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Article in International Journal of Audiology · February 2010

DOI: 10.3109/14992020903280161 · Source: PubMed

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**Key Words:**

Hearing aid satisfaction;  
hearing aids;  
assistive technology;  
aging

## The impact of health literacy on patient understanding of counseling and education materials

### Abstract

Low health literacy is reported to have negative consequences on patient understanding of health-related information; however, there is a dearth of research regarding health literacy in an audiology-specific context. This study examines the grade level of language used in verbal and written communication samples during routine hearing aid orientation appointments. Patient counseling sessions were videotaped and transcribed; hearing aid instruction guides used during counseling sessions were also transcribed. The Flesch-Kincaid grade level formula was used to determine the approximate United States grade level equivalent of the counseling sessions, hearing aid instruction guides, and to predict patient health literacy. The results indicate that patient predicted health literacy likely impacts understanding of both one-on-one counseling and hearing aid instruction guides.

### Sumario

Los bajos conocimientos en salud se reportan como causantes de consecuencias negativas en la comprensión de la información relacionada con la salud; no obstante, son escasas las investigaciones dirigidas a los conocimientos en salud en el contexto auditológico específico. Este estudio examina el nivel de lenguaje usado en muestras de comunicación verbal y escrita obtenidas durante citas rutinarias de orientación sobre auxiliares auditivos. Las sesiones de asesoría a pacientes se videografiaron y transcribieron; las guías de instrucción sobre auxiliares auditivos usadas en estas sesiones, también fueron transcritas. Se usó la fórmula de niveles de Flesch-Kincaid para determinar el equivalente aproximado en los Estados Unidos, de las sesiones de asesoría y las guías de instrucción de auxiliares auditivos y para predecir los conocimientos en salud de los pacientes. Los resultados indican que los conocimientos sobre salud que en ellos se pueden predecir, impactan la comprensión tanto de la asesoría personal, como de las guías de instrucción de auxiliares auditivos.

In an audiology-specific context, no information is available on the complexity of language used in one-on-one counseling. Related research by Martin et al (1990) has examined patient understanding of counseling. Their findings suggest that out of 35 adults with hearing impairment, who were surveyed shortly after they had an audiological examination and received counseling, none knew what an audiogram was. Other research by Kessels (2003) suggests that 40–80% of information provided by healthcare professionals was forgotten immediately after the appointment, and Shapiro et al (1992) suggests that only about 50% of the information provided by healthcare professionals was retained. However, the reason(s) underlying this lack of understanding remains uncertain. It may be assumed that patients are forgetting information, when in actuality it may be that the information is simply too difficult for them to understand. Margolis (2004) refers to the 'head-nodding' behavior, which is often exhibited by patients who hear and/or understand only a portion of the message. Audiologists should be aware of these factors and consider what contributes to them. Shulte (2007) asserts that doctors and researchers alike characterize poor health literacy as a major drain on the U.S. healthcare system, contributing to higher costs and lower medical treatment success; however, the root of the problem has yet to be addressed. It is critical to determine if patients have sufficient health literacy to understand medical, in this case audiological, counseling and patient education materials.

The United States (U.S.) Department of Health and Human Services Healthy People 2010 (Understanding Health Literacy and Its Barriers, 2004) initiative states that functionally literate adults are able to incorporate reading that relates directly to community development and life skills. Generally, the assumption is that if an adult is able to complete their tax documentation, vote, and read a newspaper, they

are functionally literate. This is in contrast to health literacy, which is gaining more attention due to its more recently recognized impact on health outcomes. Health literacy, as defined by Healthy People 2010 (Understanding Health Literacy and Its Barriers, 2004), is the degree to which an individual can obtain, process, and understand basic health information and services needed to make appropriate health decisions. To be considered health literate, an adult must be able to look up a professional in the telephone book, process information provided by medical personnel including graphs, lists, and charts as well as make decisions that require comparing and contrasting and/or making cost-benefit analyses about possible treatments, prescriptions, etc. These additional literacy skills raise the bar tremendously in terms of effective patient communication. To date, there has been no attempt to assess these concepts in an audiology-specific context.

The American Medical Association (AMA) (Ad Hoc Committee on Health Literacy for the Council on Scientific Affairs, 1999) has its own agenda with regard to health literacy; they discuss health literacy in terms of how it affects the healthcare system. They propose that health literacy affects overall health outcomes, the ability of a person to participate as a member of the healthcare team, and a person's ability to exercise empowered decision-making. In summary, the AMA suggests that health literacy determines a person's ability to impact their care and how their care is provided. However, interest in the issue of health literacy and its impact is not a U.S. phenomenon; the World Health Organization (WHO) (Division of Health Promotion, Education, Communications, Health Education and Promotion Unit, 1998) also has a definition of health literacy, which they describe as the cognitive and social skills that determine the motivation and ability of an individual to gain access to, understand, and use information in ways that

promote and maintain good health. These definitions are helpful in that they provide a framework for investigating health literacy and, indeed, many health professionals around the world are investigating this issue. Unfortunately, the general finding is similar to that of Keleher and Hagger (2007) who concluded that although health literacy goals have existed since the mid-1990s, there remains a lack of breadth in research which has lead to a knowledge base that is patchy at best.

It is important to realize that patient counseling may not be the sole culprit; printed patient education materials, such as hearing aid instruction guides, may also be too difficult for patients to understand. Previously, patient education research in other healthcare fields has indicated that patient education materials typically require a college reading level for complete understanding (Davis et al, 1990). In which case, our supplementary information to improve patient understanding may not be doing much good. Shieh and Hosei (2008) report that the high reading level of printed health-related materials compounded by low health literacy is a major barrier to patient understanding of health-related information. They report that printed patient health information is most often used outside of the patient-professional direct contact context, so the patient is at an even greater disadvantage in that they have no one to ask for clarification. As audiologists, we often provide hearing aid instruction guides as a resource for patients when we are not available. We assume that patients can use these resources to help troubleshoot simple problems such as replacing a battery or wax guard (i.e. wax trap), but if our own ability to communicate these concepts is limited, then might it be erroneous to assume that printed material will be able to convey this information in a manner that is readily understandable by our patients? At this point, our patients' understanding may be impaired by our lack of understanding of what constitutes appropriate and effective language, both in counseling and patient education materials. Due to the lack of information regarding patient health literacy in an audiology-specific context, new research to identify appropriate and effective language for better patient communication is paramount. The purpose of this study was to evaluate the language used in both counseling and patient education materials.

Predicting audiology patients' health literacy was critical for this study. Dewalt et al (2004) conducted a comprehensive review of the literature and found evidence to support that reading ability is correlated to health knowledge, healthcare, hospitalization, and global measures of health and chronic disease. While identifying the approximate level of health literacy is important, it is also inherently difficult. Kendig (2006) suggests that many patients with low-literacy skills are adept at hiding that fact due to feelings of shame or inadequacy. In order to predict patients' approximate health literacy in this study, the patient's dialogue was transcribed and the transcriptions were analysed using the Flesch-Kincaid reading level (FKGL) formula. This reading level formula was chosen because it has been widely used to evaluate consumer health information, both online and in print. The result, or grade level, of the formula was used as an approximation of the patient's health literacy. It is acknowledged that there are some limitations to this approach; however, this study is based on retrospective data and it was believed to be the most accurate way to predict patients' health literacy at the time of their appointment. Other measurements may have been used prospectively; however, patients may no longer have been interested in participating in the study and/or their health literacy may have changed over time due to unforeseen factors.

The purpose of the study was to investigate the impact of health literacy on patient understanding of audiology-specific counseling and education materials. This study was designed to address the following research questions:

1. What is the predicted health literacy of patients receiving audiological services?
2. Are there significant differences present in the grade level of language used by patients and the average grade level of reading among U.S. adults?
3. Are there significant differences present between the grade level of language used by audiologists and patients?
4. Are there significant differences present in the grade level of patient education materials (i.e. hearing aid instruction guide) and the grade level of language used by audiologists?
5. Are there patient demographic variables present that are good predictors of the language used by audiologists?

## Method

### *Subjects*

The general design of this study was based on the qualitative analysis of three audiologist and 12 patient counseling sessions. Patients were selected at random from scheduled hearing orientation appointments. Subjects included 12 adult hearing-impaired patients with mild to moderate sensorineural hearing loss; eight were male and four were female. The mean pure-tone average at 500, 1000, and 2000 Hz was 36.1 dB HL (14.0 SD). The mean age of the hearing-impaired patients was 70.6 years; the range of age of participants was 57 to 85 years. Five subjects were first time hearing aid users and seven were experienced hearing aid users. Three patients wore completely-in-the-canal hearing aids, four wore in-the-ear hearing aids, and five wore behind-the-ear instruments. Patient demographics were not a determining factor in participation. Three audiologists at a university speech and hearing clinic were included in this study. The audiologists had a mean of 20.0 (10.8 SD) years of experience; specific years of experience was 22, 28, and 10 years. Two of the three had completed masters' level training. The third completed doctoral level training. Two of the three clinicians had taken a graduate level course in counseling. Two of the three clinicians had participated in two or more continuing education seminars on counseling.

### *Test measures*

Each patient participated in a regular, hearing-related service consultation, sometimes referred to as a hearing aid orientation or a hearing aid pick-up appointment. Each consultation was videotaped. The patients' hearing aid instruction guides were obtained retrospectively.

### *Statistical analyses*

#### COUNSELING SESSIONS

The analysis of the counseling sessions included transcribing the videotaped dialogue of the audiologists and the patients for each session. These transcriptions were then analysed in their entirety to determine reading level for both the audiologists and the patients. All samples included basic use and care instruction. The content of the sample and accuracy of the transcription was

confirmed by the second author. All samples were analysed in their entirety in order to prevent unnecessary variability that may occur when selecting only a limited subset of the dialogue. The average length of the counseling sessions was 41:17 minutes (SD 0.36). The transcriptions were input into Microsoft Word (MAC version 2004) and analysed using the FKGL formula. The formula translates writing samples into a U.S. grade level equivalent; theoretically, it specifies the number of years of education that are generally required to understand the sample. For example, a score of 5.3 would indicate that the writing sample should be understood by an average fifth grade student. The steps to calculate this score include:

1. Determine the sample to be scored
2. Compute the average length of sentences in the sample by counting the words in the sample and dividing the by the number of sentences in the sample
3. Compute the average length of words in the sample by counting the words in the sample and dividing by the number of syllables in the sample
4. The two previous computations are then entered into the formula below:  $0.39 \times (A/B) + 11.8 \times (C/A) - 15.59 = \text{Grade level}$

Where: A = Total words, B = Total sentences, C = Total syllables

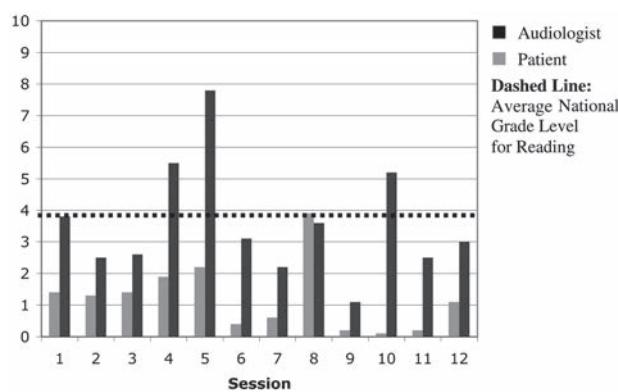
Note that this formula, like many others, is susceptible to manipulation by the length of sentences and words. This can cause some difficulty in determining the grade level of certain writing samples. As previously mentioned, it is acknowledged that all reading formula have inherent flaws.

#### EDUCATIONAL MATERIALS

The analysis of hearing aid instruction guides included transcribing the most common sections of the guides, including: how to turn the hearing aid on and off, how to change the battery, and how to clean and maintain the hearing aid. All of the instruction guides analysed had these three sections; so it was felt to be the most accurate way to make a comparison between guides. These sections were manually entered into Microsoft Word (MAC version 2004) and analysed using the FKGL formula as stated previously.

## Results

Figure 1 shows the mean FKGL for each of the 12 subjects by session as well as the mean FKGL for an adult in the United States.



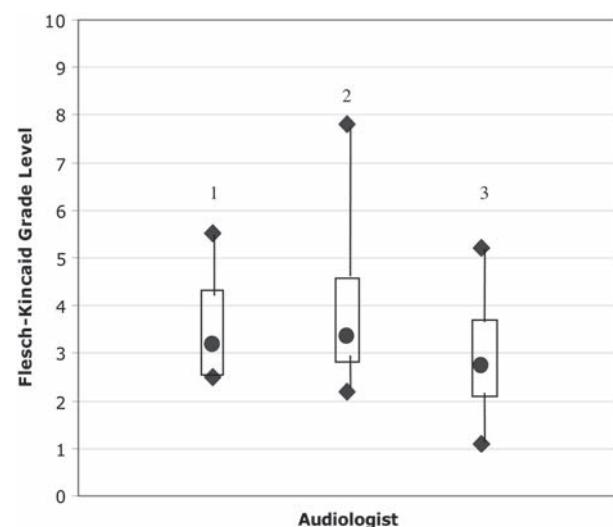
**Figure 1.** Flesh-Kincaid grade level by audiologist/patient dyads with average national grade level for reading

All of the 12 patients in this study had a predicted patient health literacy level that was below a third grade reading level based on the analysis of the counseling sessions. A paired samples t-test was used to compare predicted patient health literacy to a fourth grade reading level, which is the low end of the national average in the United States (Kirsch et al, 1993). Results shown in Table 1 indicated that predicted patient health literacy was significantly different from a fourth grade reading level at the .01 level. This finding was consistent when a Bonferroni correction was applied. This implies that predicted patient health literacy is significantly lower than the average reading level of American adults.

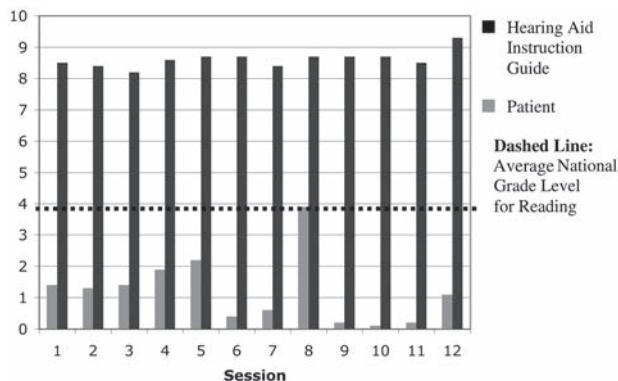
Figure 1 also displays the level of language used by the audiologist as measured for each patient/clinician dyad. To determine if there was a significant difference in the level of language used by the audiologist and the patient, a paired samples t-test was used. Results shown in Table 1 indicated that the audiologists' language significantly different from predicted patient health literacy at the .01 level. This finding was consistent when a Bonferroni correction was applied. Due to the apparent variability of the audiologists' language, as noted in Figure 1, the findings in this comparison were analysed to determine if there was a significant difference in language used across audiologists. A one-way analysis of variance (ANOVA) test, showed no significant difference between the audiologists' language; meaning that across the three audiologists, the language used was relatively uniform in terms of grade level. Results are shown in Figure 2.

The hearing aid instruction guides were also evaluated. The mean FKGL for the instruction guides was 7.96 (1.0). Figure 3 shows the comparison between the grade level of the audiologists' language and the grade level of the respective hearing aid instructions guides. As shown in Table 1, results of a paired samples t-test indicated that the audiologists' language was significantly different from the instruction guides provided at the patients appointment at the .01 level. This finding was consistent when a Bonferroni correction was applied. The audiologists' language was found to be significantly lower than the language used in the hearing aid instruction guides.

Demographic factors including patient age, patient pure-tone average, and patient hearing aid style were investigated to determine if any were good predictors of the level of conversation used by



**Figure 2.** Flesh-Kincaid grade level by audiologist



**Figure 3.** Comparison of Flesh-Kincaid grade level by patient and hearing aid instruction guide

the audiologist. Patient pure-tone average was calculated by averaging patient's thresholds at 500, 1000, and 2000 Hz across ears. These factors were analysed separately using a linear regression model and an ANOVA test. None were shown to be significant in predicting the level of language used by audiologists.

## Discussion and Conclusions

The results of this study indicate that in an audiology-specific context, patients most likely had lower health literacy than functional literacy. They probably did not understand at least some of the information provided during the consultation and probably had difficulty understanding some of the information presented in the hearing aid instruction guide. The choice of language used by the audiologists did not seem to be impacted by patient demographic factors.

The findings suggest that a communication gap exists both in regards to understanding counseling and the readability of patient education materials. The practical concern becomes how this gap impacts a patient's daily life. Reconsider the example of the patient that cannot clearly understand the counseling or the hearing aid instruction guide with regard to how to appropriately manage a wax guard (i.e. wax trap). If a patient is unable to manage simple tasks to keep their hearing aids functioning properly, they must schedule an appointment with an audiologist for a repair. Repair

**Table 1.** Paired samples t-test analyses for comparison of predicted patient health literacy and average national reading level, audiologists' language, and predicted patient health literacy, and predicted patient health literacy and hearing aid instruction guides.

Flesch-Kincaid grade levels	Mean	SD	SEM	t	dF	Sig (2-tail)
Patient vs. national	-3.033	0.851	0.246	-12.347	11	<0.001
Audiologist vs. patient	2.733	1.836	0.530	5.157	11	<0.001
Patient vs. hearing aid instruction guides	7.558	0.967	0.279	27.072	11	<0.001

appointments cost the patient time, money, and frustration, but the impact of the inability to complete simple maintenance may be further reaching. It may also effect the patient's overall satisfaction with their hearing aids and their opinion of hearing healthcare professionals. These types of maintenance problems could be the difference in satisfaction that leads a patient to make the decision to keep or return hearing aids or even to continue their relationship with the professional. This example demonstrates how minor miscommunications can affect a patient's daily life. The same example could also be used to show how this miscommunication affects an audiologist's daily practice and their ability to operate an efficient business.

Further, Kendig (2006) implies that health literacy skills are now understood to be content specific and that they may be significantly different than a patient's functional literacy skills. The results from this study are consistent with Kendig's findings. As the topic of health literacy is further investigated, it is critical to understand the strengths and weaknesses of our one-on-one counseling, educational materials, and role in a patient's overall health literacy. All world health organizations would likely agree that access to information starts with being able to hear it, ask questions, and understand the responses. In this regard, hearing-impaired patients are at a disadvantage. Clear communication is critical to hearing-impaired patients' overall healthcare, making it even more important that hearing-impaired patients can easily access direct counseling and supplemental information. Clear communication via functioning amplification and utilization of good listening strategies can provide better access to information from all healthcare professionals. Without clear communication, it is likely that hearing-impaired patients will not become successful users of the healthcare system. It is eminent that audiologists effectively communicate with their patients about their hearing healthcare because not only does it increase the likelihood that they will be both more satisfied with their hearing health care and more satisfied with their overall healthcare. In this regard, audiologists are a critical link to world healthcare organizations' goals of improving health literacy for patients.

The data in this particular study is compared to health literacy data of the general population. It is well known that the health literacy of older adults in many cases is far lower than the general population's health literacy. In a large study conducted by Baker et al in 2000, it was determined that functional health literacy as measured by the Short Test of Functional Health Literacy in Adults (S-TOFHLA) and the Mini Mental State Examination (MMSE), was markedly lower among older age groups. This finding was true even after adjusting for sex, race, ethnicity, and education. It is unknown how hearing impairment may affect overall health literacy on measures such as the S-TOFHLA and/or the MMSE in an older population. This topic may warrant future research in this area.

It is acknowledged that as with all retrospective studies, there are some limitations to this project. Health literacy was predicted by using a reading level formula to determine subjects' health literacy level. This prediction is not a direct measure of health literacy. There are tools available to determine patient health literacy; however, to take prospective measurements of subjects' health literacy may have been inaccurate. Subjects may no longer have been interested in participation and/or their health literacy level may have changed due to unforeseen factors. In addition, all reading level

formulae have inherent flaws. Reading level formulae are easily manipulated by sentence and word length as well as by grammatical structure. All transcriptions of subject and audiologist interaction were verbatim in an attempt to ensure accuracy. It is also acknowledged that only hearing aid instruction brochures generated by the manufacturer were included in this study. Other printed hearing healthcare information was excluded; there may be differences in manufacturer-generated materials versus practice-generated materials that were not considered in this study. Even with these limitations, data acquired from this project was in agreement with other published information on the topic of health literacy. However, these limitations serve as benchmarks for improvement of future research in this area rather than purporting to be generally applicable to all audiology situations at this time.

In conclusion, even with the limitations described above, the predicted health literacy of this patient cohort was low. It may be reasonable to be concerned that hearing-impaired patients are at a disadvantage when it comes to understanding audiology-specific counseling, educational materials, and ultimately their overall healthcare needs. These factors may impact patients' acceptance of and satisfaction with personal amplification. Although these factors seem to only impact patient hearing, it is important to remember what else patient hearing impacts. Clear communication is critical to all health literacy, making it even more important that hearing-impaired patients can easily access direct counseling and supplemental information. Otherwise, it is likely that hearing-impaired patients will not become successful hearing aid users and ultimately will not become successful users of the healthcare system.

## Acknowledgment

We would like to thank the clinicians and subjects for their participation in this study.

**Declaration of interest:** The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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