>JCIH's guiding principle is for continued improvements in the EHDI system and endorsed early detection and early intervention for all infants who are, or who are at risk of being or becoming, D/HH. EHDI looks to maximize language and communication competence, literacy development, and psychosocial well-being for children who are deaf and hard of hearing. Focusing on the importance of prompt diagnosis and timely, high-quality early intervention for such infants, EHDI systems should facilitate seamless transitions for infants and</p>	<p>Early Hearing Detection and Intervention (EHDI) Programs; Deaf/Hard of Hearing; Newborn screening; Pediatric diagnostic audiology; Early Intervention; Medical home</p>

Yr	Reference	Background	Key Findings/ Recommendations	Key Words
		ensure newborns benefit from early recognition and have access to appropriate supports.	their families through the processes of screening, audiologic and medical diagnosis, and intervention.	
2019	Findlen UM, Malhotra PS, Adunka OF. <b>Parent perspectives on multidisciplinary pediatric hearing healthcare.</b> <i>International Journal of Pediatric Otorhinolaryngology.</i> 2019;116:141-146. doi:10.1016/j.ijporl.2018.10.044	Family-centered care demands that families provide input regarding the care of their children. The authors aimed to determine families' perceptions about their experience in different types of multidisciplinary team models in pediatric hearing clinics. Authors utilized quantitative and qualitative parent survey responses in a tertiary care pediatric medical center after a 1-day multidisciplinary assessment clinical appointment to identify and understand family perceptions.	<p>Survey questions addressed 5 domains: overall experience, diagnosis, treatment plan formulation, additional testing, and resources. Quantitative and qualitative data were evaluated separately and then compared to delineate themes for strengths and weaknesses.</p> <p>Overall, high satisfaction was evident in both quantitative and qualitative responses. Results suggested that a full, 1-day multidisciplinary assessment appointment may have contributed to parents feeling overwhelmed by information shared and not fully understanding which disciplines are providing care.</p> <p>Results contributed to a change from a multidisciplinary team model to an interdisciplinary care coordination approach to pediatric hearing health care. The authors assented that a systematic way of evaluating parent perspectives on the clinical process can influence service delivery and help children with hearing loss meet their potential.</p>	Interdisciplinary care; Multidisciplinary care; Pediatric hearing loss

Yr	Reference	Background	Key Findings/ Recommendations	Key Words
2019	<p>Humphries T, Kushalnagar P, Mathur G, Napoli DJ, Rathmann C, Smith S. <b>Support for parents of deaf children: Common questions and informed, evidence-based answers.</b> <i>International Journal of Pediatric Otorhinolaryngology</i>. 2019;118:134-142. doi:10.1016/j.ijporl.2018.12.036</p>	<p>96% of babies who deaf are born to hearing parents who, initially, are uninformed about and unprepared to raise a child who is deaf and hard of hearing (D/HH). Doctors may have anxiety about what to say to parents following newborn hearing screening. To assist medical and hearing-science professionals in supporting parents of children who are D/HH, authors identified common questions that parents may have and provide evidence-based answers. The authors presented recent evidence that underscored the critical nature of early exposure to a fully accessible visual language, which in the United States is American Sign Language (ASL).</p>	<p>The authors recommended that in order for parents to provide a nurturing and anxiety-free environment for early childhood development, signing at home is important even if their child also has the additional nurturing and care of a signing community. The authors suggested that it is not just the early years of a child's life that matter for language acquisition; it is the early months, the early weeks, even the early days. Children who are D/HH cannot wait for accessible language input. The authors highlighted that the whole family must learn simultaneously as the child learns. The authors described that even moderate fluency on the part of the family benefits the child enormously. Signing at home allows caregivers to engage children who are D/HH in group conversations, especially in family and extended-family gatherings. Children who are D/HH need to be able to communicate with their families daily and feel engaged by their families – just as children with typical hearing do.</p> <p>Authors stated that parents and families who are able to sign with their children who are D/HH enjoy closer relationships in the long run because parents and families will have recognized and accepted their children's deafness by taking the time and effort to learn and use a truly accessible visual language.</p>	<p>Deaf children; Sign language; Sensitive period for first language acquisition; Linguistic deprivation; Cognitive development; Family well-being</p>

Yr	Reference	Background	Key Findings/ Recommendations	Key Words
2019	<p>Stewart JE, Bentley JE. <b>Hearing Loss in Pediatrics.</b> <i>Pediatric Clinics of North America.</i> 2019;66(2):425-436. doi:10.1016/j.pcl.2018.12.010.</p>	<p>As part of the 2000 and 2007 position statements, the Joint Committee on Infant Hearing (JCIH) recommended that all newborns should be screened for hearing loss before 1 month of age with associated recommendations and follow-up for infants who do not pass the screen.</p> <p>According to the Centers for Disease Control and Prevention (CDC) data 98% of infants were screened for hearing loss in 2016. However, of those who <i>did not pass</i> the newborn screening, only 47% had a completed diagnostic hearing evaluation before 3 months of age and only 45% of infants diagnosed with hearing loss were enrolled in early intervention (EI) before 6 months of age.</p> <p>This article sought to identify the barriers to the follow-up evaluation, diagnosis and intervention for children who did not initially pass their screening test for hearing loss, and how the medical home could better serve this population and their families.</p>	<p>Outcomes for children who are deaf and hard of hearing (D/HH) are dependent on the timing of intervention and affected children are vulnerable to oversights within the process. Awareness by the medical home can ensure optimal language acquisition.</p> <p>Medical homes should recognize:</p> <ul style="list-style-type: none"> <li>• Evaluation for deafness-associated medical and genetic conditions provides important information that can impact parental choice of communication and outcome for the affected child and other family members.</li> <li>• Early access to language therapy and developing a rich language environment is important in shaping language development.</li> <li>• Advances in technology (eg, hearing aids and cochlear implants) have improved outcomes of infants with hearing loss.</li> </ul> <p>Children who are D/HH will achieve their best outcomes with appropriate specialized multidisciplinary EI services for the child and family. Providing a medical home that facilitates this long-term support, monitoring, and adjustment as needed is a critical component of this child's medical care.</p>	<p>Audiology; Hearing loss; Risk factors</p>

Yr	Reference	Background	Key Findings/ Recommendations	Key Words
2018	<p>Cawthon SW, Fink B, Schoffstall S, Wendel E. <b>In the Rearview Mirror: Social Skill Development in Deaf Youth, 1990–2015.</b> <i>American Annals of the Deaf.</i> 2018;162(5):479-485. doi:10.1353/aad.2018.0005.</p>	<p>The article presents historical data on how social skills in students who are deaf and hard of hearing (D/HH) were conceptualized and studied empirically during 1990–2015. Social skills function as a vehicle by which individuals, including students with disabilities, navigate the transition from childhood into the educational and professional experiences of early adulthood. Individuals who are D/HH often have different identity, linguistic, educational, cultural, and interpersonal experiences from those of their hearing peers.</p> <p>Using a structured literature review approach, the researchers coded 266 articles for theoretical frameworks used and constructs studied. In addition, 315 social-skill constructs were coded across the data set; the majority focused on socioemotional functioning.</p>	<p>The majority of articles reviewed did not explicitly align with a specific theoretical framework. Of the 37 that did, most focused on socioemotional and cognitive frameworks, while a minority drew from frameworks focusing on attitudes, developmental theories, or ecological systems theory.</p> <p>Findings showed implications for both research and practice. From a theoretical framework perspective, researchers should reflect on their assumptions about the social environment of individuals who are D/HH when conceptualizing interactions between them and their peers, parents, teachers, and colleagues.</p> <p>Data indicated that the field may be increasingly aware of the potentially negative impact of inaccessible environments on deaf individuals' well-being. As interventions in education become more integrative, addressing both the socioemotional and academic needs of students in a comprehensive manner, research is needed that understands developmental trajectories and the possible barriers to and supports for attainment of desired outcomes. Research with individuals who are D/HH, particularly those who account for the high degree of variability within the population, can help to shape ways to tailor interventions to meet these different needs.</p>	<p>Social skills; Deaf; Development; Socioemotional functioning</p>

Yr	Reference	Background	Key Findings/ Recommendations	Key Words
2017	<p>Bush ML, Taylor ZR, Noblitt B, et al. <b>Promotion of early pediatric hearing detection through patient navigation: A randomized controlled clinical trial.</b> <i>The Laryngoscope.</i> 2017;127(Suppl 7):S1-S13. doi:10.1002/lary.26822.</p>	<p>Early infant hearing detection and intervention (EHDI) programs are coordinated on a state level and, in spite of multiple initiatives to streamline the process, the diagnostic and hearing loss treatment process is complex, and many parents find it difficult to navigate.</p> <p>The objective of this research was to decrease non-adherence (lost to follow-up rates) to recommended infant audiological testing after failed newborn hearing screening. Using a randomized controlled design, the study looked to assess the efficacy of a patient navigator intervention to decrease non-adherence to obtain audiological testing following failed screening, compared to those receiving the standard of care.</p>	<p>The authors found that the percentage of participants non-adherent to diagnostic follow-up during the first 6 months after birth was significantly lower in the patient navigator arm compared with the standard of care arm (7.4% versus 38.2%) (p=0.005). The timing of initial follow-up was significantly lower in the navigator arm compared with the standard of care arm (67.9 days after birth versus 105.9 days, p=0.010). Patient navigation increased baseline knowledge regarding infant hearing loss diagnosis recommendations compared with the standard of care (p=0.004).</p> <p>The study found that patient navigation decreased non-adherence rates following abnormal infant hearing screening and improved knowledge of follow-up recommendations. This type of intervention is promising to promote adherence to timely diagnostic testing and intervention. Further research is needed to assess the feasibility of larger scale implementation within state EHDI systems and to assess the cost of patient navigation.</p>	<p>Patient navigation; Early hearing detection and intervention; EHDI; Congenital hearing loss; Randomized controlled clinical trial</p>

Yr	Reference	Background	Key Findings/ Recommendations	Key Words
2017	<p>Chung W, Beauchaine KL, Grimes A, O'Hollearn T, Mason C, Ringwalt S. <b>Reporting Newborn Audiologic Results to State EHDI Programs.</b> <i>Ear and Hearing.</i> 2017;38(5):638-642. doi:10.1097/aud.000000000000443.</p>	<p>All US states and territories have an Early Hearing Detection and Intervention (EHDI) program to facilitate early hearing evaluation and intervention for infants who are deaf and hard of hearing (D/HH). To ensure efficient coordination of care, the state EHDI programs rely heavily on audiologists' prompt reporting of a newborn's hearing status. This is an important public health responsibility of pediatric audiologists, however reasons for failing to report vary.</p> <p>The <i>Early Hearing Detection and Intervention-Pediatric Audiology Links to Services</i> facility survey was used to inform reporting compliance of audiology facilities throughout the United States. This survey was undertaken to ascertain if the audiology community was compliant in reporting hearing results to the state EHDI programs and to identify barriers to reporting.</p>	<p>Among 1,024 facilities surveyed, 88 (8.6%) did not report newborn's hearing findings to their state EHDI program. Not knowing how to report to the state EHDI program was the most frequently chosen reason. However, among the 936 compliant facilities, 51 estimated that they reported less than two-thirds of all hearing evaluation results. Some facilities did not report a normal hearing result and some failed to report because they assumed another facility would report the hearing results.</p> <p>Surveys indicated that an overwhelming majority of audiologists were compliant in reporting hearing results and follow-up information to their state EHDI programs, suggesting a high degree of familiarity with the state tracking/surveillance effort. Among those facilities not reporting findings to the state EHDI programs, the majority were audiologists from private practices, followed by audiologists in school settings.</p> <p>Provider outreach and training by the state EHDI program is necessary to ensure non-reporters will comply and to clarify requirements for those who are already compliant. Explicit guidance to the audiology community about who, what, when, and how to report the hearing results should be considered when designing future training curricula.</p>	<p>Audiology facilities; Early Hearing Detection and Intervention; Guidance; Reporting results; State EHDI programs; Survey</p>

Yr	Reference	Background	Key Findings/ Recommendations	Key Words
2017	<p>Chung W, Beauchaine KL, Hoffman J, Coverstone KR, Oyler A, Mason C. <b>Early Hearing Detection and Intervention-Pediatric Audiology Links to Services EHDl-PALS</b>. <i>Ear and Hearing</i>. 2017;38(4):e227-e231. doi:10.1097/aud.000000000000426.</p>	<p>Finding diagnostic audiologic and follow-up services for infants and young children can be challenging for parents and health care professionals. This study aimed to create a searchable web-based national audiology facility directory using a standardized survey, so parents and providers could identify which facilities had capacity to provide appropriate services based on child's age.</p> <p>To that end, an Early Hearing Detection and Intervention-Pediatric Audiology Links to Services (EHDl-PALS) expert panel was convened to create a survey to collect audiology facility information. Professional practice documents were reviewed, a survey was designed to collect pertinent test protocols of each audiology facility, and a standard of care template was created to cross-check survey answers. Audiology facility information across the United States was collected and compiled into a directory structured and displayed in an interactive website, <a href="http://www.EHDl-PALS.org">www.EHDl-PALS.org</a>.</p>	<p>The authors reported that from November 7, 2012, to May 21, 2016 over 1,000 facilities completed the survey and become listed in the Early Hearing Detection and Intervention-Pediatric Audiology Links to Services directory. The high usage rate (151,981 page views) since going live indicated that the site was utilized by consumers.</p> <p>A searchable, web-based facility directory has proven useful to consumers as a tool to help them differentiate whether a facility was set up to test newborns versus young children.</p> <p>Ongoing promotion of the website continues to be a need and a priority. Promotion to state EHDl program staff is of key importance because state EHDl program staff are uniquely positioned to assist parents connecting with pediatric audiology facilities. Ongoing efforts to make these tools available to state EHDl program staff, parents, and clinicians continue to be explored.</p>	<p>Early hearing detection and intervention; Facility search; Facility survey; Website</p>

Yr	Reference	Background	Key Findings/ Recommendations	Key Words
2016	<p>Cannon JE, Guardino C, Gallimore E. <b>A New Kind of Heterogeneity: What We Can Learn From d/Deaf and Hard of Hearing Multilingual Learners.</b> <i>American Annals of the Deaf.</i> 2016;161(1):8-16. doi:10.1353/aad.2016.0015.</p>	<p>This article introduced a special issue of the <i>American Annals of the Deaf</i>. Students who are deaf and hard of hearing (D/HH) and come from homes where a language other than English or American Sign Language is used constituted 19.4%–35.0% of the US D/HH population. Children who are D/HH who immigrated to the United States and Canada faced the task of acquiring not one new language and culture, but at least two.</p> <p>Authors proposed terminology encompassing these learners as diverse and rich in language: D/HH Multilingual Learners (DMLs). The authors presented: (a) a discussion of terminology, (b) an overview of available demographic data, (c) a synopsis of the special issue, (d) themes across three case study vignettes, and (e) overall recommendations to advance curriculum design and approach to teaching for DMLs.</p>	<p>DMLs create a unique challenge for professionals in the schools. Social and emotional factors, age at exposure to the second language, foundation in the native language, and proficiency of communication skills and academic language are just a few issues that need to be considered in the life and learning of a culturally and linguistically diverse D/HH student.</p> <p>Effective practices with culturally and linguistically diverse D/HH students is challenging. The obvious implication—research related to DMLs is lacking.</p> <p>Several researchers have looked to the broader literature to understand the best strategies to meet the needs of DMLs. Synthesizing evidence-based strategies in the English-Language Learner (ELL) and special education literature have determined that the following strategies may benefit DMLs: (a) guided reading, (b) Visual Phonics, (c) pre-teaching that uses chaining and multimedia tools, and (d) peer tutoring that uses metacognitive strategies. Based on these findings, the researchers have implemented and replicated single case-design research studies with DMLs using a pre-teaching strategy paired with repeated “readings” of books read in ASL on DVD. Further research is necessary to examine vocabulary strategies that are effective with DMLs.</p>	<p>Bilingual; Culturally and linguistically diverse (CALD); Deaf; Deaf Multilingual Learner (DML); Deafness and Diversity (DAD); Demographics; Disability; Diverse; English for Speakers of Other Languages (ESOL); English Language Learner (ELL); Hard of hearing; Hearing loss; Multicultural</p>

Yr	Reference	Background	Key Findings/ Recommendations	Key Words
2016	<p>Bowen, SK. <b>Early Intervention: A Multicultural Perspective on d/Deaf and Hard of Hearing Multilingual Learners.</b> <i>American Annals of the Deaf.</i> 2016;161(1):33-40. doi:10.1353/aad.2016.0009.</p>	<p>Research has demonstrated when children who are deaf and hard of hearing (D/HH) receive appropriate early intervention (EI) services, their language, speech, cognitive, and social-emotional development is better than that of later-identified children.</p> <p>The article explored the intricacies of providing carefully designed individualized family-centered early intervention (FCEI) for D/HH infants and toddlers with families from a minority culture and/or who speak a language other than English—that is, infants and toddlers who are or will become D/HH Multilingual Learners (DMLs).</p> <p>Five themes are addressed: family and professional partnerships, family decision-making and linguistic diversity, research in EI for DMLs, competencies for FCEI providers, and transitioning to preschool.</p>	<p>The goal of FCEI was to develop cross-cultural competence to cultivate parent/professional partnerships that promote successful outcomes for infants and toddlers who are D/HH and to support families' communication choices for their child.</p> <p>All providers should be aware of the potential benefits of bilingualism and be respectful of the choices families make with respect to communication options. These recommendations can best be realized by employing culturally and linguistically diverse (CLD) interventionists and interpreters and by providing the families of DMLs with appropriate and comprehensive written materials.</p> <p>To become culturally responsive, EI providers must understand the influence of culture on parenting styles, views of deafness and hearing loss, communication styles, and collaboration practices with families who are CLD—and must be aware of their own cultural beliefs, values, and even biases.</p>	<p>Bilingual; Culturally and linguistically diverse (CLD); Deaf; d/Dhh Multilingual Learner (DML); Deafness and Diversity (DAD); demographics; disability; early intervention (EI); English for Speakers of Other Languages (ESOL); English Language Learner (ELL); Family-centered early intervention (FCEI); Hard of hearing; Hearing loss, Multicultural; Transition</p>

Yr	Reference	Background	Key Findings/ Recommendations	Key Words
2015	<p>Bush ML, Alexander D, Noblitt B, Lester C, Shinn JB. <b>Pediatric Hearing Healthcare in Kentucky's Appalachian Primary Care Setting.</b> <i>Journal of Community Health.</i> 2015;40(4):762-768. doi:10.1007/s10900-015-9997-0.</p>	<p>Children who are deaf and hard of hearing (D/HH) in rural regions, such as Appalachia, are at significant risk of being delayed in diagnosis and treatment. Primary care providers play a key role in timely hearing health care.</p> <p>The purpose of this study was to assess the practice patterns of rural primary care providers (PCPs) regarding newborn hearing screening (NHS) and experiences with rural early hearing diagnosis and intervention (EHDI) programs in an area of known hearing health care disparity.</p> <p>Appalachian PCPs in Kentucky were surveyed, using a cross sectional questionnaire, regarding practice patterns and experiences regarding the diagnosis and treatment of congenital hearing loss.</p>	<p>Ninety-three Appalachian primary care practitioners responded with 85% reporting that NHS is valuable for pediatric health. Family practitioners were less likely to receive infant NHS results than pediatricians. A knowledge gap was identified in the goal ages for diagnosis and treatment of congenital hearing loss. Pediatrician providers were more likely to utilize diagnostic testing compared with family practice providers. Very rural practices were less likely to perform hearing evaluations in their practices compared with rural practices. Family practitioners reported less confidence than pediatricians in counseling and directing care of children who fail newborn hearing screening. 46% felt inadequately prepared or completely unprepared to manage children who fail the NHS.</p> <p>Lack of provider knowledge about NHS results and hearing loss is an important issue in this health disparity. Primary care providers may possess limited training and confidence to direct further diagnostic and therapeutic management of a child with hearing loss. Further training and multi-disciplinary support for clinicians may empower and equip these rural providers to better care for children who are deaf and hard of hearing.</p>	<p>Health disparity; Congenital hearing loss; Rural healthcare</p>

Yr	Reference	Background	Key Findings/ Recommendations	Key Words
2015	<p>Mellon et al. <b>Should All Deaf Children Learn Sign Language?</b> <i>Pediatrics</i>. 2015;136(1):170-176. doi:10.1542/peds.2015-2443.</p>	<p>Children who are deaf and hard of hearing (D/HH) born to parents with typical hearing (and non-signing) are unique as they cannot easily or naturally learn the language that their parents speak. These parents face tough choices. Pediatricians can parents understand the risks and benefits of different approaches to parent-child communication when a child is D/HH.</p> <p>Prosthetic approaches (eg, cochlear implants (CIs)) to hearing restoration are being applied to younger children at increasing rates. Children with CIs require intensive rehabilitation to learn to communicate orally. Even with this training, some children become better oral communicators than others. Some experts suggest that all children who are D/HH, with or without a CI, should be taught a sign language. Others worry that learning a sign language will interfere with the extensive and intensive rehabilitation that is necessary to reap the most benefit from a CI or that asking parents to learn a new language to communicate with their child is too onerous.</p>	<p>This article asked experts in otolaryngology and language development, who were presented with different scenarios, to discuss the pros and cons of teaching sign language in addition to teaching oral language. Some of the experts were deaf professionals, others were parents of profoundly deaf children.</p> <p>Each expert presented his/her own opinion and experience in response to the proposed scenarios. However, themes did emerge. Communication is critical – no matter the form. Families must be informed about all options and decisions respected. The most engaged and participatory family members are in the chosen communication method/s, the more included and engaged the child will feel. Pediatricians and other providers should be aware of the latest research and be able to translate best practices and evidence into information families can understand.</p>	<p>Deaf; Deaf children; Non-signing parents; Sign language; Cochlear implants</p>

Yr	Reference	Background	Key Findings/ Recommendations	Key Words
2015	<p>Stika CJ, Eisenberg LS, Johnson KC, et al. <b>Developmental outcomes of early-identified children who are hard of hearing at 12 to 18 months of age.</b> <i>Early Human Development.</i> 2015;91(1):47-55. doi:10.1016/j.earlhumdev.2014.11.005.</p>	<p>Although it is well documented that children with congenital hearing loss are at risk for speech-language delays, poor academic achievement, literacy delays, and psychosocial difficulties in comparison to their peers with normal hearing, a body of research indicates that early detection and intervention can help reduce negative outcomes for these children.</p> <p>However, much of the outcomes research on children with hearing loss has focused on children with severe and profound hearing loss (&gt; 70 dB HL) and, more recently, children with cochlear implants. Significantly less attention has been given to developmental outcomes for children who are hard of hearing (ie, those children with better-ear pure-tone averages between 25 and 79 dB HL, who typically receive benefit from hearing aids and do not use cochlear implants).</p> <p>This study represented one of the first comprehensive investigations of developmental outcomes specifically targeting young children who are hard of hearing (as opposed to deaf), who were early identified, and for whom intervention services (including amplification) were initiated soon after hearing loss was officially confirmed.</p>	<p>The results of the study indicated that overall, the children who were hard of hearing demonstrated age-appropriate language skills.</p> <p>The results expanded on previous research by providing evidence suggesting that young children from ethnically diverse home environments (ie, where another language in addition to English is spoken) could acquire a solid foundation of early language skills. Prospective studies are needed to verify whether these children's language skills remain stable.</p> <p>The results showed no elevation in level of internalizing problem behaviors for the children who are hard of hearing, irrespective of degree of hearing loss.</p> <p>Consistent with previous research, the study did not find a significant association between severity of hearing loss and early psychosocial outcomes, possibly suggesting that amplification provided adequate access to the sounds of speech at an early age.</p> <p>Results of the study indicated that mothers of very young children who are hard of hearing report similar levels of maternal stress and comparable levels of maternal self-efficacy as mothers of children with normal hearing.</p> <p>Most mothers enrolled in this study, in general, felt good about the quality of services delivered and satisfied with their level of involvement in decisions about their child's services. However, almost one-quarter of the mothers reported that they wanted to be more involved.</p> <p>The authors predicted that as tracking the development of this population of children continues, factors that contribute to both</p>	<p>Universal newborn hearing screening; Early Hearing Detection and Intervention (EHDI); Congenital childhood hearing loss; Speech-language delays</p>

Yr	Reference	Background	Key Findings/ Recommendations	Key Words
			positive and negative developmental outcomes will be better understood.	
2015	Williams TR, Alam S, Gaffney M. <b>Progress in Identifying Infants with Hearing Loss—United States, 2006-2012.</b> <i>MMWR.</i> 2015;64(13):351-356.	<p>Progress has been made in screening and diagnosing infants with hearing loss, reducing the number of infants lost to follow-up/lost to documentation, and increasing enrollment in early intervention.</p> <p>Ensuring that infants receive recommended services is crucial to help prevent delays in speech, language, social, and emotional development that can occur when permanent hearing loss is not identified early.</p>	<p>This study analyzed Early Hearing Detection and Intervention (EHDI) program survey data and found that during 2006–2012: 1) number of jurisdictions reporting data increased; 2) rates of screening increased; 3) rates of diagnosis among infants not passing the final screening increased; and 4) enrollment in early intervention (EI) of infants diagnosed with permanent hearing loss increased. However, rates of lost to follow-up/lost to documentation declined.</p> <p>To ensure continued progress toward identifying and providing EI for all infants with permanent hearing loss, practices should take advantage of new opportunities. Improvements in existing clinical and public health infrastructures and adoption of technologies, such as electronic health records and clinical decision support tools, can assist providers and EHDI programs in improving coordination, delivery, and documentation of recommended EHDI services.</p> <p>EHDI programs should work with health care providers who provide diagnostic and EI services to accurately document the receipt of necessary follow-up services, thereby increasing the opportunities for infants to receive proper care to minimize the negative impact that hearing loss can have on their speech, language, and emotional development.</p>	Identifying hearing loss in children; congenital hearing loss; Early Hearing and Detection and Intervention (EHDI); Newborn hearing screening

Yr	Reference	Background	Key Findings/ Recommendations	Key Words
2014	<p>Allen TE, Letteri A, Choi SH, Dang D. <b>Early Visual Language Exposure and Emergent Literacy in Preschool Deaf Children: Findings From a National Longitudinal Study.</b> <i>American Annals of the Deaf.</i> 2014;159(4):346-358. doi:10.1353/aad.2014.0030.</p>	<p>This article was a review of recent research on the impact of early visual language exposure on a variety of developmental outcomes, including literacy, cognition, and social adjustment. This research pointed to the great importance of giving young children who were deaf and hard of hearing (D/HH) early exposure to a visual language as a critical precursor to the acquisition of literacy.</p>	<p>Four analyses of data from the Visual Language and Visual Learning (VL2) Early Education Longitudinal Study were summarized by the authors. Each confirmed findings from previously published laboratory studies and pointed to the positive effects of early sign language on, respectively, letter knowledge, social adaptability, sustained visual attention, and cognitive-behavioral milestones necessary for academic success.</p> <p>In looking at development of language and literacy for children who are D/HH, some claims were irrefutable. First, early exposure to a visual language greatly increased the likelihood that a child who was D/HH would develop an array of cognitive, language, literacy, and social skills that will ultimately lead to higher levels of academic achievement.</p> <p>Second, the presence of both English and American Sign Language (ASL) in the home extended the benefits of early exposure through mechanisms that enhanced literacy and cognition in the context of bilingualism.</p> <p>Third, there is a critical, or sensitive, period for language development that begins at birth and extends through the earliest years of childhood. This further emphasized the importance of early language exposure.</p> <p>And fourth, children who are D/HH experienced an early visual language with their caregivers and developed the ability to regulate and sustain their visual attention when learning. This resulted in enhanced language ability and higher levels of adaptability in social learning environments.</p> <p>All children learning to read must possess phonological knowledge and awareness, and this knowledge requires an exposure during early childhood. However, the authors believed</p>	<p>Age of ASL acquisition; Literacy; Preschool deaf children; Alphabetic knowledge; Reading and bilingualism</p>

Yr	Reference	Background	Key Findings/ Recommendations	Key Words
			that the acquisition of knowledge and awareness occurs independently of modality.	
2014	<p>Bower CM, John RS. <b>The Otolaryngologist's Role in Newborn Hearing Screening and Early Intervention.</b> <i>Otolaryngologic Clinics of North America.</i> 2014;47(5):631-649. doi:10.1016/j.otc.2014.06.002.</p>	<p>The main premise behind infant hearing screening is that early detection and provision of intervention is beneficial. However, some children are never screened; of those screened, loss to follow-up rates can be very high. Pediatric audiology services remain limited in many locations.</p> <p>Otolaryngologists play an important role in hearing screening and intervention and can be critical to the success of local and regional programs.</p> <p>This article was developed as a guide for pediatricians and otolaryngologists on infant hearing screening and early intervention.</p>	<p>Otolaryngologists should routinely assess for hearing loss while ascertaining the results of infant hearing screening and diagnostics. Referral for hearing testing is required for any concern regarding hearing loss or speech and language development.</p> <p>Otolaryngologists should recognize the developmental urgency of hearing loss in infants and children and provide expedient clinical access for care. A complete history and physical examination should be completed on all infants and children with known or suspected hearing loss.</p> <p>After diagnostic testing, when a child has been identified as deaf and hard of hearing, otolaryngologists should recommend referral to pediatric audiologists, speech/language pathologists, ophthalmologists, geneticists, and other indicated specialists, including surgical intervention.</p> <p>Otolaryngologists should monitor for the success of intervention in children with hearing loss and assess for newly developed or declining hearing levels in all patients. They should be involved in the development and maintenance of hearing screening and intervention programs in their community and state.</p>	<p>Hearing screening; Hearing loss; Newborn; Auditory evoked response; Otoacoustic emissions; Early intervention</p>

Yr	Reference	Background	Key Findings/ Recommendations	Key Words
2014	<p>Dye MW, Hauser PC. <b>Sustained attention, selective attention and cognitive control in deaf and hearing children.</b> <i>Hearing Research.</i> 2014;309:94-102. doi:10.1016/j.heares.2013.12.001.</p>	<p>Previous research suggested that children who are deaf and hard of hearing (D/HH) suffered from elevated inattentiveness, distractibility, and impulsiveness. However, that research tested children who were D/HH born to hearing parents who are likely to have experienced language delays. The authors sought to extend previous research by testing D/HH children born to D/HH parents from whom they acquired American Sign Language (ASL) as a first language.</p> <p>The study sought to determine whether an absence of auditory input modulates attentional problems in D/HH children with no delayed exposure to language.</p> <p>Two versions of a continuous performance test were administered to 37 D/HH children born to D/HH parents and 60 children with typical hearing, all aged 6–13 years. A vigilance task was used to measure sustained attention over the course of several minutes, and a distractibility test provided a measure of the ability to ignore task irrelevant information – selective attention.</p>	<p>Data from the administered tests suggested that children who were D/HH in the study did not suffer from weaker sustained attention. This raised the possibility that earlier reports may have misattributed inattentiveness to deafness, when the causes may have been related to delayed access to natural language and/or problems with communication.</p> <p>While some difficulties with selective attention were observed, this was restricted to younger children with D/HH, and not evident in children with D/HH aged 9–13 years. One suggestion was that the inability to select task-relevant information at fixation stemmed from greater peripheral attentional resources, as described before in children and adults who were D/HH. Younger D/HH children may still be learning how to control the allocation of their attentional resources, with tasks that require suppression of peripheral information and focus on central targets being especially challenging. The finding of weaker cognitive control, especially in the presence of peripherally distracting information, reinforces this view.</p> <p>More studies are needed to assess the potential influence of developing bilingualism in deaf children who use a sign language such as ASL and also develop oral or written language skills in a spoken language such as English. Future work should also carefully assess IQ, executive function, and language skills in young deaf children and where possible also provide audiometry to determine the extent of deafness.</p>	<p>Deafness; Visual selective attention; Sustained attention; Neuroplasticity; Cognitive control</p>

Yr	Reference	Background	Key Findings/ Recommendations	Key Words
2014	<p>Uhler K, Thomson V, Cyr N, Gabbard SA, Yoshinaga-Itano C. <b>State and Territory EHDI Databases: What We Do and Dont Know About the Hearing or Audiological Data From Identified Children.</b> <i>American Journal of Audiology.</i> 2014;23(1):34-43. doi:10.1044/1059-0889(2013/13-0015).</p>	<p>The purpose of this study was to define the information currently collected by state and territory Early Hearing Detection and Intervention (EHDI) coordinators and to determine whether best practice guidelines are used.</p> <p>Authors used a multiple-choice electronic survey with 4 sections addressing: diagnostic assessment; amplification; early intervention (EI); and medical information regarding hearing loss that might have implications for child outcomes. The survey was sent to all state and territory EHDI coordinators.</p>	<p>The surveys garnered a return rate of 70%. Diagnostic, amplification, and Part C services were tracked by the majority of respondents. Additionally, medical prenatal and postnatal risks were collected.</p> <p>The authors concluded that data collected on audiologic screening and diagnostic evaluations had increased. Given the results, it was difficult to discern whether best practices were being used for each child. A delay in reporting a confirmed hearing loss was observed. Amplification results suggested that systems were not in place to ensure consistency and accountability for fitting amplification in infants. The results of this survey identified audiologic and EI information tracked by states to help provide a framework to monitor quality care in the future.</p> <p>The findings in this article highlighted the need to further explore the data management and tracking efforts currently in place. Those efforts tracked follow-up that occurred after newborn hearing screenings to ensure systems were in place to provide quality care and outcomes for children who are identified through newborn hearing screenings and identified areas to improve outcomes.</p>	<p>Early Hearing Detection and Intervention (EHDI); Early Intervention; Audiologic screening;</p>

Yr	Reference	Background	Key Findings/ Recommendations	Key Words
2013	<p>Moeller MP, Carr G, Seaver L, Stredler-Brown A, Holzinger D. <b>Best Practices in Family-Centered Early Intervention for Children Who Are Deaf or Hard of Hearing: An International Consensus Statement.</b> <i>Journal of Deaf Studies and Deaf Education.</i> 2013;18(4):429-445. doi:10.1093/deafed/ento34.</p>	<p>In June 2012, a diverse panel of experts convened in Austria to establish consensus on essential principles to guide family-centered early intervention (FCEI) with children who are deaf and hard of hearing (D/HH). The panel included parents, deaf professionals, early intervention program leaders, early intervention specialists, and researchers from 10 nations. All participants had expertise in working with families of children who are D/HH, and focus was placed on identifying family-centered practice principles that are specific to partnering with these families.</p>	<p>Panel members initially established the inconsistencies of implementing such family-centered principles in each of their respective nations. However, the panel identified 10 best practice, foundational principles:</p> <ol style="list-style-type: none"> <li>1. Early, Timely, &amp; Equitable Access to Services</li> <li>2. Family/Provider Partnerships</li> <li>3. Informed Choice and Decision Making</li> <li>4. Family Social &amp; Emotional Support</li> <li>5. Family Infant Interaction</li> <li>6. Use of Assistive Technologies and Supporting Means of Communication</li> <li>7. Qualified Providers</li> <li>8. Collaborative Teamwork</li> <li>9. Progress Monitoring</li> <li>10. Program Monitoring</li> </ol> <p>Each principle included provider and/or program behaviors needed to properly address each principle, as well as resources and evidence citations. The goal of this effort was to promote widespread implementation of validated, evidence-based principles for FCEI with children who are D/HH and their families. The members closed the paper with a call to action to act on the 10 principles on a global scale.</p>	<p>Early Intervention; Deaf; Hard of Hearing; Family-centered best practices</p>

Yr	Reference	Background	Key Findings/ Recommendations	Key Words
2013	<p>Vohr BR, Topol D, Watson V, Pierre LS, Tucker R. <b>The importance of language in the home for school-age children with permanent hearing loss.</b> <i>Acta Paediatrica.</i> 2013;103(1):62-69. doi:10.1111/apa.12441.</p>	<p>The objective of this prospective, longitudinal study was to examine the home language environment and to explore the association of factors within the language environment with receptive and expressive language of children with hearing loss (HL) and hearing controls.</p> <p>The authors contend that children with HL enrolled in early intervention (EI) before 3 months versus those enrolled after 3 months have better Reynell language scores and that a more optimal language environment is associated with better language skills.</p>	<p>Authors used a language processor recorded language environment: child vocalizations, conversational turns, adult word count, percentage of language, percentage of silence in 23 children with HL and 41 children with typical hearing. Relationships of language environment scores with Reynell language scores were analyzed.</p> <p>Children with HL had significantly lower Reynell comprehension scores and expressive scores than children with typical hearing. After adjusting for age of entry to EI and stay in a NICU, every increase in ten percentage points of language in the home was associated with 7.2 points higher comprehension score and 9.99 points higher expressive score. After adjusting for nonverbal intelligence, similar effects of the language environment on both comprehension and expressive scores were identified.</p> <p>A rich language environment in the home was associated with better receptive and expressive language skills, which are necessary for academic success for children with permanent HL. The authors' findings underscored the role EI plays in offsetting the reported language delays of children with HL at school age and provided the opportunity for designing parent education programs for families with children learning language.</p>	<p>Early intervention; Hearing loss; Language environment; School age; Speech</p>

Yr	Reference	Background	Key Findings/ Recommendations	Key Words
2013	<p>Yoshinaga-Itano C. <b>Principles and Guidelines for Early Intervention After Confirmation That a Child Is Deaf or Hard of Hearing.</b> <i>Journal of Deaf Studies and Deaf Education.</i> 2013;19(2):143-175. doi:10.1093/deafed/ento43.</p>	<p>This document was a supplement to the recommendations in the 2007 position statement of the Joint Committee on Infant Hearing (JCIH) and provided comprehensive guidelines for early hearing detection and intervention (EHDI) programs on establishing strong early intervention (EI) systems with appropriate expertise to meet the needs of children who are deaf and hard of hearing (D/HH).</p> <p>This document focused on the practices of EI providers outside of the primary medical care and specialty medical care realms, rather than including the full spectrum of necessary medical, audiologic, and educational interventions.</p>	<p>This document for the implementation of EI services (habilitative, rehabilitative, or educational) was intended to assist the state/territory EHDI systems to optimize the development and well-being of infants/children and their families. Another goal of this document was to facilitate the development of systems that are capable of continuously evaluating and improving the quality of care for infants/children who are D/HH and their families. Finally, this document outlined best practices to promote quality assurance of EI programs for children from birth to age 3 years and their families.</p> <p>This document advocated for the implementation of coordinated statewide systems with the expertise to provide individualized, high-fidelity EI programs for children who are D/HH and their families. Consistent monitoring of child and family outcomes is an essential step toward ensuring optimal outcomes for the majority of children. There is a great need to strengthen the evidence base supporting specific EI approaches. The establishment of practice standards, implementation of developmentally appropriate protocols for monitoring of outcomes, and commitment to research collaborations are critical steps toward this goal.</p>	<p>Joint Committee on Infant Hearing (JCIH); early hearing detection and intervention (EHDI); children who are deaf or hard of hearing (D/HH); best practices; practice standards</p>

Yr	Reference	Background	Key Findings/ Recommendations	Key Words
2012	<p>Decker KB, Vallotton CD, Johnson HA. <b>Parents' Communication Decision for Children With Hearing Loss: Sources of Information and Influence.</b> <i>American Annals of the Deaf.</i> 2012;157(4):326-339. doi:10.1353/aad.2012.1631.</p>	<p>It is important that children with hearing loss experience healthy development by learning and using a system of communication that best fits their needs and the needs of those with whom they must develop relationships. Parents of children with hearing loss must make choices about their child's method of communication early in life so healthy language development is not disrupted. The study addressed 4 questions:</p> <ol style="list-style-type: none"> <li>1. From whom did parents receive information about communication options for their child who was deaf and hard of hearing?</li> <li>2. Who did parents feel was most influential to their decision about a communication method?</li> <li>3. Are there differences in sources of information and sources of influence between parents who chose speech only versus communication that included signs for their children?</li> <li>4. Did parents' values and knowledge influence the method of communication they chose for their child?</li> </ol>	<p>The study findings indicated that the method of communication that the parents chose was influenced by the sources of information they received during the decision-making process.</p> <p>Specifically, parents who chose to use speech received information from teachers or school personnel and audiologists or speech pathologists more often than those who chose to use a method that included signs. However, there were no significant differences in the sources of information that parents cited as having the greatest influence on their decision. Instead, there is one common source of information that parents cited as being influential—their own judgment, followed by the influence of their child's other parent or their spouse or partner.</p> <p>Results suggest that parents internalize the opinions of professionals. These findings have implications for the sources from which parents receive advice. It is of utmost importance that these sources of information provide parents with current, accurate information so they can make well-informed decisions about their child's communication, and, if necessary, refine those decisions over time.</p>	<p>Communication; Communication choice; Deaf; Hearing loss; Parenting knowledge; Parenting values; Sign language</p>

Yr	Reference	Background	Key Findings/ Recommendations	Key Words
2012	<p>Holte L, Walker E, Oleson J, et al. <b>Factors Influencing Follow-Up to Newborn Hearing Screening for Infants Who Are Hard of Hearing.</b> <i>American Journal of Audiology.</i> 2012;21(2):163-174. doi:10.1044/1059-0889(2012/12-0016).</p>	<p>Early intervention (EI) is effective in preventing or minimizing the negative impact of hearing loss on speech and language development. However, it is likely that EI will result in developmental advantages for children only if the process is linked to timely and effective interventions.</p> <p>This study documented the epidemiological characteristics of a group of children who are deaf and hard of hearing (D/HH), to identify individual predictor variables for timely follow-up after a failed newborn hearing screen, and to identify barriers to follow-up encountered by families.</p>	<p>An accelerated longitudinal design in a multicenter study investigated outcomes in a subgroup of 193 D/HH children who did not pass the newborn hearing screen. Available records captured ages of confirmation of hearing loss, hearing aid fitting, and entry into EI. Relationships were examined among individual predictor variables and age at each follow-up benchmark.</p> <p>Results of the study indicated:</p> <ol style="list-style-type: none"> <li>1. Many families accessed care following newborn hearing screening (NHS) within recommended time frames. Specific barriers were identified, and were addressed through improved systems, services, and educational efforts.</li> <li>2. In a group of D/HH children, higher maternal educational levels were significantly associated with earlier confirmation of hearing loss and fitting of amplification, while severity of hearing loss was not.</li> <li>3. Public awareness campaigns about NHS and the importance of good hearing for speech and language development must be developed. Underserved communities need extra support in navigating steps that follow a failed NHS.</li> <li>4. There was confusion in providers and families about the possibility of hearing loss in infants and toddlers who displayed awareness of sound. Educational resources and training should address this specific gap in understanding.</li> </ol>	<p>Hearing loss; Universal newborn hearing screening</p>

Yr	Reference	Background	Key Findings/ Recommendations	Key Words
2012	Lantos JD. <b>Ethics for the Pediatrician: The Evolving Ethics of Cochlear Implants in Children.</b> <i>Pediatrics in Review.</i> 2012;33(7):323-326. doi:10.1542/pir.33-7-323.	<p>This study explored the ethical controversy surrounding cochlear implants. Complex issues of clinical and research ethics are intertwined with complex cultural issues and a long history of discrimination and stigmatization of children who are deaf.</p> <p>The author reviewed the origins of the controversy, noted “most heated moments”, and summarized the current state of the debate. Recommendations were also given.</p>	<p>There are 4,000 to 8,000 infants born each year in the United States with severe hearing impairment. Their parents will have to make decisions about what is best for their child.</p> <p>The author cited that cochlear implantation was an innovative therapy that was introduced into practice without adequate study. Promising early trials led to FDA approval, although long-term outcome data from rigorous studies were lacking. Also, cochlear implants were the results of when advocacy groups claim to know better what is best for children than do the children’s parents or doctors.</p> <p>The author recommended that pediatricians should understand all options and be prepared to help parents interpret complex data and multiple options to arrive at the decision that is best for themselves and their child. Understanding the ethical controversy over cochlear implants is important in overall knowledge of this topic.</p>	Cochlear implants; Children – Deaf/Hard of Hearing; Ethics with Cochlear implants;
2011	Kenney MK, Kogan MD. <b>Special Needs Children With Speech and Hearing Difficulties: Prevalence and Unmet Needs.</b> <i>Academic Pediatrics.</i> 2011;11(2):152-160. doi:10.1016/j.acap.2011.01.003	<p>The need for durable medical equipment (DME) for children with special health care needs (CSHCN) who also have communication issues is great.</p> <p>This study aimed to establish prevalence and sociodemographic characteristics associated with parent-reported speech and hearing difficulties among CSHCN; determine unmet needs for therapy, hearing aids, and communication devices; and examine the association between unmet needs and resources such as health insurance, early intervention/ special education, and a medical home.</p>	<p>Data were analyzed for 300,910 children without special health care needs and 40,723 CSHCN from the 2005–2006 National Survey of Children with Special Health Care Needs. The parent-reported relative unmet need was greatest for communication devices and least for hearing aids. The strongest association with reducing unmet needs was having a medical home, and the most significant aspect of medical home was having effective care coordination.</p> <p>Therefore, this study reported that having a medical home was significantly associated with fewer unmet needs for therapy and hearing/communication devices among CSHCN with speech and hearing difficulties. Care coordination may constitute an important factor that allows the primary care provider to link with services that CSHCN with communication problems require.</p>	Hearing; Medical home; National Survey of Children with Special Health Care Needs; Speech; Unmet needs

Yr	Reference	Background	Key Findings/ Recommendations	Key Words
2011	<p>Muñoz Karen, Nelson L, Goldgewicht N, Odell D. <b>Early Hearing Detection and Intervention: Diagnostic Hearing Assessment Practices.</b> <i>American Journal of Audiology.</i> 2011;20(2):123-131. doi:10.1044/1059-0889 (2011/10-0046)</p>	<p>In 2007, the Joint Committee on Infant Hearing (JCIH, 2007) recommended the completion of a battery of diagnostic hearing tests no later than 3 months from when an infant fails a newborn hearing screen.</p> <p>A team of 3 pediatric audiologists with expertise in infant diagnostic hearing assessment developed a cross-sectional survey design to learn of practice patterns for infant diagnostic hearing services at pediatric audiology facilities across the US. Anonymous surveys were mailed by state EHDI coordinators to 1,091 facilities in 28 states and the District of Columbia. One survey response was requested per facility.</p>	<p>Of the 356 returned surveys (33%) returned, 18 facilities reported not providing any type of infant testing, and 34 facilities provided only screening services for infants. Surveys were received from 304 facilities did conduct pediatric diagnostic hearing testing.</p> <p>Overall, results revealed that the comprehensiveness of the test batteries used varied among facilities. Over half of the respondents, 55%, reported using a limited test battery, 94 facilities reported using a comprehensive test battery but lacked at least 1 component recommended by the JCIH, and 25 facilities reported using a test battery that met JCIH recommendations. The wait time for an appointment varied between facilities and was affected by the test condition (i.e., natural sleep, sedation, or operating room).</p> <p>The results suggested that it was difficult for stakeholders to identify pediatric audiology facilities that served infants less than 6 months of age and that there was variability among facilities in test batteries and wait times for an appointment. Implications impacted diagnostic accuracy and timeliness of diagnosis.</p> <p>The authors offered that the rapid expansion of newborn hearing screening has created widespread demand not only for continuing education, but also for stakeholders to have timely access to information in order to effectively support families throughout the follow-up process. An information infrastructure that allows the primary care provider timely access to newborn hearing screening results and follow-up diagnostic results would improve the effectiveness and efficiency of care management.</p>	<p>Infants; Early hearing detection and intervention; Joint Committee on Infant Hearing; Diagnostics</p>

Yr	Reference	Background	Key Findings/ Recommendations	Key Words
2010	<p>Gaffney M, Green DR, Gaffney C. <b>Newborn Hearing Screening and Follow-up: Are Children Receiving Recommended Services?</b> <i>Public Health Reports</i>. 2010;125(2):199-207. doi:10.1177/003335491012500208.</p>	<p>Given the potential for developmental delays among children with unidentified hearing loss, states and territories within the United States have implemented Early Hearing Detection and Intervention (EHDI) programs to identify infants with hearing loss as early as possible. To monitor progress toward national goals, the Centers for Disease Control and Prevention (CDC) collected data from state and territorial programs.</p> <p>This article summarized findings from the CDC EHDI Hearing Screening and Follow-up Survey (HSFS)—analyzing those data to evaluate progress towards goals. The article also provided a summary of recent efforts to identify infants with hearing loss in the US.</p>	<p>In 2005 and 2006, more than 90% of infants were screened for hearing loss. Of these infants, 2% in both years did not pass their final screening. Out of those not passing the final screening, approximately two-thirds were not documented as having a diagnostic finding. In both years, the reason reported for the majority of infants was loss to follow-up/loss to documentation (LFU/LTD). Although the majority of infants with permanent hearing loss were receiving intervention, more than 30% were classified as LFU/LTD and could not be documented as receiving intervention services.</p> <p>The HSFS enabled the collection of more complete data that highlighted the progress in screening infants for hearing loss. It also provided detailed data about LFU/LTD, the type/severity of identified hearing losses, and the ability of programs to provide demographic data. While results indicated that progress has been made in screening, and to a lesser extent enrollment in intervention, additional efforts are needed to ensure infants and children with hearing loss are documented to receive a timely diagnosis and enrolled in EI services before 6 months of age.</p> <p>Continued efforts to ensure the standardization of how data are classified and reported in the HSFS is also important in addressing the issue of LFU/LTD. In addition, collecting more comprehensive demographic data can help states better understand some of the causes for LFU/LTD. This will help programs better direct their efforts and resources toward providing services to the most vulnerable populations.</p> <p>The author stated that this is critically important because, without the receipt of documented follow-up services, the benefits of newborn hearing screening and the possibility of early identification and intervention might be severely reduced.</p>	<p>Newborn hearing screening; Early Hearing Detection and Intervention (EHDI) programs; Infant hearing loss</p>

Yr	Reference	Background	Key Findings/ Recommendations	Key Words
2010	<p>Halpin KS, Smith KY, Widen JE, Chertoff ME. <b>Effects of Universal Newborn Hearing Screening on an Early Intervention Program for Children with Hearing Loss, Birth to 3 Yr of Age.</b> <i>Journal of the American Academy of Audiology.</i> 2010;21(3):169-175. doi:10.3766/jaaa.21.3.5.</p>	<p>Universal Newborn Hearing Screening (UNHS) was introduced in Kansas in 1999. Prior to UNHS, a small percentage of newborns were screened for and identified with hearing loss.</p> <p>This study aimed to determine the effects of UNHS on a local early intervention (EI) program for young children with hearing loss. The charts of 145 children were reviewed. These were children enrolled in the EI program during specified years before and after the establishment of UNHS.</p>	<p>Chart review analysis uncovered that UNHS had a positive impact on caseload size, age of diagnosis, age of enrollment in EI, and age of hearing aid fit. The percentage of the caseload identified in the newborn period was about 25% before UNHS and over 80% after its implementation.</p> <p>Specific to this study, the number of children with a timely diagnosis of hearing loss, fitting of amplification, and enrollment in early intervention services had increased substantially since UNHS was implemented in Kansas community. The children with severe and profound hearing loss were able to begin candidacy for cochlear implants in a timely fashion to enable them to have surgery at younger ages as allowed by the FDA.</p> <p>The authors concluded that this greatly increased the probability that these children with hearing loss will be more successful communicators and successful students in school.</p>	<p>Birth to three; Cochlear implants; Early intervention; Hearing aids; Hearing loss; Infants; Infant Toddler Services; Toddlers; Universal Newborn Hearing Screening</p>

Yr	Reference	Background	Key Findings/ Recommendations	Key Words
2010	<p>Houston KT, Behl DD, White KR, Forsman I. <b>Federal Privacy Regulations and the Provision of Early Hearing Detection and Intervention Programs.</b> <i>Pediatrics.</i> 2010;126(Suppl 1):S28-S33. doi:10.1542/peds.2010-0354g.</p>	<p>Early Hearing Detection and Intervention (EHDI) programs require a child's identifiable information be shared with those responsible for screening, diagnosis, early intervention, family support, and medical home services.</p> <p>Pediatricians and other stakeholders in the EHDI process see 3 federal privacy and confidentiality laws as major obstacles to achieving effective EHDI programs: 1) the Health Insurance Portability and Accountability Act (HIPAA); the Family Education Rights and Privacy Act (FERPA), and Part C privacy regulations of the Individuals With Disabilities Education Act (IDEA).</p>	<p>The authors summarized the provisions of HIPAA, FERPA, and IDEA and how those laws most directly affect information-sharing in EHDI programs.</p> <p>Strategies were outlined with regards to sharing the information needed to operate successful EHDI programs while remaining in compliance with these laws. Those strategies included: obtaining signed parental consent to share information between providers; adding an option on the individual family services plan for parents to permit sharing of the plan with pediatricians and other providers; and giving copies of all relevant test results to parents to share with whomever they choose. The authors shared examples of forms and documents to support many of these strategies; <a href="http://www.infanthearing.org/privacy">www.infanthearing.org/privacy</a>.</p> <p>The authors concluded that consistent training is needed at the community level so that all stakeholders understand the importance of sharing information and helping families to be full participants in that process. Families and providers should offer feedback to EHDI programs to ensure that all children are receiving timely and effective hearing screening, diagnostic evaluations, and interventions.</p>	<p>Deaf; Hard-of-hearing; Early intervention; Newborn hearing screening</p>

Yr	Reference	Background	Key Findings/ Recommendations	Key Words
2010	<p>McCarthy M, Muñoz K, White KR.  <b>Teleintervention for Infants and Young Children Who Are Deaf or Hard-of-Hearing.</b> <i>Pediatrics.</i> 2010;126(Suppl 1):S52-S58.  doi:10.1542/peds.2010-0354j.</p>	<p>One of the reasons that many young children who are deaf and hard of hearing (D/HH) do not receive the early intervention (EI) services they need is that D/HH is still a relatively low-incidence condition. Thus, many children who are D/HH may live a great distance from the specialized services they need. Plus, there are often few D/HH children living in the same area, which makes it difficult for many educational systems to find trained people to deliver services.</p> <p>As such, “teleintervention” strategies (eg, videoconferencing, web-based tools) could help to provide EI services to children who are D/HH.</p> <p>This article outlined the rationale for using teleintervention services for children who are D/HH, described a teleintervention program that has been serving children in Australia, and summarized cost-effectiveness of such an approach.</p>	<p>The authors noted that because of critical needs for services and the shortage of trained and qualified providers, it is easy to assume that teleintervention services are as good as face-to-face services and can be delivered at lower cost. The feasibility of using 2-way real-time videoconferencing to deliver the types of services needed by infants and young children who are D/HH has been demonstrated many times. Nonetheless, there is no good evidence that the outcomes for children or the costs of delivery are comparable to those with face-to-face services.</p> <p>The authors recommended randomized comparisons of teleintervention services and face-to-face services for relatively large numbers of infants and young children who are D/HH. In addition to collecting data about children’s outcomes, the studies should examine the actual costs of delivering both types of services, including equipment, materials, staff time, travel, and administrative support. Parent time, experience, and satisfaction with the programs should be assessed. The authors concluded that the United States could be the ideal site to carry out a randomized, controlled trial of teleintervention versus traditional face-to-face services.</p>	<p>Deaf; Hard-of-hearing; Early intervention; Newborn hearing screening</p>

Yr	Reference	Background	Key Findings/ Recommendations	Key Words
2010	<p>Russ SA, Hanna D, DesGeorges J, Forsman I. <b>Improving Follow-up to Newborn Hearing Screening: A Learning Collaborative Experience.</b></p> <p><i>Pediatrics.</i> 2010;126(Supplement 1):S59-S69. doi:10.1542/peds.2010-0354k.</p>	<p>Approximately 95% of the infants born in the United States are now screened for hearing loss at birth. Of these, 2% have a positive screening test that required follow-up (either rescreening or diagnostic audiologic evaluation) to determine if they had permanent hearing loss.</p> <p>National data (2007) suggested that nearly half of these infants have “no documented diagnosis,” the majority of whom were classed as “lost to follow-up” or “lost to documentation.” Of those infants found to have a permanent hearing loss, more than one-third were not documented to receive early intervention services.</p>	<p>The study reported on an effort to improve the quality of the follow-up process, with teams from 8 states participating in a learning collaborative. Teams, recruited from statewide Early Hearing and Intervention (EHDI) programs, used the Model for Improvement as the specific approach to making changes. That approach incorporated 4 key elements: (1) setting specific, measurable aims; (2) tracking measures of improvement over time; (3) identifying key changes that result in desired improvement; and (4) using continuous, rapid-cycle tests of change. Parents acted as equal partners with professionals in guiding system improvement.</p> <p>Teams identified promising change strategies including ensuring the correct identification of the primary care provider before discharge from the hospital; obtaining a second contact number for families before discharge; “scripting” the message given to families when an infant does not pass the initial screening test; and using a “roadmap for families” as a joint communication tool between parents and professionals to demonstrate each family’s location on the “diagnostic journey.”</p> <p>Participants reported that collaborative experience allowed them to move beyond a focus on improving their own service to improving connections between services and viewing themselves as part of a larger system of care.</p> <p>Ongoing quality improvement efforts will require refinement of measures used to assess improvement, development of valid indicators of system performance, and an active role for families at all levels of system improvement. Local QI initiatives, whether at individual practice sites, or through regional or statewide collaboratives, are likely to benefit from national exchange of experiences and sharing of successful change strategies.</p>	<p>Deaf; Hard-of-hearing; Early intervention; Newborn hearing screening</p>

Yr	Reference	Background	Key Findings/ Recommendations	Key Words
2009	Balachandra SK, Carroll JK, Fogarty CT, Finigan EG. <b>Family-centered maternity care for deaf refugees: The patient-centered medical home in action.</b> <i>Families, Systems, &amp; Health.</i> 2009;27(4):362-367. doi:10.1037/a0018214.	<p>A patient-centered medical home is uniquely equipped to provide outstanding primary care to disadvantaged groups.</p> <p>This study noted that providing a comprehensive medical home for this specific underserved population—refugees who are deaf individuals—was lacking in the literature. This study used an illustrative case study to describe author experiences when applying medical home principles to a challenging clinical situation: providing high-quality maternity care to a recently immigrated Vietnamese refugee couple lacking formal language skills.</p>	<p>The subjects of the study were a 28-year-old Vietnamese woman and her husband, both deaf and without functional language skills in English, Vietnamese, or American Sign Language (ASL), presented to the authors' family medicine residency practice for prenatal care.</p> <p>A care plan for the couple was developed, using the tenets of medical home. Specifically, authors aimed to enhance access for a family with complex cultural and linguistic barriers; provide family-centered continuity; coordinate and collaborate among multiple providers; and provide care that was compassionate and culturally appropriate.</p> <p>It was concluded that given the medical home's emphasis on patient-centered communication, enhanced access, and multidisciplinary collaboration, it served as a useful framework for overcoming the barriers faced by couple. By demonstrating individual and organizational commitments to the tenets of the medical home, the authors offered that family medicine training sites may be ideal venues for similarly marginalized communities.</p>	Refugee; Pregnancy; Deaf; Primary care; Collaboration