

# Head Start Hearing Screening Protocols in Connecticut: A Survey

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For several years, the University of Connecticut Speech and Hearing Clinic provided hearing screening services to one of the large, diverse Head Start programs in the state. Through ongoing efforts to determine the most efficient, cost effective, and reliable screening process using existing evidence for best practices in screening hearing in preschoolers, the question of how the other Head Start programs in the state were conducting screening arose. The researchers designed and disseminated a survey of Head Start programs to each of the 22 health managers that manage the 114 service locations in Connecticut. The results of that survey revealed several areas of concern regarding hearing screenings. Head Start health managers used a wide variety of types of equipment, protocols for screening, and personnel to conduct the screening. Screening processes were seldom adapted to children with disability or who spoke a foreign language. Training for persons who conduct the screenings also varied widely in type and frequency. Health managers and similar gatekeepers for the screening process struggled with determining whether a referral was more appropriate for an audiologist or the pediatrician. They defaulted in almost every instance to the pediatrician even if middle ear function was intact. Respondents reported high interest in more education on conducting the screening, use and care of equipment, and interpretation of results. They also requested more access to pediatric audiologists in the community that could provide testing and screening resources to the program.

## Introduction

The Head Start program is a federally funded program designed to promote the school readiness of children ages birth to five from low-income families. Target areas of readiness include cognitive, social, and emotional development (U.S. Department of Health and Human Services, 2015a). In order to minimize the impact of controllable factors in development, overall health is also an important target area for Head Start programs. Amongst the many regulations for promotion of health and safety are mandates for completion of developmental, sensory, and behavioral screenings. These must occur within the first 45 calendar days of a child's first day in the program. Specifically noted in the regulation for Head Start screening (45 CFR 1304.20; 1308.60; U.S. Department of Health and Human Services, 2015b), is the demand that all screening be "linguistically and age appropriate" and "to the greatest extent possible, these screening procedures

must be sensitive to the child's cultural background". In addition, the agencies must obtain direct guidance from a mental health or child development professional on how to use the findings to address identified needs.

Hearing screening is a mandated component because the early childhood and the preschool years are critical for speech, language and cognitive development. Research consistently demonstrates that undetected childhood hearing loss, late identification of hearing loss, and lack of early intervention, are likely to result in delayed speech, language, and literacy development (Delage, Tuller, 2007; Kiese-Himmel, Reeh, 2006; McGuckian, Henry, 2007; Moller, 2000; Sininger, Grimes, Christensen, 2010; Yoshinagao-Itano et al., 1998). Even a unilateral hearing loss can result in a delay in a child's speech and language development, poor academic achievement, and increased social and emotional dysfunction (Bess, Dodd-Murphy & Parker, 1998; Khairi et al., 2010; Lieu, 2013).

Newborn hearing screenings are effective at identifying children born with hearing loss. In 2012, the Centers for Disease Control (CDC) identified one to four per 1000 infants as having a hearing loss through the United States hearing screening programs (CDC, 2012). However, the prevalence of hearing loss continues to increase as children develop. Research suggests that up to 14% of school-age children (approximately 7 million) have some degree of hearing loss (Niskar et al., 1998; White, Forsman, Eichwald, & Munoz, 2010). Screening in the birth-to-three and preschool years allows capture of children not previously identified with late-onset, progressive, or adventitious hearing loss. These losses may be associated with diseases or traumatic events occurring in early childhood such as meningitis or head trauma. Middle ear disorders also occur frequently in the early childhood years. Otitis media is the most common cause of conductive hearing loss in early childhood. In one study, 75% of children experienced at least one case of otitis media with effusion by age three (NIDCD, 2002).

In order to meet the demand for this important screening and minimize the risks of undetected hearing loss, various groups established protocols for the timing and nature of screening in early childhood. The American Academy of Pediatrics (AAP) and Bright Futures published recommendations which guided well-child screenings and recommended hearing screenings at 4, 5, 6, 8, and 10 years of age (AAP, 2014). The timing or occurrence of screening was, therefore, clear. The manner of screening, however, was more variable as there were a variety of screening protocols for ages seven months to five years of age. Head Start standards did not indicate a particular hearing screening protocol (Eiserman et al., 2007).

Several organizations published recommended practices for hearing screenings including the National Center for Hearing Assessment and Management (NCHAM, 2014) Early Childhood Hearing Outreach (ECHO) Initiative, the American Speech-Language-Hearing Association (ASHA, n.d.), and the American Academy of Audiology (AAA, 2011). NCHAM ECHO recommendations supported the use of otoacoustic emission (OAE) screenings for all children birth-to-three years of age and for children older than three that were unable to follow instructions or complete a behavioral screening task. Pure tone screenings were recommended for populations age three (chronologically and developmentally) or older (AAA, 2011; ASHA, n.d.; NCHAM, 2014). Both AAA and ASHA suggest conducting pure tone screenings at 20 dB HL for 1000, 2000 and 4000 Hz. ASHA (n.d.) screening recommendations included the use of play audiometry as more appropriate for children age two to four. ASHA (n.d.) also stated, "the use of OAE technology may be appropriate for screening children who are difficult to test using pure-tone audiometry." AAA (2011) and ASHA (n.d.) promoted the involvement of a pediatric audiologist in the selection of equipment and development of OAE protocols. In addition, both the ASHA and AAA papers discussed the use of tympanometry during screenings. AAA (2011) indicated that tympanometry should be utilized as a second-stage screening for toddler, preschool, kindergarten and 1st grade populations due to high risk of middle ear effusion in these groups. These recommended practices provided guidance in development of protocols. However, ASHA (n.d.) recognized that available technology, the population screened, and staffing/audiology resources influence protocol development.

The UCONN Speech and Hearing Clinic provided screening assistance to some Head Start programs in Connecticut. Annual review of the UCONN screening protocol and a request from one Head Start program to expand services to additional student populations resulted in awareness of the variability of protocols in use by the Head Start programs in Connecticut. In addition, contact with the State Early Hearing Detection and Intervention task force revealed a need to identify current screening methods and plan activities to enhance screening, surveillance, and service delivery. A need for data related to the tools, techniques, reporting, and referral processes was clear. Therefore, the purpose of this study was to collect data, through a survey, focusing on current methods of hearing screening in Connecticut Head Start agencies. The results of the survey would serve as a starting point for assisting the state of Connecticut in promoting the use of best practice in hearing screening in early childhood.

## **Method**

### **Survey**

Researchers developed an online survey instrument to collect data to answer the question of methodology of hearing screening in Connecticut Head Start agencies. Questions targeted health managers, or the person in a program that was responsible for the coordination and/or delivery/execution of the required screenings. Questions were designed by the authors in conjunction with a

representative from the Early Hearing Detection and Intervention, Family Health Section of the Connecticut Department of Public Health. The demographic section included questions on the nature of adaptations made to screening for various sub populations (i.e. language and disability). The 34 survey questions were divided into seven categories: Program and Student Demographics, Protocols, Equipment, Referral Process, Screening Personnel, Personnel Training, and Requested Needs. Questions were predominantly multiple choice with some yes/no and open-ended questions (see Appendix A for survey questions). Twenty-two of the 34 questions required completion. The introductory letter provided instructions for the survey and an estimate of the time needed to complete it (approximately 15 minutes). At most, there were five questions per page. Question logic employed in the first question confirmed the respondents desire to participate. If the answer was yes, participants entered the survey and if the answer was no, they exited the survey. Question logic employed later in the survey determined if every child underwent the same screening process. For this question, if the participant responded "no," they answered an additional question regarding the screening protocol choice.

### **Participants**

At the time of this study, Head Start in Connecticut was comprised of 118 locations under the jurisdiction of 26 agencies. The 2013 population estimate for Connecticut was 3,596,080 persons, of whom 5.3% were under the age of five (U.S. Census Bureau, 2014). The state of Connecticut encompassed both highly urban regions (Bridgeport, Hartford, Stamford), smaller cities and suburbs (Willimantic, New Britain, Bristol), and rural areas (Pomfret, Dayville, Morris). It was also a highly diverse population where 14.2% of households were Hispanic or Latino alone, 11.2% were Black or African American alone, and 4.2% were Asian alone. Approximately 2% of households represented two or more races (U.S. Census Bureau, 2014), and 21.2% of households containing children who were five years old or older spoke a language other than English. The percentage of persons living below the poverty level between 2008 and 2012 was 10% (U.S. Census Bureau, 2014).

The Connecticut Head Start Program indicated that there were 118 Head Start locations operating in the state and suggested using the Head Start website for individual contact information (Head Start, 2012). Utilizing the Connecticut Head Start website, 114 of the 118 Head Start locations were identified. Of these 114 Head Start locations, the same directors and health managers managed multiple locations. As a result, for all 114 locations there were 22 health managers in charge of coordinating health-screening activities. These individuals received the survey. One of the health managers identified and contacted was affiliated with an agency that contracted UCONN to complete the hearing screenings at their facilities.

## ***Procedure***

An e-mail introduced the survey to the 22 health managers and invited them to participate. A University of Connecticut graduate assistant confirmed the e-mail addresses for the most appropriate recipient per program by phone call prior to sending the e-mail. The letter described participation in the survey to the managers as voluntary and anonymous. An embedded link in the e-mail led directly to the survey. The tool used to conduct the survey, surveymonkey.com, was set to prevent tracking or storage of IP addresses, therefore, protecting the anonymity of responders. The e-mail was sent three times within two months to increase participation and allow completion over time for programs that needed to gather data in order to respond. Due to the anonymity of the survey, the University of Connecticut Institutional Review Board (IRB) deemed the study unnecessary for full IRB approval.

## **Results**

### ***Demographics***

Twenty-two invitations resulted in 16 responses. This yielded a 73% response rate as each survey response represented a health manager that was responsible for multiple locations. Twelve respondents managed one to five Head Start locations, two respondents managed six to ten locations, one respondent managed 16-20 and one respondent managed for more than 20 locations. Figure 1 shows the percentage of respondents from each of the counties in Connecticut. Responses represented all of the counties in Connecticut except Middlesex County. New Haven County had the highest number of children represented in their responses. The approximate number of children served by the health managers totaled 4,000. The average number of children screened, which may have been comprised of one or more locations, was 250 children per health manager. Numbers ranged from 30 to 765 children.

Across all health managers, 72% of children served spoke English as their primary language. Other common languages spoken in the home were Spanish (33%), Polish (1%), Arabic (3%), and Chinese (1%). Figure 2 demonstrates that there was variability in the percentage of children speaking each primary language across health managers, with four respondents who indicated more than 50% of their children spoke Spanish as their primary language. Respondents five and fourteen did not provide answers to this question. Health managers reported from five to 30% of children had a disability. Health managers listed the disabilities present in their locations. The most common was speech/language delay. Seventy-seven percent of health managers cited this as their most typical disability. Also listed were developmental delay (62% of respondents) and autism/autism spectrum disorder (31% of respondents).

### ***Screening Protocol and Equipment***

The health managers described the method of hearing screening used in their facilities. OAE was used by 75% of respondents, audiometry by 50%, and 25% used physician report. Questionnaire, tympanometry, and newborn screening results were also sources of screening information. Only 11 health managers answered the

question about first method of screening. OAE screenings were used first by four respondents while three respondents used pure tone audiometry as a first method. Four participants used reports from physicians, newborn screening results, or teacher/parent ratings as the first method of screening.

Eight health managers reported a second type of screening. Three used OAE screening as their second method, one used pure tone audiometry, one used tympanometry, and three used reports/questionnaires. Four health managers reported a third option if necessary which was one of the following: OAE screening, tympanometry, and report/questionnaire. One health manager indicated that the fourth option was OAE. No respondent used otoscopy. It should be noted that some individuals indicated they had access to tympanometry and otoscopy at times, but did not use them in their protocol.

While all health managers screened within the federally mandated 45 days from admission, the surveyors asked for any other times when screenings might also be necessary. Nine health managers reported screening at teacher request and nine screened at parent's request. Four indicated they screened annually. It was not clear if annual screening referred to the annual mandatory screening for new students or repeat screening for students still in the program after one year. One individual screened every six months and, once again, it was not clear who received the screening.

Eighty-eight participants indicated that children of all ages underwent the same screening process. Of the two respondents who modified the protocol, one used OAE for children below three years of age and pure tone screening for children over three years of age. The second individual used OAE for Head Start children and observation for Early Head Start children.

Specific questions focused on whether protocols were modified due to disability or language barriers. Four individuals used assistance from a Speech-Language Pathologist, paraprofessional, teacher, or family member in these cases. Two respondents modified the way in which the child responded to the test. The modifications were picture pointing for pure tone screening and completion of OAE screening during naptime. One individual requested a physician evaluation if a child could not be tested, and one person requested nursing assistance from a neighboring health manager.

Location of screenings, regardless of the protocol, was variable. Some health managers screened in multiple environments. Fifty percent of health managers described locations specific to their setting including "the quietest place available," which may have been an office, an unused classroom, or other room. Forty-four percent indicated use of the nurse's office, 25% used a special hearing screening room, and 19% screened in the child's home.

For equipment maintenance, all but one health manager indicated regular calibration by the manufacturer or private technician. Ten participants reported that calibration occurred annually and three were unsure how often calibration occurred.

### **Screening Personnel and Training**

Various individuals were responsible for completing the screenings. Seven of 16 health managers used a nurse as the primary screener. Four respondents indicated the primary screener was the family service coordinator. Four health managers indicated they conducted screenings. A contracted service completed the screening for one respondent. Eight health managers reported that the individuals completing the screening had 10 years or less experience in conducting screenings. Two reported screeners had more than 10 years of experience and four reported the experience of their professionals as “varied”. Health managers reported using additional individuals to assist in completing screenings and some of those positions included teachers, volunteer medical assistants, interpreters, family advocates, home visitors, health program aides, partnership managers, and parents.

When it came to training the individuals who conducted screenings, again, a variety of methods were employed. Most respondents reported using more than one method of training. Half of the respondents used a written protocol and the other half used demonstration by an equipment provider. Six used demonstration by facility personnel and six used discussion of the procedure with facility personnel. Five individuals used an outside contractor. Respondents did not report qualifications of the outside contractors. Four individuals indicated that training occurred annually, and one individual indicated that training occurred at the onset of the screening cycle. The remainder of the health managers either did not conduct repeat training or did it “as needed”, which was not defined. Figure 3 is a breakdown of the number of programs that had multiple training methods available for screening staff. This figure illustrates the lack of consistency in training screeners across health managers.

### **Referral Process**

Eleven health managers defined the need for referral as a failed second screening in at least one ear. Additionally, two health managers referred following the first screening if a child failed in one ear. Six respondents indicated referrals made when there was a failure to complete the screen. The majority of health managers reported multiple triggers for referring for outside evaluations. Health managers and nurses were the primary persons responsible for making referrals. Three individuals had the family advocate/service worker make the decision to refer. Five health managers used the “failed” or “refer” readout from OAE or tympanometry exclusively to refer. Seven indicated that they did not necessarily refer based on the equipment readout alone. The survey questions did not require further clarification.

The most common referral destination was the pediatrician, regardless of the nature of the test result. Figure 4 shows that few referrals are made directly to a hearing professional, either the audiologist or otolaryngologist. In the state of Connecticut, children covered by the Husky or state Medicaid system are required to have referrals to specialists from their primary physician. Therefore, a visit to the pediatrician was a necessary first step to a visit with an audiologist or otolaryngologist. One health manager gave

the parents a general referral so they could decide themselves. Once the referral was made it fell most frequently to the family advocate/social worker to track the outcome. Follow-up occurred anywhere from two weeks to 60 days, although over half of the health managers did not report a timeline for follow-up.

### **Program Needs**

The respondents indicated the primary educational and training needs related to hearing screenings within their programs. The number one overwhelming response was a need for pediatric audiology resources. In a follow-up question, only three out of the 16 health managers indicated access to a pediatric audiologist for assistance in developing or reviewing the hearing screening protocols and referral processes. Eleven respondents wanted referral locations for comprehensive hearing testing. Half of the health managers requested additional training on conducting hearing screenings and making follow-up recommendations. Two respondents wrote additional comments: “Staff to conduct screening as it is very labor intensive. As a manager, my services are needed elsewhere,” and “a review for experienced staff would still be good; a way to help with training of new staff when we have them.”

A final question encouraged respondents to provide additional information at the completion of the survey. One health manager referred to the protracted nature of the screening process with two fail/refers needed, then a trip to the pediatrician, followed by rescreen, followed by referral to an ENT physician/Audiologist, followed by an ENT physician/Audiology report and recommendations. Another person indicated a need for pediatricians to support the hearing concern referral. Many times, the response back was “no concern at this time.” One additional health manager responded with a need for recommendations on tools and resources available for Early Head Start populations.

### **Discussion**

The survey yielded a high return rate from Head Start agencies. The demographic questions indicated that responses represented a diverse group of Head Start programs that ranged in size, primary language spoken by enrolled children, and number of children enrolled with disabilities.

All health managers that responded comply with the federally mandated screening standard. Various personnel roles were primary hearing screeners including the health manager, the nurse, and the family service coordinator. Many individuals also indicated the use of additional personnel or family members to assist during the screening process. The training provided to these roles was extremely diverse, likely due to the variety of methods and protocols in place. More notable was the lack of consistency of initial or repeat training. Methods of training included written protocols, vendor demonstrations, or current user training to the next user. Regular training is necessary to maintain competence for the primary screener and insure that they are providing correct training to those in supporting roles or to new staff. Regular training can also trigger processes for calibration and preventive maintenance for equipment used.

ASHA (n.d.) indicated, “personnel may include an audiologist, SLP, nurse or other trained lay or volunteer screener.” The American Academy of Audiology Task Force on Early Childhood Hearing (2014) stated in their description of screening standards for newborns: “A formal training program for support personnel should be in place under the direction of the supervising audiologist who should conduct the training. Specific competency-based training through formal instruction and supervised practice should be included. Instruction in all assigned responsibilities and clear definition of limits in the role and function of support personnel should be included. Personnel should complete a recertification of proficiency every two years, as a minimum, with ongoing assessment and re-training as needed.” The key in both of these statements is the need for training for screening personnel. The researchers noted from the results that no health manager had regular communication with a pediatric audiologist for guidance or training. Access to an audiologist is critical for application of the American Academy of Audiology or American Speech-Language-Hearing Association recommendations.

The survey identified large variability in screenings protocols, with pure tone screening and OAE screening as the primary methods of obtaining results. According to the ASHA Guidelines for Childhood Hearing Screening (n.d.), an acceptable modification or alternative procedure for screening when a child cannot condition to pure tone screening would be OAE. In an evidenced-based systematic literature review on the accuracy of hearing screening instruments, Prieve and colleagues (2015) reported that both pure tone and OAE screening methods can be used to screen hearing loss in preschool and school age populations. In their review of 18 studies, only two studies directly compared both screening tools in the same sample. Results from those studies suggested that pure tone screenings were more effective in identifying hearing loss in the school age population than OAE screenings. As a result, pure tone screenings are the preferred tool for school age children. However, Harlor and Bower (2009) described OAEs as a test that “allows for individual ear assessment, can be performed quickly at any age, and does not depend on whether the child is asleep or awake”. These factors may be more important in a preschool population in comparison to a school age population.

Health managers reported that within each program, there was often one primary hearing screening method in use. This method, however, was not consistently adaptable to disability, language or culture. Therefore, despite high numbers of disability and language difference reported by some programs, there was minimal adaptation of screening procedures.

One of the predominant findings regarding the methods employed in screening was the lack of otoscopy and/or tympanometry. While not demanded by Head Start standards, by not using these tools, the opportunity for misidentification or cause of screening failure may exist. Further support for the use of these tools is the high incidence of middle ear pathology previously discussed. Lack of these procedures may lead to inappropriate referrals, excessive re-screening, overuse of resources, and excessive time invested in the screening process.

An example would be a child sent to a pediatrician for a middle ear evaluation when excess cerumen or a pressure equalization tube disrupted the test results. A few programs indicated the use of tympanometry during their screening procedure. It is unknown if the screener was familiar with the difference in screening for middle ear dysfunction versus hearing sensitivity. Due to increased risk of middle ear dysfunction and to assist the screener in determining audiological or medical referral, both ASHA (n.d.) and AAA (2011) recommended adding tympanometry screening to the protocol for younger children. Differentiating the purpose of screening is crucial to the interpretation of results and timely and accurate referrals.

Programs also reported reliance on physician report in certain circumstances to meet the screening standard. For example, if the physician’s physical report clearly stated a hearing screening result within the previous six months, that result could be accepted and the screening deferred. The survey did not address questions that would elicit descriptions of the type of screening completed by the physician. It is unknown if those were OAE, pure tone audiometry, tympanometry, otoscopy, or behavioral report.

In the programs that reported use of parent or teacher report to meet the screening standard, the survey did not detail the nature of the questions asked or what format the screening was conducted. It is unclear if the checklists or questionnaires were solicited by the program or if they were used as a screening tool only when triggered by the parent or teacher themselves. Subjective questionnaires may have poor sensitivity to differentiate between children with and without hearing loss, especially those with mild hearing loss, or otitis media (Gomes & Lichtig, 2005; Olusanya, 2001). One study demonstrated that parent hearing ratings do not accurately predict hearing levels or changes in hearing in children with otitis media (Rosenfeld et al., 1998).

Review of the data clearly indicated that the standard referral destination was the pediatrician. This was true regardless of the trigger for referral. A failed tympanogram suggesting middle ear pathology was appropriately sent to the pediatrician. A failed OAE screening indicating questionable hearing sensitivity with a typical tympanometry and/or otoscopy result may be better referred to the audiologist. In reference to an example presented earlier, otoscopy that revealed a pressure equalization tube in the ear canal along with a failed tympanogram result may be best sent to the ENT when the child is followed by that professional. The previously noted comments regarding access to a pediatric audiologist and adequate training in the interpretation of results are implicated in this area as well. In fact, when asked to list program needs, survey respondents identified more input and assistance in determining referrals as areas of need. They also noted that a list of area pediatric audiologists to answer questions or accept referrals would be very beneficial.

## Conclusions

Connecticut Head Start agencies clearly followed the hearing screening mandate and providers were conscientious in attending to the screening needs of the children in their care. While there were protocols for screening in place, they represented a wide range of approaches and variability in the data and its use for determining referrals. Interestingly, OAE screening was present in many locations as a primary or secondary tool despite inconsistent guidelines from professional organizations. There was also a misconception among health managers that a paper based screening tool met the Head Start standards for sensory screening of vision and hearing (US Department of Health and Human Services, 2015b). Some respondents reported using paper tools to meet the screening criteria.

It was quite evident that there was a need for a statewide standard in Connecticut for Head Start hearing screening. Standard protocols could lead to improved training consistency, allocation of training resources in the most cost effective manner across programs, and results that have predictable interpretation and referral. A consistent protocol in the Head Start population may lead to an improved statewide process for hearing screening in other early childhood agencies and programs such as Early Head Start, Birth to Three services, and Medical Home programs. Researchers identified an overwhelming need for access to pediatric audiology resources. This presents an opportunity for state advocacy groups and supportive agencies such as the university community to establish strong partnerships and mutually beneficial relationships that support these needs.

Future studies might further explore the sensitivity and specificity of OAE screening versus pure tone screening of hearing sensitivity and middle ear function in the Head Start preschool population. Other studies might determine best practices for including tympanometry in hearing screening protocols for preschool populations when otitis media may be more prevalent. Time and efficiency studies in the delivery of various protocols would be of benefit in establishing cost effective practice. Outcome research is necessary regarding the effect of standardized training on referral rates and efficiency of hearing screening protocols. This body of research is essential to establish a standard protocol for the earliest possible identification of children with hearing loss. Head Start programs, along with other early childhood service agencies, whose constituents have reduced access to the medical community, make this endeavor even more imperative.

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## References

- American Academy of Audiology [AAA]. (2011). *Childhood Hearing Screening [Clinical Practice Guidelines]*. Retrieved from [http://audiology-web.s3.amazonaws.com/migrated/ChildhoodScreeningGuidelines.pdf\\_5399751c9ec216.42663963.pdf](http://audiology-web.s3.amazonaws.com/migrated/ChildhoodScreeningGuidelines.pdf_5399751c9ec216.42663963.pdf)
- American Academy of Audiology Task Force on Early Identification of Hearing Loss. (2014). *Considerations for the use of support personnel for newborn hearing screening*. Retrieved from <http://www.audiology.org/publications-resources/document-library/considerations-use-support-personnel-newborn-hearing>
- American Academy of Pediatrics. (2014). *Recommendations for Preventive Pediatric Health Care*. Retrieved from [http://www.aap.org/en-us/professional-resources/practice-support/Periodicity/Periodicity%20Schedule\\_FINAL.pdf](http://www.aap.org/en-us/professional-resources/practice-support/Periodicity/Periodicity%20Schedule_FINAL.pdf)
- American Speech-Language-Hearing Association [ASHA]. (n.d.). *Childhood Hearing Screening. [Practice Portal]* Retrieved February 28, 2016, from [http://www.asha.org/PRPSpecificTopic.aspx?folderid=8589935406&section=Key\\_Issues](http://www.asha.org/PRPSpecificTopic.aspx?folderid=8589935406&section=Key_Issues)
- Bess, F. H., Dodd-Murphy, J., & Parker, R. A. (1998). Children with minimal sensorineural hearing loss: prevalence, educational performance, and functional status. *Ear & Hearing, 19*(5), 339-354.
- Centers for Disease Control and Prevention. (2012). Summary of 2009 National CDC EHDI Data. Retrieved from [http://www.cdc.gov/ncbddd/hearingloss/2009-data/2009\\_ehdi\\_hsf\\_s\\_summary\\_508\\_ok.pdf](http://www.cdc.gov/ncbddd/hearingloss/2009-data/2009_ehdi_hsf_s_summary_508_ok.pdf)
- Delage, H. & Tuller, L. (2007). Language development and mild-to-moderate hearing loss: Does language normalize with age? *Journal of Speech, Language, & Hearing Research, 50*, 1300-1313.
- Eiserman, W. D., Shisler, L., Foust, T., Buhmann, J., Winston, R., & White, K. R. (2007). Screening for hearing loss in early childhood programs. *Early Childhood Research Quarterly, 22*(1), 105-117.
- Gomes, M. & Lichtig, I. (2005). Evaluation of the use of a questionnaire by non-specialists to detect hearing loss in preschool Brazilian children. *International Journal of Rehabilitation Research, 28*(2), 171-174.
- Harlor, A.D.B & Bower, C. (2009). Hearing assessment in infants and children: Recommendations beyond neonatal screening. *Pediatrics, 111*(2), 436.
- Head Start. (2012). *Head Start Locator*. Retrieved from <http://eclkc.ohs.acf.hhs.gov/hslc/HeadStartOffices#map-home>
- Khairi, M. D., Daud, M., Noor, R. M., Rahman, N. A., Sidek, D. S., & Mohamad, A. (2010). The effect of mild hearing loss on academic performance in primary school children. *International Journal of Pediatric Otorhinolaryngology, 74*(1), 67-70.
- Kiese-Himmel, C., & Reeh, M. (2006). Assessment of expressive vocabulary outcomes in hearing-impaired children with hearing aids: Do bilaterally hearing-impaired children catch up? *The Journal of Laryngology & Otology, 120*, 619-626.
- National Center for Hearing Assessment and Management [NCHAM]. (2016). Early childhood screening & follow-up. Retrieved from <http://www.infantheating.org/earlychildhood/>

- Lieu, J. E. C. (2013). Unilateral hearing loss in children: speech-language and school performance. *B-ENT, Suppl 21*, 107–115.
- McGuckian, M. & Henry, A. (2007). The grammatical morpheme deficit in moderate hearing impairment. *International Journal of Language & Communication Disorders, 42*(S1), 17-36.
- Niskar, A. S., Kieszak, S. M., Holmes, A., Esteban, E., Rubin, C., & Brody, D. J. (1998). Prevalence of hearing loss among children 6 to 19 years of age: The Third National Health and Nutrition Examination Survey. *The Journal of the American Medical Association, 279*(14), 1071-1075.
- Olusanya, B. (2001). Early detection of hearing impairment in a developing country: What options? *Audiology, 40*, 141–7.
- Prieve, B.A., Schooling, T., Venediktov, R., & Franceschini, N. (2015). An evidenced-based systemic review on the diagnostic accuracy of hearing screening instruments for pre-school- and school-age children. *American Journal of Audiology, 24*, 250-267.
- Rosenfeld, R. M., Goldsmith, A. J., & Madell, J. R. (1998). How accurate is parent rating of hearing for children with otitis media? *Archives of Otolaryngology–Head & Neck Surgery, 124*(9), 989-992.
- Sininger, Y. S., Grimes, A., & Christensen, E. (2010). Auditory development in early amplified children: Factors influencing auditory-based communication outcomes in children with hearing loss. *Ear & Hearing, 31*(2), 166-185.
- U.S. Department of Health and Human Services Administration for Children and Families Office of Head Start. (2015a). Retrieved from <http://www.acf.hhs.gov/programs/ohs/about>
- U.S. Department of Health and Human Services Administration for Children and Families Office of Head Start. (2015b). *Head Start Program Performance Standards* (45 CFR 1304.20; 1308.60). Retrieved from <http://eclkc.ohs.acf.hhs.gov/hslc/standards/hspps>
- U.S. Census Bureau. (2014). *State and County Quick Facts*. Retrieved from [quick-facts.census.gov](http://quick-facts.census.gov)
- White, K. R., Forsman, I., Eichwald, J., & Munoz, K. (2010). The evolution of early hearing detection and intervention programs in the United States. *Seminars in Perinatology, 34*(2), 170-179.