

# Hearing and Vision Screening in Pediatric Primary Care and the Sharing of Results with Early Care and Education Programs

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## Abstract

This study explores the extent to which pediatric primary care (PPC) providers share hearing and vision screening results with early care and education (ECE) programs and report being unable to assess hearing and vision among pre-kindergarten children. Reports of hearing and vision screening are assessed to explore whether national support for early hearing detection and intervention has similarly promoted vision screening in PPC. We evaluated the reporting of hearing and vision screening data from 4,119 early childhood health assessment records, which were obtained from licensed ECE programs in Connecticut. Records were stratified by age group into younger or older per national recommendations for screening type by age. Overall, most PPC providers shared screening results with ECE programs. However, rates of sharing results were lower and unable to assess hearing and vision were higher among younger compared to older children ( $p < .001$ ). A similar proportion of hearing and vision sensory screens were reported, suggesting that national support for hearing screening may have promoted vision screening in PPC. Findings from this study highlight the need for improved support for PPC providers in implementing sensory screening for younger children and suggest a greater role for ECE programs in screening to ensure healthy development and early learning for young children.

**Key Words:** Early Care and Education, Hearing Screening, Pediatric Primary Care, Vision Screening

**Acronyms:** AAP = American Academy of Pediatrics; CECHA = Connecticut Early Childhood Health Assessment; DHHS = U.S. Department of Health and Human Services; ECE = early care and education; ECHO = Early Childhood Hearing Outreach; EHDI = Early Hearing Detection and Intervention; PPC = pediatric primary care; RFP = Request for Participation

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Recommendations for hearing (American Academy of Pediatrics' [AAP] Joint Committee on Infant Hearing, 2007) and vision screening (AAP Committee on Practice and Ambulatory Medicine, 2016) of young children in pediatric primary care (PPC) contribute to early identification of hearing and vision impairments, which may impede optimal sensory, social-emotional, and academic outcomes for children (de Koning et al., 2013; Yoshinaga-Itano, 2004). However, little is known about the extent to which PPC providers are unable to assess hearing and vision and share screening results with early care and education (ECE) programs. Reporting of hearing and vision status is particularly important for children who are deaf, hard-of-hearing, or visually impaired to ensure that their needs can be met while in their ECE program.

The United States census reports that 12.5 million children between birth and four years old attended childcare in 2011, comprising 61 percent of the early childhood

population (Laughlin, 2013). Head Start, a federally-funded preschool program that serves 3- and 4-year-old children from low-income families in the United States, requires hearing and vision screening within 45 days of enrollment (U.S. Department of Health and Human Services [DHHS], 2007). Head Start regulations state that hearing and vision screening performed as part of the child's recent well-child visit does not need to be repeated by the program (DHHS, n.d.). This regulation recognizes that health information sharing between PPC and ECE providers can ensure that sensory screening is complete for children in childcare.

## National Guidelines for Hearing and Vision Screening in PPC

The AAP (2007) position statement identifies the roles and responsibilities of various child service providers who can collaborate to create an effective early hearing detection and intervention program and ensure optimal outcomes for children with hearing impairments. Providers

include birthing hospitals and centers, primary care health professionals, audiologists, otolaryngologists, early intervention professionals, care coordinators, and medical homes. Medical homes are health care sites that deliver family centered, accessible, coordinated, comprehensive, and culturally competent care (AAP Committee on Children with Disabilities, 2005).

The AAP Committee on Practice and Ambulatory Medicine (2015) provides guidelines for hearing and vision screening as an integral part of PPC. The guidelines represent best practice and inform public and commercial insurers' decisions about covered services. The most recent guidelines call for 14 well-child visits before a child's fifth birthday, with hearing and vision screening included in each visit. The guidelines recommend subjective screening for younger children and objective screening for older children. Objective hearing screening is recommended for children four years and older. Objective vision screening is recommended for children three years and older.

The AAP (2010) does not provide recommendations for subjective or objective hearing screening methods. In 2012, 2,172 child health providers responded to a multi-state survey distributed by the National Center for Hearing Assessment and Management (White, Behl, & Levine, 2015). Respondents reported using several hearing screening methods such as asking parents about hearing concerns, using tuning forks, and making noises while watching for the child's response (White et al., 2015). While otoacoustic emissions and behavioral audiometry are two commonly used objective methods, fewer than 30% of respondents reported having hearing equipment in their office (White et al., 2015). The AAP (2010) highlights the use of parental questions and observation for subjective vision screening. An HOTV chart, Lea chart, Snellen numbers, and Random Doe-E stereotest are highlighted for objective vision screening (AAP Committee on Practice and Ambulatory Medicine, 2016).

In addition to the AAP (2010) screening guidelines, public policy has supported hearing screening and follow-up through the Universal Newborn Hearing and Intervention program (DHHS, 2016). This program is funded by the federal bureau of Maternal and Child Health under the Early Hearing Detection and Intervention (EHDI) program. The initiative funds the program in all 50 states and promotes newborn hearing screening at all birthing hospitals. The AAP (2016) has undertaken great efforts to heighten awareness of newborn hearing screening and follow-up activities among PPC providers. The program has developed a network of AAP state Chapter Champions to work locally to promote newborn screening and follow-up. Chapter Champions work with their local EHDI programs, provide education and guidance to pediatricians and other child health providers, and serve as a central EHDI resource for child health providers.

There has been no federal initiative to support vision screening for young children despite a position statement from the AAP (2016) recommending vision screening in newborns, cooperative 3-year-old children, and at the 4- and 5-year-old well-child visits. The position statement describes the role of ophthalmologists, optometrists, orthoptists, pediatricians, and family doctors, as well as other trained professionals in schools, ECE settings, and churches to perform vision screenings. The statement highlights referrals to medical doctors for comprehensive vision exams when impairments are suspected. The statement also highlights continuous collaboration between child health professionals and families of children with vision impairments to maximize the benefits of early intervention. Further support for vision screening in PPC is available from the U.S. Preventive Services Task Force, which is poised to recommend vision screening for 3 to 5-year-old children, but not for younger children (DHHS, 2017). These consistent guidelines between the national organizations have not resulted in the same federal attention and effort that has occurred for hearing screening.

### **Hearing Screening in PPC**

Results from the White et al. (2015) survey of 2,172 child health providers found that 81 percent of respondents reported screening children whose parents had concerns about hearing. About half of the respondents reported screening babies who did not pass newborn hearing screening, and about half also reported screening all 1 to 3-year-old children as part of their annual well-child visits. Forty-three percent of respondents reported screening children for whom they could not obtain newborn screening results from the child's hospital or birthing center. Combined, these survey results suggest variable performance in hearing screening within PPC.

Respondents were also surveyed about their collaborations with early hearing detection and intervention partners. The survey included many of the same questions from a similar survey in 2005. Except for otolaryngologists, respondents from the 2005 and 2012 surveys reported very little interaction with the early hearing detection and intervention professionals identified in the AAP Joint Committee on Infant Hearing guidelines (2007).

### **Vision Screening in PPC**

The few studies that have documented the performance of vision screening in PPC show that little has changed in screening preschool-age children over nearly two decades, (Kemper & Clark, 2006; Wall et al., 2002; Wasserman, Croft, & Brotherton, 1992) despite the introduction of new vision screening instruments for PPC and the availability of insurance payment for vision screening (Wall et al., 2002). Among the studies, rates of vision screening ranged between 34 to 38 percent for 3-year-old children and 73 to 91 percent for 4 to 5-year-old children (DHHS, 2007; Wall et al., 2002). Child health providers consistently cited lower rates of screening in 3-year-old children due to difficulty in screening them at such a young age (DHHS, 2007; Wall et al., 2002).

## Study Aims

This study explores the extent to which PPC providers share hearing and vision screening results with ECE programs, and report being unable to assess hearing and vision among pre-kindergarten children. Reported rates of hearing and vision screening are assessed to explore whether national support for early hearing detection and intervention has similarly promoted vision screening in PPC.

## Method

A secondary analysis of an existing dataset was conducted to explore completion of hearing and vision screenings for children enrolled in a sample of ECE programs at the time of the study. This study was exempted from Institutional Review Board review as no protected health information and individual identifiers were included in the existing dataset.

## Sample

In May 2013, 42 community early childhood councils throughout Connecticut were invited to respond to a Request for Participation (RFP) in the Early Childhood Health Data pilot project. Successful applicants were communities that had, in addition to other strengths, engaged a minimum of two school-based or licensed center-based ECE programs to participate in the project. All eight communities that responded to the RFP were eligible and participated in the project. Within the eight communities, 26 ECE programs also participated, including 80.8% ( $n = 21$ ) center-based programs, 15.4% ( $n = 4$ ) school-based programs, and 3.8% ( $n = 1$ ) home-based programs. Among the 26 ECE programs, there were 41 ECE program sites. Half of these sites (51.2%,  $n = 21$ ) received state or federal childcare subsidies, including one Head Start program. No Early Head Start programs participated in this project.

Hearing and vision screening data from 4,119 early childhood health assessment records were evaluated. Records were for children ages one month through 6 years old ( $M = 40.8$  months,  $SD = 11.6$  months,  $Mdn = 41$  months). Half (48.8%) of the sample were female.

## Materials

**Connecticut Early Childhood Health Assessment Record.** Connecticut requires licensed ECE programs to have an up-to-date health assessment on file for every child in their care (CT Gen Stat § 10-206, 2012). The Connecticut Early Childhood Health Assessment (CECHA) Record (see Appendix) satisfies this administrative regulation (Crowley & Whitney, 2005). The primary purpose of the health assessment record is to confirm that the child is mentally, medically, and developmentally ready to attend childcare and does not pose a safety threat to him/herself or others while in attendance (Crowley & Whitney, 2005). The record is useful for sharing health information and coordinating care among medical homes, parents/guardians, and ECE programs (Crowley & Whitney, 2005).

The CECHA record solicits critical child health information from parents/guardians and the medical home about physical health, chronic disease, and developmental concerns. Parents or guardians complete the first page of the record, which includes demographic and insurance information, parental concerns about their child's health, and health history information.

Pediatricians, advanced practice registered nurses, physician assistants, or any other licensed practitioners of medicine complete pages 2 and 3 of the record. Page 2 includes health information from the child's medical record, physical exam, and screenings. A section of page 2 is designated for practitioners to document the results of hearing screening, including marks of pass or fail for the right and left ears, and the results of vision screening for each eye, both with and without glasses. The record also includes space for providers to document if they were unable to assess hearing or vision, and if they made a referral to a specialist. The record does not solicit information about sensory screening methods. Page 3 of the record includes immunization information.

## Procedure

This study is a follow-up to the Early Childhood Health Data pilot project. The pilot project was designed to help community early childhood councils inform their early childhood planning using health data reported to ECE programs. A second project aim was to assess the value of the CECHA record in supporting communication between PPC providers and ECE programs (Macary, Honigfeld, & Wakefield, 2015). ECE programs that participated in the project were expected to enter all data from pages 1 and 2 of their records into a Microsoft Access (2010) database that was constructed for the project. The database included data entry and validation rules, reporting, and health monitoring capabilities for use in ECE programs (Macary et al., 2015). These capabilities served as incentive for ECE programs to report data for all children enrolled during the project.

ECE programs electronically submitted a de-identified copy of their dataset for analysis in May 2013 and again in October 2014 for newly enrolled children. Subsequently, the datasets were combined for aggregate analysis. Hearing and vision screening data (i.e., hearing screen completed, vision screen completed, unable to assess, referral made, marks of pass or fail for hearing, and marks of acuity with and without glasses for vision) were accessed and extracted from the aggregate dataset.

## Data Analysis

The analysis of categorical data was conducted using SAS® software version 9.3. Preliminary results of several child health indicators, which did not include hearing and vision screening information, were previously reported (Macary et al., 2015). The proportion of all CECHA records with documentation of any hearing or vision screening information was computed as a proxy for communication with ECE programs. Documentation was defined as a

completed screen, unable to assess, referral made, marks of pass or fail for hearing, or marks of acuity with and without glasses for vision.

Among records with any hearing or vision information, the proportion of records with documentation of unable to assess was computed. Z-scores were calculated to compare the data by age group (i.e., younger or older) for communication and unable to assess. Age groups were defined per AAP Committee on Practice and Ambulatory Medicine (2015) guidelines: subjective screening for younger children and objective screening for older children. Objective hearing screening is recommended for children four years and older. Objective vision screening is recommended for children three years and older.

## Results

Three quarters (74.3%) of the 4,119 CECHA records had documentation of hearing and/or vision screening information. Two-thirds of records had documentation of hearing (67.9%) and vision (66.7%) information,  $Z = -1.17$ ,  $p = 0.240$ , 95% CI [-0.03, 0.01]. Vision concerns were documented on 0.4% ( $n = 16$ ) of records. Referrals to vision specialists were documented on 2.3% ( $n = 95$ ) of records. Hearing concerns were documented on 0.3% ( $n = 13$ ) of records. Referrals to hearing specialists were documented on 1.2% ( $n = 48$ ) of records.

## By Age Group

**Documentation of any hearing or vision screening information.** For CECHA records with documentation of hearing screening information, 60.8% ( $n = 2,505$ ) were for younger children (i.e., < 4 years old) and 39.2% ( $n = 1,614$ ) were for older children (i.e., ≥ 4 years old). Among records of younger children, 61.6% ( $n = 1,544$ ) had documentation of any hearing information compared with 77.7% ( $n = 1,254$ ) among older children,  $Z = 11.31$ ,  $p < .001$ , 95% CI [-0.19, -0.13]. For records with documentation of vision screening information, 21.2% ( $n = 872$ ) of all records were for younger children (i.e., < 3 years old) and 78.8% ( $n = 3,247$ ) were for older children (i.e., ≥ 3 years old). Among records for younger children, 57.5% ( $n = 501$ ) had documentation of any vision information compared with 69.2% ( $n = 2,247$ ) among older children,  $Z = -6.32$ ,  $p < .001$ , 95% CI [-0.15, -0.08]. Table 1 provides comparisons of records with documentation of hearing and vision screening information by age group.

**Unable to assess hearing or vision.** Of CECHA records with any hearing screening information, unable to assess was documented on 48.4% ( $n = 748$ ) of records among younger children ( $n = 1,544$ ) compared with 26.2% ( $n = 329$ ) of records among older children ( $n = 1,254$ ),  $Z = 12.49$ ,  $p < .001$ , 95% CI [0.19, 0.26]. Of records with any vision information, unable to assess was documented on 59.1% ( $n = 296$ ) of records among younger children ( $n = 501$ ) compared with 37.9% ( $n = 852$ ) of records among older children ( $n = 2,247$ ),  $Z = 4.33$ ,  $p < .001$ , 95% CI [0.16, 0.11]. Table 2 provides comparisons of records with documentation of unable to assess hearing and vision by age group.

**Table 1**  
*Early Childhood Health Assessment Records with Documentation of Any Hearing or Vision Screening Information from the Medical Home*

	Age Group		P
	Younger Children	Older Children	
Sensory Screening			
Hearing (N records)	2,505	1,614	
Records with hearing information <sup>a</sup> (n, %)	1,544 (61.6)	1,254 (77.7)	< 0.001
Vision (N records)	872	3,247	
Records with vision information <sup>a</sup> (n, %)	501 (57.5)	2,247 (69.2)	< 0.001

*Note.* Age groups were defined according to national guidelines recommending subjective screening for younger children and objective screening for older children. Objective hearing screening is recommended for children four years and older. Objective vision screening is recommended for children three years and older.

<sup>a</sup>Any hearing or vision screening information refers to documentation of screening, *unable to assess*, referrals made, marks of pass or fail for hearing, or marks of acuity for vision.

**Table 2**  
**Early Childhood Health Assessment Records with Documentation of Unable to Access Hearing or Vision from the Medical Home**

	Age group		<i>p</i>
	Younger children	Older children	
Sensory screening			
Hearing ( <i>N</i> records)	1,544	1,254	
Records with hearing information <sup>a</sup> ( <i>n</i> , %)	748 (48.4)	329 (26.2)	< 0.001
Vision ( <i>N</i> records)	501	3,247	
Records with vision information <sup>a</sup> ( <i>n</i> , %)	296 (59.1)	852 (37.9)	< 0.001

*Note.* Age groups were defined according to national guidelines recommending subjective screening for younger children and objective screening for older children. Objective hearing screening is recommended for children four years and older. Objective vision screening is recommended for children three years and older.

## Discussion

This study explored the extent that PPC providers shared hearing and vision screening results with ECE programs, and reported being unable to assess hearing and vision among pre-kindergarten children. Most PPC providers shared screening results with ECE programs. However, rates of sharing results were lower and unable to assess hearing and vision were higher among younger compared to older children ( $p < .001$ ). These findings are consistent with previous findings (Wall et al., 2002) and highlight the need for hearing and vision screening among younger children. PPC provider education about strategies for screening younger children could improve the detection of early hearing and vision impairments. A similar proportion of hearing and vision screenings was documented on the CECHA records. This suggests that the federally-funded, national EHDI initiative may have similarly promoted vision screening in PPC.

This study reinforces the need for ECE programs to be vigilant in reviewing health assessment forms, completing missing screenings, and reporting results to the PPC provider. These actions can ensure that screening is complete between settings. Additionally, ECE providers play an important role in screening children when PPC providers report that they are unable to assess hearing and vision.

The National Center for Hearing Assessment and Management at Utah State University has shown that ECE programs can play an expanded role in early hearing detection (Eiserman et al., 2007; Eiserman et al., 2008). The Early Childhood Hearing Outreach (ECHO) program trains publicly funded ECE programs to complete hearing screening and related follow-up activities (National Center for Hearing Assessment and Management, 2017). The program highlights the use of screening results to promote school readiness in young children and connection to local support services for children with hearing impairments. In collaboration with PPC providers, the initiative brings

efficiency to hearing screening services for young children by advising providers about hearing screening results. This is particularly true for children whom they are unable to assess.

This study has several limitations. First, the measurement tool used in this study has limited reliability and validity. The CECHA record is not designed to collect and analyze early childhood health data for research purposes. The sensory screening method, quality, accuracy, and consistency could not be addressed as the record does not solicit this information from PPC providers. Additionally, PPC providers were not required to enter responses in all sections of the record, resulting in some records without documentation of hearing or vision screening information. It is also unclear why some PPC providers selected the unable to assess category. It is possible that the child was uncooperative or the provider did not have adequate equipment or means to conduct the screening.

Despite these limitations, this study highlights one area of collaboration between PPC providers and ECE programs in promoting child health and development by ensuring early sensory screening. ECE programs can address sensory impairments in children, beginning with knowledge of hearing and vision needs. Sharing sensory health information among families, PPC providers, and ECE programs is critical to meeting the needs of all children and especially those with hearing or vision impairments. Health and ECE professionals working with families can ensure early detection of hearing and vision impairments, connection to intervention services and accommodations, and ensure family support for children with sensory impairments.

Additional research is warranted to fully explore whether organized national support for early hearing detection and intervention has similarly promoted vision screening in PPC. Refinement of national guidelines for hearing and vision screening to address acceptable methods and reporting to ECE programs can improve early learning

opportunities for young children with sensory impairments. Guidelines could highlight the use of feasible, best practice screening methods, and accurate reporting of specific, up-to-date screening results and methods to ECE programs.

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Appendix

State of Connecticut Department of Education
Early Childhood Health Assessment Record
(For children ages birth – 5)



To Parent or Guardian: In order to provide the best experience, early childhood providers must understand your child’s health needs. This form requests information from you (Part I) which will be helpful to the health care provider when he or she completes the health evaluation (Part II). State law requires complete primary immunizations and a health assessment by a physician, an advanced practice registered nurse, a physician assistant, or a legally qualified practitioner of medicine, an advanced practice registered nurse or a physician assistant stationed at any military base prior to entering an early childhood program in Connecticut.

Please print

Form with fields for: Child’s Name (Last, First, Middle), Birth Date (mm/dd/yyyy), Gender (Male/Female), Address (Street, Town and ZIP code), Parent/Guardian Name (Last, First, Middle), Home Phone, Cell Phone, Early Childhood Program (Name and Phone Number), Race/Ethnicity (American Indian/Alaskan Native, Hispanic/Latino, Black, not of Hispanic origin, Asian/Pacific Islander, White, not of Hispanic origin, Other), Primary Health Care Provider, Name of Dentist, Health Insurance Company/Number\* or Medicaid/Number\*, and health insurance questions.

\* If applicable

Part I — To be completed by parent/guardian.

Please answer these health history questions about your child before the physical examination.

Please circle Y if “yes” or N if “no.” Explain all “yes” answers in the space provided below.

Table with 3 columns of health history questions and Y/N response options. Questions include: Any health concerns, Allergies to food, bee stings, insects, Allergies to medication, Any other allergies, Any daily/ongoing medications, Any problems with vision, Uses contacts or glasses, Any hearing concerns, Frequent ear infections, Any speech issues, Any problems with teeth, Has your child had a dental examination in the last 6 months, Very high or low activity level, Weight concerns, Problems breathing or coughing, Asthma treatment, Seizure, Diabetes, Any heart problems, Emergency room visits, Any major illness or injury, Any operations/surgeries, Lead concerns/poisoning, Sleeping concerns, High blood pressure, Eating concerns, Toileting concerns, Birth to 3 services, Preschool Special Education, and Developmental — Any concern about your child’s: 1. Physical development, 2. Movement from one place to another, 3. Social development, 4. Emotional development, 5. Ability to communicate needs, 6. Interaction with others, 7. Behavior, 8. Ability to understand, 9. Ability to use their hands.

Explain all “yes” answers or provide any additional information:

Have you talked with your child’s primary health care provider about any of the above concerns? Y N

Please list any medications your child will need to take during program hours:

All medications taken in child care programs require a separate Medication Authorization Form signed by an authorized prescriber and parent/guardian.

I give my consent for my child’s health care provider and early childhood provider or health/nurse consultant/coordinator to discuss the information on this form for confidential use in meeting my child’s health and educational needs in the early childhood program.

Signature of Parent/Guardian

Date