INTRODUCTION

Although it is well documented that children require more favorable signal-to-noise ratios than adults for optimal hearing and learning, classroom noise levels continue to exceed recommended minimum standards. Children with hearing loss, even those who wear hearing aids (HAs), generally encounter difficulty hearing and understanding speech in noisy classrooms. These difficulties often lead to the recommendation of a frequency-modulated (FM) system to improve the signal-to-noise ratio of the teacher’s voice.

Device use in school is of particular interest for audiologists, as school age children spend a majority of their time (7-8 hours a day, 5 days a week) in this setting. Unfortunately, if the child is not consistently using their HAs and/or an FM system, the problems will take on an added significance as a result of the increased classroom noise. To address these problems, the use of educational audiological services across the U.S. has increased over the last decade. However, recent reports indicate that parents typically overestimate device use, leaving the clinical community without an accurate portrayal of the child’s hearing assistive technology use at school.

PURPOSE

1) Document parent-reported and researcher-observed patterns of hearing aid (HA) and/or FM system use by school grade level and classroom.

2) Identify potential characteristics that may influence device use or nonuse to improve fitting and counseling for these specific groups.

METHODS

Data were collected as part of a larger ongoing study examining testing effort and fatigue in school-age children (6 to 12 years old) with hearing loss. All participants had bilateral mild-to-moderate hearing loss (MMHL) and were monolingual speakers of English. Children spent at least two hours per school day in a general education classroom. Those with parent-reported diagnoses of cognitive impairment, autism spectrum disorder, and other developmental disorders were excluded.

HA and FM system use was documented in two ways for each participant:

1. Participants were asked to estimate the number of their child’s available HA and FM system use during typical school days and indicated whether the child had an FM system available for use in the classroom.

2. Participants’ classrooms were visited by a research assistant on two typical school days and indicated whether and how long the child was using their HA and/or FM system.

RESULTS – Observed Patterns of Hearing Aid & FM System Use

Classroom Hearing Aid Use

<table>
<thead>
<tr>
<th>Consistent user</th>
<th>Variable user</th>
<th>Nonuser</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency (%)</td>
<td>42</td>
<td>26</td>
<td>32</td>
</tr>
</tbody>
</table>

The following factors were observed to potentially influence HA use in the classroom:

- Most consistent HA use was observed in children in grades 1-4.
- Of children in the grade level range, 26.3% were found to be consistent users.
- Conversely, only 42% of participants in grades 5-7 were found to use HAs consistently.
- Of the children in this grade level range, 73.7% were not using HAs consistently.
- A one-way analysis of covariance (ANCOVA) using the better-ear threshold for each child as the dependent variable and grade group as the independent variable showed that children with greater hearing loss were more often observed to be “non-users.”
- A significant main effect (F=4.882, p<.05) suggests that children in grades 1-4 have different HA use patterns than those in grades 5-7, regardless of the severity of hearing loss.

FM and HA Use Group:

- 28 of 32 children were consistent HA users.
- 22/25 (88%) of these consistent HA users were never observed using an FM system.

FM and Grade Level:

- The majority of children (65%) with reportedly available FM systems were between 1-4th grade.
- 90% of children between 5-7th grade did not have an FM system or their parents didn’t know if they had one.

SUMMARY & CONCLUSIONS

The following factors were observed to potentially influence HA use in the classroom:

- Degree of hearing loss: Consistent HA users had significantly more hearing loss than non-users.
- Grade level of the student: Children in grades 1-4 were more likely to be consistent users when compared to the other grade levels.

Despite available FM systems, the majority of children with MMHL, and/or their teachers were observed to use these devices inconsistently or not at all. The pattern of available FM system use does not appear to influence by grade level, degree of hearing loss, or gender. However, half of the 5-7th grade children were not reported to have an available FM system.

Collaboration between audiologists and school personnel to accurately determine device use for each child is key; parents are not always aware of their child’s device use and/or if the child has an FM system for use at school. Clinical audiologists should provide training on how to properly fit, administer, and advocate and understand what services and equipment the child has available at school.

The limitations of this study include a small sample size and limited observation times. Additional information, including longitudinal and longer observation periods are needed. Future studies are needed to determine potential psycho-social barriers to device use, rates of malfunction of devices being worn throughout the school day, and the knowledge of teachers and school staff related to hearing assistive technologies.

KEY REFERENCES


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