Ohio School Hearing and Vision Screening Report

Survey Results 2006–2007

The mission of the Ohio Department of Health is
to protect and improve the health of all Ohioans by preventing disease,
promoting good health and assuring access to quality health care.

The vision of the Ohio Department of Health is optimal health for all Ohioans.

2006-2007
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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 1 and 6 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 (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 (www.preventblindness.org).

The Ohio Department of Health 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 vision and hearing 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; and
4. To assist in planning ODH's Maternal and Child Health Block Grant measures.

Methodology

The purpose of the 2006-2007 biennial survey was to collect data on hearing and vision screening practices in Ohio schools, kindergarten through 12th grade and school-based preschools. A random stratified sample survey design was used to select school buildings and surveys were sent to the school nurse at each sampled school. School buildings, excluding vocational schools, listed in the Ohio Department of Education's web site in February 2007 were eligible to be sampled. Surveys were re-sent to schools not responding to the initial contact. The final response rate for the survey was 62.5%.

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 2006-2007 school survey results. Per ORC 3313.69, if a school provides health services (medical inspection) then hearing and vision screening must be conducted and follow guidelines set by the ODH.

Table 1: Number and percent of schools providing hearing and vision screening during the 2006-2007 school year

		Total	
		Frequency	Percent
Hearing	Yes	3512	92.0
	No	304	8.0
Vision	Yes	3780	99.0
	No	21	1.1

92 percent (n=3512) of hearing screening respondents were in compliance with ORC 3313.69.
99 percent (n=3780) of vision screening respondents were in compliance with ORC 3313.69.

Hearing Screening

Table 2: Number of children screened and referred during the 2006-2007 school year.

Grade	Children initially screened	Children rescreened	Children Referred	Proportion of screened who were referred
Preschool	13,698	1,626	779	5.7%
Kindergarten	130,252	12,495	3,471	2.7%
First Grade	150,305	12,232	4,031	2.7%
Third Grade	145,268	10,604	3,089	2.1%
Fifth Grade	139,610	7,931	2,931	2.1%
Seventh Grade*	30,776	1,375	521	1.7%
Ninth Grade	127,623	6,019	2,583	2.0%
Total	737,532	52,283	17,404	3.2% (average)*

**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 (5.7%) followed by kindergarten (2.7%), first grade (2.7%), third grade (2.1%), fifth grade (2.1%), ninth grade (2.0%) and finally seventh grade (1.7%). The highest proportion of children referred was in preschool, kindergarten and first grade.

Based on screening records, a total of 47.4% of respondents estimated that 0%-25% of their referred students received follow-up hearing care; 12.6% of respondents estimated that 26%-50% of their referred students received follow-up hearing care; 13.9% of respondents estimated that 51%-75% of their referred students received follow-up hearing care; and 26.0% 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.

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 10.3% 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 (262 respondents) and 25 dB (531 respondents) respectively. Of all the screeners who responded they screened at other frequencies or decibels, 23.3% said they don't refer; 64.2% said they do refer; and 12.4% said they sometimes refer based on those frequency and decibel levels.

Table 3: Frequency and decibel levels used for pure tone screening

	1000Hz @ 20dB		2000Hz @ 20dB		4000Hz @ 20dB	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	3781	99.7	3792	100.0	3792	100.0

Vision Screening

Table 4: Number of children screened and referred during the 2006-2007 school year.

Grade	Children initially screened	Children rescreened	Children referred	Proportion of screened who were referred
Preschool	12,832	2,160	1,169	9.1%
Kindergarten	136,368	21,160	10,543	7.7%
First Grade	156,856	17,047	10,589	6.8%
Third Grade	147,897	17,330	12,487	8.4%
Fifth Grade	141,251	16,800	13,664	9.7%
Seventh Grade	152,701	20,490	19,024	12.5%
Ninth Grade	157,497	13,673	18,446	11.7%
Total	905,402	108,660	85,922	9.4% (average)

The highest proportion of referrals out of those initially screened was in seventh grade (12.5%), followed by ninth grade (11.7%), fifth grade (9.7%), preschool (9.1%), third grade (8.4%), kindergarten (7.7%) and finally first grade (6.8%).

Based on screening records, a total of 38.0% of respondents estimated that 0%-25% of their referred students received follow-up vision care; 22.8% of respondents estimated that 26%-50% of their referred students received follow-up vision care; 18.1% of respondents estimated that 51%-75% of their referred students received follow-up vision care; and 21.2% 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.

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 (www.aoa.org). Of those conducting distance visual acuity screening among preschool and/or kindergarten students, a total of 73.8% of all respondents used an LEA Chart; 12.9% used a Tumbling E Chart; 17.2% of all respondents used a Lighthouse Chart; and 7.1% used another type of equipment.

Table 5: Tests performed for mass or group vision screening

Type	Frequency	Percent
Observation	9338	41.5
Distance Visual	11215	49.5
Muscle Balance	3423	13.9
Color	2914	12.3
Stereopsis	3007	12.0
Near Visual Acuity	1205	5.3

Table 6: Equipment used to measure distance visual acuity (all grades)

Type	Frequency	Percent
Acuity light box and eye chart	3387	74.0
Good-lite insta line vision screener	491	10.7
Titmus, keystone or optec	359	7.8
Other	220	4.8

The brain registers two images, one from each eye. The result is stereopsis-the fusion of the two messages into one image (www.strabismus.org). A total of 93.3% of respondents said stereopsis screening is administered during vision screening for preschool and/or kindergarten students, 5.1% said it wasn't used and 1.6% said they did not know. If stereopsis screening was not administered the following reasons were stated:

- 10.1% stated they didn't administer the stereopsis because the test is too expensive.
- 20.5% stated they didn't know how to administer the stereopsis test.
- 29.8% said they didn't have time to administer stereopsis.
- 19.4% said they didn't know stereopsis was required.
- 21.3% had another reason for not administering stereopsis.

Other responses for not administering stereopsis included performing the screening in first grade only; that preschoolers were evaluated prior to entrance; and that most were students with special needs.

There were 737,532 students who received hearing screening in the 2006-2007 school year; 52,283 were rescreened; and 17,404 were referred for follow-up. There were 905,402 students who received vision screening in the 2006-2007 school year; 108,660 were rescreened; and 85,922 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 FTE was 1,269.

Conclusions

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 measures (in collaboration with the ODH School Nurse Survey). The next biennial survey is scheduled for school year 2008-2009.

Overall, the compliance rate was very high. Based upon the results, 99% (n=3780) of vision screening respondents were in compliance with ORC 3313.69. Yet only 92% (n=3512) 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.

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, 10% of survey respondents stated they did not administer the stereopsis screening because the test is too expensive. In addition, based on the hearing screening compliance, the 2008-2009 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 of respondents estimated 0-50% of their referred students received follow-up care (60% of respondents for hearing and 61% for vision). Over 75% 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 be identified for research to determine the barriers to follow-up and fund efforts to reverse this trend.

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 measures.

Guidelines Revision

The guidelines are revised periodically to remain current with national recommendations and the latest research. The current and proposed preschool screening guidelines are identical to 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 provided for the hearing screening protocol to avoid screening at frequencies and decibels not recommended in the guidelines.

Compliance and Training

The Ohio Department of Health offers five regional training sessions each year, 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 only be based 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 only be used 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 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 caught early.

Maternal and Child Health Block Grant State Negotiated Performance Measure # 9

The goal of the Maternal and Child Health Block Grant State Negotiated Performance Measure # 9 is to increase the proportion of preschool children (ages three to five) who receive age- and risk-appropriate screenings for hearing, lead and vision. One of the workgroup strategies is to identify available data sources and/or explore data collection methods to measure the specific impact of activities on preschool screening rates for hearing, lead and vision. Due to the limitations in available preschool hearing and vision screening or exam data, ODH will collect 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 decrease, the assumption can be 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 serves as the baseline data.

Appendix

Per ORC 3313.69, if a school provides health services (medical inspection) then hearing and vision must be included and follow guidelines set by the ODH. The following is a summary of school-based hearing and vision screening guidelines at the time of the survey.

Grade Level of Hearing Screening	Type of Hearing Screening Procedure	Recommended Equipment for Hearing Screening Procedure
Preschool kindergarten 1st, 3rd, 5th and 9th grades	External observation	No equipment needed
	Pure-tone air conduction audiometry *Occurs in right and left ear*	Screening to occur at the below frequencies in both the right and left ear
		1000 Hz at 20 dB HL
		2000 Hz at 20 dB HL
		4000 Hz at 20 dB HL
	Optional Test: Tympanometry	226 Hz tone with a constant pump speed of 200 daPa/sec

Grade Level of Vision Screening	Type of Vision Screening Procedure	Recommended Equipment for Vision Screening Procedure
Preschool	Observation	No equipment needed
	Distance visual acuity	LEA Chart
	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
	Ocular muscle balance	Occluder and fixation target for distance and near
	Stereopsis	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
	Color deficit screening	Pseudoisochromatic plates, Color Testing Made Easy
	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
Fifth	Optional Test-Near visual acuity	Near point acuity card with letters, pictures, or symbols
	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