Hearing Screenings in Arkansas Schools

Education for School Nurses in Arkansas
Updated Summer 2012
The planning committee & faculty attest that NO relevant financial, professional or personal conflict of interest exists, nor was sponsorship of commercial support obtained, in the preparation or presentation of this educational activity.
Objectives

1. Explain the importance of hearing screening for the school-aged child
2. Identify the components of a hearing screening and the pass/fail criteria for each
3. Apply age appropriate screening techniques and procedures
4. Demonstrate the use of an audiometer
5. Identify the steps of the recording, referral and reporting process
Outline for Training

• Why are hearing screenings performed in Arkansas schools?
• What is needed to perform appropriate hearing screenings?
• How is a pure-tone hearing screening performed?
• What should happen when a student doesn't pass the hearing screening protocol?
• Do’s and Don’ts of hearing screenings
Why are hearing screenings performed in Arkansas schools?
It’s the Law!

Arkansas Code Annotated 6-18-701 states that each school district shall employ a physician or nurse to make such physical examinations. The exam shall be only such as to detect contagious or infectious diseases or any defect of sight, hearing or condition that would prevent a pupil from the benefits of school work.
It’s Important!

• Approximately 15% of children in the U.S. have hearing loss in one or both ears.

• Hearing loss can seriously impede learning

• Early identification and treatment can prevent or at least alleviate the consequences of many hearing problems
Purpose of Hearing Screening

- To identify those children *likely to* have hearing problems from those *not likely to* have hearing problems
- To screen a large number of children in a short amount of time
- To refer those children who do not pass the screening or who are suspect for hearing problems
What is needed to perform appropriate hearing screenings?
Background Knowledge
Ear Anatomy
Outer Ear

Labels

27 = Pinna or auricle

29 = External auditory meatus or ear canal

31 = Tympanic membrane or eardrum
Microtia and Atresia
Wax Impaction
Middle Ear

- Malleus
- Incus
- Stapes
- Eustachian Tube
Ossicles
Sound & Sound Measurement

**Frequency:**
- Measured in Hertz (Hz)
- Human Range is 20 to 20,000 Hz
- Psychological correlate = Pitch

**Intensity:**
- Measured in decibels (dB)
- Normal conversation = 50-70 dB HL
- Psychological correlate = Loudness
Normal Hearing
Speech Sounds
Types of Hearing Loss
Conductive Hearing Loss (CHL)

- Conductive hearing loss (CHL) occurs when there is a decrease in sound transmission before the sound reaches the inner ear.
- CHL occurs because of a problem in the outer or middle ear (as previously discussed).
- USUALLY (but not always), CHL can be treated medically or repaired.
- Examples of issues causing CHL and possible treatments:

<table>
<thead>
<tr>
<th>Problem contributing to CHL:</th>
<th>Possible treatment:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wax blockage</td>
<td>Have wax removed by physician or audiologist</td>
</tr>
<tr>
<td>Fluid in middle ear (otitis media)</td>
<td>Physician prescribes antibiotic treatment</td>
</tr>
<tr>
<td>Ossicular chain abnormality</td>
<td>Otologist performs partial or total ossicular chain replacement with prothesis</td>
</tr>
</tbody>
</table>
Otitis Media
Middle Ear Infections

- 24.5 million visits to doctors’ offices yearly
- Most frequently cited reason for taking child to the emergency room
- Most common surgery for children is a Tympanostomy, 110,000 per year
- Health care costs are reported between $3 and $5 billion/year
Secondhand Smoke

- More ear infections and hearing problems
- More upper respiratory infections
- More bronchitis and pneumonia
- Higher rate of SIDS
- More cases of asthma
- More severe symptoms in children who already have asthma
Secondhand Smoke

- Children living in households where more than three packs of cigarettes were smoked per day were more than four times as likely to be hospitalized for placement of PE tubes.
Conductive Hearing Loss
Sensorineural Hearing Loss (SNHL)

- Sensorineural hearing loss (SNHL) usually occurs because of a problem in the inner ear (as previously discussed).
- USUALLY (but not always), SNHL is permanent and cannot be repaired to a normal state.
- Examples of issues causing SNHL and possible treatments:

<table>
<thead>
<tr>
<th>Problem causing SNHL:</th>
<th>Possible treatment:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Damage to the inner hair cells of the inner ear</td>
<td>May require amplification</td>
</tr>
<tr>
<td>Hearing loss due to noise exposure</td>
<td>May require amplification</td>
</tr>
<tr>
<td>Hearing loss due to ototoxic drugs</td>
<td>May require amplification</td>
</tr>
</tbody>
</table>
Sensorineural Hearing Loss
Mixed Hearing Loss

• Mixed hearing loss occurs when there is both a conductive component and a sensorineural component to the hearing loss.

• There are many ways that this can happen, however, the best example of a mixed hearing loss is when a child who is known to have sensorineural hearing loss also has an ear infection. The conductive component of this hearing loss is temporary and can be treated medically.
Mixed Hearing Loss
Other Hearing Disorders
Auditory Neuropathy

- A hearing disorder in which sound enters the INNER ear normally but the transmission of the signals from the inner ear to the brain is impaired
- May exhibit “normal” hearing sensitivity to pure tones or hearing loss ranging from mild to severe
- Usually have poor speech-perception abilities
- Diagnosis is usually made with several tests including auditory brainstem response and otoacoustic emissions
- Can be very complex and confusing diagnosis
(Central) Auditory Processing Disorders

• These children will usually pass the hearing screening administered by the nurse
• Difficulty understanding speech in noise most common symptom
• Maturation is a factor (most audiologists agree that a child needs to be 7 years or older for appropriate diagnosis)
• Normal or near-normal hearing sensitivity
• Diagnosis should be made by an audiologist
Audiometers
Portable Audiometer

- A portable audiometer is needed
- Conduct a biological (or listening) check everyday that it is used
- Calibrate the audiometer on a yearly basis (see list for sources of calibration services)
- Use extreme caution when moving audiometer around from school to school – be gentle
EXAMPLES OF APPROPRIATE AUDIOMETERS
Earscan 3M
Maico 27
Maico 39
Maico Pilot Audiometer
(*this is MORE than you need)
EXAMPLES OF AUDIOMETERS THAT ARE NOT APPROPRIATE
Welch Allyn AudioScope 3 Screening Audiometer
(not appropriate for school screening)
OtoScreen I by Handtronix
(not appropriate for school screenings)
How is a pure-tone hearing screening performed?
Protocol Summary

- Pure Tone Screening
- Rescreening (if did not pass 1\textsuperscript{st} screen)
- Referral
- Follow-up
- Annual summary
Who to screen

• Students in grades Pre-K, K, 1, 2, 4, 6, 8 & transfer students

• Special education students & teacher referrals

NOTE: Students who wear hearing aids, who have cochlear implants or have documented hearing loss (by an audiologist/MD) should NOT be screened
FYI: Example of Hearing Aids
FYI: Example of Bone Anchored Implant

- A BAI uses a titanium implant, which is placed in the skull bone behind the ear.

- An abutment connects the sound processor with the implant in the bone, creating direct bone conduction.

- Direct bone conduction, provided by a BAI, gives improved access to sound when compared to traditional bone conductors since sound is not weakened when passing through the skin.

- Can be worn on a headband
F.Y.I: Example of Cochlear Implant (Advanced Bionics)

- Built-in multi-function LED status indicator
- Processor: holds 3 listening programs that can be used for FM and/or different listening environments
- Additional external microphone & Rechargeable Battery
- Designed withstand rain, sweat and moisture
- Head piece/coil
When to Screen

• **NOT** the first week of school
• Children entering school for the first time
  – Need time to adjust to school environment
  – BUT you do not want to wait too long if a child DOES have hearing loss
• Don’t wait too long
  – Cold and Flu season
  – Need time for follow-up
Audiometer Controls

- Power (on/off)
- Ear indicator (right/left)
- Intensity selector (dB; e.g. 40 dB HL)
- Frequency selector (Hz; e.g. 4000 Hz)
- Signal selector (use continuous or pulsed tone only)
- Presentation function (how do you present the tone)
Headphone Placement

• Place the headphones on student (red on right ear; blue on left ear)
• Hair behind ears
• Remove large earrings
• May want to remove glasses
• Diaphragm of headphones over ear canal
• Adjust head band for snug, **even** fit
• Head band on top of head is preferred
How to screen

• Instruct student for the task (e.g. raise hand when they hear the beep)

• Condition the student to the task (i.e. present a tone in one ear at one frequency ABOVE the screening level – example: 50 dB)

• Once the student is conditioned – start the screening protocol
### Screening Protocol

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Right Ear</strong></td>
<td>1000 Hz</td>
<td>20 dB</td>
</tr>
<tr>
<td></td>
<td>2000 Hz</td>
<td>20 dB</td>
</tr>
<tr>
<td></td>
<td>4000 Hz</td>
<td>20 dB</td>
</tr>
<tr>
<td><strong>Left Ear</strong></td>
<td>1000 Hz</td>
<td>20 dB</td>
</tr>
<tr>
<td></td>
<td>2000 Hz</td>
<td>20 dB</td>
</tr>
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<td></td>
<td>4000 Hz</td>
<td>20 dB</td>
</tr>
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**NOTE:** Need to obtain 2 responses in each ear at each frequency for a pass
Pass/Fail Criteria

- Student must pass all frequencies in an ear for that ear to be classified as a “pass”

- If a student does not pass ALL frequencies in each ear, he/she should be re-screened in 2-4 weeks
Rescreening Protocol

<table>
<thead>
<tr>
<th>Ear</th>
<th>Frequency</th>
<th>Decibel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right Ear</td>
<td>1000 Hz</td>
<td>20 dB</td>
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**NOTE:** Need to obtain 2 responses in each ear at each frequency for a pass.
Tips and Tricks to Perform Hearing Screenings
Play Audiometry

- Use with students who are difficult-to-test, who are developmentally delayed, or who are non-English speaking
- Use a play task (drop blocks in a bucket)
- Teach child the task at an elevated intensity level (e.g. 50 dB HL)
- Make sure child can do on his own before you attempt screening at 20 dB HL
What should happen when a student doesn’t pass the hearing screening protocol?
REMEMBER: Pass/Fail Criteria

• Student must pass all frequencies in an ear for that ear to be classified as a “pass”

• If a student does not pass ALL frequencies in each ear, he/she should be re-screened in 2-4 weeks
Referral

• Refer immediately if you observe physical abnormalities that are not documented in the student’s file

• May immediately refer if child does not pass and there is serious concern regarding hearing or speech/language development

• Refer to MD or Audiologist if fails rescreen

• Refer to MD or Audiologist if child passes, but there is concern regarding hearing
Follow-up

- Send letter, referral form, financial assistance information and list of appropriate professionals to the parent/guardian (make sure school nurse contact info is on referral form)
- If no response from parent/guardian in 2 weeks, follow-up with a phone call or personal contact
- Review information received from examining professional
- Rescreen after medical treatment if indicated
- Collaborate with special education personnel if indicated
Do’s

• **DO** find a quiet room
• **DO** screen at 20 dB HL
• **DO** present tone for at least 3 seconds
• **DO** use pulsed tones if possible
Don’ts

• Don’t require students to raise right or left hand
• Don’t get into a pattern with your presentation of the tone
• Don’t give visual cues-position audiometer controls out of view
Don’ts

- Don’t screen ear with known hearing loss
- Don’t switch the headphones from one audiometer to another. This changes the calibration for your machine. If you have to get your headphones repaired or replaced, your audiometer has to be re-calibrated
Forms

- Forms are available on the Arkansas Coordinated School Health Website
- Referral Form (which has been re-formatted)
- HS Record Form
- Rescreen Record Form
- Summary Form
Documentation

• Data entry will be in APSCN (or use the summary form if APSCN not available)
• eSchool+ will be the data entry software for public and charter schools in the future
• You may need to get more training/information on APSCN data entry in your coop area
Resources
Parent and Student Education

• Childhood Hearing Loss

• Recreational Firearm Noise Exposure
EARS
Educational Audiology/Speech Pathology Resources for Schools
An outreach program of Arkansas Children's Hospital
How to contact the EARS Program @ ACH

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