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CURRENT TRENDS IN HEARING ASSISTANCE TECHNOLOGY

by

Abigail S. Keller

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

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Approved by:
A.U. Bankaitis, PhD, FAAA, Capstone Project Advisor

Abstract: A survey was distributed to practicing audiologists regarding the dispensing trends of Hearing Assistance Technology. Sixty-one responses were collected and analyzed revealing significant trends in HAT dispensing.

CHAPTER I

Literature Review

The ability to hear a lecture, to have a conversation in a noisy restaurant, or to effortlessly converse over the telephone represent situations normal hearing individuals take for granted. For those with varying degrees of sensorineural hearing loss, the same situations pose difficulty in communication for the hearing impaired individual, leading to frustration, potential depression or isolation. Approximately 30 million people in the United States report having hearing difficulty, representing 10% of the current population of the country (Kochkin, 1999). Fortunately, amplification in the form of hearing instruments is readily available and has shown to greatly improve the quality of life of individuals with hearing loss. Individuals with mild to severe sensorineural hearing loss who wear hearing instruments are more likely to report perceived improvements in their physical, emotional, mental, and social well-being, exhibiting more socially active lifestyles with minimal reports of depression, worry, paranoia, and insecurity as compared to hearing impaired counterparts who do not wear hearing instruments (Kochkin & Rogin, 2000).

The degree of communication improvement achieved with hearing instrumentation is influenced by hearing instrument technology. Hearing instruments employing dual microphone technology provide a significant advantage in noisier environments over omni-directional hearing instruments in a variety of areas. For example, Shuchman, Valente, Beck, and Potts (1999) documented hearing instrument user satisfaction improvements of 400% to 500% in noisy situations when using dual-microphone technology as compared to omni-directional technology. In his 10-year consumer satisfaction study assessing trends in the United States' hearing instrument market,

Kochkin (2004) reported a definite consumer perceptual advantage when using dual-microphone technology in difficult listening situations that include large group interactions, workplace communication, outdoor activities, and entertainment situations. Similarly, while comparing satisfaction in a group of hearing instrument wearers with dual-microphone technology to Kochkin's 2004 consumer group, Kuk (1996) found that dual microphone technology doubled customer satisfaction in noise.

Need for Supplemental Hearing Technology Beyond Hearing Instruments

While hearing instruments do provide individuals with sensorineural hearing loss a significant communication and life advantage, hearing instrument wearers continually experience dissatisfaction with such devices, particularly in challenging listening situations where background noise is present. Regardless of the type or age of hearing instruments, hearing aid satisfaction typically reaches slightly more than 50% (Kochkin, 1999). According to the majority of consumers, the most common reasons why hearing instruments are not worn are due to perceived poor benefit in noisy situations (Kochkin, 2000). A number of prominent industry researchers and authors have recognized hearing aid performance in noise as one of the key barriers to growth (Kochkin & Strom, 1999). Based on current technology, multiple microphone hearing aid technology holds the greatest promise for improving consumer satisfaction in difficult listening situations (Kochkin, 2000), however, despite the significant improvement in consumer satisfaction when using dual-microphone technology, the consumer would most likely benefit from the supplementation of available technology to improve communication in noisy situations that current, more advanced hearing aid technology may not necessarily provide.

Beyond difficult listening situations, there will be instances when individuals with

sensorineural hearing loss will be unable to wear hearing instruments yet still possess the need to be alerted of certain activities or occurrences. For example, hearing instruments traditionally are not worn to bed and typically removed during sleeping hours. In the absence of appropriate amplification during sleeping hours, individuals with hearing loss are faced with new levels of communication limitations beyond hearing a conversation in a noisy environment including challenges in hearing an alarm clock or fire alarm during sleeping hours. Unfortunately, the majority of traditional alarm clocks are equipped with buzzers or alarms insufficient in waking a hearing impaired individual; similarly, doorbells and telephones may not be sufficiently loud to alert a hearing instrument wearer that someone is ringing the front doorbell or that a call is coming in on the telephone (Ross, 2004). The inability to efficiently hear certain alarms can pose potentially life-threatening risks to the individual with hearing loss. Standard smoke alarms traditionally emit a high frequency tone that falls within the typical range of hearing impairment for those with sensorineural hearing loss, creating a situation where the hearing impaired individual who is sleeping and therefore not wearing hearing instruments would be unable to hear the alarm during the night (Ross & Mulvany, 2003.)

Lastly, there are individuals with hearing loss who, for a variety of reasons, postpone the use of hearing instruments. Kochkin (2000a) outlined a variety of reasons that consumers were not satisfied with hearing instruments including consumer reports of poor benefit, difficulty hearing in background noise, uncomfortable fit, cost of instrumentation and associated maintenance. More importantly, Kochkin (2000a) found that nearly 10% of consumers who had pursued hearing instrumentation independently determined that either their hearing loss was too mild to necessitate the use of hearing instruments or that they were already socially isolated and therefore no longer needed hearing aids. Consumer denial expands across a broad continuum, ranging from the

perception that the individual does not need help when they really do to the individual who knows that they need help but have been so removed from social interaction that the prospect of hearing instrumentation reintegrating them back into a more active, social lifestyle is perceived as too futile of a solution. Historically, the hearing instrument market penetration has been low, approximating 20% penetration (Kochkin, 1999). In other words, the majority of individuals with hearing loss (80%) who would benefit from hearing instrumentation have not pursued hearing instrumentation. Furthermore, of those who have pursued hearing instrumentation, almost 20% report that they never wear their devices (Kochkin, 2000).

As outlined above, hearing instrument wearers remain vulnerable to listening challenges that serve as communication barriers. Even with advanced technology, consumers are unsatisfied with hearing instrumentation in noisy situations. Since hearing instruments are traditionally worn during those hours that an individual is awake, consumers are in need of alternative amplification systems during sleeping hours. Furthermore, hearing impaired individuals who have not pursued amplification with hearing instrumentation are in need of a less sophisticated, entry-level amplification option. For these specific populations, the solution is readily available in the form of Hearing Assistance Technology (HAT).

Hearing Assistance Technology:

Hearing assistance technology (HAT) refers to a broad range of devices beyond traditional hearing instruments designed to facilitate the reception of auditory information (Thibodeau, 2004). Examples of HAT devices include both corded and cordless amplified telephones, telephone amplifiers, telephone ringer amplifiers, infrared devices, FM systems, and various alerting devices. Regardless of the specific type of device, the intent of HAT is to optimize communication for

individuals with hearing loss. From this perspective, HAT is a more accurate description than the term assistive listening devices (ALDs) since it more precisely conveys the various means in which communication optimization can be pursued.

HAT may be categorized into one of two general groups based on the strategy employed to achieve optimal communication: 1) amplification devices, and 2) alerting devices. Furthermore, some HAT products incorporate a combination of the two strategies. For example, some amplified telephones provide not only a 95 dB ringer (i.e. amplification device) but supplement the incoming signal with a visual flashing strobe light (alerting device). To appreciate the scope of HAT, it is critical to review both groups in more detail.

Amplification Devices

Amplification devices refer to devices that are designed to increase the signal-to-noise ratio for purposes of creating a more favorable listening environment. Signal-to-noise ratio (S/N) refers to the relationship between the sound level of a signal and of the noise at the listener's ear (Mendel, Danhauer and Singh, 1999). It is generally reported as the difference in decibels (dB) between the intensity of the desired signal and the intensity of the undesired noise (Agnew, 2002). The S/N may be reported either as a positive or negative ratio. For example, a S/N +5dB indicates that the desired signal is 5 dB *louder* than the undesired noise. Conversely, an S/N –10dB specifies that the signal is 10 dB *softer* than the background noise. Considering these two examples, an S/N +5dB is a more favorable listening situation than an S/N -10 dB. For those with sensorineural hearing loss, the more favorable the S/N, the easier it will be for individuals to hear, thereby optimizing communication.

Improved S/N transmits signals from the designated sound source to the individual with hearing loss as directly as possible, overcoming the disadvantage of speaker to listener distance as

well as poor room acoustics. In general, amplification devices are comprised of three basic components: 1) transmitter, 2) receiver, and 3) output transducer or coupler (Lesner 2003). There are several technologies available that specifically improve S/N ratios, some of which include: 1) amplified telephones, 2) telephone amplifiers, 3) infrared devices, and 4) FM systems.

Amplified Telephones

Amplified telephones work just like standard telephones with the exception that amplified telephones are designed to increase the volume of the caller's voice when needed. Amplified telephones come in both corded and cordless versions and offer the consumer a wide range of user options including caller ID, call Waiting, memory dials buttons, adjustable ringers, speaker phones, and built-in answering machine capabilities. While the primary function of the amplified telephone is to increase the S/N ratio by making the incoming caller's voice louder than normal, some amplified telephones are equipped with alerting devices that either flash a strobe light or activate a room lamp to turn on and off in a pattern, alerting the individual of an incoming phone call. Figure 1 shows two different amplified phones currently available from various manufacturers.

Figure 1: From left the right, the Freedom phone from ClearSounds® and the JV 35 phone from Ameriphone®

Telephone Amplifiers

Telephone amplifiers are battery operated portable devices that attach to existing corded

telephones and amplify the incoming volume of the caller's voice. These amplifiers will not work with cordless telephones. As illustrated in Figure 2, depending on the specific product model, the telephone amplifier fits over the ear piece of the handset with a strap or connects between the handset and base of an existing corded phone.

Figure 2: Two examples of portable telephone amplifiers. On the left, the PA 25 from Ameriphone® which is designed to strap over the earpiece of the telephone receiver; on the right, the HA 40 from Ameriphone®

Infrared Devices

Infrared devices utilize infrared light signals to send information from a sound source to a headset worn by the individual with hearing loss. These devices incorporate the use of a transmitter and a receiver. The transmitter is connected to the specific sound source, including the TV or stereo. The transmitter then delivers the auditory signal via an invisible beam of light to the receiver. The receiver is usually a headset worn by the hearing impaired individual that is supplied with a volume control. These devices allow the user to listen to the TV or stereo without having to increase the volume of the TV or stereo such that it is too loud for others. In addition, these devices may be used in movie theaters, churches, and other venues equipped with compatible transmitters. Figure 3 illustrates a popular infrared device that can be used in the home or in public places equipped with 95 KHz transmitters.

Figure 3: The Direct Ear™ Set 810 infrared system from Sennheiser®

FM Systems

FM systems are devices that convey sound from a sound source to a listener via a frequency-modulated radio signal. As with infrared devices, FM systems are comprised of both a transmitter and a receiver. In general, the transmitter is contained within the microphone that is used to pick up the source signal. The transmitter than sends the auditory signal via radio signals to a receiver. There are many receiver options available; different FM systems are equipped with self-contained systems, which are worn in place of hearings aids and have internal controls that can be adjusted according to degree and configuration of the hearing loss, and personal systems, which are designed to be coupled to the ear via headphones or earbuds, or can be worn with hearing instruments (Lewis, 1999). Figure 4 shows an example of a popular personal FM system.

Figure 4: Hearing Helper® wireless FM system from Williams Sound Corp.

Alerting Devices

Alerting devices refer to those devices that are designed to alert incoming signals by enhancing the auditory signal via amplification or supplementing or substituting the auditory signal with an alternative signal including vibrotactile or visual stimulation.

Alerting Devices Providing Auditory Amplification

HAT designed to specifically alert individuals with sensorineural hearing loss of incoming signals via auditory amplification include amplified telephone ringers. Amplified telephone ringers connect to existing phones or stand along phone jacks and make the phone ring louder than the standard intensity. Some phone ringers supplement the amplified auditory signal with a simultaneous flashing light, providing an additional means of signaling an incoming phone call. Figure 5 shows a common amplified telephone ringer.

Figure 5: The CL 1 amplified telephone ring signaler from ClearSounds®

Alerting Devices Providing Vibrotactile or Visual Stimulation

Alerting devices that provide some form of vibrotactile or visual stimulation either in the presence or absence of auditory stimulation are available in many different forms and include alarm clocks, alarm watches, and smoke detectors. Alarm clocks provide amplified adjustable volume and tone control of the auditory alarm signal. In addition, the alarm clocks are designed to allow for a lamp to be plugged into the back of the clock so that the lamp is activated to flash on and off during the alarm cycle. Furthermore, optional bed shakers placed under the pillow will vibrate or shake the person awake during the alarm cycle as well. Alarm watches provide both an audible and/or vibrating alarm to alert the wearer of a specific time without disturbing others. Amplified smoke detectors work like standard smoke detectors with the exception that they provide a much louder

auditory signal than traditional smoke detectors. The auditory signal is usually a 90 to 95 dB horn. In addition, the auditory signal is supplemented with a strobe signal. Figure 6 depicts an amplified smoke detector.

Figure 6: An amplified smoke detector from Gentex

Benefits of HAT:

There is a rather sparse amount of clinical research available regarding the benefits of HAT. According to Wayner (2004), over 75% of hearing impaired individuals who purchased and used HAT regularly reported significant benefit as compared to the time prior to product purchase. The extent of the benefit seemed to extend beyond HAT's ability to assist in communication by improving S/N ratios. For example, an overwhelming majority (84%) of HAT users expressed that the integration of this type of technology facilitated independent living (Wayner 2004).

Very few investigations have been found throughout the audiology literature documenting speech understanding improvements with HAT technology. In a recent study, Boothroyd (2004) assessed phoneme recognition in a group of adults with varying degrees of sensorineural hearing loss. Phoneme recognition was assessed in both quiet and noisy conditions. In addition, subject's phoneme recognition ability was assessed utilizing hearing instruments as compared to the use of an FM system. His research found that phoneme recognition in noise using the FM system was equivalent to phoneme recognition in quiet for each of the 12 adult subjects.

Barriers to HAT Integration:

Despite the limited literature, the benefits of HAT are readily apparent in terms of what the products are designed to do. Despite the inherent benefits of this type of technology, successful integration of HAT into current audiology practices is hindered by a variety of barriers. The most commonly cited barrier is the factor of limited time (Servedio, 2000). Most appointment times for amplification assessments accommodate a review of hearing instruments, with little or no time left to review HAT. Many clinics must sustain a specific patient flow to stay in business; faster-paced clinical environments will inherently have less time to allot sufficient time to review HAT with each patient. A solution to the limited time barrier would be the provision of additional resources, whether an audiologist or trained office personnel, who could take the time to review HAT options with patients. Unfortunately, the lack of additional resources serves as another barrier (Prendergast & Kelley 2002).

Limited space serves as another potential barrier to HAT. Given the number of different HAT categories and associated product lines within each category, the perceived need for stocking space and/or room for product demonstration may be perceived as an overextension of current clinical capacity, particularly for clinics with very small waiting room/reception areas or clinics lacking adequate counseling room space. In addition, the plethora of available HAT products may also be overwhelming to the audiologist who has not had the extra time or energy to acquire necessary product knowledge (Ross, 2004).

From a financial perspective, many dispensing professionals believe that HAT is not profitable (Servedio, 2000). Depending on the specific HAT product, the price of products to clinics is usually slightly lower than manufacturer's suggested retail prices (MSRP). For example, corded

amplified telephones can range in price from $79 to $125 with a resale price to the patient ranging from $99 to $160. A $79 phone that is re-sold for $99 represents a 25% mark-up, but only yields a $20 price differential. Within the context of hearing instruments that are typically sold for thousands of dollars, the amount of time that a clinician will spend orienting a patient to an appropriate product can certainly be influenced by the degree of profitability. Clinicians would rather spend 30 minutes on hearing instruments since that product will inherently bring in more cash flow than spending 30 minutes discussing amplified telephones. As a result, lack of interest and professional apathy also create barriers to HAT integration in the audiology clinic.

Current Status of HAT within Audiology Practice

The literature assessing the extent to which HAT is integrated within the audiology clinic is quite limited. Most of the available studies do not specifically differentiate the dispensing audiologist from the hearing instrument specialist (HIS), combining the two into a more general dispensing professionals group. Of the available studies, most of the literature suggests that HAT is not being effectively integrated into routine hearing instrument evaluations. Not surprisingly, when dispensing professionals are asked to respond to questions pertaining to importance of aural rehabilitation the overall scope of the individuals hearing health care, a unanimous majority (100%) of clinicians rate the provision of information on HAT as beneficial; furthermore, 78% indicate that HAT services are provided "most of the time" (Predergast & Kelley, 2002). In contrast, when hearing impaired patients were asked about scope of hearing health care services received, approximately 30% indicated that the dispensing professional informed them of HAT beyond traditional hearing aids (Stika, Ross, & Cuevas 2002). In other words, the majority of hearing impaired patients, or 70%, reported that they were not informed of HAT other than traditional

hearing instruments.

A plausible explanation for the discrepancy in what dispensing professionals report versus what hearing impaired consumers report in terms of whether or not an orientation or assessment of HAT was provided may be attributed to the fact that patients simply did not remember that HAT was reviewed. In other words, it is possible that 70% to 80% of dispensing professionals review HAT but only 30% of the patients retain the information regarding HAT as an alternative option either to hearing instrumentation or a potential option in addition to hearing instrumentation.

Prior to exploring the efficacy of HAT delivery services, it is necessary to determine current trends in HAT delivery services. Based on the current literature review, there is a need to address trends in a more well-defined population of dispensing audiologists. Due to discrepancies in educational requirements and scope of profession practice, information gathered from dispensing audiologists versus HIS may differ due to such factors that need to be controlled for.

Purpose of the Present Study

The purpose of this study is to document HAT dispensing trends in a randomly selected group of dispensing audiologists. Specifically, knowledge obtained from this research will answer the following questions:

1. What percentage of dispensing audiologists actively dispense HAT in their current employment setting?
2. What are the reported barriers to actively dispensing HAT in their current employment setting?
3. What are the reported dispensing trends in HAT by dispensing audiologists in terms of type of products dispensed, quantity of products dispensed, and dispensing model or strategy?

CHAPTER II

Methods

Dispensing audiologists were solicited to participate in a 10-minute on-line survey made available through the website www.hostedsurvey.com addressing Hearing Assistance Technology (HAT). Subject recruitment was conducted in two separate stages. Stage one focused on recruiting subjects from the Academy of Dispensing Audiologists (ADA) whereas state two involved subject recruitment from the American Academy of Audiology (AAA).

Stage One:

In collaboration with the ADA Executive Board, 1000 ADA members were invited to participate in an on-line survey. The notification of the survey was delivered on November 28, 2005 in the form of an e-mail newsletter alert called the ADAlert. ADA members reading the news section of the ADAlert were directed to the survey's URL address. A copy of the survey is found in Appendix A. In addition, the survey may be accessed via the internet at http://www.hostedsurvey.com/takesurvey.asp?c=sample-patient1.

Stage two:

Stage two involved random selection of 100 subjects from the AAA membership directory. Subjects were asked to participate in the on-line survey via an e-mail which including an explanation of the study and included the survey's URL address that, when double clicked, directed the subject to the Hostedsurvey website. To maximize response rates, follow-up e-mails were sent 5 days following the initial e-mail invitation.

CHAPTER III

Results

Subjects:

Sixty one (61) subjects participated in the on-line hearing assistance technology (HAT) survey. During stage one, 25 subjects were successfully recruited from the ADA membership. In addition, during stage two, an additional 36 subjects were recruited. The websites automated response system ensured subject anonymity by assigning arbitrary subject identification numbers to each participant. Of the 61 respondents, five surveys (8%) were not completed resulting in a total of 56 completed surveys. The following data analysis was based on the 56 completed surveys.

Data Analysis

Survey responses were automatically tracked by the Hosted Survey website's software program. The website's data program automatically tabulated responses in real time, as the data was collected. The data was stored in a secure database, accessible via a password protection system. The tabulated data was extracted from the website and further analyzed.

Demographic Information

Demographic data regarding gender, primary work setting, highest degree earned, geographic location in the form of the state currently employed in, and number of years involved in dispensing hearing instruments were collected. As shown in Figure 7, of the 56 surveys analyzed, 34 respondents (61%) were female and 22 respondents (39%) were male (Figure 7). The geographic distribution of subjects is visually illustrated in Figure 8 with respondents reportedly residing in 26 of the 50 United States. The state of Illinois yielded the most respondents with six, followed by California, Florida, Michigan, New York, and Ohio, each with five.

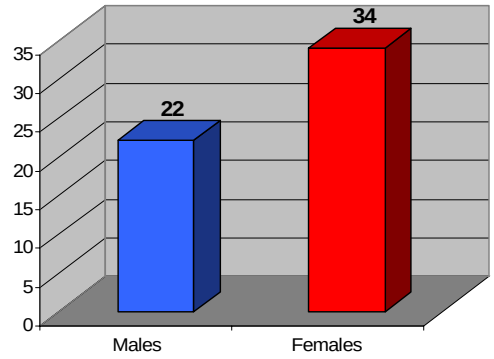

Figure 7: Number of respondents responding to the on-line survey as a function of gender.

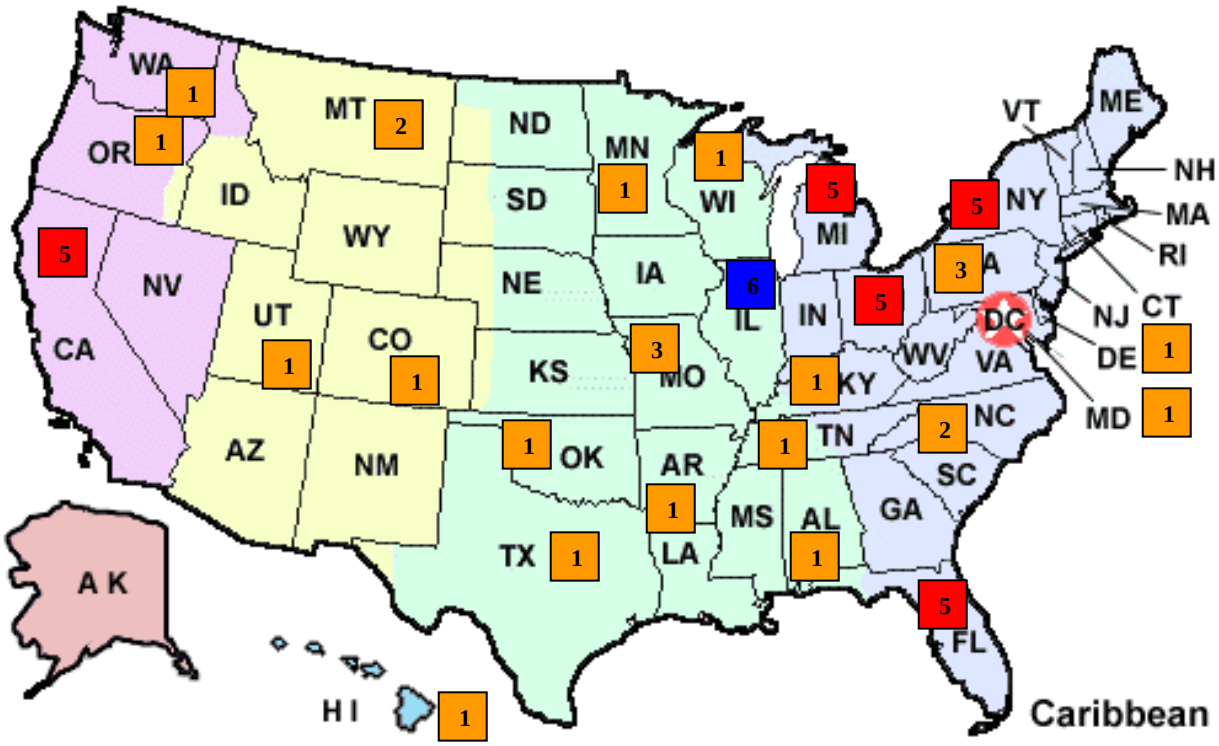

Figure 8: Geographic distribution of subjects responding to the on-line survey

Dispensing Experience & Terminal Degree

As shown in Figure 9, more than half of the respondents (33/56 or 58%) reported at least 16 years of dispensing experience. The remaining subjects were essentially equally divided in terms of years of experience with 13% (7 of 56) reporting 0-5 years, 11% (6 of 56) with 6-10 years, and 18% (10 of 56) with 11-15 years of professional experience. The majority of subjects held the AuD (64% or 36/56) as the terminal degree while 25% (14 of 56) and 9% (5 of 56) held Master's or a PhD degree respectively (Figure 10). Only 1 subject reported the EdD as the terminal degree.

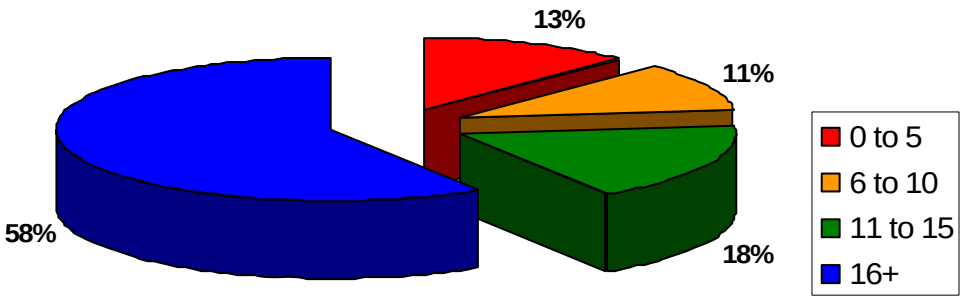

Figure 9: Percentage of subjects with corresponding years of professional experience

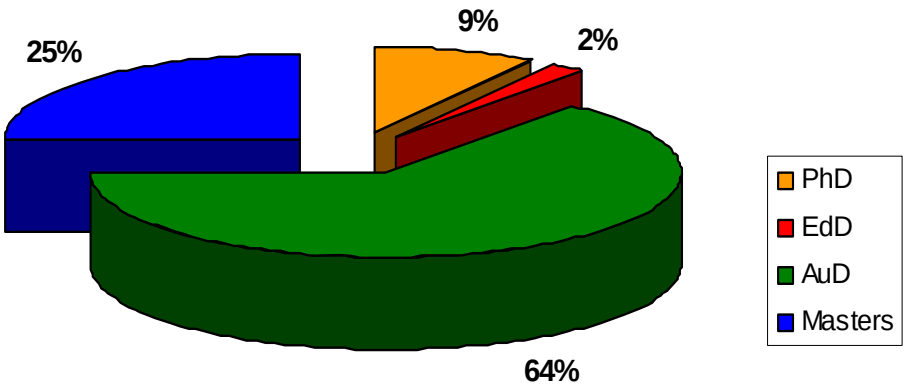

Figure 10: Percentage of subjects with corresponding terminal degrees

Employment Setting and Populations Served:

Figure 11 illustrates the distribution of subjects as a function of employment setting. More than half of the respondents (32/56 or 57%) were employed in private practice. The remaining subjects were employed in a clinic/hospital (9/56 or 16%), ENT office (8/56 or 14%), university (4/56 or 7%), medical school (1/56 or 2%), or other setting (2/56 or 4%). None of the subjects reportedly were employed by the government (military or Veteran's Administration) or a manufacturer. In addition, none of the subjects were retired. Regardless of work setting, Figure 12 shows that most subjects (65%) provided clinical services to mainly adult patient populations with another 20% reportedly providing clinical services to a fairly balanced patient load comprised of both adults and children. Only a small percentage of subjects provided services to only adult (11%) or pediatric (4%) patient populations.

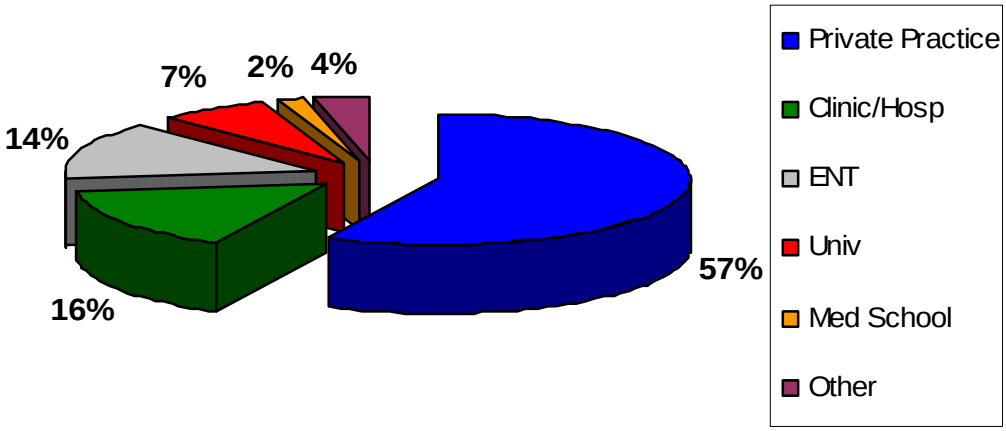

Figure 11: Percentage of subjects employed in different primary work settings

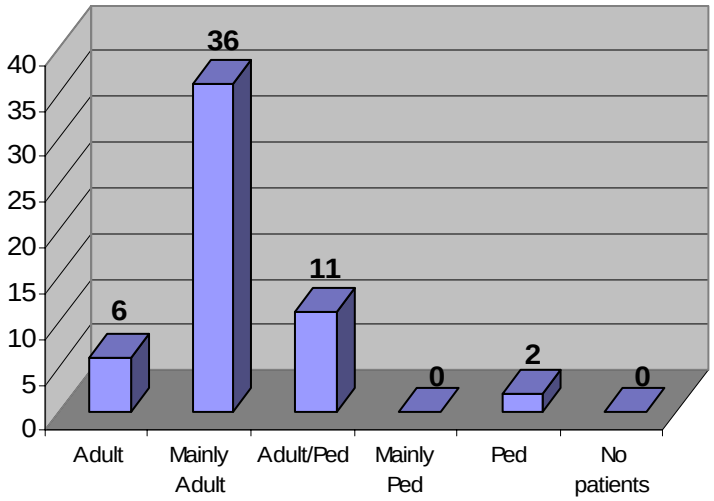

Figure 12: Number of subjects providing clinical services to specific patient populations

Dispensing Trends:

Figure 13 illustrates hearing instrument dispensing trends amongst the survey respondents. On average, 13/56 or 23% of the respondents dispense 1-10 hearing instrument per month, 20% (11 of 56) dispense 11-15 hearing instruments each month, 23% (13/56) dispense 16-20 hearing

instruments each month, 9% (5/56) dispense 21-24 hearing instruments each month, while 25% (14/56) dispense more than 25 hearing instruments each month.

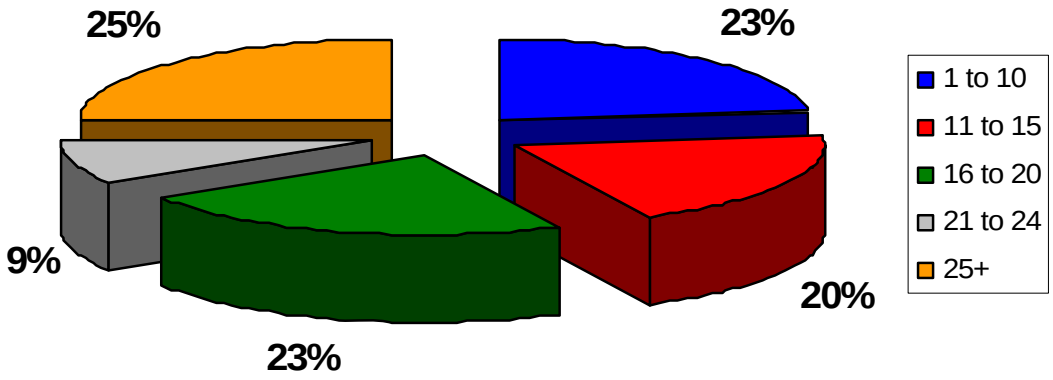

Figure 13: Mean number of hearing instruments dispensed each month

Figure 14 reveals the percentage of hearing instruments reportedly equipped with t-coils. More than two thirds of subjects indicated that more than 50% of the hearing instruments dispensed are equipped with t-coils. For example, 38% (22/56) of respondents reported that more than 80% of hearing instruments dispensed are equipped with t-coils. An additional 29% (16/56) reported that 50% to 80% of hearing instruments dispensed are equipped with t-coils. Sixteen percent (9/56) reported that 31-50% of hearing instruments dispensed contained t-coils whereas 13% and 4% of the respondents indicated that 11-30% or less than 10% of hearing instruments were dispensed with t-coils, respectively.

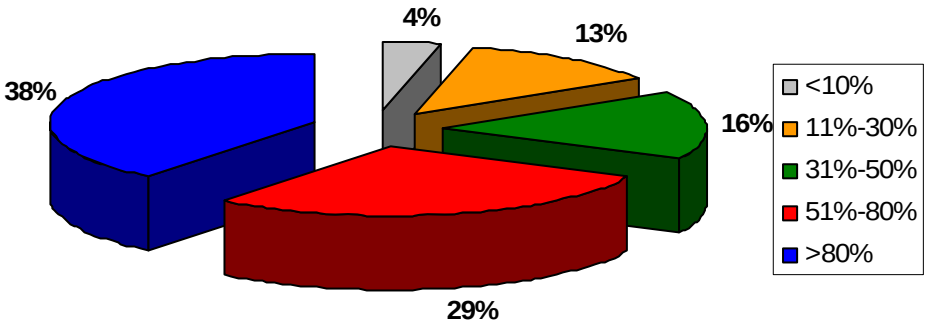

Figure 14: Percentage of dispensed hearing instruments equipped with t-coil

Hearing Assistance Technology (HAT) Dispensing Trends:

Slightly more than 92% (52/56) reported active involvement in dispensing at least one type of HAT in the past year. In other words, of the 56 respondents completing the on-line survey, only 4 indicated that they did not dispense HAT products in the past year. The remaining data analysis will include the results of the on-line surveys in which the 52 subjects indicated active involvement in dispensing HATs in the past year.

For purposes of this on-line survey, 11 different HAT categories were developed, ranging from TV listening systems to alarm clocks. Figure 15 illustrates the number of respondents reporting active dispensing of HATs for each of the 11 different HAT categories. The three most popular HAT products dispensed included TV listening systems, amplified telephones, and FM systems with 80%, 75%, and 70% of respondents actively dispensing these products, respectively. More than half of the subjects reported actively dispensing both personal listening systems (62.5%) and telephone amplifiers (53.5%). Alarm clocks were also actively dispensed by 45% of the respondents. Less than 1/3 of the respondents were actively involved in dispensing the remaining HAT product categories including telephone ringers (18/52 or 32%), other alerting devices (13/52 or 23%), cell phone

amplifiers (13/52 or 21%), voice carry over telephones (3/52 or 5%), and TTY telephones (3/52 or 5%).

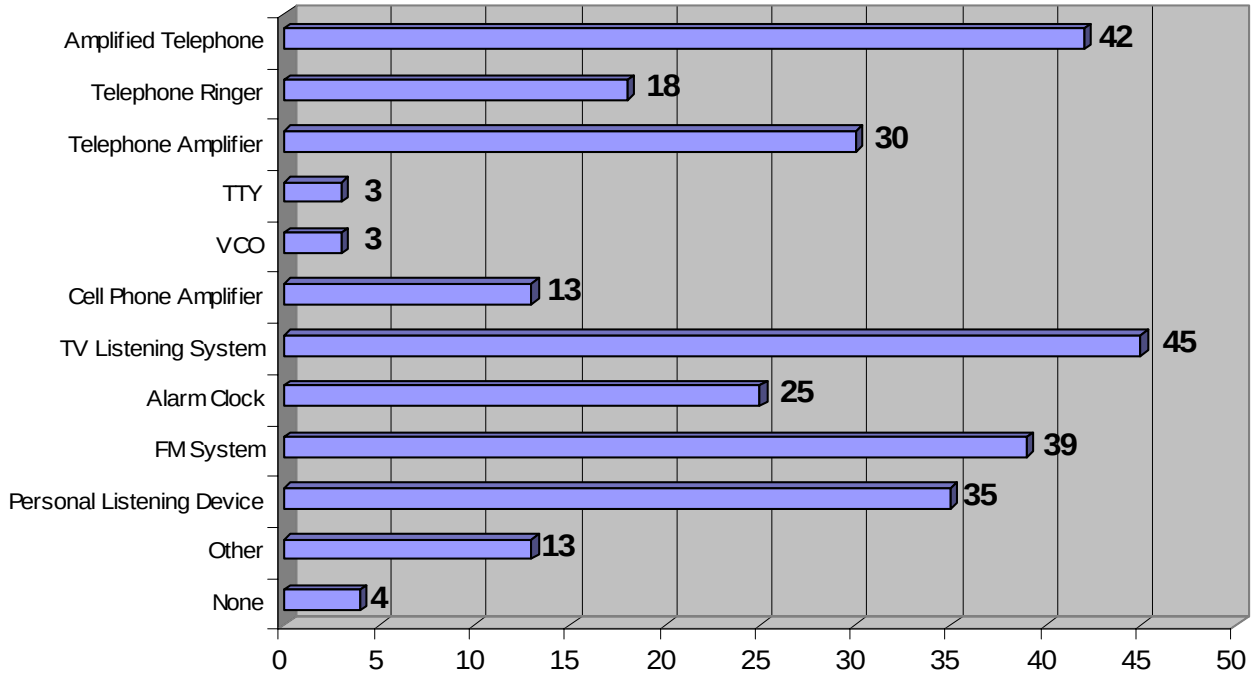

Figure 15: Number of respondents who reportedly dispense various HATs

In terms of monthly sales of HAT, an overwhelming majority of subjects indicated that average monthly sales for any HAT category yield 0-2 units per month. For example, as shown in Figure16, of the 52 respondents, 79% (41/52) reported that 0-2 amplified telephones were dispensed each month. This trend was consistent across other HAT categories including VCO telephones (98%), TTY (100%), telephone amplifiers (88.5%), telephone ringers (94%), cell phone amplifiers (94%), TV listening systems (71%), alarm clocks (96%), other alerting systems (98%), FM systems (81%), and personal listening systems (90%). None of the subjects indicated dispensing more than

15 units per month for any HAT category. With the exception of TTY's, a smaller percentage of subjects reported dispensing an average of 3 to 15 units each month; however, as initially stated, the majority of subjects dispensed 0 to 2 units of HAT products each month.

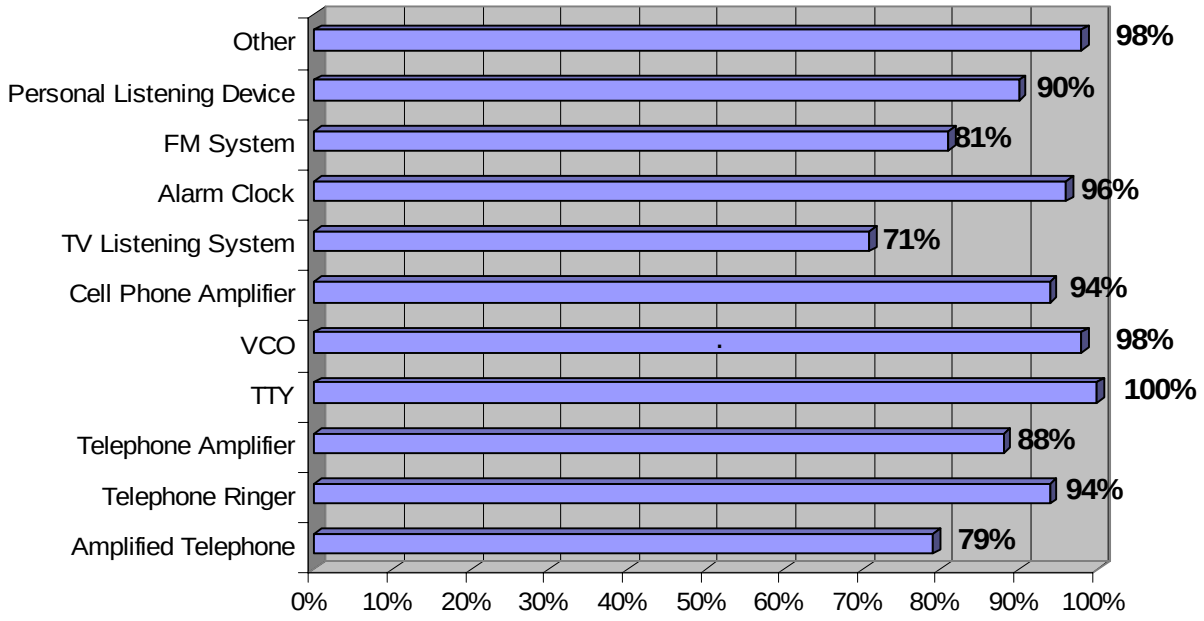

Figure 16: Percentage of subjects reporting average monthly sales of 0-2 units as a function of HAT cateogry

Tactics Used to Dispense HATs

The majority of respondents (51/52 or 98%) reported relying on multiple tactics to educate patients about HATs. Overall, the majority of subjects (81% or 42/52) reported using one-on-one counseling during the hearing instrument orientation to educate patients about HATs. In addition, nearly half (48% or 25/52) of survey subjects supplemented one-on-one counseling with the presentation of an HAT brochure. A quarter of the subjects (25% or 29/52) provided patients with a packet of HAT information. A small portion of the subjects (8% or 4/52) reported providing patients

with HAT vouchers.

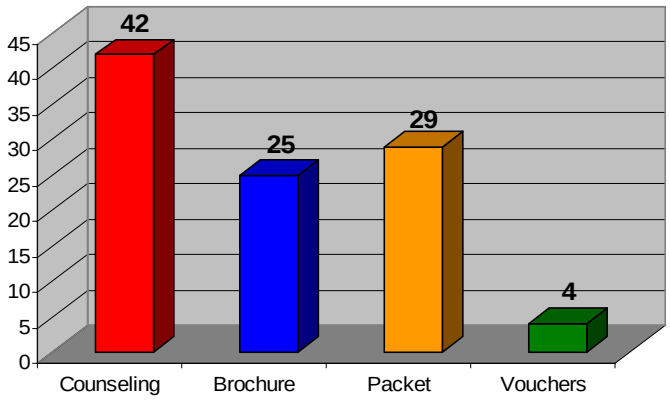

Figure 17: Educational tactics used to generate HAT awareness. Figure 17 reflects the percentage of subjects reporting reliance on corresponding tactics.

In terms of patient access to hands-on HAT models or displays, Figure 18 shows that 9 of the 52 subjects (17%) reported staging non-working HAT models in the waiting room whereas 6 of the 52 subjects (11.5%) used non-working HAT models in treatment/counseling rooms. In contrast, 12 of 52 subjects (24%) reported stating working HAT demonstration units in the waiting room. A total of 21 subjects (40%) reported that patients using working demo units in treatment/counseling rooms.

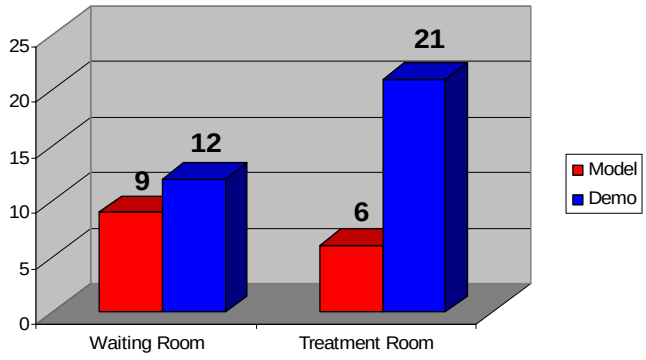

Figure 18: Number of subjects using non-working models and/or working demonstration HATs in the waiting room versus treatment room.

Subjects were asked questions regarding whether they relied on the use of various forms of

audio visual collateral to educate patients. As illustrated in Figure 19, only 2% of the subjects (1/52) used an HAT educational video in the patient reception/waiting room area. None of the subjects (0/52) reported using educational HAT video in treatment or counseling rooms. Furthermore, none of the subjects (0/52) incorporated educational messages about HATs via the phone's on-hold system. Nearly a quarter (23% or 12/52) of subjects reported referring patients to the internet for HAT information. Four percent (9/52) of subjects reportedly offered lunch and learn programs.

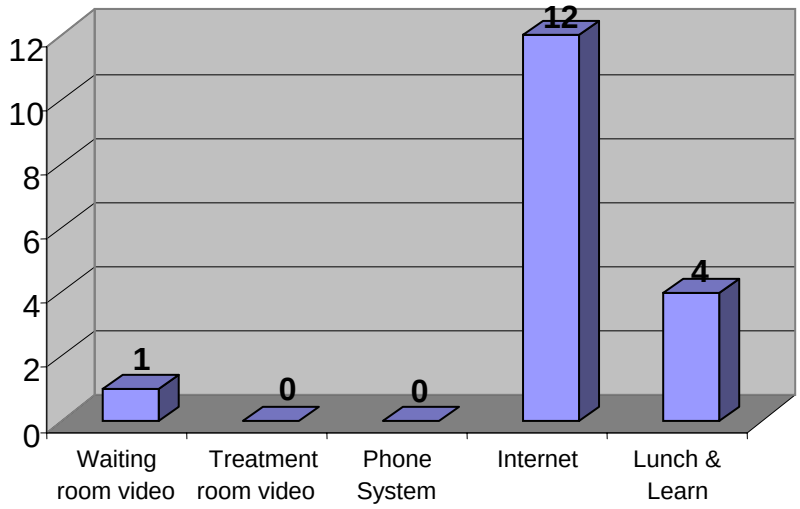

Figure 19: Audio-visual educational tactics used to generate HAT awareness. Figure 17 reflects the percentage of subjects reporting reliance on corresponding tactics.

Point of HAT Purchase

The timing in which patients invest in an HAT was examined and visually represented in Fig 20. At the initial hearing instrument fitting, only 2% (1/52) reported that 90% of their patients immediately invested in an HAT at that time; overall, 81% (42/52) of respondents indicated that the percentage of patients investing in HATs at the initial hearing instrument fitting was less than 10%.

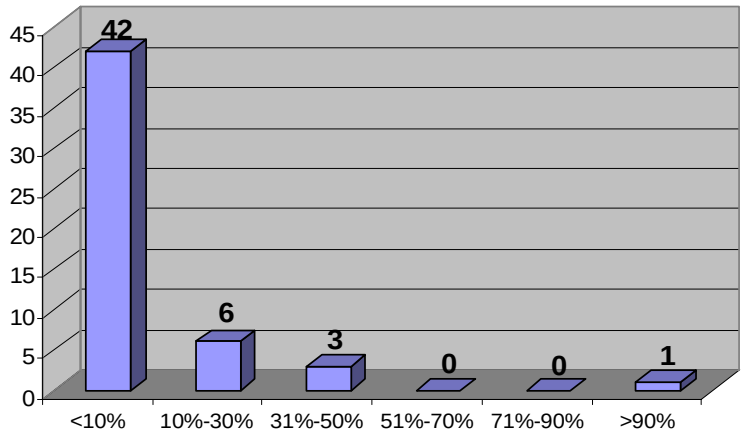

Figure 20: Number of subjects reporting HAT point of purchase during initial hearing instrument fitting.

In terms of the number of subjects reporting that patients invest in HATs within 3-months of the initial hearing instrument fitting, the general trend remains similar to that illustrated in Figure 20. As shown in Figure 21, 71% of subjects (37/52) reported that less than 10% of patients invested in HATs within the 3 month period after the hearing instrument fitting. As additional 2% (1/52) indicated that more than 90% of patients invested in HATs during this time.

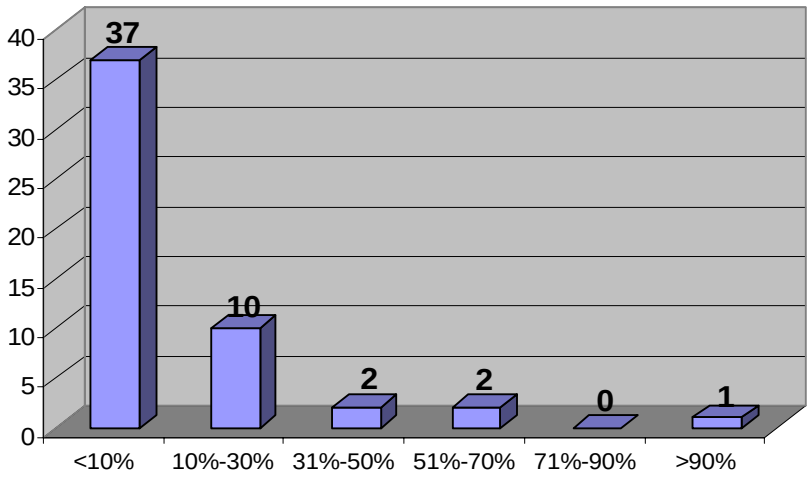

Figure 21: Number of subjects reporting HAT point of purchase within 3-months of initial hearing instrument fitting

Percentage of Patients Investing in HATs

Regardless of point of purchase timelines, Figure 22 illustrates the percentage of patients who eventually invest in HATs as indicated by subjects responding to the on-line survey. Nearly two-thirds (62% or 32/52) indicated that more than 70% of the time, their patients did not invest in HATs. For example, 35% (18/52) and 27% (14/52) of subjects indicated that their patients did not invest in HATs either 71%-90% or more than 90% of the time, respectively. Conversely, only 8% (4/52) of subjects reported that less than 10% of their patients never invested in HATs.

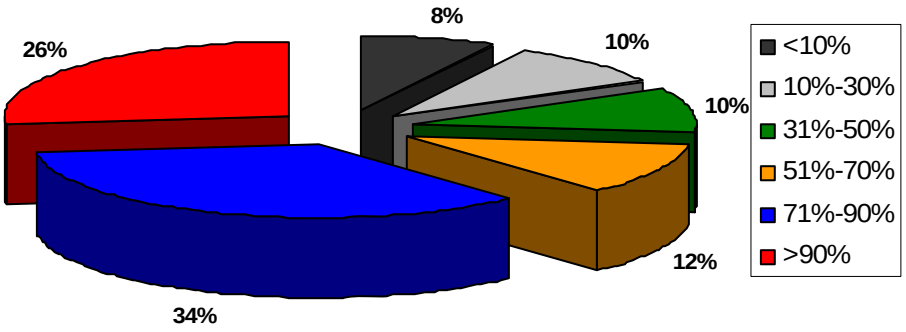

Figure 22: HAT purchase trends. The percentages in the graph reflect the percentage of patients who decide not to invest in HATs as reported by subjects.

Finally, subjects were also asked to provide information regarding the percentage of patients who did not invest in hearing instrumentation but who did invent in HAT. As shown in Figure 23, the majority of subjects (71% or 37/52) reported that less than 10% of their non-hearing-instrument-wearing patient population invested in HATs.

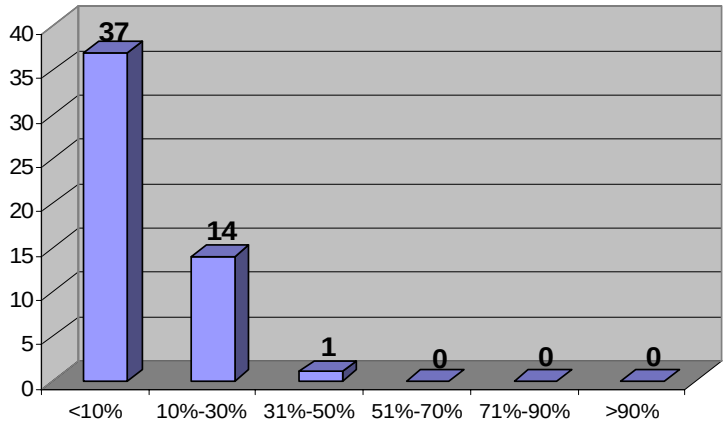

Figure 23: Number of subjects reporting trends in terms of percentage of patients who do not invest in hearing instruments but do invest in HATs.

Reasons Hearing Instrument Patients do not invest in HAT

Respondents were questioned as to why they feel their hearing instrument patients do not invest in HAT. They were asked to choose one reason that best describes why their patients are not made aware of HAT or decide not to invest in HAT from the following: 1) patients are not made aware of the devices due to time restraints in appointments, 2) audiologist feels that hearing instruments are enough and does not review HAT, 3) Audiologist does review HAT but informs patients that hearing instruments are enough, 4) patient thinks hearing instruments are enough, 5) patient is not interested in technology, 6) patient cannot afford the technology or does not want to spend the additional money, or 7) other. Nearly half of the respondents (43% or 23/52) reported that money was the main issue. Intimidation with the technology (23% or 12/52) accounted for another fourth of the respondents. Time restraints and the patient thinking hearing instruments are enough yielded 4 responses, or 8% for each response. A small number of respondents reported that hearing instruments are enough but either still reviewed HAT (8% or 4/52)or did not review HAT (6% or 3/52.) Finally, 12% (6/52) of the respondents reported that there was some other reason as to why

HATs are not dispensed.

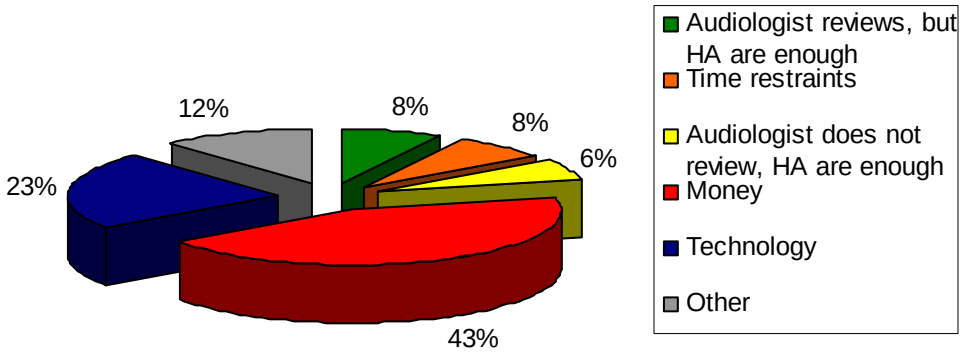

Figure 24: Primary reason as to why hearing instrument patients are not investing in HAT

Pricing of HAT

HAT pricing was also surveyed in this study. As shown in Figure 24, the majority of subjects (42% or 22/52) resold products based on manufacturer's suggested retail price (MSRP) although nearly the same percentage of subjects (40% or 21/52) reported establishing a resale price as 30% over cost. In a few cases, HATs were either provided to patients at no cost (2% pr 1/52) or at cost (4% or 2/52).

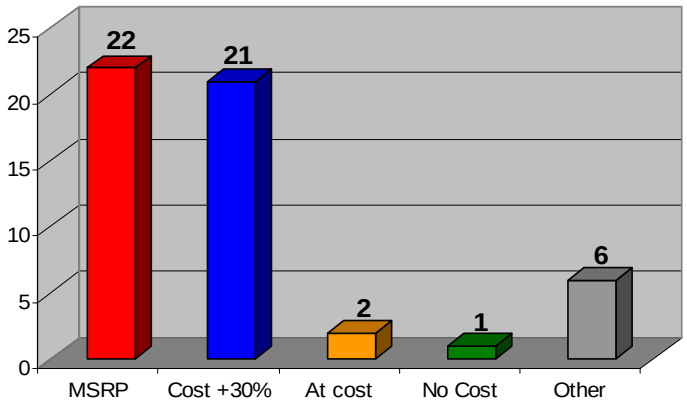

Figure 25: Pricing strategy of HATs as reported by subjects

CHAPTER IV

Discussion & Conclusion

The purpose of this study was to gain insight into general dispensing trends of Hearing Assistance Technology (HAT). In order to achieve this goal, 1100 audiologists were invited to participate in an on-line survey designed to identify general trends and barriers associated with dispensing HATs. A total of 61 subjects responded to the survey resulting in an overall return rate of 5.5% (61/1100). Five surveys were incomplete resulting in data analysis of 56 questionnaires. This subjects sampling was much smaller than anticipated.

Subject recruitment

This study was not originally designed to recruit subjects using two different techniques. Due to unforeseen circumstances, electronic notification of the ADA membership via e-mail with subsequent e-mail follow-up could not be employed. An alternative plan proposed by ADA was implemented, referred to as Stage 1. Over a two month period, the alternative plan yielded an initial response rate of 2.5% (25/1000). The author felt it was necessary to devise and execute a supplementary strategy for recruiting subjects. As a result, a second subject recruitment strategy was implemented and referred to as Stage 2.

Stage1 subject recruitment involved electronically inviting 1000 ADA members to participate in an on-line survey. Originally, the plan was to send an e-mail to the entire ADA membership however, several weeks prior to the scheduled e-mail invitation distribution, the ADA Board determined that the provision of membership e-mails constituted a breach of membership confidentiality and would potentially create issues with membership privacy. Alternatively, the ADA Board offered to publicize the on-line survey in the ADAlert, a quarterly e-mail newsletter

electronically distributed to the membership. In November 2005, an ADAlert containing a letter of invitation to participate in the on-line survey from the author was distributed to the ADA membership.

Over the course of 2 months, the ADAlert generated a total of 25 responses, resulting in a preliminary response rate of 2.5% (25/1000). Several issues pertaining to subject recruitment were evident. As a quarterly release, the survey invitation appearing in the ADAlert was accessible one time only. In the absence of access to individual membership e-mails, it was not possible to issue follow-up reminders to the ADA membership. This significantly influenced subject recruitment. In addition, while the invitation to participate in the on-line survey was prominently displayed on the front page of the e-mail newsletter, the actual letter was located toward the bottom of the page and could not be visualized unless the subscriber scrolled down the front page of the newsletter. It is possible that a portion of the membership either didn't scroll down far enough to access the letter or, more likely, did not bother to read the ADAlert.

Given the poor response to the ADAlert, a second subject recruitment strategy was applied. During state two subject recruitment, 105 audiologists were randomly selected from the AAA membership directory. The overall response rate for this sub-sample was 34% (36/105). While the number of subjects contacted during this stage (105) was significantly smaller than Stage 1 (1000), the overall response rate obtained in Stage 2 was significantly greater (34%). The most distinct difference between the two subject recruitment strategies was the ability to follow-up with potential subjects during the later recruitment stage. Whereas stage 1 did not allow for subject follow-up, it was possible to send e-mail reminders to the 100 audiologists randomly selected from the AAA membership directory.

With the implementation of Stage 2 subject recruiting, the overall response rate more than

doubled, increasing from 2.5% to 5.5%. Despite the increase in participating subjects, this two-tiered approach to recruiting subjects may have created biased sub-samples. First, subjects recruited from ADA membership versus the AAA membership represent two distinct audiology populations. By definition, all members of ADA dispense hearing instruments and may be more likely to have experience dispensing HATs whereas not all members of AAA dispense hearing instruments. The ADA membership is more heavily biased toward small business owners with private practices and AAA tends to have a more diverse employment setting distribution. For example, in this study, 88% (22/25) of the respondents from ADA were employed in private practice whereas only 32% (10/36) of those solicited from AAA were employed in private practice. Furthermore, 80% (20/25) of the ADA respondents were female whereas only 42% (14/33) of the AAA respondents were female. In terms of dispensing experience, 72% (18/25) of ADA respondents reported 16 or more years of clinical experience. In contrast, 45% (15/33) of AAA respondents reported 16 or more years of clinical experience. Second, subject recruitment during Stage 1 in the form of the ADAlert was unscientific; it is likely that those audiologist with successful experience dispensing HATs were more willing to share information than those audiologists with less or no experience. Subject recruitment during Stage 2 involved randomization which more stringently controls the external validity of the study. Due to the overall small number of subjects recruited, the data from both groups was merged however the sub-sample data was also individually reviewed in an effort to detect any potential trends unique to either group.

Subject Demographics

Overall, more females responded to the on-line survey then men. Taking into consideration the gender distribution within the audiology profession, this finding was expected. Geographically,

the subject sample represented all general areas of the United States; most of the subjects were reportedly employed in the states of Illinois, California, Florida, Michigan, New York, and Ohio. Most of the respondents reported working in private practice although other employment settings were fairly represented. Respondents also reported the tendency to mainly provide services to the adult population. The propensity for respondents to report private practice as the primary employment setting was expected. As previously mentioned, most ADA members are small business owners and since nearly half of the respondents were from ADA, the representation from the private practice sector was anticipated. Most respondents reported the AuD as the terminal degree. Given the trend for established practitioners to pursue the AuD and new standards for the AuD as the entry level degree in the field, this finding was not surprising. Finally, many of the respondents reported more than fifteen years hearing instrument dispensing experience. This may have inadvertently biased the data collected in this projects as subjects with greater experience are most likely more established in clinical practice and may, again, be more willing to share HAT dispensing experience as compared to those subjects with less clinical experience.

HAT Dispensing Trends

Of the 56 surveys that could be analyzed, surprisingly, the majority (52/56) of subjects responding to the on-line survey reported HAT dispending activity in the past year. Based on the literature review, it was anticipated that a sizeable portion (e.g. at least half) of respondents would not have HAT dispensing experience. A retrospective analysis of the proposal and on-line survey questions revealed potential factors that may have contributed to these skewed findings. First, recruiting subjects with an open invitation to participate in an on-line survey in the form of the ADAlert may have inherently biased the study sample. As previously mentioned, it is possible that

those subjects with HAT dispensing experience were more willing to participate in the on-line survey for purposes of sharing their success. Conversely, those subjects who did not dispense or who have not been successful dispensing HATs may have refrained from participating in the study. More importantly, the definition of an active HAT dispenser as outlined in the on-line survey was, in retrospect, too liberal. By definition, any audiologist who dispensed at least one HAT within the past year was considered an active HAT dispenser. Unfortunately, the scope of this definition included a larger number of subjects who probably should not have been included. For example, an audiologist dispensing 1 HAT 9 months ago would, by definition, be considered an active HAT dispenser. From a practical perspective, an audiologist providing a specific service only once a year should not be included in the same category as another audiologist who dispenses several HATs each month. A narrower time window should have been applied to more realistically reflect dispensing trends. Instead of defining an active HAT dispenser as an audiologist who dispenses at least one HAT product within the past year, it would have been more appropriate to quantify the active HAT dispenser as an audiologist who dispensed at least one HAT "within the past month". In addition, it would have been beneficial to further quantify the definition with some mention of HAT dispensing consistency throughout the year (i.e. with an average volume of about 10-12 units per year). In designing the questionnaire, there was a preconceived notion that only a very small majority of audiologists dispensed HATs which probably influenced the development of a more liberal definition.

The three most popular HAT products reportedly dispensed included TV listening systems amplified telephones, and FM systems although personal listening systems and telephones amplifiers were also dispensed by more than half of the respondents. The popularity of TV listening systems is not surprising. Listening to the television is a situation that can be very difficult for people with

hearing loss. A person with hearing loss naturally prefers to raise the volume of the TV in order to hear it better. Raising the volume of the television, however, is often bothersome and too loud for family members and/or neighbors. Television listening systems are an easy, effective way of getting the television signal to the person's ears without bothering other people. Regardless of the activity level of the adult, some portion of the day may be spent watching television. It isn't clear as to whether most of the TV listening devices were dispensed to patients who were active hearing aid wearers or to consumers who have opted from investing in hearing instruments. For hearing instrument wearers, several different types of TV listening devices are available: those that interface with the user's hearing instruments and those that do not, requiring the user to remove the hearing instruments prior to using the device. In either case, the TV listening device offers the wearer the opportunity to listen to amplified sound emitted from the TV only, providing the listener an easier listening experience.

The popularity of amplified telephones was also not surprising. Most people have experience using a telephone. From a technology perspective, it probably represents the least intimidating HAT product to the consumer. In addition, for those with hearing impairment, access to an amplified telephone represents a communication necessity. Based on these reasons, not only was it not surprising to find that 75% of respondents reported actively dispensing amplified telephones, but that 53.6% of the respondents also dispensed telephone amplifiers. From a practical and financial perspective, in lieu of having a patient invest in an amplified telephone that ranges from $120 to $350 in price, a telephone amplifier is a product that can be integrated with an existing telephone, providing the user with 30-40 dB of amplification. This product achieves the same level of amplification as an amplified telephone at a significantly reduced price (i.e. $30).

It was surprising to find that 70% of respondents reported actively dispensing FM systems.

These systems are more complex in terms of number of components. In addition, FM systems are expensive, with lower end versions starting at approximately $350. Typically, these devices are integrated in schools systems although they are certainly not limited to only this environment. Recall from the subject demographics section, most of the respondents worked mainly with adults. Specifically, 3.6% of the respondents indicated working exclusively with the pediatric population whereas 76.8% of the respondents reported working either exclusively with adults or at least 80% of the time with adults. It is possible that pediatric audiologists who dispense HATs mainly are involved in fitting patients with FM systems. Again, FM systems are not exclusive to the pediatric population. They may be used in variety of settings including large meeting rooms, restaurants, and other similar settings. Unfortunately, the design of this on-line survey cannot provide further insight into FM dispensing trends.

In an effort to gain insight into the volume of HAT products dispensed, respondents were asked to report average monthly HAT dispensing activity. The actual number of HAT devices dispensed on a monthly basis was minimal relative to hearing aid dispensing. For example, when looking at the average number of TV listening units, amplified telephones, and FM systems dispensed each month, the majority of respondents dispensed anywhere from 0 to 2 units (71%, 79% and 81% respectively). Since these three products represent the most popular HATs, the overall monthly volume of units dispensed is very low. Furthermore, it is unclear as to the actual number of units dispensed due to the unit categorization system used in the study. For example, when asked how many units were dispensed on average each month, the choices provided to the subject included the following ranges: 1) 0-2, 2_ 3-5, 3) 6-10, 4) 11-15, and 5) >15. In retrospect, it would have been beneficial to provide respondents with the opportunity to report "0" as an absolute value rather than including it within the range of 0-2. For those reporting 0-2, it isn't clear if 0 units were dispensed or

if at least 1 unit was dispensed each month. Unfortunately, the ranges used in the questionnaire probably reflect a level of bias in terms of how subjects were expected to respond based on the literature review. It was the impression of the author that this study would have revealed two distinct groups where one group did not dispense much versus a smaller group that dispensed quite a bit.

The majority of respondents reported relying on multiple tactics to educate patients about HATs with the most popular tactic being one-on-one counseling during the hearing instrument orientation. Interestingly, as reported by survey respondents, less than 10% of patients invested in HATs when these products were introduced during the hearing instrument orientation. While timing the HAT educational process during the hearing instrument orientation makes sense, it is possible that using that time as an HAT educational opportunity is too overwhelming to the patient. To the new hearing instrument user, a lot of information about the hearing instrument must be processed. Introducing additional technology during that time is probably not appropriate. Furthermore, hearing instruments are a costly investment to most patients. By presenting patients with additional amplification options, the audiologist may be inadvertently sending a message to the patient that their hearing aids won't be enough. Even if this is true, timing the introduction of HAT technology to the patient seems to be a more critical component to the patient buy-in process. For example, most subjects indicated that most of their patients did not invest in HATs at a point in time after their hearing instruments were dispensed. Specifically, it was reported that less than 10% of patients invested in HATs 3 months after the initial hearing aid fitting.

While more information is needed, it appears that the point of purchase for an HAT may be most effective prior to the hearing instrument fitting. As reported in this study, subjects indicated that their patients did not invest in HATs at least 70% of the time. If 80% of the audiologists are educating patients about HATs during the hearing aid orientation but only 30% are investing in

HATs, the hearing aid orientation may not be the appropriate time to introduce HATs to the patient.

Furthermore, the way in which HATs are introduced to the patient may certainly influence the purchasing process. While the consumer purchase process is complex, it was surprising to find that most subjects did not integrate working HAT demo models in the clinical setting. In order for consumers to appreciate the potential benefits of a product, consumers require experience using the product. Providing access to working models not only gives the patient the opportunity to experience what a particular product can do, but it also puts the patient in a position to ask better questions regarding product benefit. Whether a TV listening device or personal listening system, event the briefest exposure to a working HAT inherently empower the patient to ask more pertinent questions, creating a more effective educational exchange with the audiologists and potentially increase the chances of the patient investing in the product.

In addition, less than 50% of subjects reported using a brochure to educate patients about HATs. Various brochures that educate patients on HAT product categories and show pictures of products are readily available. An information brochure in the reception area would be one of the easiest means of communicating information to a patient base without the investment of too much time or energy. More importantly, the reception area may be the more appropriate setting to initiate the patient educational process. As documented in the audiology literature, most patients postpone investing in hearing instruments an average of 7 years (Kochkin, 2000a). Based on this data alone, by the time the patient decided to finally invest in hearing instruments, it may be too late to convert patients to HAT users. By providing patients with an educational brochure about non-hearing instrument options, it is possible that the patient may be more willing to pursue technology that is associated with less of a handicapping stigma and requires a much smaller financial investment than hearing instruments. For example, while the patient is in denial about his or her hearing loss and

decides not to pursue hearing instruments, investing in a $50 telephone amplifier may make more sense to the patient at that specific time rather than during the hearing aid fitting 5 years from now.

Nearly one quarter of subjects reportedly referred patients to the internet for HAT information. It wasn't clear whether patients were referred to a specific web site or were encouraged to simply browse the internet for information. In either case, it appears that many audiologists who participated in this study preferred to refer patients to a second source for HAT information rather than providing the information themselves. This may reflect a need to educate audiologists on the importance of establishing themselves as the communication expert. Regardless of potentially poor margins, it may be beneficial for audiologists to minimally offer the opportunity for patients to have access to more popular HAT products within the confines of the audiology clinic rather than referring them elsewhere. Even though the margins for HATs are significantly less than hearing instruments, providing patients access to an amplified telephone, a TV listening system, a cell phone amplifier, or a personal listening system will not only provide a communication solution to a hearing impaired patient, but provide a level of service that will encourage HAT users to come back for other hearing health care services (i.e. fitting of hearing instruments, etc).

To gain more insight into which type of audiologist tended to dispense HATs, the data was reviewed to see if any trends could be detected in terms of the relationship between number of hearing instruments dispensed versus number of HAT units dispensed each month. Although the data was not inferentially analyzed, based on a comparison on demographic data, regardless of the number of hearing instruments dispensed, on average, most audiologists in this study reported dispensing approximately 5 different types of HATs in the past year. In other words, whether an audiologist dispensed 5 hearing instruments each month or 25 hearing instrument each month, the

average number of HAT products offered to their patients was five. In terms of the relationship between number of hearing instruments dispensed and number of HAT units dispensed, the data seemed to indicate that those who dispensed more hearing instruments were more likely to dispense more HATs. This trend seems to contradict that notion that busy audiologists cannot dispense HATs. However, since this data was observational and was not statistically confirmed, it is not possible to generalize this observation to the audiology population as a whole.

Since many HATs are designed to work with t-coils, respondents were queried as to what percentage of hearing instruments dispensed contained t-coils. This was a necessary question to ask in an effort to determine how much the presence or absence of t-coil equipped hearing instruments influenced HAT dispensing trends. A majority of hearing instruments, as reported in this study, were equipped with a t-coil at least 50% of the time. There were some instances whereby subjects rarely ordered hearing instruments with t-coils. Unfortunately, one of the weaknesses of the survey was that information pertaining to the type of hearing instruments dispensed was not gathered. It is possible that a large portion of hearing aids that are not equipped with t-coils are custom-in-the-canal (CIC) instruments. These instruments are popular due to their small size; however, given their small size, CIC hearing instruments are restricted in t-coil housing capability and are unable to accommodate the circuitry associated with t-coils.

Barriers to HAT Dispensing

Only 4 subjects (4/56%) reported that they did not actively dispense HATs. The specific reasons cited by these 4 subjects included: 1) limited space for product 2) lack of profitability in HATs 3) inability for patient populations to afford HAT, 4) too many products to choose from, 5) the availability of an established source that provided the ability to refer patients to another center,

6) the assessment that hearing instruments are enough, 7) patients intimidated by technology, and 8) training in HAT was never received. When subjects were asked to choose the primary reason as to why HATs were not dispensed, each of the four respondents provided different answers. These answers ranged from lack of training, not affordable to the patient, hearing aids are enough, and the ability to refer patients to another center. Due to the low number of subjects who were classified as inactive HAT dispensers, making greater generalizations from the data collected is limited.

Conclusion:

The findings of this study showed that most of the participating subjects dispensed HATs to some degree. While most of the respondents actively dispensed HATs, the overall success rate in patients investing in HATs remains low. It is possible that traditional HAT educational models typically integrated in the clinical setting may not be effective. For example, most audiologists expend educational efforts at the time of the hearing aid orientation. This may not be the most appropriate time to introduce patients to this technology. It may be more appropriate to introduce HATs to patients sooner, preferably during the time period where patients are postponing investment in hearing instruments. In order to gain more insight, future studies may include comparing different techniques for generating patient awareness about HATs. With that insight, it would be helpful to then focus on identifying the most effective tactics in generating patient buy-in process regarding the potential benefits of HAT.

Appendix A

Dear Dispensing Audiologist:

This survey is being distribution to the ADA membership to help determine current dispensing trends of Hearing Assistance Technology (HAT), also know as Assistive Listening Devices (HAT). This survey only takes 10 minutes to complete, but the results are critical in assessing current dispensing activity of amplification devices beyond hearing instruments.

Below is a link to the online survey. Your response will be kept completely confidential. The survey is web-based and conducted by a third party vendor. Your name will not be attached to any results. The survey is user-friendly and you should be able to complete it in 10 minutes or less.

We appreciate your willingness to participate and value your feedback. Completing this survey will assist in an AuD Capstone Project at Washington University School of Medicine.

If you have any questions, please contact Abbey Keller at kellera@msnotes.wustl.edu.

To begin, please click the survey URL below:

http://www.hostedsurvey.com/takesurvey.asp?c=HAT

Thank you for your participation..

Abbey Keller
AuD Student
Washington University School of Medicine
St. Louis, MO.

Appendix B

GENERAL INFORMATION:

Gender M F

How long have you been a dispensing audiologist?
0 to 5 years
6 to 10 years
11 to 15 years
More than 16 years

What is (are) your highest degree(s) earned?
Master's Degree
AuD
PhD
Other (please specify) _____

What is your current primary work setting?
Clinic/Hospital
VA/Military/Government
Medical School, University
ENT office
Manufacturer
Private Practice
Retired
Other (please specify): _____

Number of years at current primary work setting?
Less then a year
1 to 5 years
6 to 10 years
11 to 15 years
More than 16 years

What state is your primary work setting located in? _____

What patient population do you currently serve at your primary work setting?
Adults only
Mainly adults (80% or more) with some pediatric patients (up to 20%)
Fairly balanced representation of adults and pediatric patients
Mainly pediatric patients (80% or more) with some adult patients (up to 20%)
Pediatric only
Don't see patients

On average, how many hearing aids do you dispense each month? Note: binaural fittings are counted as 2 hearing aids.
1 to 10

11 to 15
16 to 20
21 to 25
More than 25

What percentage of hearing aids that you dispense come equipped with a T-coil?
less then 10%
10% to 30%
31% to 50%
51% to 80%
More than 80%

HEARING ASSISTANT TECHNOLOGY (HAT)

Please check each of the product categories that you have dispensed in the past year. (Please check ALL that apply).
Amplified Telephones
VCO (Voice Carry Over Telephone)
TTY
Telephone amplifiers
Telephone ringers
Cell phone amplifiers
TV listening system (infrared devices)
Alarm clocks
Other alerting systems (such as smoke detector, vibrotactile watch)
FM system
Personal Listening Systems (such as PockeTalker)

If the respondents checked at least one item in the previous question, they proceeded to answer the following questions.

If they did NOT check any of the product categories listed in the previous question, they were given the questions labels with the next grey box.

What tactics/techniques are used to generate awareness about HAT to your patients? (Please check ALL that apply).
Voucher Program
HAT Brochure
Display of non-working HAT models in the waiting room
Display of non-working HAT models in the treatment/counseling room
Working demo units in the waiting room
Working demo units in the treatment/counseling room
One-on-one counseling during hearing aid orientation
Provision of HAT informational packet
Playing HAT video tape in waiting room
Playing HAT video tape in treatment/counseling room
Playing HAT awareness message in phone system
Referral to Website
Aural Rehabilitation classes

Lunch and Learn programs
Other (please specify):

What percentage of your patients to whom hearing instruments are dispensed immediately invest in an HAT *at the time of the initial hearing aid fitting*?
less then 10%
10% to 30%
31% to 50%
51% to 70%
71% to 90%
More than 90%

What percentage of your hearing aid wearing patients *eventually* invest in an HAT d*uring the designated trial period or within 3 months of the initial hearing aid fitting?*
less then 10%
10% to 30%
31% to 50%
51% to 70%
71% to 90%
More than 90%

What percentage of your hearing aid wearing patients never invest in an HAT?
less then 10%
10% to 30%
31% to 50%
51% to 70%
71% to 90%
More than 90%

Which of the following best describes why your hearing aid wearing patients decide NOT to invest in HAT?
Patients are not made aware of HAT technology due to time restraints in appointment times
Dispensing Audiologist feels that hearing instrument(s) is/are enough and does not review HAT
Dispensing Audiologist reviews HAT but informs the patient that hearing instruments are enough
Dispensing Audiologist reviews HAT but patient is not interested in technology
Dispensing Audiologists reviews HAT information but patient either cannot afford the technology or does not want to spend the additional money
Other (please specify):

What percentage of your patients who decide NOT to pursue hearing instrumentation invest in some type of an HAT either exclusively or prior to purchasing hearing instruments?
less then 10%
10% to 30%
31% to 50%

51% to 70%
71% to 90%
More than 90%

For each product category, circle the average number of units that you have dispensed each month

Amplified Telephones:
0 - 2 3 - 5 6 - 10 11 – 15 16- 20 21-25 >25

VCO
0 - 2 3 - 5 6 - 10 11 – 15 16- 20 21-25 >25

TTY
0 - 2 3 - 5 6 - 10 11 – 15 16- 20 21-25 >25

Telephone amplifiers
0 - 2 3 - 5 6 - 10 11 – 15 16- 20 21-25 >25

Telephone ringers
0 - 2 3 - 5 6 - 10 11 – 15 16- 20 21-25 >25

Cell phone amplifiers
0 - 2 3 - 5 6 - 10 11 – 15 16- 20 21-25 >25

TV listening system (infrared devices)
0 - 2 3 - 5 6 - 10 11 – 15 16- 20 21-25 >25

Alarm clocks
0 - 2 3 - 5 6 - 10 11 – 15 16- 20 21-25 >25

Other alerting systems (such as smoke detector, vibrotactile watch)
1 - 2 3 - 5 6 - 10 11 – 15 16- 20 21-25 >25

FM system
1 - 2 3 - 5 6 - 10 11 – 15 16- 20 21-25 >25

Personal Listening Systems (such as PockeTalker)
1 - 2 3 - 5 6 - 10 11 – 15 16- 20 21-25 >25

In general, how are HAT resale prices determined?
Not applicable; HAT provided at no charge with hearing instruments
Not applicable; HAT provided at cost to the patient
Use manufacturer's suggested retail price (MSRP)
HAT resold at 30% or more over cost
Other (please specify):

The following questions were given to those individuals who did not check yes to dispensing any of the HAT devices in the past year.

Check each reason as to why you have not dispensed HAT in the past year. (Please check ALL that apply).

Limited space for product
Limited time/too busy
HAT are not profitable
HAT are not affordable for patient
Too many products to get a good handle on
Other staff member dispenses HAT at current employment setting
Refer to other center for HAT needs
Hearing aids are enough
Patients intimidated by technology
Never received formal training in HAT
Apathy
Administration does not allow us to dispense HAT
Other (please specify)

Check the primary reason as to why you do not dispense HAT. For this question, check the one best answer.

Limited space for product
Limited time/too busy
Not profitable
Not affordable for patient
Too many products
Hearing aids are enough
Intimidated by technology
Lack of formal training
Apathy
Administration does not allow us to dispense HAT
Other (please specify):

Based on your professional experience and expertise, what is the single most important factor that would influence you to offer HAT to your patients at your current employment setting?

Higher profitability/higher margins

Solution to minimizing inventory needs
Availability of more time to offer patients technology orientation
Availability of space to display products
Accessibility to product training for clinicians
Paring down technology to only a handful of essential products
Simplifying technology
Lowering product costs
Other (please specify)

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