2013

The impact of instructional videos on perceived satisfaction among new hearing aid users

Beth Watson
Washington University School of Medicine in St. Louis

THE IMPACT OF INSTRUCTIONAL VIDEOS ON PERCEIVED SATISFACTION AMONG NEW HEARING AID USERS

by

Beth Watson

A Capstone Project
submitted in partial fulfillment of the
requirements for the degree of:

Doctor of Audiology

Washington University School of Medicine
Program in Audiology and Communication Sciences

May 16, 2014

Approved by:
Amanda Ortmann, Ph.D., Capstone Project Advisor
Robert Mareing, Au.D., Second Reader

Abstract: The current medical model utilizes verbal informational counseling when counseling new hearing aid users on their device. This counseling is extensive and often overwhelming, which can negatively impact the patient's understanding of their hearing aid. The data from this Capstone shows that the use of instructional videos could be used to reinforce the verbal counseling, possibly increasing patient satisfaction and benefit.

ACKNOWLEDGEMENTS

First and foremost, I would like to thank Dr. Amanda Ortmann for her infinite support, knowledge, and supervision throughout this Capstone Project and during my education at Washington University School of Medicine. I was so fortunate to work with a faculty member who is so passionate about furthering the field Audiology, not only through her research efforts, but also through developing competent future clinicians. I am lucky to call her a friend and colleague and look forward to emulating her skills, clinical insight, and enthusiasm in my future practice.

Second, I would like to acknowledge Dr. Robert Mareing for his comprehensive review of this project. His years of experience added a special touch to the overall product.

I would also like to thank the participants in this study. Without them, this project would not have come to fruition.

Additionally, I would like to thank Rene Miller, Beth Elliott, and Beth Fisher for answering my endless questions and their constant support throughout the past three years. No problem is too big for you three, and this program would not be the same without your teamwork!

To my friends and classmates, your constant support throughout this process has helped me persevere. I will remember our bond forever. I would not be here without all of you.

Finally a very special thanks to my fiancé and family, your love and understanding throughout my life and education means the world to me. You make me strive to be a better person every day.

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

ABBREVIATIONS

APHAB	Abbreviated Profile of Hearing Aid Benefit
AV	Aversiveness
EC	Ease of Communication
BN	Background Noise
RV	Reverberation
SADL	Satisfaction with Amplification in Daily Life

INTRODUCTION

A recent MarkeTrak survey indicated that at least 34 million people in the United States have some degree of hearing impairment (Kochkin, 2009). For most individuals with hearing loss, the hearing loss is ameliorated through the use of hearing aids. While current advancements in hearing aid technology are inspiring for professionals in the world of hearing healthcare, some new hearing aid users are dissatisfied with their amplification. Sergei Kochkin and colleagues (2010b) stated approximately 1 million hearing aid purchasers in the United States report having hearing aids they do not use. This means that even though the patient invested what they feel to be a fair to exorbitant amount of money on the aid, for one reason or another, they are dissatisfied with their aids. Although it is hard to pinpoint what makes a patient truly satisfied, evaluation of the current hearing healthcare model for the fitting and delivery of hearing aids is both valuable and necessary.

The current model for health management in the field of Audiology follows the medical model. Clinicians who follow the medical model focus on the physical cause of a disorder. In audiology, clinicians complete a diagnostic audiometric evaluation to determine where in the auditory system a hearing loss originates, as well as the degree of the sensitivity lost due to this disorder (Duchan, 2004). The audiologist determines the site of lesion of hearing loss to be peripheral, cochlear, or retro-cochlear. When just looking at the physical cause of the problem, clinicians may neglect to examine the underlying concerns of the patient that are, most often, the reason they have made an appointment to evaluate their hearing sensitivity. These concerns include psychological, social, and environmental issues (Duchan, 2004); for example, the inability to communicate with grandchildren on the telephone, avoidance of dinner dates with friends due to difficulty hearing in a noisy environment, or difficulties communicating with their main communication partner could be major motivators for patients to seek re-habilitation. The

medical model aims to diagnose, and then treat the disorder so the patient can return to normal or improved health. For the majority of hearing losses, treatment is amplification through hearing aids. This solution, however, cannot restore the distortion accompanied with hearing loss due to the spectral distortion in the damaged cochlea (Oxenham & Bacon, 2003); therefore, audiologists must address the secondary and tertiary issues associated with the patient's hearing loss through a combination of both treatment (hearing aids) and educational counseling.

Following the diagnostic audiometric evaluation and in accordance with the medical model, patients receive *verbal* informational counseling regarding their hearing test results, treatment options, and communication strategies. When counseling a patient on hearing test results, many audiologists discuss the type, degree, and configuration of the loss, as well as the interpretation of word recognition scores. After the explanation of diagnostic results, clinicians often quickly proceed to offering recommendations and treatment options. This appointment can take a considerable amount of time and a lot of information is provided to the patient. It has been shown that about fifty percent of the information provided to patients during this appointment is retained, while, depending on the patient, between forty to eighty percent of new information received could be forgotten immediately. Furthermore, of the information that is retained, about half of that information is misunderstood (Margolis, 2004). For a patient with hearing loss, there are additional confounding variables that further negatively impact the information received by a patient. These variables include intrinsic factors such as the age of the patient, the working memory capacity of the patient, and his or her hearing loss that causes communication breakdowns.

According to the National Institute on Deafness and Other Communication Disorders (NIDCD), approximately one third of Americans over the age of 65 will have some degree of

hearing impairment and this prevalence of hearing loss will increase to nearly fifty percent with a decade increase in age (NIDCD, 2010). A human's ability to *hear* is not what differentiates them from other species, but rather it is their ability to *engage* in the active process of "listening", a cortical process that requires attention and mental effort (Beck, 2012).

Cognitive functions such as memory, attention, learning and language are all involved in the active listening process (Kiessling et al., 2003). It has been reported that word recognition scores, in quiet, drop off at a faster rate in the elderly than would be expected by the Audibility Index (Dubno et al., 2008). Research also suggests that only 65-90% of variability in unaided speech-understanding scores comes directly from poor audibility in high-frequency regions (Gordon-Salant and Fitzgibbons, 1993; Humes et al. 1994; Humes, 2007). Once audibility is restored, however, other factors related to measures of underlying cognitive function account for 30-50% of the variability in speech understanding performance among older adults (Humes, 2007; Harris, Wilson, Eckert, and Dubno, 2011). There is research suggesting that older adults require additional cognitive effort than their younger counterparts for accurate performance on a listening task (Cabenza, Anderson, Locantore, & McIntosh, 2004; Wong et al, 2009); therefore, audiologists should be conscious of the interaction between hearing loss, cognitive decline, and increased cognitive load (stresses on working memory) when providing verbal counseling to their patients. Considering these additional factors, it is alarming that the average age of first time hearing aid users is 74 years old, with most patients waiting 10 years before seeking amplification (Davis, Smith, Ferguson, Stephens, & Gianopolous, 2007).

McCormack and Fortnum (2013) report 80% of adults age 55-74 do not use their hearing aids, even though they would benefit from them. Their research was a scoping study of 10 papers related to non-hearing aid use. Some of the main factors they reported that were related to why

individuals do not use their aids were: hearing aid value and clarity of speech, comfort of the fit, care/maintenance of the aids, and device malfunction (McCormack & Fortnum, 2013). Specifically, issues with background noise, help with insertion of the aid, dexterity issues, not understanding how to work the device, and disappointment in function of the aid were all major factors that effected usage. All of these issues could be alleviated through better counseling techniques.

Given the aforementioned factors related to retention of educational and informational counseling, how should an Audiologist counsel patients? Margolis (2004) suggests that withholding information from a patient because they may not understand negatively impacts the clinical process. It is suggested that when patients understand information communicated by their healthcare provider, patient satisfaction and compliance with recommendations and outcomes are enhanced (Margolis, 2004). Margolis (2004) postulates that, "every important fact or recommendation that is given to a patient should be shared with family members, read, reread, and kept for future reference". Giving the patient a simple and concise presentation of the information in a categorical way, often incorporating appropriate pictures and graphs, may lead to greater retention of information. Fortunately, with today's technology, practitioners are able to create innovate ways to provide patient counseling.

In addition to the large concentration of information given to a patient at the time of the hearing test and hearing aid evaluation, patients often feel bombarded with the amount of information and education they receive on their new hearing instrument at the time of the initial fitting. As mentioned previously, this information is often forgotten or confused by many patients. When a patient's hearing aid is not working and/or they are not able to perform simple maintenance tasks their satisfaction with the device is likely impacted (Nair & Cienkowski,

2010; Deshardins & Doherty, 2009). Currently, as a means of reinforcement of informational counseling provided by the audiologist, hearing aid companies distribute instructional manuals that are associated with the patient's device. Hearing aid companies and hearing aid dispensers view these booklets as a quick guide for use and troubleshooting of the aids.

A recent cross-sectional study involving forty participants between the ages of 46-72 years evaluated the effectiveness of hearing aid user manuals (Brooke, Isherwood, Herbert, Raynor, & Knapp, 2012). The participants did not have prior hearing aid use or audiological knowledge and were recruited to test the instruction manuals for behind the ear hearing aids from two different manufacturers. The participants were stratified by hearing aid manufacturer (n=20 for Unitron hearing aids, n = 20 for Danalogic hearing aids) and were asked to read the user manuals of the aids in order to learn how to use the devices. They were assessed on their understanding of the manual through both hands-on usability and also literature-testing techniques. Usability of the devices was evaluated by having each participant demonstrate cleaning and maintenance of the aid and earmold, as well as changing the battery. The participants were required to ask the investigators for any materials they would need to perform the required tasks. The investigators scored the participants on their performance of troubleshooting tasks based on what they read in the manuals. The participant's scores were dependent on their completion of the tasks in the exact way the manual described. Secondly, in terms of understanding the literature, the participant had to find and understand three facts in the manual on troubleshooting and health and safety. The participants received two different scores on this task: finding the information and then understanding the information. Participants had difficulty with both manuals in terms of usability and literature testing. Many had trouble inserting and removing the battery, turning the hearing aid off and on, cleaning the hearing aid, and reattaching the earmold to the aid. Most

participants found the literature of the manuals confusing and too wordy; the images seemed to hard to interpret, and many participants could not explain what they had read. This study suggests the need for a more comprehensive and easily understood method for patients to reference (Brooke et al., 2012).

Recent research suggests benefit in using instructional videos for new hearing aid users. A 2010 MarkeTrak survey by Sergei Kochkin and colleagues, 46,843 households were surveyed on hearing aid dispensing protocols and its correlation with successful patient outcomes. Participants completed questions that used a seven point Likert scale to evaluate things such as fit and comfort of the device, sound quality, counseling, and attributes of the Audiologist or dispenser both personally and in terms of their office space. The participants also answered questions on self-generated scales of benefit and satisfaction. In addition, the participants reported on the fitting protocol when they received their hearing aids. Interestingly, about 5% (n=44) of hearing aid users reported receiving some sort of instructional video as part of the hearing aid fitting protocol. For these new hearing aid users that received a video, a small positive effect was noted for hours of usage, subjective benefit, and benefit in various listening environments. Even the experienced hearing aid users who received a video were positively affected in terms of successful outcomes and satisfaction (Kochkin et al., 2010b).

Additional new research from the United Kingdom suggests that how-to video tutorials may increase the success of first time fittings. The National Institute for Health (NIHR) and the National Biomedical Research Unit in Hearing (NBRUH) supported researchers at the University of Nottingham for the development of eight video tutorials that could be viewed via DVD player, computer, or on the Internet. (http://www.hearing.nihr.ac.uk/research/evaluation-of-interactive-videos-for-enhancing-for-new-hearing-aid-users) The purpose of the videos is to

counsel patients on how to best use hearing aids as well as how to communicate with family and friends. The videos were developed as a means of reinforcing information received in the clinic. The counseling in the videos included information on hearing loss, helpful animations, and personal messages and experiences from established hearing aid users. The tutorials proved to be beneficial for family and friends, as well, offering insight on how to best support the hearing aid user by developing awareness of communication strategies and communication partner training. Currently, the research team at the University of Nottingham is collecting data on the effectiveness of these videos; however, a preliminary press release stated that these videos have been shown to be effective in helping patients and their families understand how to handle their hearing devices (Koufali, 2011).

The positive effect noted in the previous study may be attributed to some of the basic foundations and principles in psychology. The video acts as a model prompt, helping to trigger some piece of information learned in the counseling session. The video also serves as reinforcement for the patient because they are able to perform hearing aid troubleshooting from home, or think of a communication strategy that could help them in a certain situation. Instructional videos model a style of teaching and learning that is present in the field of education known as Just-In-Time Teaching (JiTT). The JiTT strategy incorporates classroom learning and web-based reinforcement. The students prepare for the classroom lecture prior to the class meeting. Right before the class begins, the students take a short web-based quiz, and "just-in-time" the teacher reads the responses of the students to tailor the class meeting around their understanding. After class, the students complete other web-based activities to help with retention of the information. These interactions create a "feedback loop" that promotes retention

and learning, student and faculty interaction, and satisfaction among all parties involved (Novak et al., 1984).

The use of instructional videos could also reduce the number of return visits by patients for further counseling and instruction. It is reasonable to assume that if a patient better understands how to use and care of his or her hearing aid, then he or she will become a more successful hearing aid user. The number of return visits for programming/counseling is highly correlated with patient satisfaction. Kochkin et al. (2010b) found that about forty percent of patients had what they considered to be below average success. Of that forty percent, about half of that group required four or more programming visits. Therefore, a series of instructional videos were created for use in adult Audiology clinics to promote patient education and help patients retain important counseling information that was given during their appointments. The hypothesis in the dissemination of these videos is that they will increase patient satisfaction of new hearing aid users and also help these users remember key information related to their hearing test results, hearing aid use, and use of communication strategies. Also, it is hypothesized that if a patient is satisfied with their hearing aids, there will be more perceived benefit. Having increased benefit and satisfaction could potentially make the patient a better hearing aid user, which in turn, could lead to more routine usage, brand loyalty, and higher likelihood of the patient purchasing hearing aids again (Kochkin, 2010a).

METHODS

SUBJECTS

Twenty-six new hearing aid users (Video group: N=13, 7 men and 6 women with a median age of 70; No video group: N=13, 10 men and 3 women with a median age of 72) were recruited to participate in this study. The participants were from the Saint Louis area, and were recruited directly from Washington University School of Medicine Adult Audiology Clinic at the Central Institute for the Deaf. All participants were over the age of 18 years old and had sensorineural hearing loss. The Human Research Protection Office at Washington University, in Saint Louis, approved the study and informed consent was obtained for each participant.

VIDEOS

A series of instructional videos were created by a team of both an Audiologist and clinical doctoral students at Washington University in St. Louis School of Medicine. These videos were created in such a way that the videos can be segmented and divided, so that patients will only need to view the videos that pertain to their style of hearing aid. Figure 1 contains a flowchart detailing the creation of 40 original videos (marked in gray). Three of these videos are considered core videos, meaning that they are to be given to all patients regardless of their hearing aid style. These three videos are each approximately seven minutes in length and they are *Understanding Hearing Loss, Communication Strategies,* and *Hearing Assistive Technology*. The remaining videos pertain to each of the six hearing aid styles, behind the ear (standard), behind the ear (slim-tube/open-fit), receiver in the canal, in the ear, in the canal, and completely in the canal. Within the hearing aid style category, there are specific videos that reinforce information from the fitting related to *Understanding the Hearing Aid, Batteries, Wearing the Hearing Aid, Controls and Options, Using the Telephone,* and *Maintenance and*

Troubleshooting. The hearing aid specific videos were each approximately 3-4 minutes in length. Digital video discs (DVDs) containing nine videos (three core videos and six specific videos) for each of the six hearing aid styles were distributed to the participants.

MEASUREMENT TOOLS

Three measures were used to collect qualitative data on benefit and satisfaction to quantify data on retention of information with reference to hearing aid use from each of the participants.

The Abbreviated Profile of Hearing Aid Benefit (APHAB) was used as an outcome measure to evaluate the perceived benefit of the device itself. The tool utilizes a pre and post hearing aid measure to collect data on benefit in particular environments with and without the hearing aids (Cox & Alexander, 1995). The tool is comprised of twenty-four questions where participants respond with choices that range from Always through Never, by circling a letter, A-F, which corresponds with their benefit rating. A high benefit rating most often corresponds with "Always"; however eleven questions are scored in a reversed fashion, where "Never" would have the highest benefit rating (Cox & Alexander, 1995). The outcome measure is broken into four subscales: Ease of Communication (EC), Background Noise (BN), Reverberation (RV), and Aversiveness (AV). The means of each of these subscales add up to one Global score. Subtracting the aided average from the unaided average gives an overall benefit rating. All completed APHAB's were scored using the APHAB questionnaire software on the NOAH 3 database.

The Satisfaction with Amplification in Daily Life Scale (SADL) was used to measure participant satisfaction on non-device variables, such a services received (Cox & Alexander, 1999). Similar to the APHAB, the SADL requires participants to rate their satisfaction via

fifteen questions by circling a number, 1-6, which corresponds with choices Not at All through Tremendously. The SADL is also broken into four subscales: Personal Image, Service and Cost, Negative Features, and Positive Effect that also add up to one overall Global score. The scale was designed for high satisfaction ratings to correspond with "Tremendously" most often; however, four questions work in the reverse sense, in that, high satisfaction ratings should correspond with "Not at All" (Cox & Alexander, 1999).

A Hearing Aid Quiz was created to measure the participant's retention of the informational counseling they received. It was scored out of 22 points with answers being marked as correct or incorrect, with a maximum score of 100%.

PROCEDURE

The study paralleled the typical medical model for a hearing aid fitting. At the patient's 60-minute hearing aid evaluation, the participants were recruited. During the hearing aid evaluation: the audiogram was reviewed, styles, cost, and internal processing was discussed, their hearing aid was selected, and earmolds were made, if applicable. The participants were randomized into two different groups; one group of participants received an instructional video while the other group of participants did not. Every other new hearing aid participant was selected to receive an instructional video.

In the course of the hearing aid evaluation, participants received a cover letter explaining the study. After consenting to participate in the study, participants from both groups took 5-10 minutes to fill out the "Without Hearing Aids" column of the APHAB. At this one-hour appointment, the participants in the "video" group received their video. They were instructed to watch their videos at home before their hearing aid fitting, but the participants were not limited

on how many times they viewed the videos throughout the course of their hearing aid trial period.

When the hearing aids were received by the clinic, the participants would return for their 75-minute hearing aid fitting. All the participant's fittings were verified using Real Ear Measures, and all were counseled on hearing aid use and maintenance by the audiologist. A checklist was utilized to ensure all participants received the same verbal informational counseling (See Appendix B).

Two weeks after the hearing aid fitting, the participant's returned for their hearing aid follow-up appointments. All of the participants had the opportunity to ask questions about their hearing aids and were able to have adjustments made to their hearing aids, if necessary.

One month after the hearing aid evaluation, the participants returned for their final follow-up appointment. During this 45-minute appointment, participants had the opportunity to have additional adjustments made to their hearing aid fitting. All participants filled out the "With Hearing Aids" column of the APHAB, the SADL, and the Hearing Aid quiz. The participants in the "no-video" group were offered a copy of the instructional video, if interested.

RESULTS

The data from the two groups was analyzed using independent sample t-tests with a 95% confidence interval to compare the Video and No Video group's scores on the APHAB, SADL, and quiz scores.

APHAB

Figure 2 displays the effect of video delivery on the APHAB scores; statistical significance ($p < 0.05$) was documented in the overall Global score (t (24) = -3.174, p = 0.004). The following subscales were statistically significant: Ease of Communication (EC) (t (24) = -2.602, p = 0.016), Reverberation (RV) (t (24) = -3.099, p = 0.005), and Background Noise (BN) (t (24) = -2.338, p = 0.028). These scores reflect the Video group perceiving more benefit than the No Video group. The final subscale, Aversiveness (AV) did not show statistical significance (t (24) = .349, p = .730).

SADL

Figure 3 displays the influence of video delivery of measures of perceived satisfaction in the overall Global score of the SADL (t (24) = -3.938, p = .001). In further looking at statistical significance the subsequent subscales of the SADL: Service and Cost (t (24) = -2.712, p = 0.012), Negative Features (t (24) = -4.241, p = 0.000) were significant for the participants who watched the videos. The remaining subscales for the SADL were not statistically significant: Positive Effect (t (24)= -1.939, p = 0.071) and Personal Image (t (24) = -1.891, p = 0.074).

Quiz

Finally, the Video group scored an average of 84% on their quiz, while the No Video group scored an average of 56%. This difference was statistically significant (t (24) = -5.262, p = 0.000)

DISCUSSION

Results of this study indicate that those new hearing aid users who receive an instructional DVD as part of their hearing aid fitting protocol report having greater perceived benefit and satisfaction when compared to those who did not receive a video. The positive results including greater score on the quiz measuring memory retention of counseling items suggest that not only did the participants watch the video, but that it was effective.

The APHAB evaluates patients on four sub-scales: Ease of Communication (EC), Background Noise (BN), Reverberation (RV), and Aversiveness (AV). Each of these categories generates a score, that contributes to an overall Global score. Statistical significance was noted in the following categories: Global, EC, RV, and BN, with those receiving the video perceiving more benefit than those who did not. These differences can be attributed to the Video group having a better understanding of their device. Using the Video to reinforce communication strategies would definitely *ease* communication. Issues with background noise and reverberation were likely alleviated for the Video group because they better understood communication strategies and how to properly position themselves in noisy environments. Statistical significance was not found in the AV subscale, but that is to be expected. The APHAB compares "with" and "without" hearing aids; so aversive sounds like sirens would be less noticeable without hearing aids than with hearing aids. Amplifying a siren with hearing aids would definitely be aversive for a new hearing aid user.

As mentioned previously, the SADL is broken into four subscales that add up to a Global score. The four subscales include: Personal Effect, Service and Cost, Negative Features, and Personal Image. Service and Cost, Negative Features, and the Global score indicated statistical significance between the Video and No Video group. Greater satisfaction in terms of service and

cost is great news for Audiologists. The participants valued the service of the Audiologist and through reinforcement on their hearing aid counseling, viewed the cost of the device to be worthwhile. The impact of greater knowledge of one's device helps the patient have realistic expectations; therefore the user is more tolerant of hearing aid limitations.

The quiz seemed to be the most useful tool in quantifying the effectiveness of these instructional videos. The quiz was designed to target the participant's understanding of their device. The results from the quiz are hard to ignore. Not only did the participants who received the video have a higher overall average score; they were also better able to explain what their word recognition score represents, list communication strategies, and describe the function of their telecoil. Patients often confuse their word recognition score with a "percentage of hearing loss". The patient, who understands that the word recognition score is representative of how well the hearing nerve conducts sound to the brain, will better comprehend that it is the distortion in the cochlea that will always be the culprit of poorer understanding speech in noise and that hearing aids will not restore former hearing performance. Hearing aids assist in amplifying all sounds, including background noises. While advances in hearing aid technology have improved the impact of background noise on hearing aid users, it is imperative to educate patients on ways to capitalize on their environment when in difficult listening situations. The patient who is able to utilize communication strategies will perceive more benefit and satisfaction from their device. With the current push for "looping" the telecoil will be invaluable for patients; understanding its function and activation will help outside of the home, as well as, on the telephone.

Future research goals should seek to evaluate the application of these videos with established hearing aid users. Sergei Kochkin's MarketTrak survey (2010) listed benefit amongst new *and* old hearing aid users. For example, the videos might be incorporated when an

established user purchases a new device. Understanding new equipment or relearning prior information is always helpful.

Next, in paralleling the research from Nottingham on instructional videos, the addition of a video on communication strategies for the communication partner should be considered. Having an additional advocate for the person with the hearing impairment would be advantageous in a variety of situations. This education would likely promote empathy and understanding on the part of the communication partner.

As mentioned in the introduction, Davis et al (2007) reported 74 years old is the average age of a new hearing aid user. Interestingly, the average age of the two groups in this project were 70 and 72 years old. Comparing individuals less than 74 years old and older than 74 years old would possibly offer information on learning styles between these cohorts. Finding a difference could prompt future research in learning.

Expanding this project to other clinics and Audiologists could help the field draw conclusions about the impact of these videos nationwide. Through the sample in this study, greater benefit and satisfaction was documented. These perceptions could potentially lead to more patient referrals, brand loyalty, and likelihood to repurchase.

CONCLUSION

Overall, instructional videos reinforce verbal informational counseling. This study offers the value of these videos as they led to greater perceived benefit and satisfaction among the new hearing aid users that utilized them.

REFERENCES

Beck, D. L. , (2012). We hear with our brains! *The Hearing Review, 19 (10),* 16.

Brooke, R. E. , Isherwood, S. , Herbert, N. C. , Raynor, D. K. , & Knapp, P. , (2012). Hearing aid instruction booklets: employing usability-testing to determine effectiveness. *American Journal of Audiology, 21(2),* 206-14.

Cabeza, R., Anderson, N. D., Locantore, J. K., & McIntosh, A. R. (2002). Aging gracefully: Compensatory brain activity in high- performing older adults. Neuroimage, 17, 1394-1402.

Cox, R. M. , & Alexander, G. C., (1995). Measuring hearing aid benefit with the APAHB: is this as good as it gets? *American Journal of Audiology, 4,* 10-13.

Cox, R. M. , & Alexander, G. C. , (1999). Measuring satisfaction with amplification in daily life: the SADL scale. *Ear and Hearing, 20 (4),* 306- 339.

Davis, A., Smith, P., Ferguson, M., Stephens, D., Gianopolous, I., (2007). Acceptability, benefit, and costs of early screening for hearing disability: A study of potential screening tests and models. *Health Technology Assessment,* 11 (1), 294.

Deshardins, J. L. & Doherty, K. A. (2009). Do experienced hearing aid users know how to use their hearing aids correctly? *American Journal of Audiology, 18,* 69-76.

Dubno, J. R. , Lee, F. , Matthews, L. J. , Ahlstrom, J. B. , Horwitz, A. R. , & Mills, J. H. (2008). Longitudinal changes in speech recognition in older persons. *Journal of the Acoustical Society of America, 123 (1),* 462-475.

Duchan, J. F. (2004) Maybe audiologists are too attached to the medical model. *Seminars in Hearing, 25 (4),* 347-354.

Gordon-Salant, S., & Fitzgibbons, P. J. (1993). Temporal factors and speech recognition performance in young and elderly listeners. *Journal of Speech and Hearing Research, 36,* 1276-1285.

Harris, K. C. , Wilson, S. , Eckert, M. A. , & Dubno, J. R. (2012). Human evoked cortical

activity to silent gaps on noise: effects of age, attention, and cortical processing speed. *Ear & Hearing, 33 (3),* 330-339.

Humes, L. E. (2007). The contributions of audibility and cognitive factors to the benefit provided by amplified speech to older adults. *Journal of the American Academy of Audiology, 18,* 590-603.

Humes, L. E., Watson, B. U., Christensen, L. A., Cokely, C. G., Halling, D. C., Lee, L. (1994). Factors associated with individual differences in clinical measures of speech recognition among the elderly. *Journal of Speech and Hearing Research, 37,* 465-474.

Kiessling, J. , Pichora- Fuller, M. K. , Gatehouse, S. , Stephens, D. , Arlinger, S. , Chisolm, T. , . . . von Wedel, H. (2003). Candidature for and deliver of audiological services: special needs of older people. *International Journal of Audiology, 42 (Suppl 2),* 2S92-101.

Kochkin, S. (2009). MarkeTrak VIII: 25-Year trends in hearing health market. *The Hearing Review, 16 (11),* 12, 14, 16, 18, 19, 20, 22, 23, 24,26, 28, 30, & 31.

Kochkin, S. (2010a), MarkeTrakVIII: Consumer satisfaction with hearing aids is slowly increasing. *The Hearing Journal, 63 (1),* 19-27.

Kochkin, S. , Beck, D. L. , Christensen, L. A. , Compton- Conley, C. , Fligor, B. J. , Kricos, P. B. , . . . Turner, R. G. (2010b). MarkeTrak VIII: the impact of the hearing healthcare professional on hearing aid user success. *The Hearing Review, 17 (4),* 12, 14, 16, 18, 23, 26, 27, 28, 30, 32, & 34.

Koufali, M. (2011). Interactive videos from Nottingham Hearing BRU to help new hearing aid users. Retrieved from: http://nuhrise.org/2011/02/interactivevideos-to-help-new-hearing-aid-users/

Lee, F. , Matthews, L. J. , Dubno, J. R. , & Mills, J. H. (2005). Longitudinal study of pure-tone thresholds in older persons. *, 26 (1),* 1-11.

Margolis, R. H. (2004). In one ear and out the other- what patients remember. *Audiology Online*. Retrieved from

http://www.audiologyonline.com/articles/in-one-ear-and-out-1102

McCormack, A., & Fortnum, H., (2013). Why do people fitted with hearing aids not wear them? *International Journal of Audiology*, *52 (5)*, 360-368.

Nair, E. L. & Cienkowski, K. M. (2010). The impact of health literacy on patient understanding. *International Journal of Audiology*, *49*, 71-75.

National Institute on Deafness and Other Communication Disorders. (2010). Quick statistics. Retrieved from http://www.nidcd.nih.gov/health/statistics/Pages/quick.aspx

Novak, G., Gavrin, A., Christian, W., Patterson, E., Just-In-Time Teaching : Blending Active Learning with Web Technology (Prentice Hall Series in Educational Innovation, 1999)

Oxenham, A. J. & Bacon, S. P., (2003). Cochlear compression: perceptual measures and implications for normal and impaired hearing. *Ear and Hearing*, *24 (5)*, 352-366.

Wong, P. C., Jin, J. X., Gunasekera, G. M., Abel, R., Lee, E. R., & Dhar, S. (2009). Aging and cortical mechanisms of speech perception in noise. Neuropsychologia, 47, 693-703.

FIGURE 1

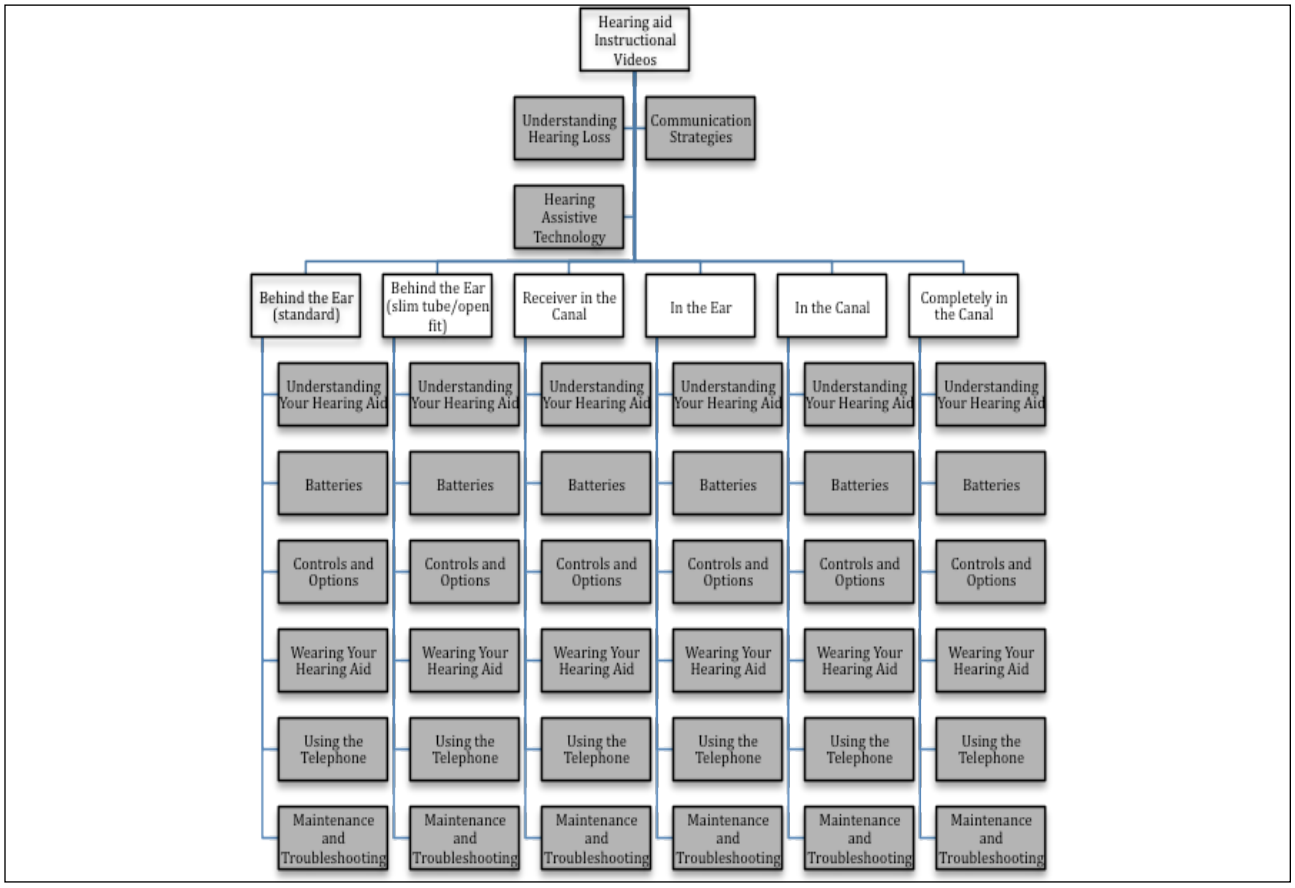

Figure 1: Flowchart diagramming the breakdown of the instructional videos, beginning with the three core videos at the top and separating into the six hearing aid style specific videos.

FIGURE 2

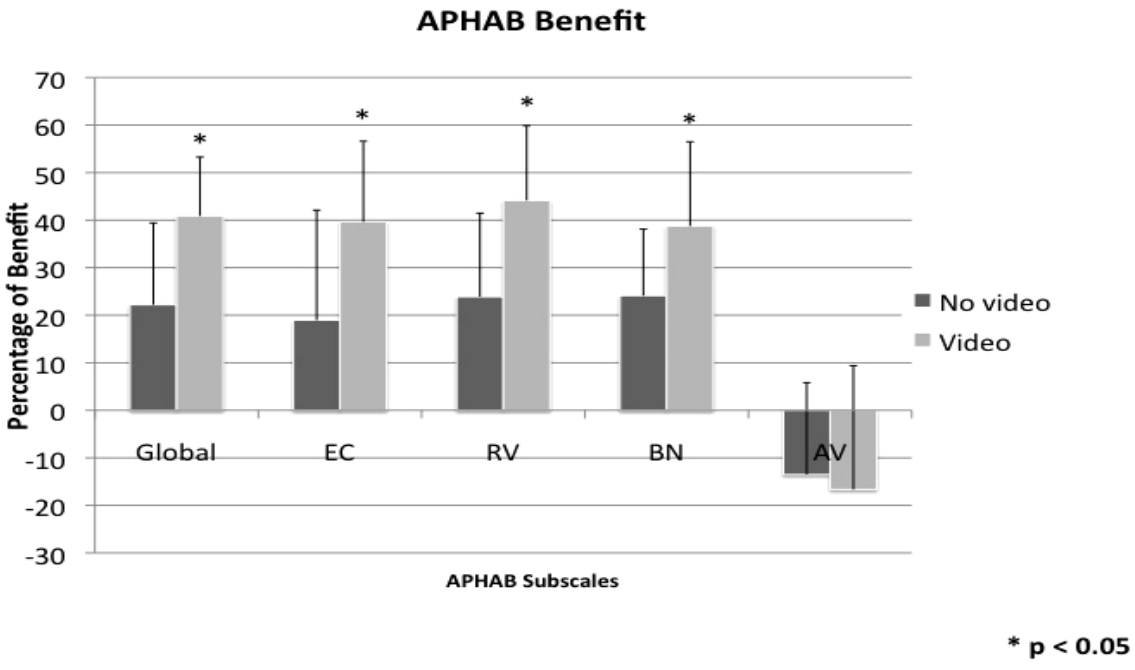

Figure 2: Statistically significant ($p < 0.05$) differences noted between the Video and No Video group on subscales: Global, Ease of Communication (EC), Reverberation (RV), and Background Noise (BN), with the Video group perceiving more benefit.

FIGURE 3

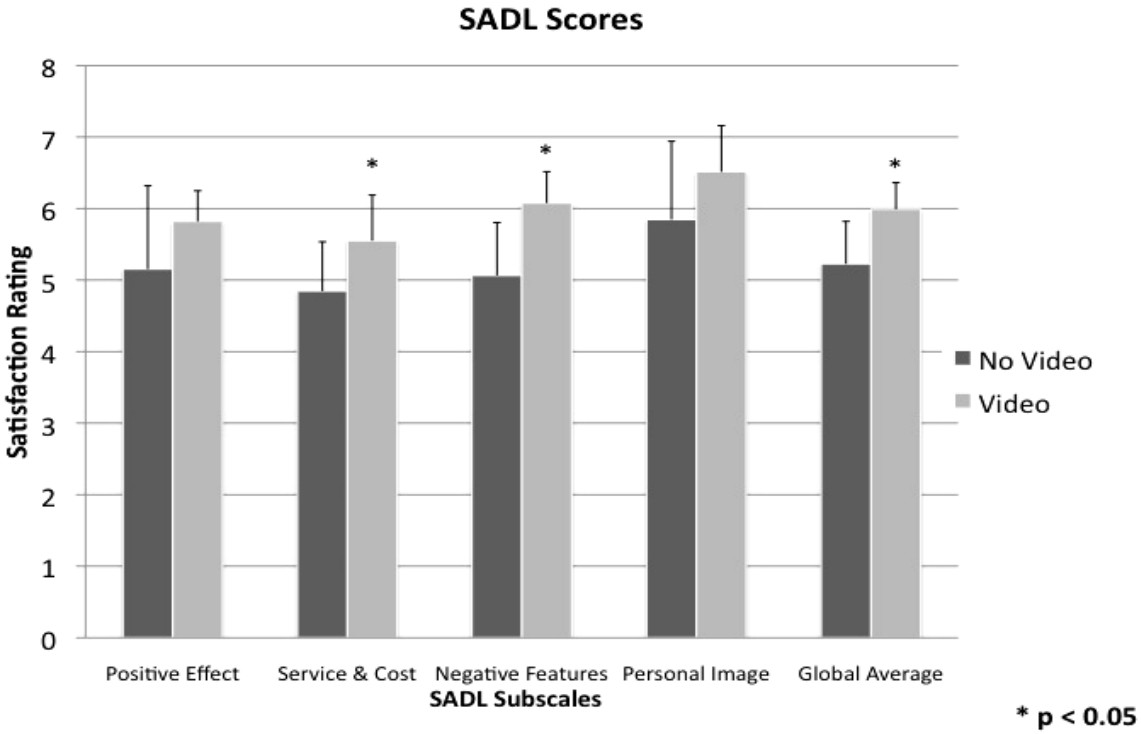

Figure 3: The above subscales demonstrating statistical significance ($p < 0.05$): Service and Cost, Negative Features, and Global Average. These scores indicate the Video group perceives more satisfaction than the No Video group.

FIGURE 4

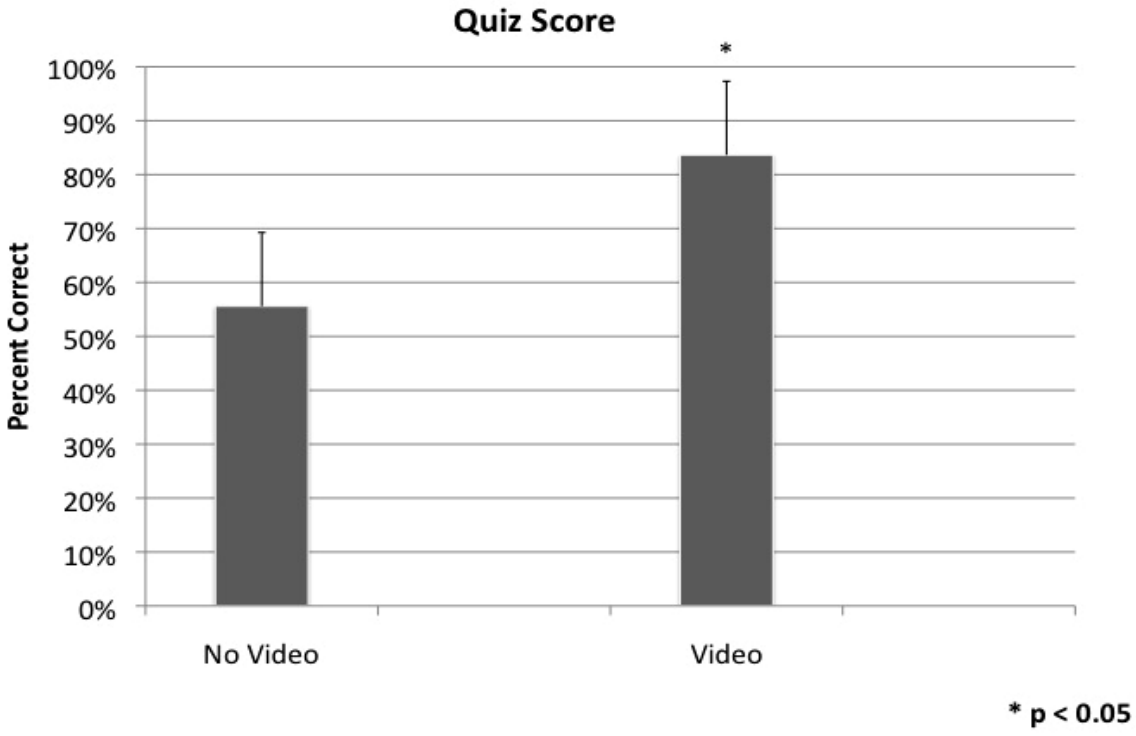

Figure 4: Statistical significance ($p < 0.05$) between the Video and No Video group. The Video group scored an average of 84% correct while the No Video group scored an average of 56% correct.

APPENDIX A

HEARING AID SURVEY

1) What type of hearing loss do you have?

_____

2) What's your gender? _____

3) What's your age? _____

4) Will hearing aids restore your hearing?

_____

5) On the hearing test results, what is a good predictor of how well your nerve conducts sound?

_____

6) After you peel the sticker off the back of the battery, how long should you wait before inserting the battery into the aid?

_____

7) What size are your batteries?

_____

8) What color corresponds with your batteries?

_____

9) Where can you buy batteries?

_____

10) How often should you replace the Dry Briks in the Dry and Store?

_____

11) What part of the hearing aid do you need to make sure is clear of debris?

_____

12) How do you tell the right aid from the left aid?

_____

13) When your hearing aid sounds weak, after I've replaced the battery, I should check:

_____

14) Where do you position the phone receiver when using the telephone?

_____

15) What is a telecoil?

_____

16) How do you clean your hearing aids?

_____
_____

17) If you have trouble hearing on the telephone, what should you do?

_____

18) Name three communication strategies for effective communication.

_____
_____
_____

19) Name three assistive devices that can be used with or without your hearing aids.

_____

_____

_____

20) Overall, you are _____ with the understanding of your hearing aid.

a. Very satisfied

b. Satisfied

c. Disappointed

d. Unsatisfied

21) The video provided to me reinforced my understanding of hearing aid maintenance and troubleshooting

a. True

b. False

22) What situations do you find your hearing aids most beneficial?

_____

_____

23) Based on satisfaction, how likely are you to refer this provider to a friend?

Very Satisfied Satisfied Somewhat satisfied Neutral Dissatisfied

24) How confident are you in your knowledge of how to use and take care of the hearing aids?

(Very Confident) 1 2 3 4 5 (Very Unsure)

APPENDIX B

Hearing aid Evaluation Counseling and Instruction Checklist

- ☐ Explain type and degree of hearing loss to patient
- ☐ Give them their audio plotted on a familiar sounds audiogram
- ☐ Review WRS and its implications
- ☐ Go over communication strategies
    - Reduce background noise
    - Get a good visual
    - Know your limitations
    - Know your topic
    - Ask for clarification
    - Stay calm
- ☐ Hearing aid Instructions
    - Battery type
    - Where to by batteries
    - Aeration of battery
    - Turning off/on
    - Volume Control
    - Program button
    - Inserting/Removing hearing aid
    - Use of telephone
    - Maintenance/Troubleshooting
        - Use of Zephyr
        - Use of dry bricks
        - Cleaning
        - Removing wax guard
        - Cleaning mold
- ☐ Assistive Technology
    - Amplified telephones
    - FM systems
    - HAT in public places
    - Bluetooth availability