

Hearing and Vision School Screening Survey

RESULTS AND RECOMMENDATIONS



2008-2009



BACKGROUND

The Ohio Department of Health (ODH) Hearing and Vision Screening Program is a program of early detection, diagnosis and treatment of children with hearing and vision problems. Early detection and treatment of hearing and vision disorders provide children the best opportunity to develop academically, emotionally and socially. Regular school hearing and vision screenings are an important method of identifying children who are at risk.

Hearing loss in school children may interfere with normal speech and language development and with the ability to learn. Even mild or unilateral hearing losses may be educationally significant. Between one and six per 1,000 newborns are born with congenital hearing loss and it is not always identifiable at birth. Almost 15% of children have low-frequency or high-frequency hearing loss of at least 16 decibels in one or both ears. It is estimated that 83 out of every 1,000 US children have educationally significant hearing loss (<http://www.asha.org>).

Childhood vision disorders are also a significant public health problem. Early identification, diagnosis and correction of children's vision disorders are essential parts of all child health programs. Amblyopia (lazy eye), uncorrected refractive error (errors of eye focusing), and strabismus (eye misalignment) are the most frequently occurring vision problems of young children and pose a significant public health threat. These vision problems are the leading handicapping conditions of childhood. It is estimated that two to three percent of the general population suffers from amblyopia; vision loss attributable to amblyopia is entirely preventable (<http://www.preventblindness.org>).

The Ohio Department of Health (ODH) is given the authority by the Ohio Revised Code (ORC) to set the hearing and vision screening requirements for school-aged children and to track the data (ORC Sections 3313.50 and 3313.69). ODH works in partnership with ad hoc committees to set the requirements (see Appendix) for what grades are routinely screened each year, what equipment is acceptable to use, what specific hearing and vision tests are needed to perform the screenings and referral criteria.

In addition to establishing school screening standards, the program conducts a biennial statewide survey of school hearing and vision screening programs. ODH uses data from this survey in multiple ways:

- 1. To determine compliance with screening requirements**
- 2. To plan statewide hearing and vision hearing screening trainings**
- 3. To establish and revise Ohio hearing and vision screening guidelines**
- 4. To assist in planning ODH's Maternal and Child Health Block Grant objectives.**



M E T H O D O L O G Y

The purpose of the 2008-2009 biennial survey was to collect data on hearing and vision screening practices in Ohio schools, kindergarten through 12th grade and school-based preschools. A stratified sample survey design was used to select school buildings. School buildings, excluding vocational schools, listed on the Ohio Department of Education's Web site in February 2007, were eligible to be randomly sampled within each stratum. School buildings were stratified by county type (Metropolitan, Suburban, Rural Appalachian or Rural Non-Appalachian) and by classification as high school or non-high school. Surveys were sent to school nurses at sampled schools; respondents were also given the option of completing the survey electronically through Survey Monkey. Surveys were re-sent to schools not responding to the initial contact. The final response rate for the survey was 81%. This was an increase from the 2006-2007 survey response rate of 62.5%. In addition, ODH increased the sample size from the previous survey cycle.

Survey data were weighted by The Ohio State University Center for Biostatistics. The weighted data were analyzed using SAS statistical software version 9.1 and the frequencies provided represent statewide estimates.



RESULTS

The following is a summary of the 2008-2009 school survey results. Per ORC 3313.69, if a school provides health services (medical inspection) then hearing and vision screening must be conducted following guidelines set by the ODH.

TABLE 1

Schools providing hearing and vision screening during the 2008-2009 school year

		Percent (%)	
Hearing	Yes	88.9%	
	No	11.1%	
Vision	Yes	94.5%	
	No	5.5%	

88.9% (n=3833) of hearing screening respondents were in compliance with ORC 3313.69. This is a decrease compared to the 2006-2007 survey results (92% reported hearing screening).

94.5% (n=4187) of vision screening respondents were in compliance with ORC 3313.69. This is a decrease compared to the 2006-2007 survey results (99% reported vision screening).

HEARING SCREENING

TABLE 2

Number of children screened and referred during the 2008-2009 school year

Grade	Children initially screened	Children rescreened	Children referred	Proportion of screened who were referred
Preschool	10972	1571	590	5.3%
Kindergarten	129865	11198	2976	2.3%
First Grade	131541	9255	2685	2.0%
Third Grade	136092	7944	2440	1.8%
Fifth Grade	125919	7386	2867	2.3%
Seventh Grade*	39011	2519	858	2.2%
Ninth Grade	125749	7214	2551	2.0%
TOTAL	699149	47087	14967	2.1%* <i>(average)</i>

*7th grade is included in the hearing screening results but is not a required grade for hearing screening.

The highest proportion of referrals out of those initially screened was in preschool (5.3%) followed by kindergarten (2.3%), fifth grade (2.3%), seventh grade (2.2%), first grade (2.0%), ninth grade (2.0%) and finally third grade (1.8%). The highest proportion of children referred was in preschool and kindergarten. Hearing screening and rescreening is predominantly performed by nurses (59%) followed by other licensed screeners (19%).

Based on screening records, a total of 49.6% of respondents estimated that 0%-25% of their referred students received follow-up hearing care; 15.1% of respondents estimated that 26%-50% of their referred students received follow-up hearing care; 12.5% of respondents estimated that 51%-75% of their referred students received follow-up hearing care; and 22.9% of respondents estimated that 76%-100% of their referred students received follow-up hearing care. The majority of respondents estimated that 0%-50% of their referred students received follow-up hearing care based upon follow-up information received by the respondent.

TABLE 3

Frequency and decibel levels used for pure tone screening

	1000Hz @ 20dB		2000Hz @ 20dB		4000Hz @ 20dB	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
TOTAL	3640	95.0%	3637	94.9%	3626	94.6%

At this time, the only frequencies to be used in the hearing screening are 1000, 2000 and 4000 Hz and the only intensity is 20dB. A total of 8.3% of respondents said hearing screenings are conducted at other frequencies or decibel levels than those listed above. The most common frequency and decibel levels of noncompliance were 500 Hz (104 respondents) and 25 dB (144 respondents), respectively. Of all the screeners who responded they screened at other frequencies or decibels, 24.1% said they don't refer; 43.5% said they do refer; and 32.4% said they sometimes refer based on those frequency and decibel levels.



VISION SCREENING

TABLE 4

Number of children screened and referred during the 2008-2009 school year

Grade	Children initially screened	Children rescreened	Children referred	Proportion of screened who were referred
Preschool	11485	1425	1051	9.2%
Kindergarten	129817	19692	11914	9.2%
First Grade	133041	16301	11956	9.0%
Third Grade	136813	15467	12313	9.0%
Fifth Grade	126562	14502	12702	10.0%
Seventh Grade	130774	17558	15199	11.6%
Ninth Grade	128901	13000	10988	8.5%
TOTAL	797393	97945	76123	9.5% (average)

The highest proportion of referrals out of those initially screened was in seventh grade (11.6%), followed by fifth grade (10.0%), preschool (9.2%), kindergarten (9.2%), first grade (9.0%), third grade (9.0%) and finally ninth grade (8.5%). The proportion of children screened who were referred in the 2008-2009 school year was an average of 9.5%.

Based on screening records, a total of 38.7% of respondents estimated that 0%-25% of their referred students received follow-up vision care; 23.8% of respondents estimated that 26%-50% of their referred students received follow-up vision care; 19.4% of respondents estimated that 51%-75% of their referred students received follow-up vision care; and 18.1% of respondents estimated that 76%-100% of their referred students received follow-up vision care. The majority of respondents estimated that 0%-50% of their referred students received follow-up vision care based upon follow-up information received by the respondent.

TABLE 5

Tests performed for mass or group vision screening

Grade	Observation		Distance Visual		Muscle Balance		Color		Stereopsis		Near Visual Acuity	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Preschool	277	50.0	302	54.4	101	18.2	93	16.8	212	38.1	37	6.7
Kindergarten	1,877	78.5	2,204	92.2	1,439	60.2	1,728	72.3	2,071	86.6	312	13.1
First Grade	1,923	78.7	2,262	90.1	1,540	63.0	1,259	51.5	1,597	65.3	224	9.1
Third Grade	1,948	79.7	2,283	93.4	257	10.5	170	7.0	182	7.4	176	7.2
Fifth Grade	1,778	77.6	2,088	88.7	188	8.2	125	5.4	141	6.2	167	7.3
Seventh Grade	1,112	70.7	1,360	86.5	100	6.4	89	5.7	80	5.1	145	9.2
Ninth Grade	711	71.9	848	85.7	61	6.1	51	5.2	49	5.0	108	11.0

Shaded areas indicate vision screening requirements by grade

Schools indicating they conducted vision screening were asked which screening tests they used to conduct mass or group screenings. The most frequently used test was Distance Visual screening, which was used in over 80% of kindergarten, first, third, fifth, seventh and ninth grade screenings. It was used in 54% of preschool screenings; this response rate is low. ODH will revise the survey to determine if compliance is lower for screening preschool aged children or if the survey design affected the response rate.

TABLE 6

Equipment used to measure distance visual acuity (all grades)

Type	Percent (%)
Acuity light box and eye chart	80.2%
Good-lite insta line vision screener	14.1%
Titmus, keystone or optec	7.4%
Other	3.2%

Refer to the Appendix for what grades are routinely screened each year, what equipment is acceptable to use and what specific vision tests are needed to perform the screenings. Visual acuity is described as the sharpness or clarity of vision (<http://www.aoa.org>). Of those conducting distance visual acuity screening among **preschool and/or kindergarten students**, a total of 82.5% of all respondents used an LEA Chart.



stereopsis test kit

The brain registers two images, one from each eye. The result is **stereopsis**—the fusion of the two messages into one image (<http://www.strabismus.org>). A total of 92.8% of respondents said stereopsis screening is administered during vision screening for preschool and/or kindergarten students, 5.5% said it wasn't used and 1.8% said they did not know.

Of those 5.5% of responders that stated stereopsis screening was not administered, the following reasons for noncompliance were provided:

- 49.1% said they didn't know stereopsis was required.
- 28.1% had another reason for not administering stereopsis.
- 20.8% said they didn't know how to administer the stereopsis test.
- 20.4% said they didn't have time to administer stereopsis.
- 9.7% said they didn't administer the stereopsis because the test is too expensive.

SCREENING SYNOPSIS

There were 699,149 students who received hearing screening in the 2008-2009 school year; 47,087 were rescreened; and 14,967 were referred for follow-up. There were 797,393 students who received vision screening in the 2008-2009 school year; 97,945 were rescreened; and 76,123 were referred for follow-up. The majority of respondents estimated that 0%-50% of their referred students received follow-up care based upon information received.

The survey also collected data regarding the ratio of students per school nurse full-time equivalent (FTE). For ODH purposes, a school nurse FTE is 37 hours per week. The average number of students per school nurse FTEs was 1,325. This was an increase from 1,269 reported in the 2006-2007 survey.

Hearing screening and rescreening is predominantly performed by nurses followed by other licensed screeners.

The majority of vision screening is performed by nurses.



DISCUSSION

The current and future survey results will be used to determine compliance with screening requirements; to plan statewide hearing and vision hearing screening trainings; to establish and revise Ohio hearing and vision screening guidelines; and to assist in planning ODH's Maternal and Child Health Block Grant objectives (in collaboration with the ODH School Nurse Survey). The next biennial survey is scheduled for the 2010-2011 school year.

The compliance rate in 2006-2007 indicated that 99% of vision screening respondents and 92% of hearing screening respondents were in compliance with ORC 3313.69. The 2008-2009 compliance rate decreased from the 2006-2007 survey for hearing and vision yet the compliance rate remained high. Based upon the results, 94.5% of vision screening respondents were in compliance with ORC 3313.69. The 88.9% of hearing screening respondents were in compliance with ORC 3313.69. Compliance issues related to hearing screening at incorrect frequencies or decibels and issues related to stereopsis vision screening need to be addressed through future training endeavors. ODH will continue to monitor compliance.

Feedback from survey respondents regarding screening methods used and barriers to screening compliance will be presented to the advisory committee for consideration for future revisions to the guidelines. For example, 9.7% of those who did not administer stereopsis stated that the test was too expensive. In addition, based on the hearing screening compliance, the 2010-2011 survey will inquire about barriers to hearing screening.

LIMITATIONS

A limitation of the study and the data collection is that there is no requirement that parents/caregivers submit follow-up documentation so the data on number of referred students who received follow-up care is based on the percent received by the respondent and not a true representation of actual follow-up received.

Based upon follow-up information received by the respondents, the majority estimated 0-50% of their referred students received follow-up care (65% of respondents for hearing and 63% for vision). More than 80% of respondents reported receiving follow-up care information for <75% of the children referred for follow-up. Potentially 25-50% of children referred for follow-up may not be receiving the follow-up care. It is our recommendation that funding should be identified for research to determine the barriers to follow-up and efforts to reverse the trend are made.

RECOMMENDATIONS

Recommendations for use of the data correspond with the four purposes of the survey: to establish and revise Ohio hearing and vision screening guidelines; to determine compliance with screening requirements; to plan statewide hearing and vision hearing screening trainings; and to assist in planning ODH's Maternal and Child Health Block Grant objectives.

GUIDELINES REVISION

The guidelines are revised periodically to remain current with national recommendations and the latest research. The current and proposed preschool screening guidelines correspond with the Ohio Early Periodic Diagnostic, Screening and Treatment (EPSDT) requirements and are compatible with national recommendations such as the American Academy of Pediatrics (AAP) Bright Futures Guidelines, a uniform set of recommendations for health care professionals, and the U.S. Preventive Services Task Force (USPSTF) recommendations for vision screening. The results of this survey will be used in future years when the guidelines are revised. For example, an emphasis will be made on the importance of stereopsis screening for vision and further justification will be provided for the hearing screening protocol to avoid screening at frequencies and decibels not recommended in the guidelines.

COMPLIANCE AND TRAINING

ODH will offer nine regional training sessions during 2010-2011, in-house training sessions most months of the school year and other training sessions as needed. Visit the ODH Web site at http://www.odh.ohio.gov/odhPrograms/cfhs/hvscr/hv_trg.aspx to view a listing of training sessions. Based on the results of this survey, training sessions will emphasize correct frequency and intensity used in hearing screening; information on appropriate referral practices; appropriate charts and screening tests for vision screening; and use of non-licensed screeners.

The purpose of a hearing screening program is to detect hearing problems in the school-age population. It is not a diagnostic evaluation. In the past, the frequency of 500 Hz was included in the hearing screening process. The American Academy of Audiology (AAA), American Speech-Language and Hearing Association (ASHA) and ODH no longer recommend screening at this frequency. **At this time, the only frequencies to be used in the hearing screening are 1000, 2000 and 4000 Hz and the only intensity is 20dB.** Referrals should be based only on the child failing to hear at 20dB at 1000, 2000, and 4000 Hz. Performing hearing screenings at 250, 500 or 8000 Hz is unnecessary and more time consuming. Also, using the lower frequencies may increase the referral rate because these frequencies should be used only when testing in a soundproof room. Ambient noise greatly interferes with testing of lower frequencies. There is large pressure difference between 20 dB and 25 dB as decibels rise exponentially. Twenty decibels is the bottom range of normal hearing and if a child cannot hear at 20 dB then there may be a problem. Noise levels do not affect 2000 and 4000 Hz. However, noise could affect 500Hz so this level was removed from the protocol.

The vision screening chart recommended by ODH for screening preschoolers and/or kindergarteners is the LEA eye chart because all the symbols blur to the same configuration when the child reaches their visual threshold. The Lighthouse chart, which has an apple, house and umbrella, is not recommended because the umbrella when blurred is not the same configuration as the apple and house thus giving the child an advantage at guessing.

Stereopsis is one of the most important tests to be conducted in preschool and kindergarten. This test allows the screener to identify children who are at risk for amblyopia. Maturation of the eyes takes effect about age seven or eight; identification of these children as young as possible is critical because treatment is more effective when the condition is caught early. Of the respondents who reported stereopsis was not administered, more respondents stated that they did not know stereopsis was required than in previous years. This will be addressed in training.

Hearing screening and rescreening is predominantly performed by nurses followed by other licensed screeners and the majority of vision screening is performed by nurses. When possible, the nurse and other licensed screeners are the preferred screeners for preschool, kindergarten and first grade. The testability of children increases with age, therefore the screening may be more challenging with these younger age groups. Volunteers, if used, would be better utilized for screening older children.

Maternal and Child Health Block Grant State Negotiated Performance Measure

The goal of the ***Maternal and Child Health Block Grant State Negotiated Performance Measure # 9*** was to increase the proportion of preschool children (ages 3 to 5) who receive age- and risk-appropriate screenings for lead, vision and hearing. One of the workgroup strategies was to identify available data sources and/or explore data collection methods to measure the specific impact of activities on preschool screening rates for lead, vision and hearing. Due to the limitations in available preschool hearing and vision screening or exam data, ODH collected kindergarten referral rates each year through the biennial Hearing and Vision Screening School Survey and the biennial School Nurse Survey (alternating years). If kindergarten referral rates decreased, the assumption was made that more preschoolers are being screened and treated, thereby having an affect on screening and referral rates in kindergarten. The 2006-2007 Hearing and Vision Screening School Survey data served as the baseline data.

For Federal Fiscal Years 2011-2015, ***State Performance Measure #9*** has become ***State Performance Measure #10***. During the Maternal and Child Health Block Grant statewide needs assessment process, age appropriate screening and referral/follow-up was deemed important. ***State Performance Measure #10*** will include the development of statewide capacity to improve the percent of children who receive timely, age-appropriate screening and referral using quality improvement science methods.

This program helps support ODH's mission to protect and improve the health of Ohioans by developing minimum school screening requirements, providing training to screeners and monitoring screening compliance so that children are identified and referred for treatment. These community-based services for children help assure quality and safety as well as access to healthcare, preventing illnesses and injury.

APPENDIX

Grade Level of Hearing Screening	Type of Hearing Screening Procedure	Recommended Equipment for Hearing Screening Procedure
Preschool Kindergarten First Third Fifth Ninth	<i>External observation</i>	<i>No equipment needed</i>
	Pure-tone air conduction audiometry	Screening to occur at the below frequencies in both the right and left ear
	Occurs in right and left ear	1000 Hz at 20 dB HL
		2000 Hz at 20 dB HL
	4000 Hz at 20 dB HL	
Optional Tests: Tympanometry	226 Hz tone with a constant pump speed of 200 daPa/sec	
Otoacoustic emissions (OAEs)	Follow manufacturer's instructions. Should be used in conjunction with otoscopy and tympanometry.	

Grade Level of Vision Screening	Type of Vision Screening Procedure	Recommended Equipment for Vision Screening Procedure
Preschool	Observation	No equipment needed
	Distance visual acuity	Broken Wheel, HOTV, LEA chart or Tumbling E
	Stereopsis	Random Dot E
Kindergarten	Observation	No equipment needed
	Distance visual acuity	Acuity light box and eye charts at 10 feet/20 feet depending upon design of chart
		Any letter chart
		LEA chart Tumbling E chart
	Stereopsis	Lang or Random Dot E
	Color deficit screening	Pseudoisochromatic plates, Color Testing Made Easy
Optional test-near visual acuity	Near point acuity card with letters, pictures or symbols	
First	Observation	No equipment needed
	Distance visual acuity	Acuity light box and Eye Charts at 10 feet/ 20 feet depending upon design of chart
		Any letter chart
	Ocular muscle balance	Occluder and fixation target for distance and near
	Color deficit screening	Pseudoisochromatic plates, Color Testing Made Easy
Stereopsis	Lang or Random Dot E	
	Optional test-near visual acuity	Near point acuity card with letters, pictures or symbols
Third	Observation	No equipment needed
	Distance visual acuity	Acuity light box and Eye Charts at 10 feet/ 20 feet depending upon design of chart
		Any letter chart
	Color deficit screening	Pseudoisochromatic plates, Color Testing Made Easy
Optional test-near visual acuity	Near point acuity card with letters, pictures, or symbols	

Grade Level of Vision Screening	Type of Vision Screening Procedure	Recommended Equipment for Vision Screening Procedure
Fifth	Observation	No equipment needed
	Distance visual acuity	Acuity light box and eye charts at 10 feet/20 feet depending upon design of chart
		Any letter chart
	Color deficit screening	Pseudoisochromatic plates, Color Testing Made Easy
Optional test-near visual acuity	Near point acuity card with letters, pictures, or symbols	
Seventh	Observation	No equipment needed
	Distance visual acuity	Acuity light box and eye charts at 10 feet/ 20 feet depending upon design of chart
		Any letter chart
	Color deficit screening	Pseudoisochromatic plates, Color Testing Made Easy
Optional test-near visual acuity	Near point acuity card with letters, pictures, or symbols	
Ninth	Observation	No equipment needed
	Distance visual acuity	Any letter chart
		Acuity light box and eye charts at 10 feet/20 feet depending upon design of chart
	Color deficit screening	Pseudoisochromatic plates, Color Testing Made Easy
Optional test-near visual acuity	Near point acuity card with letters, pictures or symbols	

