WILL Cochlear Distortion Measures EVENTUALLY TELL US WHAT THE Audiogram CAN’T?

Tinnitus: From the Clinic to the Lab Bench and Back
Fee-for-Service Models
Patients’ Freedom of Choice
From this moment, everything changes.

A holistic approach to helping first-time users find a clear path to success with hearing instruments.

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EDITORIAL MISSION
The American Academy of Audiology publishes Audiology Today (AT) as a means of communicating information among its members about all aspects of audiology and related topics.

AT provides comprehensive reporting on topics relevant to audiology, including clinical activities and hearing research, current events, news items, professional issues, individual-institutional-organizational announcements, and other areas within the scope of practice of audiology.

Send article ideas, submissions, questions, and concerns to amiedema@audiology.org.

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For moderate to severe hearing loss
Ear simulator:
Max gain: 69 dB
Max output: 130 dB SPL
2cc coupler:
Max gain: 63 dB
Max output: 120 dB SPL

HP receiver (High Power)
For moderate to severe to profound hearing loss
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Our New Reality

The ubiquitous Internet. There is very little that we can’t do on the Internet.

What can we do? Well, we can go shopping, pursue a degree, watch television, movies, and videos, participate in gaming and all forms of social media, do research (everything from purchasing a car to finding references for a manuscript), read newspapers, post photos to share with friends and family, blog, invest and manage our (dwindling) financial portfolios, make a phone call, purchase prescription drugs, find a doctor, research health conditions, and so much more. You name it—it can be done on the Internet.

Not exactly what the early Internet pioneers had in mind or envisioned in the early days of the Internet (see the AT article “Who’s Your Daddy?” as a father of the Internet shares his views on hearing aids and technology, May/June 2009). To say that the Internet has changed our personal and professional lives is a vast understatement. The Internet and associated technologies are our new and burgeoning reality.

What does this mean to us as audiologists? Yes, you guessed it: our patients (especially all those tech-savvy Millennials, Gen Xer’s, and baby boomers) are showing up at our front door armed with information on hearing and balance care and treatment options based on their regular and intentional use of the Internet to find information about the health problems they face. We aren’t unique as a health-care profession; the use of the Internet for all manner of health care is nothing new. Telehealth, telemedicine, e-health care, and so forth are here, and not just in the United States, but globally. The World Health Organization (WHO) established the Global Observatory for eHealth to review the benefits of technology and communication systems on patient health care. Their most recent survey was completed in 2009 and is available (where else?) online at http://whqlibdoc.who.int/publications/2010/9789241564144_eng.pdf.

The information obtained from this global survey of developed and developing countries is to be used by governments, researchers, academics and e-health professionals—I think this means us. The survey outlines steps that can be implemented such as the development of a national agency whose job it is to “coordinate telemedicine and e-health initiatives” and to help ensure that these initiatives are funded, cost-effective, and continually evaluated and integrated with other “traditional” health services.

How perfect is this? One of our Academy Preferred Futures (see chart to the right) is to “expand the availability and accessibility of hearing and balance care.” One major way we can do this is through telemedicine/telehealth. Aligned with this is the use of electronic medical records, which, when fully implemented, will allow even easier sharing of health care among providers and patients. This horizon is now; however, it is not without some controversy such as the cost of doing e-health business, the ethics of sharing information, and data and reimbursement to the provider for telehealth/telemedicine just to name a few. However, these issues are being addressed, and e-solutions will be found. We have to be there on the ground floor to be part of the solution for tele-audiology care—as only we can be.

Stay tuned and stay connected to the Academy Web site, the WHO Web sites, and the Health and Human Services Web sites (to include CMS—Centers for Medicare and Medicaid Services) for developments in this new reality. Some are already involved at some level in telehealth in their facilities, and there is a plethora of Web sites that contend to have all the answers for the consumer with hearing loss: online
hearing screenings, hearing aids that can be purchased online, earmold impression kits sold online for consumers to use on themselves (for hearing aid use and custom hearing protection), tinnitus self-treatment, and so on. These are the first forays into telehealth. Some Web sites have providers standing by to consult with consumers.

The question is, How do we manage all this information and the communication technologies to effectively improve accessibility to the services we provide? Do we wait for national agencies to tell us how to do this, or do we develop solutions that work for our patients and the consumers of our services so that we indeed use telehealth/telemedicine as an effective complement to more traditional brick-and-mortar delivery of care? I’m guessing we would be in agreement to be “all in” on this and take ownership as a profession of the solutions for this new reality. To paraphrase Gandhi, “As one changes one’s nature, so does the attitude of the world change. We do not have to wait to see what others do.”

Therese Walden, AuD
President
American Academy of Audiology

Preferred Futures 2012–2017

Our Vision: To be essential in the professional lives of audiologists by advancing the science and practice of audiology and achieving public recognition of audiologists as experts in hearing and balance.

Our Mission: To promote quality hearing and balance care by advancing the profession of audiology through leadership, advocacy, education, public awareness, and research.

<table>
<thead>
<tr>
<th>GOAL</th>
<th>Description</th>
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<tr>
<td>1</td>
<td>Ensure that audiologists are known as the preferred health-care providers for hearing and balance wellness</td>
</tr>
<tr>
<td>1A</td>
<td>Evaluate various business models (e.g., optometry, dental) as potential templates for audiology</td>
</tr>
<tr>
<td>1B</td>
<td>Identify and develop a preliminary plan for consumer groups that can improve hearing health and balance</td>
</tr>
<tr>
<td>1C</td>
<td>Collect and develop outcomes measures that demonstrate that audiologists are preferred providers</td>
</tr>
<tr>
<td>1D</td>
<td>Develop an outreach plan that communicates outcomes messages</td>
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<tr>
<td>2</td>
<td>Expand the availability and accessibility of hearing and balance care</td>
</tr>
<tr>
<td>2A</td>
<td>Determine the feasibility of providing a professional home for audiologists’ assistants</td>
</tr>
<tr>
<td>2B</td>
<td>Identify technologies (e.g., telehealth, mobile audiology) that extend the reach of audiology services</td>
</tr>
<tr>
<td>2C</td>
<td>Amplify recruitment of future audiologists through SAA and career counseling organizations</td>
</tr>
<tr>
<td>3</td>
<td>Achieve recognition by policymakers of the value of audiologists’ full scope of practice</td>
</tr>
<tr>
<td>3A</td>
<td>Achieve direct access (H.R. 2140)</td>
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<tr>
<td>3B</td>
<td>Obtain a seat at the RUC-HCPAC and CPT-HCPAC</td>
</tr>
<tr>
<td>3C</td>
<td>Achieve fair compensation for services</td>
</tr>
<tr>
<td>3D</td>
<td>Obtain an individual classification for audiology in the NAICS codes</td>
</tr>
<tr>
<td>4</td>
<td>Establish and promote (exemplary) standards in the provision of hearing and balance wellness</td>
</tr>
<tr>
<td>4A</td>
<td>Complete development of professional standards</td>
</tr>
<tr>
<td>4B</td>
<td>Evaluate the Academy’s strategic and fiscal interests in academic standards</td>
</tr>
<tr>
<td>4C</td>
<td>Evaluate the strategic and fiscal implications of developing a national exam</td>
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Philanthropy is powered by voluntary giving. We are inspired by stories of philanthropists because their actions are from the heart. Thanks to such altruism, $235 billion was given by individual Americans to philanthropic causes in 2010 (see Figure 1).

The purpose of National Philanthropy Day®, November 15, is to recognize the generosity of all these donors. Acknowledging that action expresses priorities (Gandhi), consider these facts:

- **Philanthropy Fact**: 60 percent of public charities saw decreases in giving in 2010.
- **Foundation Fact**: The American Academy of Audiology Foundation experienced a three percent increase in the dollar amount donated in 2010–2011 by audiology philanthropists who are also Academy members.
- **Philanthropy Fact**: People give to support what they value and believe in.
- **Foundation Fact**: The Foundation 2010–2011 Annual Report recognizes the many audiologists who both value the Foundation’s initiatives and understand the importance of audiology philanthropy. (Look for the Annual Report included with this issue of Audiology Today).
- **Philanthropy Fact**: Over 80 percent of philanthropic dollars are contributed by individuals.
- **Foundation Fact**: Approximately 500 audiology philanthropists (less than four percent of Academy members) financially supported the AAAF in 2010–2011.

The Foundation funds programs with both corporate and individual gifts. The mission statement (below) highlights a few of the programs funded with gifts to the Foundation by individuals...audiology philanthropists such as you.

### American Academy of Audiology Foundation

**Mission**: To promote philanthropy in support of...

### Education
- Member Assistance Program
- Roger Ruth and Sadanand Singh Scholarships
- Advances in Children’s Hearing Lecture

### Awareness (and Organizational Partnerships)
- DiscovEARy Zone at Kohl’s Children’s Museum
- Secondary School Science Fair Awards
- Accreditation Commission for Audiology Education
- National Hearing Conservation Association

### Research
- Research Grants in Hearing and Balance
- Student Research Forum Awards
- James Jerger Awards for Excellence in Student Research

...in audiology and hearing science.

Each of us has benefited personally and professionally from the philanthropic contributions of others. Will you become an audiology philanthropist to power the profession that has given so much to you? On National Philanthropy Day, you will hear from the Foundation, and I hope you’ll join me in celebration of philanthropy by making your gift to the Foundation! ☝️

*Cheryl Kreider Carey, CAE*

Executive Director
American Academy of Audiology
FIGURE 1. Philanthropic Giving in the United States 2010 Contributions: $291 Billion by Source ($ In Billions – All Figures Are Rounded)

- Individuals  $235 billion
- Foundations/family  $20 billion
- Foundations/corporate  $21 billion
- Corporations  $15 billion

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Understanding Antitrust: What Members Need to Know

By Erin L. Miller

As a new board member, I was charged with reading the Academy Bylaws and Policies and Procedures Manual prior to my first board meeting in July. The board was also fortunate to have Academy legal counsel, Tom Daly, review the fiduciary responsibilities of board members during the July board meeting. After reading these documents, and meeting with Tom, I began to truly understand the responsibility the membership had given me and my fellow board members. Not only is the Academy board charged with providing strategic direction for the association, we must also initiate and establish policies that govern the Academy. These policies must completely align with federal and state laws in order to avoid placing the Academy’s nonprofit tax status in jeopardy, as well as to avoid risk for litigation and fines.

I was already feeling a little overwhelmed when Academy President Therese Walden asked me to write an article for Audiology Today that would highlight the federal antitrust laws. My immediate reaction was “What do I know about antitrust...shouldn’t we have our legal counsel write this article?” Therese assured me that while legal counsel could write the article, the perspective of a member of the Academy would provide other members with a better understanding of how these very complex laws impact the sometimes daily activities we engage in as members of the association. Following the July board meeting, I set off on a quest to learn as much as I could about federal antitrust laws and their impact on the activities of the Academy and its members.

The Sherman Act, the Robinson-Patman Act, the Clayton Act, and the Federal Trade Commission Act are among the federal antitrust laws that prohibit all contracts, combinations, or conspiracies to restrain trade. Antitrust is used to describe all laws that intend to promote and regulate competition and make our competitive economic system work. I know this can get pretty dry, but try to stay with me....

While most professional association activities are procompetitive, or at least competitively neutral, there are certainly activities that could violate federal antitrust laws. The Federal Trade Commission (FTC) is very clear that professional or trade associations are not shielded from penalties for violating antitrust laws. As members of the Academy, we are all competitors. As such, activities that the Academy and its members are involved in are subject to close scrutiny under the laws regulating competition, marketing practices, and advertising. Knowing, understanding, and abiding by the laws is our individual and collective responsibility.

Members of the Academy may participate in any number of association activities that could result in discussions or actions that may violate antitrust laws. These activities include committee or task force work, participation on Listservs, blogs, and other social media, and attendance at continuing education activities at AudiologyNOW!® or through eAudiology. Because we are viewed as competitors, we must be sensitive to the antitrust risks involved in our participation in these activities and

Remember, Academy members are competitors; as such, the Academy cannot “sign on” to any type of economic boycott.
adhere to safeguards the Academy has designed with our legal counsel to meet those risks.

So what does this really mean for each of us as members of the Academy? It is illegal for the Academy or its members to suggest pricing, standardized contracts, or other methods that might disguise price fixing. For example, any exchange of data that includes current prices or provides information that identifies data from individual members (competitors) certainly will raise antitrust concerns. The motivation behind these concerns is that it could encourage or appear to encourage more uniform prices than would otherwise exist. In a nutshell, antitrust laws require that each company or individual practitioner establish prices and other terms on its own, without agreement with other competitors. Consumers expect that prices are established based on business expenses, supply and demand, etc., and not on an agreement of competitors.

The FTC and the Department of Justice (DOJ) have developed guidelines for health-care providers that present specific information regarding sharing price and cost data. The “Statements of Antitrust Enforcement Policy in Health Care” (FTC, 1996) and other information about antitrust can be found on the FTC Web site.

The Academy policy on antitrust (Policy III (3) (a)) states that

...even discussion of collective action, pricing, boycotting, or other issues that could lessen or increase competitive advantage can subject the association to litigation and fines.

This leads me to the final point I would like to make, and it relates to the issue of boycotting. Several months ago members on the SoundOFF Listserv asked the Academy to step up and “boycott” a specific initiative. In fact, there was a petition being circulated and members asked that the Academy “sign on” to this initiative.

The FTC states that

Any company may, on its own, refuse to do business with another firm, but an agreement among competitors not to do business with targeted individuals or businesses may be an illegal boycott, especially if the group of competitors working together has market power.

Remember I pointed out earlier in the column that Academy members are competitors; as such, the Academy cannot “sign on” to this type of boycott. It would put both the Academy and its membership at risk. The FTC has already challenged the actions of several physician groups who collectively agreed not to participate with certain insurance companies. They viewed this as an illegal group boycott (FTC, 2011)

I hope this brief column helps members increase their understanding that the Academy volunteer leadership and staff are charged with protecting the association from litigation that could damage the association. Invariably, there will be times on the Listservs and during other Academy activities where discussions that could appear to violate federal or state antitrust laws will occur, and the participants will be asked to cease the discussion and/or the activity. This kind of vigilance is not “big brother” micromanaging Academy members, and it is not intended to impede the advancement of the profession and the initiatives of the Academy. Rather, it is our collective responsibility to “self-monitor” ourselves and each other in order to protect us as professionals and to protect the Academy as a membership organization. We will stay strong and will continue to build because we align ourselves with the federal and state laws that are promulgated to protect us and the consumers of our services.

While we encourage the sharing of ideas among our colleagues at AudiologyNOW! and on Academy Listservs, I hope that this article helps to further illustrate the constraints on the Academy (and individuals) to participate in these types of activities. I appreciate the trust the membership has placed in me and my fellow board members. We will do our best to continue to earn that trust and make decisions that allow continued growth of the Academy and the profession of audiology.

Erin L. Miller, AuD, is a member of the Academy Board of Directors (July 1, 2011–June 30, 2014.) She is also the coordinator of the Northeast Ohio AuD Consortium and a clinical preceptor/instructor for the NOAC program at the University of Akron, Akron, OH.

References


FROM THE EDITOR

Peer Review

Peer review is a process of self-regulation used by individuals to improve performance, assure relevance, and maintain credibility. In academia, the peer review process takes on a specific meaning: to evaluate whether a paper exceeds the rigorous publication standards developed for a professional “archival” journal. Archival journals serve as the recorded history of the research and clinical practice for a professional discipline.

Although the Journal of the American Academy of Audiology serves as the archival journal for the Academy, Audiology Today (AT) serves as its anthropological record of our profession dating back to the foundation of the Academy. A review of back issues of AT provides a glimpse into the scientific, social, and cultural development of our discipline, and often reveals that “past is prologue” to our future.

In addition to article submissions, one of the most important roles for readers of AT is to ensure that the publication provides value to your practice, profession, and/or professional organization. The best way to do that is to use the “Letter to The Editor” format, which, when published in AT, becomes part of our “peer review” process for the magazine. Further, it serves to guide future article ideas and ensure that AT remains relevant to you. In a sense, this is the most important form of “self-regulation” of all, and I encourage you to let us know how we are doing. What do you like, what misses the mark, and what would you like to see?

Thanks for reading!

Dave Fabry, PhD, is the content editor for Audiology Today.

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Save Money and Time by Hiring the Right Employee

By Tracey Irene

The importance of an exceptional staff cannot be overlooked when you are focused on delivering excellent customer service. Superior customer service can be defined by the experiences, impressions, and comfort levels that your patients feel when they are working with your staff both on the phone or in the office. What is the impression your practice makes on each patient? What are the qualities you look for when hiring staff?

Finding and hiring the right employee can be difficult. Unfortunately, when a wrong decision is made about a new hire, it can be very costly to your business. Many audiology practices do not have access to human resource departments to guide them in this process.

Save time and money by hiring the right employee.

What are the steps involved in finding the perfect fit in a new employee?

**Define the Position**

A well-written job description can be invaluable in two ways. First, it clearly defines the position and expectations for the prospective employee. Second, it serves as a guideline when determining the skills required and the interpersonal qualities best suited for the position.

The BEST Committee was asked, “What qualities do you look for when hiring a receptionist in your office?” The following qualities are the most valued in front office staff:

**Friendliness and Approachability**

The front desk staff is the first person seen and heard by the patient. As some clients experience anxiety and apprehension when visiting an audiologist for the first time, a warm and sincere personality can set the tone for the client’s appointment.

**Detail Oriented with a Good Work Ethic**

These skills are essential in a busy practice and can be difficult to teach if it is not a part of a candidate’s core values. The demands of a receptionist require the ability to multitask. He or she must be able to manage the aspects of scheduling, overseeing insurance issues, helping with patient requests, and managing...
unexpected events. Ensure that the candidate is dependable, reliable, and flexible enough to handle the demands of the office, while sensitive to the needs of the patients.

**Exceptional Verbal Communication**

The candidate must have clear speech and the ability to be understood by a variety of different listeners. The ability to explain information to patients in a clear and concise manner is essential to the job. In addition, he or she should be able to identify communication breakdown and be able to adjust his or her voice, rephrase, and/or slow down his or her speech to be better understood. Candidates who speak rapidly or have a soft voice may pose a challenge for individuals with hearing loss.

**Interview the Candidate**

When interviewing a potential candidate, ensure that the interview questions allow you to evaluate a candidate’s ability to perform the job duties defined in your job description. Reviewing the job description with the candidate at the beginning of the interview can develop the expectations for the position. Ensure that the candidate is comfortable with the duties and interested in the job. These standard interview questions may be initially very helpful in narrowing down candidates.

- What are your strengths and weaknesses?
- What do you know about the profession of audiology?
- What lead you to apply for this position?
- Where do you see yourself five years from now?
- What skills do you have to prepare yourself for this position?
- Do you enjoy working with people?

Once you have narrowed the field of candidates and are considering a second interview, ask more in-depth questions to determine the best fit for your office. Remember that receptionists need to solve problems quickly and meet the needs of the patient. Consider some of the following questions to get more detailed information.

- How would you handle an angry patient on the phone?
- Is your schedule flexible?
- Are you familiar with Word, Excel, Access, etc.?
- Have you ever been in a situation where you were asked a question that you do not know the answer to? How did you work through this to find the answer?
- What situations do you feel may be challenging when working with hearing-impaired individuals?
- If a patient was unable to understand you on the phone or at the desk, what would you do to get the message across to the patient?

Personal questions, gossip, politics, negative topics, or topics you know little about should be avoided during the interview process (American Academy of Audiology, 2011). Remember, it is important to be relaxed and personable. Not only are you interviewing the candidate, but he or she is also evaluating you and the practice to determine if it is a desirable place to work. Enjoy the process and be open to the opportunity that may present itself to you.

**Make an Offer**

Once you have determined your ideal candidate, a phone offer followed by a written offer should be made. The written offer should include the candidate’s name, date of offer, compensation, and start date. It can also include hours, responsibilities, vacation, insurance, and probationary period. The offer can be contingent on acceptance by a certain date, background check, reference check, and/or medical exam. A written agreement to the terms of employment can be referred to if needed should discrepancies arise.

Invest the time and resources necessary to find a receptionist who will exemplify the image and mission of the practice. Remember that “Capable, service-oriented employees supported by an environment and infrastructure clearly designed to make them successful produce loyal, happy customers, even advocates and apostles” (Kenagy, 1999). A positive, prepared, and motivated employee will help grow your business and set you apart from your competition.

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Illustration by Johanna van der Sterre.

**References**


## CALENDAR

### NOVEMBER

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<td>1</td>
<td>AudiologyNOW!® 2012 registration and housing opens for Academy members.</td>
<td><a href="http://www.audiologynow.org">www.audiologynow.org</a></td>
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<td>3–5</td>
<td>ADA Convention</td>
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<td>8</td>
<td>eAudiology Web Seminar: Coding and Reimbursement Series: Medicare Enrollment and Regulations (.1 CEUs)</td>
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<td>10–12</td>
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### DECEMBER

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<td>14</td>
<td>eAudiology Web Seminar: Real World Ethics for Audiologists (Tier 1) (.3 CEUs)</td>
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RECENT RESEARCH SEEKS TO DEVELOP A DIAGNOSTIC TOOL THAT HELPS DESCRIBE PHYSIOLOGIC ATTRIBUTES OF COCHLEAR HAIR CELL MECHANO-ELECTRIC TRANSDUCTION FOR THE PURPOSE OF SUBCATEGORIZING VARIOUS FORMS OF SENSORINEURAL HEARING LOSS.
For patients with sensorineural hearing loss, where thresholds are raised with no audiometric air-bone gap, ears cannot be classified in terms of the underlying damage to the various cell types of the auditory periphery. This is a limitation of presently available diagnostic tools used in audiology clinics. For example, damage to the stria vascularis or to the outer hair cells of the organ of Corti can both result in the same audiometric configuration although the underlying pathophysiology is completely different (Bian and Chertoff, 2001). Identifying and characterizing the cellular origins of hearing loss will allow more specifically targeted therapies to be applied and may eventually permit stem cell and genetic therapies of the inner ear. Here we summarize recent work aimed at developing a new diagnostic tool that helps describe physiologic attributes of cochlear hair cell mechano-electric transduction for the purpose of subcategorizing various forms of sensorineural hearing loss.

To highlight the physiologic meaning of the new tool, we review some basic hair cell physiology. Consider a single hair cell in the traveling wave excitation pattern...
arising from a single pure tone (FIGURE 1). The hair cell considered is located near the peak region where cochlear amplification is active. Since all regions of the traveling wave move up and down at the frequency of the probe tone, the hair cell will also be stimulated at the probe tone frequency.

The up-and-down vibration of the basilar membrane and organ of Corti displaces the hair cell and moves the stereocilia back and forth at the frequency of the probe (FIGURE 2). Hair cell stereocilia have mechano-electrical transduction channels through which current flows, changing conductance as they are displaced, and causes the hair cell’s electrical response to be cyclic. This mechano-electric transduction is often referred to as “forward transduction.” Outer hair cells have the unique feature whereby electrical potential alterations cause length changes in the cell body. This electro-to-mechanical transduction is often referred to as “reverse transduction.” Reverse transduction provides a force that feeds back to actively enhance vibration of the basilar membrane and organ of Corti. Vibration enhancement is a process related to what is commonly referred to as the “cochlear amplifier.” Cochlear amplification is a nonlinear process, as it is associated only with small stereocilia displacements. At present, it is not clear which process—mechano-electric or electrical-to-mechanical transduction—dominates cochlear amplification. Be that as it may, the point here is that both mechano-electric and electrical-to-mechanical transduction result in nonlinearity. In FIGURE 2 the transformation of the low-level stimulus to an electrical response (blue) is different than the transformation process for the moderate-level stimulus (red). This nonlinearity results in the response from the moderate-level stimulus being “flattened” or “clipped” at the maximal excursions, being asymmetric about the y-axis, and having considerable harmonic distortion. The asymmetry of the response is the origin of the “summing potential” when recorded outside the cell.

A common way to characterize nonlinearity of hair cell responses is to drive the hair cell with a variety of stimulus levels and plot the output versus the input. While FIGURE 2 illustrates the hair cell electrical response...
as the stereocilia are displaced through time, FIGURE 3 directly compares the hair cell electrical response to stereocilia displacement away from their resting position. The tri-colored nonlinear function describes the hair cell responses from different input levels. The blue and red sections of the function in FIGURE 3 represent the responses to the low- (blue) to moderate-level (red) probes shown in FIGURE 2. The black sections represent a response from a more intense probe that is not shown. As can be seen in FIGURE 3, the response to the more intense (red) probe was distorted because transformation was not one-to-one as would be expected from a linear transducer function. The schematized hair cells below the transducer function of FIGURE 3 show how the stereocilia were displaced away from their resting position, or “operating point.”

We now consider how the hair cell near the peak region of the traveling wave will respond when two closely spaced pure tones are presented simultaneously. Because the mechanical properties are graded along the cochlear length, high frequency acoustic signals are transduced in the cochlear base, midfrequencies are transduced in the middle of the cochlea, and low-frequencies are transduced in the apex. Accordingly, in FIGURE 4 the traveling wave envelopes from the two probe tones overlap considerably, but their peaks are separated. The net traveling wave resulting from simultaneous presentation of two pure tones is certainly more complex than what is suggested by this simple illustration, though the point to be made is clear. The hair cell being considered will be stimulated with two frequencies because the entire length of each traveling wave will move the basilar membrane up and down at the probe tone frequencies.

FIGURE 5 illustrates that the complex periodic movement resulting from two-tone stimulation will act as input to the hair cell stereocilia just as we saw in the single-tone stimulation scenario in FIGURE 2. The complex periodic displacement-input is transduced through the nonlinear function described in FIGURE 3 and results in distortion in the hair cell’s electrical responses. In particular, the output response in FIGURE 5 is asymmetric and has peak excursions that are clipped. If we were to transform the output in FIGURE 5 to the frequency domain, we would see spectral energy in frequency bins corresponding to the familiar 2f1-f2 and f2-f1 where f1 is the frequency of one tone and f2 is the frequency of the second tone. These spectral peaks are referred to as “distortion products.”

FIGURE 6 illustrates how the operating point of the transducer function can greatly influence the production
Will Cochlear Distortion Measures Eventually Tell Us What the Audiogram Can’t?

“Even order” simply means that the multipliers in front of the frequencies in the mathematical definition of a distortion product add up to an even number. For example, the distortion product $2f_1-f_2$ has a 2 and a 1 in front of the probe frequencies that add up to the odd valued number 3. Similarly, the distortion product $f_2-f_1$ has a 1 in front of both frequencies, together adding up to the even number 2. Alterations to the transducer curve operating point—either from pathology or by a procedure appropriate for humans called “low-frequency biasing”—produce changes in the amplitude of the distortion products. Operating point changes can be conceptualized as slowly, or statically, shifting the organ of Corti toward the scala tympani or the scala vestibuli. Although FIGURE 6 illustrates how shifts in transducer function operating point affect distortion product amplitudes, alterations to the slope, or sensitivity, of the transducer function that is intrinsically linked to the operating point and can yield similar results (Weiss and Leong, 1985). Changes in the operating point and associated distortion products can describe the pathophysiology of cells that remain in ears with sensorineural hearing loss and might ultimately be used to differentially diagnose the underlying pathology of a given ear to supplement the current approach of simply describing audiometric configuration. For example, when the operating point is near zero, even-order distortion is smaller than odd-order distortion. When the operating point moves away from zero the even-order distortion increases while odd-order distortion decreases. In ears with hair cells that are functioning around an abnormal operating point, the relationship between the even and odd order distortion amplitudes will not be as it is in normal ears.

Next we summarize various experiments that have used distortion measures in transducer function estimation techniques to differentially diagnose sensorineural hearing loss.
Transducer Function Estimates for Differential Diagnosis

An exciting feature of the distortions generated by the hair cells is that they can be used to tell us about the underlying nonlinear function that created them. Indeed, it is by using the distortions measurable from normal and damaged ears that we can estimate the underlying transducer function. Hair cell distortion appears in minimally invasive measures such as otoacoustic emissions, the cochlear microphonic, and the summing potential. These cochlear measures can be analyzed to describe physiologically meaningful attributes of the hair cell transducer function. In particular, the slope of the transducer function describes the sensitivity of the transformation process; the extremes of the function describe the dynamic range; and the asymmetry gives an index of whether the operating point of the transducer is displaced toward the scala tympani or scala vestibuli. These attributes vary with types of “sensory” hearing losses that are associated with “sensorineural” hearing loss.

FIGURE 7 shows example transducer function estimates from ears with a variety of types of cochlear damage. Each panel has a black line that is a transducer function estimate from a normal ear. In panel A the green transducer function shows that damage to hair cell body from salicylate (i.e., aspirin) toxicity increases hair cell conductance and shifts the operating point toward the scala tympani while the orange function shows that damage to hair cell stereocilia decreases conductance and shifts the operating point toward the scala vestibuli direction (Bian and Chertoff, 1998). The magenta curve in panel B shows that reduced current flow through the bottom of the hair cell alters the symmetry of the transducer function and shifts the operating point toward the scala vestibuli while the cyan curve shows that reduced current flow at the stria vascularis leaves the sensitivity (i.e., the slope or “pitch”) unchanged but reduces current flow through the hair cells, hyperpolarizing them, and shifts the operating point toward the scala tympani (Bian and Chertoff, 2001). In panel C the red tracing shows that moderate permanent noise-induced hearing loss yields less nonlinearity in the transducer function estimate while more severe noise trauma results in total linear transduction and an operating point shift that is in the opposite direction than that for moderate damage (Chertoff et al, 2003). The gray line in panel D shows that sustained mechanical displacement of the cochlear partition dramatically alters the operating point (Salt et al, 2009). In FIGURE 7 we do not schematize the effects of temporary noise-induced hearing loss because it is not commonly seen in the
It is quite possible that transducer curve estimation techniques can help identify and characterize central pathologies in addition to the peripheral pathologies we described in this report.

Audiology clinic. Nevertheless, the effects of temporary noise-induced hearing loss are probably worth mentioning: When compared to normal, the transducer function during temporary noise-induced hearing loss becomes more linear, less sensitive, and has an operating point that is more toward the scala tympani (Chertoff et al, 1996, 1997; Kirk et al, 1997; Patuzzi et al, 1989). A fascinating and important point is that most of the transducer function estimates shown in Figure 7 were measured from ears with the same audiometric configuration of a high-frequency sensorineural hearing loss. Transducer function estimates can supplement currently available audiometric information to tell us much more about underlying pathophysiology of a patient’s ear.

Mechano-electric transducer function estimates quite possibly have the potential to distinguish outer hair cell pathology from inner hair cell pathology. The foundation for making a distinction between types of hair cell damage is in comparing outer hair cell transducer curves estimated from transient-evoked otoacoustic emissions (Krishnan and Chertoff, 1999), distortion product otoacoustic emissions (e.g., Bian et al, 2002, 2004; Bian, 2004, 2006), and cochlear microphonic (e.g., Chertoff et al, 2001) to possible inner hair cell transducer function estimates from the summating potential (Choi et al, 2004). The ultimate diagnostic goal of comparing outer hair cell to inner hair cell transducer function estimates is to identify the location of missing cells in order to treat them with stem cell and/or genetic therapies. The more immediate diagnostic goal, however, is to describe the pathophysiology of surviving inner and outer hair cells to develop better hearing aid programming strategies.

The operating point of transducer function estimates has shown much promise in characterizing the pathophysiology of endolymphatic hydrops—an excess of endolymph, one of the cochlear fluids—and other disorders often associated with Ménière’s disease. Clinicians are often limited to using case history when attempting to diagnose Ménière’s disease. In some instances, diagnosis is supplemented with audiological test results such as a transient low-frequency sensorineural hearing loss or an abnormal summating-to-action-potential ratio (Ferraro and Durrant, 2002). We advocate that the operating point of transducer function estimates could provide a physiologically meaningful test to objectively complement the classically used diagnostic methods. Sirjani et al (2004) showed that the operating point of transducer curve estimates derived from outer hair cell physiology were displaced in cases of endolymph manipulations and reduction of the endocochlear potential. A displaced operating point means the transducer curve is more asymmetric and will produce more distortion. Salt et al (2009) advanced the understanding of operating point estimations in simulated hydropic ears by showing that sustained displacement of the cochlear partition resulted in greater distortion, thus empirically confirming the theory that operating point displacements directly relate to in vivo distortion generation. A parametric study by Brown et al (2009) showed that electrical distortion of the inner ear followed acoustical distortion emitted into the ear canal, suggesting that these types of distortion might both be produced by nonlinear mechano-electric transduction function of the hair cells. One attribute of a large scale study by Patuzzi and Moleirinho (1998) showed that transducer function estimates can differentiate between a reduced endocochlear potential and damage to outer hair cell bodies. Future research could aim to determine if physiologic indices other than the operating point are descriptive of Ménière’s disease.

The operating point of the transducer function can be modulated by the efferent medial olivocochlear system (Abel et al, 2009). The putative purpose of the medial olivocochlear system is to turn down the gain of the cochlear amplifier to protect against acoustic trauma.
and to help with listening in the presence of background noise. The strength of the medial olivocochlear system’s effect on the operating point, or perhaps other physiologic indices of transducer function estimates, should have clinical utility for predicting individual susceptibility to noise-induced hearing loss and for providing an objective measure of the ability to listen in the presence of noise. It is quite possible that transducer curve estimation techniques can help identify and characterize central pathologies in addition to the peripheral pathologies we described in this report.

Conclusion and Afterthoughts
We describe above how cochlear distortion measures relate to the morphology of the in vivo mechatroelectric transducer function. The goal of this article is to illustrate that various cochlear pathologies influence the morphology of the transducer function estimates in a complex, but interpretable, manner. A tremendous amount of work remains to be done to understand how to use these diagnostic techniques in humans.

The methods used for transducer function estimation are not trivial and are not yet available in a “turnkey” clinical system. Most of the electrophysiologic measures for transducer function estimation are already available from basic audiology clinic equipment in the form of otoacoustic emissions recorded from the ear canal as well as the cochlear microphonic and summating potential recorded with an electrode placed on the tympanic membrane. The element presently missing is analysis software suitable for the audiology clinic. This provides opportunities to develop electrophysiologic software to make transducer function estimates available to all research audiologists.

Notes
1. In various schools of basic science, using output signals to estimate characteristics of the system from which the output signals were created is often referred to as the “inverse problem.”

2. The transducer curve estimates shown in FIGURE 7 were made with a variety of physiologic measures such as otoacoustic emissions, the cochlear microphonic, and summating potential. Here we do not discuss methodologies for any of the various transducer function estimation techniques. The interested reader will need to seek out the original publications for detailed methodology and should feel free to contact one of us for more information.

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References


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Tinnitus research advancements show a glimpse of the potential growing role for audiologists as key elements in the treatment of individuals with hearing loss and tinnitus.
Objective tinnitus, a phantom auditory sensation occurring in the absence of a “real” sound can be a debilitating condition that negatively impacts quality of life, concentration, communication, and sleep. Although this condition has been documented as early as 1650 BC by the Egyptians, the lack of a biological mechanism provides a major obstacle for treatment. Tinnitus may be referred to as a condition rather than a disorder because it is a symptom that may be generated by a number of different pathologies. One such pathology is hearing loss; while the majority of people with hearing loss don’t develop debilitating tinnitus (a larger number develop tinnitus but not disabling tinnitus), most patients with tinnitus have hearing loss (>80 percent). Further, most people experience transient tinnitus after brief intense sound exposure or prolonged loud noise exposure, suggesting that hearing loss is strongly associated with the development of tinnitus.

One of the major advances in tinnitus research was the development of animal models over the last 20 years. Following the pioneering work of Dr. Pawel Jastreboff, a number of labs have demonstrated that animals exposed to conditions that induce tinnitus in humans behave during quiet conditions as if a real sound were present. The development of these animal models has led to the acceptance that, indeed, tinnitus is a biological phenomenon that can be documented in other species. This has resulted in opportunities to investigate the underlying mechanisms of tinnitus from hearing loss and other traumatic events that damage the ear or, more recently, the brain and ear after blast trauma similar to those observed in military personnel exposed to improvised explosive devices (IED). Based on data across a number of laboratories, there is strong evidence that hearing loss in both animals and humans can lead to persistent tinnitus. Imaging studies in both animals and humans have also shown that the manifestation of the tinnitus experience occurs not in the ear but in the brain.

While the animal and human data appear to correlate well, a new controversy has emerged more recently between two alternative approaches to tinnitus and tinnitus treatment. The first approach is that the primary cause of tinnitus distress is a chronic sound that cannot be escaped. Therefore, attempts to reduce the sound through pharmacological treatment, direct brain stimulation, transcranial magnetic stimulation, or sound therapy are the most logical approaches in reducing disabling tinnitus.

In contrast, there is a strong countermovement that focuses primarily on the emotional response to tinnitus where the actual acoustic properties of the tinnitus become much less relevant. For instance, tinnitus retraining therapy (TRT), developed by Pawel Jastreboff, is a deconditioning paradigm designed to reduce the abnormal response to the phantom sound of tinnitus regardless of what the tinnitus sounds like. Similarly, cognitive behavioral therapy (CBT) aims to reduce the impact of the distress associated with tinnitus. In a recent presentation at the American Academy of Audiology’s AudiologyNOW! conference and exhibition (2010), it appears that the U.S. Department of Veteran’s Affairs (VA), which spent about $1 billion last year in tinnitus-related compensation, is beginning to accept this approach to treat the large number of veterans with tinnitus. It can be argued, however, that attenuating the response to tinnitus does not fully address the underlying problem, an incessant phantom perception of sound.

There is a strong incentive to embrace the approach that focuses on emotional response to tinnitus. First, one therapy fits nearly all tinnitus patients. Second, therapies can be implemented by audiologists, the primary healthcare providers for hearing loss. Third, the therapy is relatively low risk, and fourth, clinical trials have failed to identify drug therapies that could provide immediate tinnitus relief. However, a number of these trials showed a strong placebo effect, had inconsistent tinnitus measures, and did not have well-defined subject selection.

Conversely, there is some anecdotal and direct evidence that some pharmacological treatments may work in some subjects. In one study, Dr. Robert Levine showed that carbamazepine (tegretol) could suppress a subtype of tinnitus known as typewriter tinnitus. Additionally there is some evidence from animal and human studies by Dr. Carol Bauer and Dr. Thomas Brozoski that pharmacological treatment with gabapentin can partially attenuate tinnitus.

Over the last eight years at the University at Buffalo, we have focused on the acoustic characteristics of tinnitus in both animals and humans. This work evolved from the human imaging studies by Dr. Richard Salvi and
Dr. Allan Lockwood. These studies showed that individuals with chronic tinnitus had different activation patterns to sound evidenced by PET imaging studies and that modulation of tinnitus in a subset of the test subjects via oral facial maneuvers changed the activation pattern correlated with tinnitus.

Most of our recent work has focused on tinnitus in animals exposed to unilateral noise trauma. Although this hearing loss model does not account for all tinnitus, it covers one of the sub-types of tinnitus most likely to be seen by audiologists. Our two animal models have somewhat similar characteristics to others reported in the literature. The first model we used was schedule-induced polydipsia avoidance conditioning (SIPAC). Under SIPAC, animals are placed under a schedule that induces large volumes of drinking driven by intermittent food pellet delivery. Interestingly, animals do not need to be water deprived for this paradigm to work; however, they are food restricted to 85 percent of their free-feeding weight (i.e., they are hungry).

During the first phase, we present intervals of sound (4 kHz narrow band noise) and quiet throughout the session. Animals drink during the session in bursts following automatic food delivery (food is delivered one pellet per minute automatically without any need for the animal to respond). Next we begin to slowly introduce a brief foot shock (two to three sec) if the animals drink during a sound interval, but no shock is delivered if the animals drink during quiet.

The animals quickly learn to only drink during quiet. Next, we vary the intensity (40–60 dB SPL) and frequency (4–20 kHz) of the narrow band noise (shock is delivered if animals drink in the presence of any of the sound trials). It typically takes one day for animals to generalize and refrain from drinking in the presence of any sound. In the first set of experiments we successfully replicated Jastreboff’s early results using sodium salicylate (main ingredient in aspirin) and quinine (an antimalarial agent). Both of these drugs also induce tinnitus in humans at high doses.

When treated with either of these drugs at high doses, rats refrained from drinking during the quiet condition and only ate the food pellets. After the session, animals would immediately start drinking when placed back in their home cage. These results suggested that animals perceived a phantom sound during the quiet condition (i.e., no external sound) and withheld their drinking during quiet intervals.

In a follow-up study using PET imaging in rats, we showed that high doses of sodium salicylate (250 mg/kg) shown to have behavioral evidence of tinnitus in SIPAC showed activity patterns that were significantly higher than activity patterns in quiet and were similar to patterns evoked by real sound in the inferior colliculus and auditory cortex. In contrast, in animals with hearing loss but not tinnitus, activity decreased in these same regions. (The study was funded by a generous grant from the American Tinnitus Association.)

More recently, we developed gap prepulse inhibition of the acoustic startle (GPIAS), as a screening tool for noise-induced tinnitus (by our colleague Dr. Jeremy Turner). An initial experiment correlated the effects of sodium salicylate under SIPAC with the effects on GPIAS cross-validating both measures in the same animals. Under GPIAS, an interval of continuous sound (noise or tone) is followed by a loud startling stimulus (broadband noise ~105–115 dB SPL).

In rats, this sequences of events generates a large motoric startle response. However, if a brief silent gap (25–150 msec) is inserted into the continuous sound 0–100 msec before the startle response, the startle response is significantly reduced as the gap provides a salient cue of the imminent startle sound. We developed our GPIAS model so that we could test across a range of narrow band noise frequencies (6, 12, 16, 20, and 24 kHz). In our first experiments with GPIAS we showed that a high dose of sodium salicylate (250 mg/kg) resulted in poor GPIAS at 12–16 kHz but normal GPIAS at 6, 20, and 24 kHz. These results showed that animals could not reliably detect gaps at 12–16 kHz; results consistent with tinnitus in that frequency region (i.e., the tinnitus was filling the silent gap). Interestingly, other laboratories using different animal models report evidence of tinnitus near these frequencies.

Although sodium salicylate is a reliable inducer of tinnitus, it is not a clinical problem (or at least it is easy to solve by reducing the sodium salicylate dose). We hypothesized that by using unilateral noise trauma, we could induce hearing loss and tinnitus in one ear and leave the other ear functional to detect the carrier sound and startle sound under GPIAS. We had previously obtained data from SIPAC showing that unilateral noise trauma yielded decreased licking during quiet, suggesting the presence of tinnitus.

After a number of preliminary experiments, we discovered a number of interesting things about trying to produce noise-induced tinnitus in rats. First, the rat ear is relatively tough. We needed to expose rats to noise over 120 dB SPL for at least one hour to even induce measurable hearing loss by DPOAE. Second, a number of these animals with known hearing loss from DPOAE measures
in the exposed ear continued to perform the GPIAS with no deficit. Only in a subset of animals (~30–40 percent) did we find a reduction in GPIAS. Interestingly, the frequency of the GPIAS deficit was consistent with the hearing loss in the exposed ear (note other ear was normal under DPOAE). Our noise exposure parameters were 126 dB SPL of a narrow band noise centered at 16 kHz. We consistently showed deficits in GPIAS in the 16–20 kHz region. These results mirror human data where the tinnitus is in the region of the maximal hearing loss or in the transition zone from normal to impaired hearing.

Equipped with both these models we have performed a number of studies to look at drug treatments for tinnitus. While some traditional compounds such as the benzodiazepine anxyolitic, alprazolam, and the anticholinergic scopolamine, as well as numerous other drugs from different classes, failed to reduce evidence of tinnitus, we recently published on the effects of two potassium channel modulators, Maxipost and R-Maxipost.

Potassium channel modulators are interesting because potassium channels are expressed in the central auditory pathway. In our experiments, both these drugs suppressed sodium salicylate-induced tinnitus. More recently we tested the effects of Maxipost and R-Maxipost on noise-induced tinnitus. Here we found more modest results suggesting that both modes of tinnitus may have different underlying mechanisms.

This past summer, we hosted and presented exciting new results at the Fifth International Tinnitus Research Initiative Conference in Grand Island, New York. In collaboration with the Tinnitus Research Initiative and based on preliminary human data, we showed that the widely prescribed muscle relaxant cyclobenzaprine reduced evidence of single sided noise-induced tinnitus under GPIAS. These results were exciting because tinnitus was observed in the region of poorer hearing in the exposed ear, and a single cyclobenzaprine treatment suppressed the tinnitus for 24–48 h. This study suggests that there may be drugs in the market already that could be useful in treating tinnitus. It also opens the possibility that some natural supplements could help reduce tinnitus, although evidence of this thus far has not been overly encouraging.

While our recent efforts have focused on pharmacological treatment, there is growing evidence from the work of Dr. Jos Eggermont suggesting that sound enrichment prevents abnormal brain reorganization following noise trauma. In the human literature, it is known that sound therapy can be a useful and effective tool to manage tinnitus, but the underlying mechanisms as to how and where this occurs in the brain are not well understood. We have planned a series of preliminary experiments using our animal models to explore the potential role of sound therapy and how this mode of treatment reduces tinnitus. We have already shown that noise-induced and blast-induced hearing loss correlated with tinnitus reduces brain function evidence by impaired hippocampal neurogenesis.

Interestingly, impaired hippocampal neurogenesis has been associated with depression, opening the possibility of tinnitus animal models being used for more than the percept of tinnitus. Further, it opens the possibility that stress factors could be modulated to increase the probability of inducing tinnitus in animals. Stress is strongly associated with tinnitus distress, and animal models could elucidate the physiological mechanisms underlying the relationship of stress and tinnitus.

The original tinnitus experiments in Buffalo were performed in humans using imaging technology. The evidence garnered from these studies inspired the development of animal models to better understand the mechanisms underlying tinnitus. Over the last eight years we have moved between the animal realm and human realm with studies looking at mechanisms and therapy. This team approach was led by auditory scientists and audiologists working in conjunction with professionals from other disciplines. The advancements made show a glimpse of the potential growing role for audiologists as key elements in the treatment of individuals with hearing loss and tinnitus. We ought not to retract from the challenges of working with patients with tinnitus but, rather, embrace the opportunities available to them today and in the near future.

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 ALSO OF INTEREST
 “Tinnitus Management: Interview with Amr El Refaie, MD, PhD.” Scan the QR code to view this interview on your mobile device.
One of the most common topics of conversation in audiology today is structuring of clinical fees—particularly those related to hearing instrument fitting and follow-up. The increased attention that audiologists have given to this issue closely follows the adoption of the AuD as a standard level of training and the increased emphasis on the value of an audiologist’s time. As audiologists continue to value their own time, that value will be understood and appreciated by patients, who are ultimately paying for our time regardless of the fee structure.

Without the existence of reliable empirical data, anecdotal evidence strongly suggests that the majority of audiologists are using bundling pricing for hearing instruments and related services. This method includes the devices and all necessary services related to delivery, verification, adjustment, and follow-up. This structure was largely borrowed from the practices of hearing instrument dispensers when audiologists began leaving the American Speech-Language-Hearing Association (ASHA) to perform their own dispensing services in the late 1970s and early 1980s. However, whereas dispensers cannot widely be reimbursed for their services, audiologists otherwise can (such as for diagnostic services). Audiologists appear to have maintained bundling pricing structures over the past 30 years due in large part to beliefs that patients expect this type of pricing when considering amplification.

Bundled pricing may be based on any number of calculations; however, most are based on the clinic’s cost of hearing instruments. During a presentation of this topic at AudiologyNOW! a few years ago, the audience was polled regarding how they decided what to charge for bundled hearing instruments and related services. Some common answers were “what others in the area were charging,” “what manufacturers told me I should charge,” or “what the previous owner charged.” None of the respondents stated that they had analyzed the expenses involved in providing those services, forecasted the revenues they needed to make the practice run, or used any other method based on conventional business practices. In other words, the majority of audiologists charged for hearing instruments and services based on the “because he told me to” method, a rather arbitrary way to determine a fee schedule.

No matter the extent to which you choose to implement fee-for-service, the specific grouping you choose for products and services, or how you determine your fee schedule, there is a lot to be gained by moving to a fee-for-service model.
The Medical Model

Health-care providers in general charge very differently from this for their services, as do audiologists for most diagnostic services. In health care, it is widely accepted that a provider’s time is money, and patients should be charged for the time and expertise that they use to diagnose and treat their problems. Longer clinical visits involving more complex decision making may cost more than brief visits for a check-up. Specialists are paid more than primary-care providers. It is not the patient’s fault that he or she may have contracted a complex disease that requires multiple visits, imaging studies, and complex decision making. However, patients understand and expect higher charges when more involved care is required to diagnose and/or treat their disease. Flat-rate health care is not common in the United States (although does exist in circumstances where non-routine outcomes are rare, such as dental work or chiropractic adjustments) because the human body is not a machine and a myriad of factors can alter the “routine” care of a patient with most any ailment.

In terms of the care we provide, audiological services are not significantly different from other medical procedures. We will ignore diagnostic services for the moment, because audiologists most typically render and charge for those services in a fashion consistent with the medical model. Patients present with a variety of conditions and are affected differently by conditions that may present exactly the same during diagnostic assessment. For instance, one patient with mild hearing loss may not require treatment at all, whereas another patient with very similar hearing loss may be highly motivated to pursue treatment, including amplification. Our patients present with a myriad of etiologies for hearing loss and the needs of our patients are just as varied, due to differences in psychology, lifestyle, comorbid conditions, and other factors.

Why, then, do so many audiologists continue—in many cases—to insist on maintaining a fee strategy in which all patients are charged the same bundled fee—usually based on the cost of a product—regardless of the time, skills, and effort that will be required to treat their condition? Many audiologists contend that patients expect bundled pricing. It is true that patients who have obtained instrumentation previously have likely encountered this type of pricing. It is also true that some patients have performed enough research that they have repeatedly heard a single number associated with the cost of hearing instrument. However, a brief and simple explanation of an alternate fee structure—i.e., under the medical model—is easily accepted by patients.

No audiologist who was questioned during research on this topic reported losing a patient because he or she separated instrumentation and service fees. In fact, this question provides an audiologist with a valuable opportunity. The audiologist can both explain why services are unbundled (providing options to meet the patient’s needs and income and allowing insurance to reimburse for procedures, etc.) and distinguish themselves from hearing instrument dispensers. Dispensers universally bundle services and will probably continue to do so because they have less of a basis (such as the audiologist’s years of education) to charge for services—and to provide the extent of services that an audiologist may offer. It can even be somewhat amusing to watch a patient’s reaction when he or she discovers what the “real” price of a hearing instrument is!

Problems with Bundling Services

Bundling is not always a bad thing. In fact, any audiologist who has provided services for patients with Medicare or Medicaid is familiar with bundling of codes for audiometry and, more recently, immittance measures. In fact, bundling is mandatory when certain groups of services are provided. However, bundling of services for hearing instruments may be construed as illegal or in violation of a third-party contract in some cases. If you see patients with medical assistance, you likely have provided hearing instruments and services under an unbundled model. It is important to realize, however, that the Social Security Act prohibits Medicare providers from charging Medicare substantially more than the provider’s or clinic’s usual and customary fees (SSA 1128(b)(6)). Therefore, if you were to bundle pricing and not charge for reimbursable procedures, such as initial or subsequent hearing evaluations (particularly when medical necessity exists), you may be violating federal reimbursement regulations. Furthermore, if you perform free hearing evaluations for some patients, but bill Medicare, Medicaid, or the Federal Employees Health Benefits Program for other patients, you are clearly violating the law. Similar language may also exist in contracts with private insurance companies.

If you give away all your evaluations, you are also violating Section 1128A(a)(5) of the Social Security Act prohibiting inducements or remuneration of any kind to Medicare beneficiaries. Medicare does not cover hearing instruments; however, the hearing evaluation may uncover other conditions. In this case, you may be culpable for inducing the patient to be seen when they
otherwise did not realize they had a medical or non-medical condition. At the very least, all audiologists should review these regulations and decide whether they want the risk of skirting federal law. I have heard many audiologists discount these examples when they have been presented at seminars or one-on-one conversations. However, the litmus test is this: Given what you just read, would you feel comfortable sitting across the table from an auditor with the Office of the Inspector General and defending your practices?

In addition to applicable federal laws, there are ethical guidelines that apply to the way professional services are communicated and documented for patients. Principle 5 of the American Academy of Audiology’s Code of Ethics (2011) reads, “Members shall provide accurate information about the nature and management of communicative disorders and about the services and products offered.” More specifically, Rule 5e states, “Individuals shall maintain accurate documentation of services rendered according to accepted medical, legal, and professional standards and requirements.” It could be argued under these guidelines that bundling services—and presenting sales agreements and/or other documentation to the patient—is hiding the nature and value of services rendered. It is not anticipated that our colleagues who still bundle services will start being reported *en masse* for violating ethical practices. However, we should give some thought to the spirit of this rule, what it is intended to achieve for us and for our patients, and how fee structures may apply.

Aside from potential legal ramifications or ethical questions regarding bundling, there are disadvantages for maintaining a lack of transparency with patients. Due to the apparent cost of hearing instruments being inflated (with service fees) and the cost of the audiologist’s valuable services being hidden, audiologists who bundle services may unwittingly contribute to some of the most important obstacles to reaching patients who are candidates for amplification. We have known for many years that the vast majority of patients who may benefit from hearing instruments never seek our help. How would patients react differently if they were aware of the
breakdown of instrumentation and service costs? Would patients be more likely to believe that an audiologist could help them if they saw the value of our time and expertise? Would patients be more likely to seek the help of an audiologist if they saw that we are charging for our time and expertise, whereas a hearing instrument dispenser is simply marking up a device an equal—or often disproportionate—amount?

We do not have research to answer these questions. However, we do know that the status quo has not addressed the large percentage of patients who are not asking for our help. We have not reached those individuals through marketing, discounts, or cheap instrumentation. If we are not sufficiently incentivized to unbundle for legal and ethical reasons, perhaps it is time that we consider whether providing greater transparency might help to address this problem.

A number of negative consequences to bundling have been identified during previous research on this topic.

Value of Time and Expertise
When services are bundled, it is difficult for a patient to know the value of a provider’s time, training, and expertise. Many audiologists who do not bundle services have performed an analysis of their business and determined the cost of every day, hour, and minute of time spent providing services to patients. The patient can appreciate the value of this time as well if they know they are paying for it. This often leads to a greater respect of the provider’s time and availability, as well as the value of the time and services patients receive during appointments.

Professional Identity
Audiologists are frequently included in the nonspecific group of “hearing health-care providers” with hearing instrument dispensers, yet, many audiologists are not working to differentiate themselves from dispensers. We may be able to explain the difference to patients who schedule appointments with us, but what about those who are trying to decide where to go? When the entire emphasis and cost is put on the device, patients have the impression that they are receiving the same thing no matter where they go. Promoting services and expertise, instead of products, tells the public what an audiologist offers that is different from dispensers. A bundled model also supports the false value of direct sales, such as over the Internet. Patients only see the price. When they see that devices on the Internet cost less, and do not see why, they may not give themselves the opportunity to come to your office and find out about the services you can offer.

Insurance Problems
When services are bundled with devices, two issues potentially arise with third-party payers. First, the audiologist does not know how much to charge for services and may lose reimbursement as a result. Second, as insurance companies increasingly offer coverage for hearing care (overlooking recent trends to the contrary as a result of economic downturn), they will look to what providers charge for services. Insurance companies will undoubtedly contact manufacturers to discover the actual cost of hearing instruments. If they are led to believe that audiologists by and large do not need to be reimbursed for our time, insurance companies will either pay manufacturers directly or reimburse the cost of hearing instruments and pay a minimal or no fee for our time and services.

Patient Satisfaction
Ultimately, it is the patient and their needs, not us and ours, which should be the focus of our clinical activities and the structure that we employ. We should constantly ask ourselves, “Are we serving our patients the best we can?” “Is there anything we can do to meet our patients’ needs better?” “Is there anything we can do to provide our patients with greater satisfaction?” While patients may appear to be satisfied with a bundled model, how much more satisfied would they be knowing that you are able to tailor your care to their individual needs—that you value your time and expertise so highly (and therefore they should also) that you are able to charge for your time.

Further, how much will patients devalue the non-audiologist who charges a similar—sometimes greater—fee and does not have the training and expertise that you have? Keep in mind that placing the entire emphasis on

There may be as many approaches to unbundling as there are clinics who engage in this practice.
the device means that the patient will only be satisfied if the device meets expectations—which is not an easy goal in this age of burgeoning technology and is not something that is entirely in your hands. When value is placed on your time and expertise, it is much easier to link patient satisfaction to better hearing and improvements in lifestyle, which depend in part on your counseling and guidance. After all, aren’t you the value in this equation—not only the hearing instrument?

Meeting the Needs of Patients

Picture this scenario: You need a new mobile phone. You block out some time and make the journey to the mobile phone store. Once there, you encounter a dizzying array of phones—almost enough to make you wonder whether you should just go without. Fortunately, there is a very nice and knowledgeable salesperson who guides you through the process of choosing a phone. You choose a phone that can send and receive e-mail, take photos of your kids doing cute things, and many other functions. In your case, you know that you will rarely—if ever—use text messaging or multimedia messaging, browse the Internet, watch television, download music, and a handful of other functions that are on the phone (even if you do, pretend that you are this person). That’s okay, it meets your needs well. Next, you must choose a plan. You then discover that there is no choice. Once you choose the phone, there is only one service plan. It includes everything: unlimited texting, unlimited data for viewing streaming video and audio, subscription to football and baseball packages, discounted music downloads, and an array of other things you will never fully use. You enviously eye the woman next to you, who is shopping for her teenage son before he heads off to college. He is certain to get his money’s worth.

This is essentially the scenario in which your patients find themselves in a fully bundled model. They can choose a device that best fits their needs, but they all receive the same package. There are no options beyond the device itself that account for lifestyle, experience, personality, or needs. Some of your patients with greater needs (for example, the learning challenged or physically impaired) will probably get a wonderful deal. Other patients are paying for services that they will never use—particularly your existing patients returning for new instruments. Some may require nearly as much time for fitting, instruction, counseling, adjustment, etc. Most will not. Unbundling allows you to offer appropriate services (or packages, which we will discuss in a moment) to all your patients. Some may only need a subset of services...
**Table 1.**

<table>
<thead>
<tr>
<th>FEE STRUCTURE</th>
<th>ADVANTAGES*</th>
<th>DISADVANTAGES*</th>
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<tbody>
<tr>
<td><strong>Bundled Services</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>▪ One price, no detail</td>
<td>▪ Easier for clinic</td>
<td>▪ No transparency</td>
</tr>
<tr>
<td>▪ Cost of services not identified</td>
<td>▪ No collections after fitting</td>
<td>▪ No value of services</td>
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| **Completely Unbundled Services**  |  |  |
| ▪ Devices, accessories, and services all charged separately, as incurred  | ▪ Complete transparency  | ▪ Increases staff/administrative time to manage  |
| ▪  | ▪ Lots of options for patients  | ▪ Patients may not reliably return for necessary visits, due to cost  |
| ▪  | ▪ Defers much of the cost until services are rendered  | ▪ Patients may be overwhelmed by options  |
| ▪  | ▪ Patient pays only for what is desired/used, can meet their needs easily  | ▪ Greater possibility of not collecting billables  |
| ▪  |  | ▪ May be more difficult to prevent patients from not purchasing components that are necessary or in their best interests  |

| **Partial Unbundled Model #1**  |  |  |
| ▪ One fee option, based on cost of device and cost of services rendered to a typical patient.  | ▪ Transparency is provided  | ▪ No choices for patients / does not meet the needs of an array of patients  |
| ▪ Services are included for the life of the hearing instrument  | ▪ Patients are able to see value of services provided, although they are still not separated  | ▪ “Services for life” may result in expensive proposal for audiologist  |
|  | ▪ Easy to manage administratively  |  |
### FEE STRUCTURE

#### Partial Unbundled Model #2
- Three pieces to the final cost to patient:
  - Instrumentation
  - Dispensing and all services through trial or adjustment period (no options)
  - Long-term care, accessories, adjustments, batteries, etc.
- Many options for devices, three options for “care packages”:
  - Minimal care, patient pays for services following trial/adjustment period
  - “Standard” option, includes most necessary services, standard accessories, semi-annual checkups, annual evaluation, etc.
  - “Premium” or “Worry-Free” option, includes everything with VIP treatment for life of device

#### Partial Unbundled Model #3
- In addition to the device, patient chooses from two to four options each for short-term care, long-term care, accessories, counseling programs, and maintenance plans.

### ADVANTAGES*

- Patient has manageable number of choices to meet their needs, from basic (for returning or financially limited patients) to premium
- Maintains transparency
- Value is appropriately placed both on provider services and devices
- Easier to administrate than completely unbundled model
- Necessary fees (dispensing, verification, and immediate follow-up) are grouped to emphasize that these are not options

### DISADVANTAGES*

- May need to educate patients as to the nature of unbundled services
- Probably too many choices for most patients
- May open the door for patients to negotiate or reject components deemed necessary for basic treatment
- Will likely require significant time to explain to patients and to administer

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*It is important to realize that one person’s advantage may be someone else’s disadvantage and vice versa. For instance, some audiologists do not like transparency. Some advantages/disadvantages are primarily to the patient, others are primarily to the clinic-provider.*
and accessories because the adjustment will be minor, they grasp new technology well, and they already have tools for storage and care of the devices. Some may need more time or simply want an all-inclusive package to remove worry or feel special.

Fee-for-Service Models
Separating fees for services from those for products can address these issues when done appropriately. However, there are multiple ways to structure a fee-for-service model, and some may not be appropriate for your practice. For instance, few audiologists use a completely unbundled model in which every visit and procedure is charged separately. While this is the strict medical model, it may raise administrative costs, increase chances of having uncollectible billings (as with any billing process), and create situations in which patients will forego scheduling appointments in order to save a few dollars. Very few clinics, if any, have adopted (or continued) this strict approach to unbundling, opting instead for a modified or “partially unbundled” system.

There may be as many approaches to unbundling as there are clinics who engage in this practice. If you or a family member have had surgery, received optometric care, undergone extensive dental work, such as braces, or a myriad of other health-care procedures, you have likely already experienced this approach. A well-known use of partial unbundling is dental work. Most dentists will show patients the breakdown of costs, explaining what is necessary (in most cases, it all is) and providing any options that exist. The details are provided for clarification and to demonstrate the basis for the costs; however, the choice is primarily whether to undergo the procedure or not and perhaps a decision or two about available options. Bundling in this fashion involves the patient in the process, presents manageable options (while depriving the more “detailed” patient the opportunity to renegotiate every cost), and allows the provider, or consultant in many cases, to very quickly and easily arrive at the bottom line cost.

A slightly different model is surgical care. Surgeons generally do not leave much up to the patient—and for good reason. However, whether billed to insurance or paid privately, the surgical procedure often includes one to three follow-up visits, depending on the complexity of the surgery, risks of negative outcomes or side effects, and other factors. Surgeons know the significant risks of patients failing to appear for follow-up appointments after surgery. Even though the costs of office visits may not be directly included anywhere in the fees for the procedure, they do not want patients to avoid follow-up visits because of cost and do not want to be responsible for providing barriers to patients appearing.

Anecdotal reports indicate that most audiologists using fee-for-service methods employ a partially unbundled approach. For hearing instrument fittings, this often includes charging for the hearing instrument separately—with or without a markup—and grouping some arrangement of fitting, verification, adjustment, follow-up, periodic cleanings and checkups, and periodic hearing evaluation services, as best fits the needs of the clinic, staff, and patient base.

Accessories and other items are often part of each option as well. These may include batteries, minimum or extended warranties, battery testers, dry aid kits or boxes, counseling software, aural rehabilitation sessions, priority treatment, in-office or lab repairs, and waiver of deductibles. It is possible to have no options and only use unbundling to explain the details of fees, and it is possible to have a myriad of options. Most clinics develop a system that lies somewhere in the middle. This gives patients reasonable choices and maintains transparency, while not overwhelming patients with options. A few possible fee-for-service models are described below and contrasted with bundled and completely unbundled structures.

Determining an Appropriate Model
No matter what degree of unbundling you choose or exactly what type of fee system you implement, there are a series of steps that will make the process easier when attempting to determine what type of system to use, how to determine your fees, and how to group services (in the case of partially unbundled systems) to you and your patient’s benefit. These are the same for all clinical activities, including diagnostic procedures.

Step One: Determine the Cost of Your Clinical Activities
A cost analysis is a necessary place to begin in establishing any fee structure. If you do not have a business background or are not completely comfortable with long lists of figures, an accountant or capable bookkeeper will be able to assist you in this. Once the numbers have been analyzed, you may perform periodic reanalyses by simply running a report from your accounting system and updating the numbers.

By analyzing the costs of your business, you establish what it costs you to provide services to patients. Include overhead (fixed costs to keep the doors open); salaries and benefits (including owner withdrawals if applicable);
equipment purchases, calibration, and maintenance; consumables; marketing; and all other costs of providing services to your patients. Cost of goods, such as hearing instrument purchases or purchases of items included with hearing instruments, should not be included as they do not impact the cost of providing services (particularly in an unbundled model!). Total equipment costs may be apportioned over the life of the equipment and combined with consumable and operational costs to derive very specific costs of performing each procedure in your clinic. Once a detailed analysis is complete (the entirety of which is beyond the scope of this article), you will be able to determine what it costs you to operate your business every year, month, day, hour, and minute. Don’t forget to add items for unexpected repairs, maintenance, and profit of the business!

**Step Two: Assign Fees to Each Procedure You Perform**

Once you know what it costs to perform each procedure, you may assign fees to procedures. At the very least, charge the cost. If you have built in profit and an allotment for unexpected expenses, you may charge the calculated “cost” for each procedure. A good way to double-check is to calculate how much you would have made last month/year if you charged these amounts for procedures. Be sure to also compare these costs against insurance reimbursement. If the procedures are valued more highly by insurance companies, you don’t want to give them an excuse to pay you less. You may also want to modify your cost calculations by accounting for the lower reimbursement you will receive from insurance. This is also a more complex calculation than should be discussed.

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Step Three: Analyze Options for Groups of Services and Assign Fees

When using a partially unbundled approach, first group the products and services that you wish to offer. This may be done in a variety of ways, but determine what you believe will work best in your clinic and with your patients. It is recommended that audiologists consider a small array of choices to meet the needs of the variety of patients typically seen. It may also be advantageous, as described above, to bundle necessary services together, usually short-term services, and present them as such during consultation for hearing care and instruments.

Once the groups are established, create a spreadsheet that details each component (devices, accessories, anticipated office visits and procedures performed) and the cost of each component. You may then determine what you should charge for each partially bundled package. It will then be important to track patients, even just a random selection of five or ten, to ensure that they are, on average, using about the same services that you projected.

Step Four: Review and Update

It is incredibly important to periodically review and update everything you do to determine your fee structure. At a minimum, re-analyze the service costs annually by updating numbers from your accounting system after the end of each fiscal year. Reviewing patient feedback, number of patients choosing each of your packages, average number of patient visits versus projected numbers, and other measures of your program can ensure that your projections are being met and allow you to update your fee schedule periodically as needed. As with any fees, periodic reviewing and updating are essential to the long-term functioning of your business. It can also alert you to potential issues or negative trends before they have a significant impact on your business.

Conclusion

No matter the extent to which you choose to implement fee-for-service, the specific grouping you choose for products and services, or how you determine your fee schedule, there is a lot to be gained by moving to a fee-for-service model. It builds trust with your patients, it differentiates audiologists from hearing aid dispensers and Internet sales, it increases the perceived value of the audiologist’s time, and it better fits within legal guidelines, ethical guidelines, and insurance models.

This process may seem daunting enough to some audiologists that they are tempted to not adopt such a strategy. However, careful planning and consultation with other professionals, such as an accountant, can make the process much more palatable and realistic. An increasing number of audiologists are moving to fee-for-service models. There may soon be a day when the audiologists who bundle services and products are in the minority. With a growing body of knowledge and experience to assist audiologists in making this change, the time has come to seriously consider whether your current fee structure is truly the best for you and for your patients.

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References


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Institutionalizing Patients’ Freedom of Choice

By Craig Johnson and Briana Holtan

National organizations can be called upon for help with access to federal institutions, but we must all take responsibility for building and maintaining state organizations to ensure that audiologists are recognized as the managers of hearing and balance care.

Reimbursement issues have been a primary focus of the American Academy of Audiology’s legislative and government regulatory agenda for the past 15 years. Audiologists’ autonomous practice relies upon the ability to receive appropriate and direct reimbursement for patient care. Access to audiologists’ treatment and management services is linked to the protection of third-party payments and patients’ freedom of choice.

On one hand, third-party payments to audiologists for diagnostic services have existed for over four decades. On the other hand, coverage for amplification treatment has slowly evolved. One of the cornerstones of hearing aid coverage has been the ability of patients to use discretionary funds to invest in their desired technology. Thus with a “balance billing” component, the insurance company sets a reimbursement rate for devices, and then patients have the freedom of choice to select an appropriate circuit to meet their needs. This freedom of choice assumes that the provider has not contracted to provide hearing aid services that would place an artificial limit on care.

In 2009, Federal Employee Benefit Health Plan (FEBHP) offered a new hearing aid benefit that was immediately misinterpreted by the local carriers. Likewise,
many carriers managing local state programs began to follow their interpretation of the federal hearing aid benefit. In both cases, carriers denied the patient’s right to determine their hearing aid treatment options. Patients could no longer use their plan benefit to upgrade to an appropriate hearing aid technology. Insurance carriers for both state and federal plans placed audiologists in an ethical dilemma. Do they fit a hearing aid that is not consistent with the patient’s needs, or do they inform the patient that their hearing aid benefit is inadequate and consequently should not be used? Thus, the issue needed to be resolved at both the state and federal level to ensure that patients could continue to participate in the selection of the most appropriate device.

Resolution of Hearing Aid Balance Billing Issue in Maryland

The Maryland Academy of Audiology (MAA) faced a challenge when the major carrier of hearing aid coverage, CareFirst of Maryland, arbitrarily decided not to allow patients the option of choosing their hearing aid circuit. In October 2009, CareFirst notified audiologists in Virginia, the District of Columbia, and Maryland that patients’ hearing aid benefits would only include a basic circuit and that patients would not be able to be billed for the additional cost of their device of choice. Essentially, the CareFirst of Maryland position was that one type of hearing aid was now going to be appropriate for all regardless of the patient’s communication issues. This new policy reversed a 30-year policy of allowing the patient freedom of choice. In addition, other devices such as eyeglasses were not affected. Patients could still be balanced billed for vision care. So, once a major carrier imposes a unilateral decision, how can a local audiology organization respond?

The solution is to enlist the support of outside institutions that have influence beyond the reach of the local audiology providers. The MAA identified three potential outside resources that might influence the insurance carrier: (1) the state insurance commissioner, (2) the state Office of Budget and Management (the major purchaser of hearing aid coverage for participants), and (3) key members of the Maryland General Assembly.

Maryland Bill Signing (5/19/11): Front row from left to right: Anthony Brown, Lt. Governor; Thomas V. Mike Miller Jr., President of the Maryland Senate; Martin O’Malley, Governor; Michael E. Busch, Speaker of House. Back row from left to right: Julia Worcester, lobbyist; Dr. Alicia Spoor, Past President, MAA; Dr. Craig Johnson, Legislative Director, MAA; William Pitcher, lobbyist.
A meeting was held with the Maryland Insurance Commissioner to outline the history of hearing aid benefits, to highlight the discriminatory nature of the CareFirst decision, and to advocate for consumers to maintain their freedom of choice. This prompted the commissioner to meet with the CEO of CareFirst to hear an explanation of their self-imposed policy. The commissioner agreed with the Academy that the new policy was not in the best interest of patient care.

The Secretary of the Maryland Office of Budget and Management was contacted to inform them of the unilateral change in plan benefits. Secretary Foster’s representatives were surprised that CareFirst had decided to change the hearing aid benefit during the contract period. The state insurance contract went into effect in July 2009 with a five-year term. Secretary Foster’s office contacted CareFirst to inform them that they could not change their hearing aid policy or any portion of the plan benefits without altering the existing contract.

The MAA sponsors an annual Audiology Awareness Day in the state capitol. Coincidentally, the event was held in early January 2010, just a few weeks after the meeting with the commissioner. One of the provider groups affected by the CareFirst change was the 188 members of the General Assembly. Those members who wore hearing aids had used their CareFirst benefit to purchase their devices. This turned out to be a motivated group of hearing aid users who instantly understood the value of audiology care and the threat of losing their hearing aid benefit. A draft letter was provided to key members that expressed their concern with the change in policy to eliminate a patient’s freedom of choice. The letter was directed to the CEO of CareFirst, Chet Burrell.

In view of these “outside” influences, in February 2010, CareFirst of Maryland reversed their change in policy, thereby reinstating the ability of the audiologist to balance bill for hearing aid services. The reinstated policy applied to State of Maryland enrollees and private companies but not the Federal Employee Plan (FEP).

Other carriers began to mirror CareFirst’s restrictive hearing aid treatment policy; consequently, the MAA initiated legislation to institutionalize a patient’s freedom of choice in their hearing aid care. This also served to ensure that CareFirst would not be able to reverse their policy. The legislation allows patients to use their hearing aid benefit to upgrade their amplification treatment and was introduced in the 2010 General Assembly. The bill passed overwhelmingly in the House of Delegates and the State Senate. The governor signed the legislation on May 19, 2010. Maryland’s new statute that provides freedom of choice is the first in the nation.

Resolution of Hearing Aid Balance Billing Issue on the Federal Level

The Office of Personnel Management (OPM), which is responsible for managing the health benefits offered to federal employees, asked insurance carriers in 2008 to include a hearing aid benefit for their 2009 plans. The goal of the benefit as stated by Sylvia Pulley, chief of Health Insurance Group I for OPM, “was not to have $1,000 (benefit) cover the total cost of the aid. The $1,000 was to be an offset of the cost of the hearing aid.” Therefore, the intent of OPM would be to allow the audiologist to balance bill the patient for an upgraded hearing aid.

Unfortunately, many of the federal carriers throughout the United States, providing FEP Health Benefit products, misinterpreted OPM’s intent and limited the payment to $1,000 per aid including the services of an audiologist. As you are aware, the patient cost of hearing aids have not been $1,000 since devices were analog.

To resolve this significant dilemma, a dialogue was established with congressional representatives, OPM, and the national office of CareFirst.

On April 30, 2010, MAA representatives and John Williams (the Academy’s lobbyist) met with Congressman Chris Van Hollen’s aide, Ray Thorn, in Washington, DC. We asked that Congressman Van Hollen facilitate a meeting with audiology representatives and OPM. Our objective was to ask OPM to institute consistency in the hearing aid benefit and maintain the long-established policy of allowing the patient to select the most appropriate level of hearing aid technology. The fact was emphasized that this could be executed by OPM issuing a clarification of the benefit. The act was emphasized that this could be executed by OPM issuing a clarification of the benefit. As a result of this meeting, Congressman Van Hollen contacted OPM and requested that they clearly state to insurance carriers that patients...
should have the freedom of choice in their hearing aid treatment.

In the meantime on May 10, 2010, MAA representative, Dr. Briana Holtan met with executives from Blue/Cross and Blue/Shield Association (BCBSA) in the national office in Washington, DC. This meeting was coordinated by American Speech-Language-Hearing Association (ASHA). Those in attendance were an ASHA representative, Steve White; an attorney, Mark Rogers; an Academy representative, Melissa Sinden; an Academy consultant from HillCo Partners, Grant Bagley; the Academy’s senior director of government relations, and a Virginia audiologist representing the state, Dr. Danny Gnewikow. The BCBSA executive stated that “they and OPM fully intended the benefit to be an offset of the cost but that it cannot be changed until 2011.” Thus, there would be a resolution, but not until 2011.

It is interesting to note that in Ohio the BCBS company (Mid-West Anthem BCBS) has provided their audiologist providers with a “waiver” for the patient to sign if he or she chooses an upgrade. This reportedly worked well for both the providers and patients. Unfortunately, this innovative and straight-forward approach was not duplicated in other states.

On July 19, 2010, OPM announced that FEPHB patients would be able to use their hearing aid benefit beginning on January 1, 2011, to upgrade to the most appropriate level of technology. Thus, patients’ freedom of choice in their hearing aid treatment would be restored.

Lessons for the Profession

So what did we learn? A local advocacy infrastructure is vital to protecting our patients’ access to hearing and balance health care. Unfortunately, a 2007 national survey revealed that only 32 percent of the states had local audiology academy organizations, and an additional 14 percent relied on state speech organizations for advocacy (Johnson, 2007). In addition, the effectiveness of advocacy on the local level was revealed by the following categories:

Audiology organizations with the following infrastructure in place.

<table>
<thead>
<tr>
<th>Infrastructure</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lobbyist</td>
<td>80%</td>
</tr>
<tr>
<td>Political Action Committee</td>
<td>67%</td>
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<tr>
<td>Attend fund-raising events</td>
<td>60%</td>
</tr>
<tr>
<td>Sponsor fund-raising events</td>
<td>27%</td>
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<tr>
<td>Sponsor legislative open house</td>
<td>27%</td>
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</table>

The current Academy Web site shows that the number of audiology organizations has increased to 54 percent (viable organizations are those that host a Web site). By comparison, optometry has a local organization in every state, and every infrastructure category noted earlier is in place. Frequently, in the audiology profession, the tendency is to generate interest in an issue in response to an urgent need or crisis. However, systems need to be in place prior to such crises arising.

National organizations can be called upon for help with access to federal institutions, but we must all take responsibility for building and maintaining state organizations to ensure that audiologists are recognized as the managers of hearing and balance care.


Acknowledgments

It has been said that every success generates many participants; however, there are a number of individuals and organizations that participated in this effort to continue and establish patients’ freedom of choice in their hearing aid treatment options. (They are listed in alphabetical order.)

American Academy Audiology: Deb Abel, director of coding and reimbursement; Melissa Sinden, senior director of government relations; and John Williams, lobbyist

American Speech-Language-Hearing Association: Steve White director of health care economics, and Mark Rogers, attorney

Maryland Academy of Audiology: Briana Holtan, past president; Craig Johnson, legislative director; Leslie Papel, president; Alicia Spoor, past president; and William Pitcher and Julia Worcester, lobbyists

Virginia Speech-Language-Hearing Association: Danny Gnewikow, audiologist

Reference

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THE CLOSING of an ICON

THE ARMY AUDIOLOGY AND SPEECH CENTER,
WALTER REED ARMY MEDICAL CENTER, 1946–2011

BY BRIAN E. WALDEN AND THERESE C. WALDEN
On September 16, 2011, the 102-year history of Walter Reed Army Medical Center came to an end. A victim of the Base Realignment and Closure (BRAC) Committee’s 2005 recommendations, the flagship of army medicine was merged with the National Naval Medical Center in Bethesda, Maryland. With the closure of Walter Reed Army Medical Center came the end of the Army Audiology and Speech Center (AASC) as the top echelon of hearing, balance, and speech services within army medicine. Many of the staff and functions of the AASC were transferred to the new Walter Reed National Military Medical Center in Bethesda. As a Department of Defense organization, the focus of the new medical center is tri-service, rather than exclusively army. Although the name Walter Reed lives on in military medicine, the closure of Walter Reed Army Medical Center marks the end of an era in army medicine.
Early History
The U.S. Army and the AASC in particular played an important role in the development of our profession. Audiology had its origins and much of its early development within the U.S. Army (see Bergman, 2002, for an excellent summary of this early history). Organized efforts in hearing treatment within the army date from World War I, when teachers of the deaf were employed to teach lipreading to hearing-impaired soldiers.

During the years between World War I and World War II, wearable electronic hearing aids were introduced commercially. Hence, the focus of hearing treatment shifted from exclusively lipreading and auditory training to include amplification. The problem of noise-induced hearing loss within the army became acute during World War II, when thousands of soldiers returned home with significant hearing impairments. Three “aural rehabilitation” centers (the term “audiology” had not yet been coined) were established and operated by the army to provide services to these soldiers. These were located at Walter Reed General Hospital, Washington, DC. (the first army hearing treatment center, established in the spring of 1943); Borden General Hospital, Chickasha, OK; and Hoff General Hospital, Santa Barbara, CA. A fourth army hospital, Deshon General Hospital, Butler, PA, began providing hearing treatment services six months later when the demand for services at Walter Reed General Hospital exceeded its capacity. Notably, Raymond Carhart, recognized as the “father of audiology,” was a staff member at Deshon General Hospital during World War II and is credited with coining the term “audiology” to refer to the discipline. Many of the hearing and hearing aid evaluation testing methods developed by Carhart and his colleagues at Deshon General Hospital became standards of practice within the profession of audiology. Thousands of soldiers were provided hearing treatment at these army sites between 1943 and 1946, including hearing aid fittings.

Forest Glen Annex
In September 1946, following the conclusion of World War II, the army consolidated its hearing programs into one major center—the Audiology and Speech Correction Center—which was located at the Forest Glen Annex (in Maryland) of Walter Reed General Hospital, a few miles north of the Walter Reed main campus in the District of Columbia. A few years later, this center was renamed the Army Audiology and Speech Center (AASC), which remained its name for the duration of its existence. For the next 32 years, “The Barn” at the Forest Glen Annex would be the home of the AASC. When fully developed, the center had a staff of approximately 45 military and civilians and was housed in two buildings. The Barn contained the audiology, aural rehabilitation, and speech pathology clinical sections, as well as the Administrative Section, Hearing Aid Repair Section, Earmold Laboratory, Electroacoustics Section, and Supply Section. A separate smaller building housed the Bioacoustics Laboratory (later, the Research Section).

Although a detailed history of the Forest Glen Annex is beyond the scope of this brief history, the interested reader is directed to the following Web site: www.operant.com/seminary/mainpage.html. Briefly, it began as a royal manor grant in 1689. During the colonial period, families who owned the property included signers of the Articles of Confederation and the Constitution, the first Catholic archbishop in America, and the first mayor of the District of Columbia. In the mid-nineteenth century it was converted to a farm. In 1887, a resort hotel was built on the property, which constituted the main buildings, later acquired by the army. The hotel was not successful.
The Closing of an Icon: The Army Audiology and Speech Center

and it was briefly converted to a casino. In 1894, it became a girl’s private finishing school, which it remained for nearly a half century. A tobacco plantation adjacent to the school was acquired during this time, which was used as a dairy farm to provide milk and cheese to the school. During World War II, the army invoked the War Powers Act to acquire the property. Since 1942, it has been the Forest Glen Annex of Walter Reed Army Medical Center. The original intention for the property was as a peaceful suburban site to house and rehabilitate wounded soldiers returning from the war. In 1946, the barn on the adjacent farm property was converted to the Audiology and Speech Correction Center.

During the very early years of the AASC, as audiology was just coming into being as an academic discipline, the center was directed by an otolaryngologist, and staff otolaryngologists were directly involved in the assessment of soldiers who had been referred because of hearing loss. The most notable of these early medical directors was Aram Glorig, who served from 1947 to 1952. He joined the army during World War II and became interested in noise-induced hearing loss and tinnitus. After leaving the service, he was recruited by Walter Reed General Hospital to lead the Audiology and Speech Correction Center. Later, in 1964, Glorig founded the Callier Center for Communicative Disorders in Dallas, TX, where he served as its director until 1975. Glorig was one of the founders of the International Society of Audiology and the Association for Research in Otolaryngology.

In 1952, Edward Shutts was hired as the AASC’s assistant director. Shutts was among the early recipients of a doctoral degree in the newly created discipline of audiology, receiving it from Northwestern University under Ray Carhart’s tutelage. For the next 15 years, Shutts played the major role in guiding and shaping the AASC. The position of medical director increasingly became a figurehead, as the assistant director (an audiologist) was responsible for the day-to-day operations of the center.

The AASC was the only designated hearing and speech center within the army from 1946 until 1966. Some other army hospitals had audiometric equipment to perform hearing testing, including a few commissioned and noncommissioned individuals with training in audiology. However, there was no coordinated audiology program for the army, as no military occupational specialty existed for audiologists, despite widespread recognition that hearing loss was a major problem among active-duty soldiers. The Army Audiology Officer Military Occupational Specialty was created in 1966 as a result of the coordinated efforts of staff of the AASC. Roy Sedge was the first
The Closing of an Icon: The Army Audiology and Speech Center

army audiologist commissioned. Sedge later served as AASC director from 1975 to 1986, the longest tenure of any director. Notably, the third army audiology officer commissioned was Jerry Northern.

Northern came on active duty in the summer of 1966 and was assigned to Brooke Army Medical Center in San Antonio, TX. However, when Shutts died unexpectedly in early 1967, Northern was transferred to the AASC to take over as assistant director. He served as the first military assistant director of the AASC from 1967 until he completed his two-year military obligation in the summer of 1968. He remained on as assistant director in a civilian capacity for an additional two years when, in 1970, he left to accept a position at the University of Colorado Medical Center. He was replaced by Don Worthington who, at the time, was an army audiology officer newly assigned to the AASC and a recent Northwestern University graduate. Worthington left the AASC in 1975 to become director of audiology and speech pathology at Boys Town National Research Hospital in Omaha, NE.

The growth of the army’s hearing program into an effective preventative program can be dated to an army chief of staff memorandum of June 1971 that tasked the surgeon general with determining the extent of noise-induced hearing loss within the army. This tasking was a direct result of efforts by Northern, his successor Worthington, and Harry McCurdy, MD, consultant to the army surgeon general in otolaryngology and chief, ENT service of Walter Reed General Hospital. An essential component of this tasking was to obtain empirical data to substantiate the widely held assumption that noise-induced hearing loss was a major health and readiness problem for the U.S. Army. Two army-wide studies authored by Brian Walden, an army audiologist assigned to the AASC, demonstrated that noise-induced hearing loss was the most prevalent occupationally related health hazard to U.S. Army soldiers (Walden et al, 1971; Walden et al, 1975). Over the next few years, the number of commissioned army audiology officers was increased from the original 12 authorizations to 76. As army audiology grew, the air force and navy also began to build their hearing programs by commissioning increasing numbers of audiologists.

In 1974, the medical director position was eliminated, and the assistant director at the time, Don Worthington, became the first audiologist director of the AASC. The center functioned as a fully autonomous service within the Department of Surgery, and patients had direct access to its services. In 1975, Worthington was appointed as the first consultant to the surgeon general in audiology and hearing conservation. Since that time, the AASC was directed by an active-duty army audiology officer and, for the majority of that time, the director also served as consultant to the surgeon general.

In the fall of 1978, the original Walter Reed General Hospital building in the District of Columbia was replaced by a new, larger Walter Reed Army Medical Center structure on the same campus. Simultaneous with the opening, the Army Audiology and Speech Center relocated from the Walter Reed Annex to the new medical center on the main campus, where it remained for the duration of its existence.

Inpatient Aural Rehabilitation Program

Throughout its 65-year history, the AASC provided state-of-the-art hearing diagnostic and rehabilitative services. Further, many important advances in clinical practices within the profession were developed within the AASC. In the earlier years of the center, this was especially true for aural rehabilitative services, which were provided on an inpatient basis. As noted earlier, audiology within the army originated as a hearing treatment service, and the original four hearing treatment centers focused on lip reading training. Soldiers who had incurred hearing losses were temporarily assigned to one of these treatment centers as inpatients for six to 12 weeks, during which time they received daily instruction in lipreading, auditory training, and speech conservation. The focus on lipreading training reflected the fact that wearable hearing aids were in their infancy and often provided less than satisfactory results. As hearing aid technology began to advance in the 1950s and 1960s, a focus on hearing aid fitting as the primary treatment method gradually emerged. With this change in emphasis came a steady shortening of the inpatient aural rehabilitation program of the AASC. By 1968, it had been shortened to three...
Throughout its 65-year history, the Army Audiology and Speech Center provided state-of-the-art hearing diagnostic and rehabilitative services. Further, many important advances in clinical practices within the profession were developed within the AASC.

weeks and by the early 1970s to two weeks. It remained a two-week program until 1978. During this time, the focus of the program shifted away from speechreading and auditory training toward assertiveness training, situation control training, listening and repair strategies, and counseling-based techniques, as well as adjustment to amplification. Obviously, inpatient aural rehabilitation services were increasingly costly to provide. Additional shortening of the inpatient program continued to one and a half weeks, one week, and three and one half days. Finally, in 2003, the inpatient aural rehabilitation program was eliminated altogether. This ended the tradition of inpatient hearing treatment at the AASC that defined the center in its early years.

**Clinical Services and Research**

Although the inpatient aural rehabilitation program had given the AASC its identity during the first half of its existence, other activities of the center gradually came became more prominent. Although beyond the scope of this brief history to discuss in detail, diagnostic and treatment services continued to evolve. With the advances in hearing aid technology came greater reliance on amplification as a primary treatment, augmented by individual counseling and hearing aid orientation. Vestibular testing and rehabilitation also began to play a more prominent clinical role. The AASC was consistently among the first clinics in the nation to incorporate newly developed diagnostic and treatment methods for hearing and balance. Paralleling this evolution in clinical diagnostic and treatment services was a steady growth in the productivity and visibility of the Research Section. Brian Walden served as director of research of the AASC from 1971 to 2007. He continued his association with the Research Section until his retirement in 2010. His 39-year tenure at the AASC was the longest of any staff member, more than half of its 65-year history. During this time, clinical and research staff of the AASC published hundreds of research papers and presented thousands of papers at national and international meetings.

**AASC Legacy**

What emerged during the latter part of the 20th century and continued through the first decade of the 21st century was an internationally recognized center of excellence for clinical service, education, and research. The distinguished reputation of the AASC owed largely to the competence and dedication of the clinical service providers, administrators, researchers, and support personnel who staffed the center over the years. In addition to their responsibilities within the AASC, many staff members occupied prominent positions within national professional and scientific organizations. Few institutions
The Closing of an Icon: The Army Audiology and Speech Center

There was no coordinated audiology program for the army, as no military occupational specialty existed for audiologists, despite widespread recognition that hearing loss was a major problem among active-duty soldiers.

within the profession of audiology can claim as many illustrious alumni as the AASC. In addition to the aforementioned Glorig, Northern, Walden, and Worthington, other prominent former staff members of the AASC include Harvey Abrams, Rod Atack, Doug Brungart, Dave Chandler, Mary Cord, Dick Danielson, Marilyn Demorest, Sue Erdman, Dave Fabry, John Franks, Ken Grant, David Hawkins, Marjorie Leek, Mike McClean, Al Montgomery, Gus Mueller, Lisa Newman, Bob Prosek, Dan Schwartz, Chris Schweitzer, Nancy Solomon, Van Summers, Rauna Surr, and Therese Walden. Through their efforts and the efforts of hundreds of other staff members over the years who must remain unnamed here, the AASC played a unique and important role in our profession. Not only did the center play a major part in the creation of our profession, it lead the way in many important maturational developments including rehabilitative audiology, hearing aid dispensing, clinical research programs, administrative autonomy, direct patient access to services, training and use of audiometric support personnel, military audiology, and doctoral-level distance education to name but a few. Although its history has ended, the Army Audiology and Speech Center’s significant legacy to the profession endures.

Brian E. Walden, PhD, was the director of research at the Army Audiology and Speech Center, Walter Reed Army Medical Center, from 1971 to 2007. Therese C. Walden, AuD, is president of the American Academy of Audiology and research audiologist at the Walter Reed National Military Medical Center, Bethesda, MD.

References


ALSO OF INTEREST

“Auditory Research at Walter Reed Army Medical Center” (JAAA May 2004, pages i–ii). Visit www.audiology.org and search for the article title or scan the QR code to view this article on your mobile device.
The Accreditation Commission for Audiology Education
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The Audiology Program, Central Michigan University, Mount Pleasant, MI
The Program in Audiology, Washington University School of Medicine, St. Louis, MO
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I hear what I want to hear.” How many of us over the years have heard this from our patients? Could new research regarding hearing loss and dementia reflect that commonly voiced misconception—that if one hears what one wants to hear, one hears enough?

Could it be that if we increase our patients’ incidental hearing via hearing aids that provide “surround sound” that “stretches” the audibility more than the typical 3–6 feet, dramatically improve our patients’ ability to hear on the telephone, enhance the clarity of their television, and provide audibility in poor acoustical venues previously closed to them by insisting upon hearing aids with telecoils and loop systems with which to interface, we would be not just treating our patients’ hearing loss but also forestalling their cognitive decline?

New research from Johns Hopkins University—National Institute on Aging has found that seniors with hearing loss are significantly more likely to develop dementia over time than those who retain their hearing (Lin, 2011). This research documents that the greater the degree of hearing loss, the greater the risk. Compared with volunteers with normal hearing, those with mild (25–40 dB), moderate (41–70 dB), and severe (>70 dB) hearing loss had, respectively, a twofold, threefold, and fivefold risk of developing dementia over time.

Specifically, the risk of developing Alzheimer’s disease also increased with diminishing hearing, with the authors noting that for every 10 dB decrement in hearing, the extra risk increased by 20 percent.

As audiologists, we all know from studies in pediatric audiology that so much of hearing is incidental hearing—hearing conversation that is not directed to the listener personally. Hearing colleagues greeting one another in the morning, hearing the grocery store clerk speak to another customer, and hearing the speech of others at a neighboring table are all examples of incidental hearing. Incidental hearing provides
a rich, diverse, and omnipresent means of language stimulation that is not deliberately sought out by the listener.

So many of our senior patients say they “hear what they want to hear,” and note that they only hear others when they face them, speak up, or get close before talking. As their hearing diminishes, their range of audibility gets smaller and smaller, causing concentric rings of sound isolation.

As their hearing loss further unfolds, the condition begins to trigger social isolation as well. Those with hearing loss often cease frequenting activities where their hearing is challenged. They might avoid certain restaurants, stop going to large gatherings, cease attending services at their place of worship, and restrict conversing with certain speakers whose voices they can’t understand.

In his concluding statement, the lead author of the research, Frank R. Lin, MD, notes that Hearing loss may be associated with cognitive decline through a causal pathway, possibly mediated by social isolation or cognitive load, or through a direct neuro-biologic mechanism. The effect of hearing loss on cognitive load is suggested by studies demonstrating that under conditions where auditory perception is difficult, i.e., hearing loss, greater cognitive resources are dedicated to auditory perceptual processing to the detriment of other cognitive processes such as working memory.

My take on this is that audiologists should begin treating the whole patient by

- Providing audiolologic rehabilitation classes to teach patients strategies to help their hearing aids work optimally (e.g., teaching them where to sit for maximum audibility or empowering them to demand that a speaker use a microphone).

- Providing amplified telephones or providing a completed application in those states where an amplified phone is complimentary.

- Demonstrating and providing links to the television (whether it’s a hearing loop or a manufacturer’s device—as long as it’s not closed captioning, which should be the last line of defense).

- Becoming their patients’ advocates by facilitating the placement of hearing loops in all venues with poor acoustics such as local places of worship, community theaters, and senior citizen meeting halls.

Maybe, just maybe, by assuming this proactive stance, the high incidence of dementia in our target population may also be reduced while we are fulfilling our primary goal of improving communication.

Providing a total approach for our patients is our responsibility, and if it reduces incidence of cognitive decline, the ramifications of that intervention are all the more significant.

It is currently estimated that 24 million people are living with some form of dementia worldwide. By 2030, 10 million baby boomers will be inflating that number with the total number afflicted worldwide expected to reach 84 million by 2040.

In his follow-up article in the July edition of the Journal of Gerontology, Dr. Lin concludes Our findings potentially have significant implications for public health. Hearing loss is highly prevalent, and hearing loss may be both potentially preventable and treatable with rehabilitative devices and strategies that remain grossly underutilized [emphasis mine].

What an enormous impact this intervention may have, not only on our patients but also on society.

Linda S. Remensnyder, AuD, is founder and owner of Hearing Associates, PC, with offices in Libertyville, Gurnee, and Lincolnshire, IL.

References


 ALSO OF INTEREST
“Aural Rehab, MCI, Dementia, and Aging.”
Go to www.audiology.org and search keyword “dementia” or use the QR code to view this on your mobile device.
"It’s the economy, stupid" is a well-known phrase that was coined during the Bill Clinton presidential election in the 1990s. It was designed to make you remember what the really important issue was in front of you. Leaving off the "stupid" part, I have had two recent hearing aid cases that make me want to say to fellow audiologists, “It’s the output!”

With hearing aids, the historical focus has been on gain and frequency response. More recently there has been a shift to focus more on amplified speech levels and where they are placed within the individual’s residual dynamic range (DR). What is the amplified speech output of the hearing aid in the user’s ear canal? Is speech audible and at an appropriate sensation level? Is loudness discomfort absent for intense signals? Is the patient’s functional DR as wide as possible? It is this last characteristic that I would like to discuss, as this principle was ignored for two of my recent patients, and the result was a poor fitting even though the gain of the hearing aid for normal inputs appeared reasonable.

If the maximum output of a hearing aid is too high, thus restricting the user’s DR and providing very little “headroom”? This situation tends to arise most frequently when a moderate-to-severe or severe hearing loss is present. Two patients fit outside our clinic presented to me with this situation and the complaint that “everything, especially my own voice, seems muffled and distorted, and I just can’t hear as well as I did with my older hearing aids.”

Standard 2 cc coupler gain measurements on the hearing aids for both patients looked quite reasonable given their hearing loss. However, gain alone does not tell the entire story. I examined how the hearing aids were amplifying and packaging speech signals within the patients’ residual DR through simulated real-ear measurements with the AudioScan Verifit. The results for one of the patients are shown in FIGURE 1. Notice that the amplified speech spectrum (solid green line) came reasonably close to the desired sensation level (DSL) 5.0a targets (green plus signs), except perhaps in the very low frequencies and the 3000–4000 Hz range. The gain of the hearing aid was “in the ballpark.” However, notice where the real ear saturation response (RESR, orange line) is located. It is well below the DSL maximum output targets (orange pluses) and results in a very narrow DR of 10–20 dB. This restricted DR explains the negative patient comments of muffled and distorted speech, especially their own voices.

The solution to this problem is obvious: expand the DR by raising the RESR. FIGURE 2 shows the results for this patient. The output sound pressure level with 90 db SPL input (OSPL90) was increased by the amount shown by the white arrows to the purple line until it best matched the DSL RESR targets (orange pluses), resulting in a much wider functional DR. However, the job is not done. We do not want to solve one problem, narrow DR, and create another, loudness discomfort. It must be verified that these new maximum output levels do not result in loudness discomfort for intense
signals. My procedure is to introduce narrow bands of noise centered at 500, 1000, 2000, and 4000 Hz (from the old ReSound Sound Pro II CD) at 80 dB SPL and have the patient make loudness judgments with a loudness category scaling procedure. The goal is to have the intense sounds fall in the “loud, but OK” category, not “uncomfortably loud” (output too high) or “comfortable, but slightly loud” (output too low, DR restricted). With this patient, “loud, but OK” judgments were obtained with the increased RESR setting, verifying that not only was the DR widened but loudness discomfort should not occur. The patient’s subjective reaction was immediately positive, reporting a much clearer sound, and her voice was now acceptable.

My perspective on hearing aid fittings revolves around focusing on the amplified speech signal being packaged within the patient’s residual DR and maximizing this DR without causing uncomfortable loudness. Think output in the ear canal—it tells you more than gain.

David B. Hawkins, PhD, is director of the Mayo Hearing Aid Clinic at Mayo Clinic Florida.

**FIGURE 1:** Speechmap for the patient’s hearing aid before modifications were made. The blue line represents auditory thresholds in the ear canal. The green plus signs are the DSL targets for the amplified speech spectrum, and the solid green line is the actual amplified speech spectrum. The orange plus signs are the DSL maximum output targets and the solid orange line is the actual maximum output curve, or RESR.

**FIGURE 2:** Speechmap for the patient’s hearing aid with the modified maximum output curve, which is shown by the purple line. The white arrows show the amount that the maximum output was raised in order to match the DSL targets.
Welcome back to an ongoing article series that challenges the audiologist to identify a diagnosis for a case study based on a listing and explanation of the nonaudiology and audiology test battery. It is important to recognize that a hearing loss or a vestibular issue may be a manifestation of a systemic illness. Being part of the diagnostic and treatment “team” is a crucial role of the audiologist. Securing the definitive diagnosis is not only rewarding for the audiologist but, it enhances patient hearing and balance health care.

**Case History**
A 69-year-old male was seen by an audiologist with the complaint of reduced hearing. The patient seemed in discomfort and had difficulty walking to the test booth. A comprehensive case history was performed by the audiologist, who identified a frontal headache associated with a sinus infection that was at least two weeks in duration. He also complained of imbalance, nausea, and tinnitus. The audiologist asked about the patient’s unsteady gait, and the patient reported that he had difficulty “planting” his foot and had fallen a few times within the past several months.

**Medication and Past History**
He was currently taking antidepressants that were prescribed about six months ago. He was hospitalized recently with head trauma and loss of consciousness for one minute due to a fall. Tests performed in the hospital included an MRI, CT, EEG, MRA, and ECHO stress test. All tests were normal at that time. The discharge diagnosis determined that he had a reaction to his antidepressants. He was given a “new family” of antidepressants. There was concern that he might be a diabetic, but his glucose levels were stable and were not consistent with diabetes. He was referred to ENT for a medical evaluation.

**Physical Exam**
Dry cerumen was removed bilaterally. An epithelial inclusion cyst was noted in the left concha. No nystagmus was present. Due to the complaint of hearing loss, a hearing evaluation was performed.

**FIGURE 1.** Normal brain anatomy. Note the subdural cavity that defines the space between the dura and the arachnoid.
Audiometric testing revealed a gradual sloping high-frequency asymmetric sensorineural hearing loss beginning at 1000 Hz and present through 8000 Hz. Word recognition scores were 92 percent for the left ear and 76 percent for the right ear. Immittance findings supported normal middle ear function. Acoustic reflexes and reflex decay test results were unremarkable bilaterally. The patient was dragging his left foot when walking. The ENT also noticed crusty mucus in the nose, consistent with acute rhinosinusitis. The ENT recommended an ABR and a neurology consult. The neurologist recommended a VNG.

**ABR**
Results were consistent with cochlear hearing loss. Absolute and interpeak latencies were symmetrical. Excellent waveform morphology was noted, even with the significant high-frequency hearing loss. Increased click rate studies showed expected shift in wave V, bilaterally.

**VNG**
The patient could not discontinue the use of Clonazepam and Lexapro. The neurologist wanted the VNG performed even though the patient was taking medications that can affect central nervous system functioning. Results of the VNG showed abnormal saccades for both rightward and leftward movement. Ocular flutter was noted without fixation. The patient had difficulty keeping his eyes open during caloric testing. There was a left cold caloric weakness. He was unable to tolerate warm caloric testing because he acquired a severe headache during testing. VNG test findings were consistent with central pathology, very likely the result of the medications. There was no definitive diagnostic explanation for the left caloric weakness.

**Things to Ponder**
- The patient was very anxious, explaining some symptoms, but not all.
- The description of stumbling and a “foot not planting well” could support an etiology other than the “ears.”
- The patient had recent head trauma.
- He had just started stronger sinus medications.
- The VNG was inconclusive due to his medications.
- The patient had a normal ABR.

**Medical Recommendations**
Both the ENT and the neurologist were in agreement that although the radiographic studies were only three months old, repeat CT studies were warranted due to the change in central symptoms. The patient continued to complain of being frustrated with his reduced hearing levels, especially when in the presence of noise. It was decided, however, to defer a hearing aid evaluation until a differential diagnosis was available.

**Differential Diagnoses**
A differential diagnosis is predicated upon considering all of the findings. Possibilities include
- Drug and/or alcohol overdose
- Meningitis
- Stroke
- Poorly fitting orthotics
- Subdural hematoma

So, what do you think?
If you selected subdural hematoma, you are correct!
**Radiographic Studies**

The repeat CT scan revealed bilateral SDHs, right larger than the left. There was heterogeneous density within the right subdural hematoma that supported the possibility of a chronic problem with an acute worsening, while the left SDH appeared chronic. There was a resulting underlying mass in the right cerebral hemisphere with midline shift toward the left.

**Treatment**

The patient was taken to surgery for drainage of a right frontoparietal subdural hematoma. This involved placing right frontal and parietal burr holes allowing for the placement of a right subdural drainage catheter. The patient felt immediate relief, and intracranial air was present. There was resolution of the ventricular compression and midline shift, allowing the brain to return to normal function. Low density fluid, however, still remained in the posterior frontal-parietal region.

One month later, another CT scan of the brain was performed, revealing that the right-sided catheter was still in proper position. There was a decrease in the left-sided subdural collection, but there was a decrease in the amount of postoperative intracranial air.

**Discussion**

An acute SDH is a rapidly clotting blood collection below the layer of the dura but external to the brain and arachnoid membrane. Two further stages, subacute and chronic, may develop with untreated acute SDH. Each type has distinctly different clinical, pathological, and imaging characteristics:

- **Subacute phase** begins three to seven days after acute injury
- **Chronic phase** begins about two to three weeks after acute injury
- Often associated with blunt head trauma

SDH is the most common type of intracranial mass lesion, occurring in one-third of those with severe head injuries. Acute SDH is associated with high mortality and morbidity rates. SDH is more common in people older than 60 (elderly have less resilient bridging of the veins). Acute SDH is more suspect when severe blunt head trauma has been reported.

**Typical Imaging Studies**

Noncontrast CT is the primary means of making a diagnosis. Midline shift is not uncommon. (Midline shift causes compression of the adjacent brain tissue and may result in neurological symptoms.) Imaging should occur within 48–72 hours after head injury.

**Possible Postoperative Complications**

- Elevated intra-cranial pressure
- Brain edema
- New or recurrent bleeding/hematoma
- Infection
- Seizures
- Chronic SDH
- Recurrent hematoma (50 percent of cases)
- Infection
- Seizures (up to 10%)

**Prognosis and Recommendations**

Typically, the outcome can’t be determined at the time of the emergency evaluation. Ultimate prognosis is related to the amount of associated direct brain damage resulting from the mass effect of the SDH. For this patient, serial CT scans are indicated, and he needs to be continually monitored by his neurosurgeon. Physical therapy will help with his left leg. His ENT is working with the neurologist for reevaluation of his polypharmacy and its associated effect on vestibular function.

**Hearing Aid Evaluation**

Once the definitive diagnosis was made, the patient was medically cleared for a hearing aid evaluation. The patient was very appreciative that the audiologist understood the global ramifications of his reported history and symptoms and deferred the hearing aid evaluation until the more urgent issues were resolved.

The patient values his hearing aids, is enjoying life without a piercing headache, and is walking well. The lesson learned is this: by performing a comprehensive case history and then understanding its implications, the audiologist played an invaluable role in securing quality health care for this patient.

“Case” closed until the next AT issue! 

Paul Pessis, AuD, is president of North Shore Audio-Vestibular Lab in Highland Park, IL.
TOPICS INCLUDE:

Scope of the Problem
- Burden of Noise-Induced Hearing Loss and Tinnitus

Scientific Bases
- Biology of Noise-Induced Hearing Loss and Cochlear Injury
- Noise-Induced Hearing Loss Susceptibility and Age-Noise Interactions
- Neural Plasticity After Noise

NIDCD Research Presentation
- NIDCD Funding Opportunities for the New and Budding Audiologist Investigator

Beyond the Audiogram: Evaluating the Functional Consequences of Noise Exposure
- Electrophysiologic Views of Noise-Induced Cochlear Injury
- Using Speech Signals to Assess Functional Compromise

NIHL Prevention and Horizon Treatments
- NIHL and Tinnitus: Stop it Before it Starts
- Pharmacologic Treatments for Noise-Induced Hearing Loss and Tinnitus

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The Link Between Pigmentation and Hearing Loss
By Astrid Botty Van den Bruele, Lisa L. Cunningham, and Wade W. Chien

An association between pigmentation and hearing sensitivity has been recognized for over a century. As far back as the 1850s, Charles Darwin noted an interesting relationship in his famous *Origin of Species*, stating that “cats which are entirely white and have blue eyes are generally deaf” (Darwin, 1859). Since then the relationship between pigmentation and hearing has been described in both clinical and basic research studies.

Pigment-producing cells called melanocytes are responsible for skin, hair, and eye color. Cochlear melanocytes are known as intermediate cells and are found in the stria vascularis (Schrott and Spoendlin, 1987). Intermediate cells play a critical role in the generation of the endocochlear potential (EP), which is necessary for both the development and function of the cochlea (Steel and Barkway, 1989; Tachibana, 1999; Ohlemiller et al, 2009). When hair cells of the cochlea are stimulated by sound, potassium from endolymph enters the cells and activates them. The EP contributes to hearing sensitivity by increasing the driving force for potassium influx into hair cells. Loss of intermediate cells (cochlear melanocytes) results in reduction of the EP and hearing loss (Motohashi et al, 1994; Takeuchi et al, 2000).

A strong link between melanocytes and hearing loss comes from studies in both mice and humans with hereditary or late-onset melanocyte anomalies that result in hearing deficits (Steel and Barkway, 1989; Cable et al, 1992; Cable and Steel, 1998). Waardenburg syndrome is a rare congenital developmental disorder characterized by hearing loss and abnormal pigmentation of the eye, hair and skin (Waardenburg, 1951). Mutations in any of at least six genes have been shown to cause this syndrome. Each of these genes is necessary for the differentiation, function, and survival of melanocytes (Tachibana et al, 2003). Studies on mice with mutations in these same pigmentation genes have yielded insights into the roles of melanocytes in both normal cochlear function and pathology. For example, mice bearing a mutation in a gene called microphthalmia lack skin pigmentation, and they demonstrate hearing loss and visual impairment (Tachibana et al, 1992). Hearing loss in these mice is caused by absence of intermediate cells in the stria vascularis. In humans, this gene is called microphthalmia-associated transcription factor (MITF), and mutations in this gene result...
in Waardenburg syndrome type 2 (Tassabehji et al, 1994).

While melanocytes are critical for normal cochlear development and function, the role of melanin itself is less clear (Ohlemiller et al, 2009). Like other melanocytes, cochlear intermediate cells are capable of producing pigment (called melanin), which is secreted by these cells into the surrounding extracellular space, where it is available to be taken up by other cells of the stria vascularis, including marginal cells and basal cells (Wright and Lee, 1989).

Some studies have suggested that melanin may play a role in protecting the cochlea against stresses. For example, albino guinea pigs are more susceptible than pigmented animals to aminoglycoside-induced damage to the stria vascularis (Conlee et al, 1991). However, interpretation of studies using guinea pigs is complicated by the fact that albino and pigmented guinea pigs are different strains and therefore may have other genetic differences that are unrelated to the difference in pigmentation. In contrast, inbred mouse strains are genetically identical and therefore allow for examination of specific traits on genetically homogenous backgrounds (reviewed by Peters et al, 2007).

If two strains of mice are genetically identical except for a single gene, they are said to be coisogenic, and these mice are advancing our understanding of the roles of melanocytes and melanin in the cochlea. Ohlemiller et al (2009) compared hearing sensitivity and EP between pigmented mice and coisogenic mice that have melanocytes but lack a single gene required for melanin production and are therefore albino (Ohlemiller et al, 2009). Both hearing and EP were equivalent between the pigmented and albino mice, indicating that while melanocytes are required for cochlear function, melanin itself may not be (Ohlemiller et al, 2009). However, as the mice in this study aged, the albino mice showed reduction in the EP compared to the pigmented mice. This reduction in the EP correlated with a significant loss of another cell type in the stria vascularis, namely marginal cells, suggesting that melanin may promote strial marginal cell survival in aged animals (Ohlemiller et al, 2009). Melanin can act as a free radical scavenger, and thus it may protect the strial marginal cells from oxidative stress. Both strial degeneration and endocochlear potential reduction are known correlates of age-related hearing loss (Schuknecht and Gacek, 1993; Schmiedt et al, 2002).

As discussed earlier, disorders of pigmentation may be associated with increased risk for hearing loss. As a result, the Joint Committee on Infant Hearing’s 2007 position statement lists 11 risk factors for hearing loss in children (American Academy of Audiology, 2007). Among these risk factors are physical findings that are associated with syndromes that result in hearing loss. These physical findings include abnormal pigmentation such as that found in Waardenburg syndrome. The position statement indicates that children with these risk factors should have an audiological assessment by 24 to 30 months of age even if they passed an initial hearing screening. From a basic science perspective, future studies of the roles of melanocytes and melanin in the inner ear may lead to a better understanding of normal cochlear function across the lifespan as well as therapies aimed at preventing, delaying, or reversing hearing loss.

The Joint Committee on Infant Hearing’s 2007 position statement lists 11 risk factors for hearing loss in children.

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References


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Making Sure Dreams Are Heard Loud and Clear
By Nicole Corbin

Special Olympics was founded in 1968 by Eunice Kennedy Shriver with a mission to provide children and adults with intellectual disabilities an opportunity to “develop physical fitness, demonstrate courage, experience joy, and participate in a sharing of gifts, skills, and friendship with their families, other Special Olympics athletes, and the community” through athletic training and competition in various Olympic sports (Special Olympics, 2011).

The Healthy Athletes program provides free health screenings and health information to Special Olympics athletes at local, regional, and world games. The health screenings encompass the following areas: vision (Opening Eyes), hearing (Healthy Hearing), oral health (Special Smiles), healthy lifestyles (Health Promotion), general fitness (FUNfitness), podiatry (Fit Feet), and sports physicals (MedFest). Over the years, Special Olympics has become the largest global public health organization dedicated to serving individuals with intellectual disabilities (Special Olympics, 2011). Since 1997, Healthy Athletes has provided over one million health screenings to individuals with intellectual disabilities in over 100 countries.

The Healthy Hearing program began in 1999 at the Special Olympics World Summer Games in Chapel Hill, North Carolina. Since then, volunteers around the globe have been educating athletes about their hearing, screening athletes’ hearing, and making medical referrals when appropriate. At Healthy Hearing events, Special Olympics athletes are accompanied by their coaches or another person and visit at least two of the following four screening stations: otoscopy, evoked otoacoustic emissions testing, tympanometry, and pure tones. When available, athletes who do not pass the four screening stations have
their pure tone thresholds assessed at a fifth station.

Every state has a Healthy Hearing clinical director (CD) that organizes the Healthy Hearing events for his or her state’s Special Olympics organization. The Healthy Hearing CDs train all Healthy Hearing program volunteers before events in data collection, hearing screening and threshold testing, and follow-up and referrals.

Special Olympics Healthy Hearing developed a new pilot program this year to rehabilitate athletes identified with hearing loss through hearing aids and appropriate outcome measures. Through this program, athletes assessed during spring Healthy Hearing events are receiving follow-up care and rehabilitation from university clinics and other major health-care providers in Alabama, Indiana, Iowa, Nebraska, North Carolina, Ohio, Southern California, Virginia, and Washington. Additionally, athletes involved in the Special Olympics Summer World Games in Athens, Greece, were fitted with amplification and are receiving follow-up care at their homes around the globe. These efforts are made possible by a partnership between Special Olympics International and Phonak Hear the World Foundation. Giving the athletes the gift of hearing allows them to fully participate in and enjoy their sports training and competition throughout the year, and permits them to become more immersed in their communities.

At AudiologyNOW!® 2010, the Student Academy of Audiology (SAA) announced its national service project and philanthropic relationship with the Special Olympics Healthy Hearing (SOHH) program. The intention of the SAA is to promote SOHH and encourage SAA chapters and members to connect with the Healthy Hearing clinical directors (CDs) in their states. By connecting with the CDs, SAA chapters are able to volunteer their time and expertise before and during SOHH screening events and provide support for SOHH services to Special Olympics athletes. As the SOHH program expands to include the fitting of amplification and provision of follow-up services to athletes, SAA chapters will undoubtedly become a critical aspect to the athletes’ success by connecting with community-based clinics to coordinate the athletes’ hearing rehabilitation.

To date, over 20 SAA chapters are actively involved in their local SOHH programs. Our goal is to have at least one SAA chapter from every state involved in SOHH by 2012! You can help us achieve that goal by submitting an SOHH chapter interest form, available for download at www.studentacademyofaudiology.org. By the end of this year, the SAA Humanitarian Committee expects to have an SAA Chapter Tool Kit ready for distribution. The tool-kit is designed to provide the information needed for an SAA chapter to successfully get involved in and support local SOHH programs. The tool kit will be sent to those SAA chapters registered as being a part of the SOHH program and to others who express interest. We will also have loads of information about the process and our experiences to share with you at AudiologyNOW! 2012 in Boston, MA. Don’t miss our second annual SAA/ SOHH Q&A!

Nicole Corbin is a member of the SAA Board of Directors and chair of the SAA Humanitarian Committee. She is an AuD student at Arizona State University.
Medicare Enrollment Validation

Your Medicare contractor will send you a letter requiring your response before March 25, 2013, but you must act within 60 days of receipt of the notice or face Medicare Provider Transaction Access Number (PTAN) deactivation. All providers and suppliers enrolled with Medicare prior to March 25, 2011, will be required to revalidate their Medicare enrollment information under the new risk screening criteria required by the Affordable Care Act. These new screening requirements have placed providers into “limited,” “moderate,” and “high” risk categories. Physicians and nonphysicians, including audiologists, are in the “limited” category. High-risk providers include those newly enrolled suppliers and home health agencies, leading to higher levels of screening and scrutiny.

Newly enrolled providers and suppliers that submitted their enrollment applications to their Medicare contractor on or after March 25, 2011, will not be required to revalidate. Your Medicare contractor will begin mailing revalidation request notices before March 23, 2013, and they are requesting that you do not submit your information until you receive the notice requesting you to revalidate. If you do not revalidate your enrollment information when requested, you may lose your ability to bill Medicare for audiology services as your PTAN may be deactivated. For further information, visit www.audiology.org and search keywords "Medicare and PTAN.”

When revalidating, you will be required to submit your entire enrollment information, which includes the application (can be completed via the online Provider Enrollment, Chain and Ownership System or with the recently revised paper 855I form), proof of your employer identification number, your certification statement (with the signature in blue ink to indicate that it is an original), and a copy of your state audiology license and terminal degree.

Need more information about Medicare enrollment? This topic will be discussed during the November 8, 2011, eAudiology Coding and Reimbursement (C&R) Web seminar. The C&R series will continue with a seminar on the impact of the 2012 coding changes on January 12, 2012. These Web seminars are available live and on demand for your viewing convenience at www.eaudiology.org.
New CPT Codes
With the November 2011 release of the 2012 Current Procedural Terminology (CPT) codebook, audiologists will have three otoacoustic emission codes from which to choose, effective January 1, 2012.

The new CPT code:

CPT code 92558, Evoked otoacoustic emissions, screening (qualitative measurement of distortion product or transient evoked otoacoustic emissions), automated analysis

The existing CPT codes 92587 and 92588 have new code descriptors, clarifying the requirements necessary to provide and bill for these procedures:

CPT code 92587, Distortion product evoked otoacoustic emissions; limited evaluation (to confirm the presence or absence of hearing disorder, three to six frequencies) or transient evoked otoacoustic emissions, with interpretation and report

CPT code 92588 is now “comprehensive diagnostic evaluation” (quantitative analysis of outer hair cell function by cochlear mapping, minimum of 12 frequencies), with interpretation and report

ICD-9, ICD-10, and HCPCS Codes for 2012
There will be no new ICD-9 or HCPCS codes for 2012 that are applicable for audiologists. Members are encouraged to visit the Academy’s dedicated ICD-10 Web page (Go to www.audiology.org and search keyword “ICD-10.”), for information on how to begin the transition from the ICD-9 to the ICD-10 coding system. The last day to use ICD-9 codes will be September 30, 2013. October 1, 2013, is the first day for use of the ICD-10 codes. The Academy will conduct an ICD-10 eAudiology Web seminar on May 8, 2012, to prepare your office for this important change.

CALL FOR NOMINATIONS

2012 Active Advocate of the Year Award

Nominate an Academy member who has exhibited extraordinary efforts to promote audiology or to advance initiatives impacting public policy issues pertinent to audiologists at the state or national level.

Award to be presented at the annual State Leaders Workshop and Luncheon preceding AudiologyNOW® 2012.

Visit www.audiology.org and search keyword “Advocate” for nomination form and more information.

Nominations must be received by December 31, 2011.
SAA Survey on ABA Certification

By Mariah Cheyney and Torryn P. Brazell

In September, the Student Academy of Audiology (SAA) conducted a snapshot survey of its 1,360 members to tabulate information on student perception and knowledge of ABA's provisional board certification. The students were also asked about their interest in future audiology certification specialties.

Feedback from the SAA members is already helping the ABA to communicate more effectively with the audiology student population and is helping the ABA to better focus on professional areas that are of interest to students.

Based on the results of the survey, students are increasingly aware of changes to the profession, with 74 percent planning on attaining ABA Board Certification after attaining their degree and another 44 percent planning to attain a specialty certification in pediatric audiology or cochlear implants within three to five years of graduating.

Mariah Cheyney is an AuD student at the University of Pittsburgh and the Student Academy of Audiology (SAA) secretary and ABA student liaison. Torryn P. Brazell, CMP, CAE, is the managing director of the ABA.

Are you aware that the ABA offers provisional board certification for fourth-year externs?

- Yes 52%
- No 48%

Do you plan on becoming ABA board certified after attaining your degree?

- Yes 74%
- No 26%
Additional results of the survey can be found in the following data charts:

Licensed audiologists may obtain ABA specialty certification in particular areas, for example, pediatric audiology and cochlear implants. Do you think you will obtain either of these certifications within the next 3–5 years?

![Pie chart showing distribution of responses]

FACT: Application for provisional board certification is free. There are no fees associated with provisional board certification.

FACT: Completion of a national audiology exam is required to apply for provisional board certification.

FACT: Provisional board certification is offered to doctoral students who have completed their coursework but still have to complete, or are completing, their fourth year externship.

FACT: The first year of full ABA Board Certification is free for those who obtained provisional certification in their fourth-year externship.

FACT: Applicants must have completed a minimum of 375 contact hours of clinical practice which is often earned in conjunction with academic coursework.

In what program year will you be entering this fall?

![Pie chart showing program year distribution]

The ABA is considering the development of additional specialties. Which of these areas would be of most interest to you?

- Vestibular pathology: 57%
- Clinical supervision: 51%
- Tinnitus: 46%
- Occupational audiology: 32%

To apply for provisional board certification, visit www.americanboardofaudiology.org.
The initial reaction of most faculty members when preparing for an accreditation site visit is one of dread. It represents a great deal of effort and, unfortunately, is not high on anyone’s list of things they want to do. Upon reflection, however, this viewpoint is mistaken. The accreditation process allows a program to benchmark itself against professional expectations and other academic programs. Believe it or not, this process may be very rewarding. Accreditation can identify a program’s strengths and set a standard for other programs to follow (a heady experience). Conversely, it can identify weaknesses that can then be addressed and the overall program improved. Accreditation forces reflection that confirms what was probably known all along but conveniently ignored. It sometimes takes an outside force to move deeply entrenched routines. The problems can no longer be thought about at a theoretical level (something academics love to do) and must be fixed. Eventually, program improvement occurs, which is also very rewarding.

Accreditation may also be used as bone fide leverage by a program with the university administration. The accreditation process highlights needs the program may have in terms of faculty, staff, and equipment, which impacts the program’s ability to achieve required standards. These concerns may be conveniently ignored by a university administration, especially in times of economic duress and uncertainty. However, because accreditation is important in terms of university prestige and student recruitment, university administrations take accreditation reports seriously. The above highlights the advantages of accreditation for the program and the university. What are the advantages of accreditation for the profession?

I find it interesting that one of the major driving forces underlying the AuD degree movement was the drift that occurred between academic programs and the personnel needs of the profession. There was a general feeling that MA-level clinicians were ill prepared to meet the clinical practice needs of the profession. Clinical skills were initially taught and refined after graduation. Employers were teaching graduates clinical skills that should have occurred in the graduate program. There was a perceived
disconnect between the clinicians providing audiological services and the professors teaching in the MA-level programs. The switch from the MA to a doctoral entry-level degree does not necessarily solve this problem. The accreditation process is critical in preventing this drift or disconnect between educational and professional concerns. Accreditation standards should be rigorous and developed by both academics and clinicians. Input is needed from both sides to properly prepare tomorrow’s audiology professionals. The accreditation process allows the profession to examine and interact with the academic programs, which is of benefit to both and will have a significant impact on the future of the profession. This was, in fact, the reason that leading audiologists, sanctioned by the American Academy of Audiology, developed an independent accrediting agency.

Unfortunately, program accreditation is not a solution to all of the problems facing the education of audiologists. But accreditation can be instrumental in bringing about change. For example, a current problem often expressed is that there are too many doctoral programs in audiology. Rigorous accreditation will ensure that the profession will endorse only the strong programs that adhere to contemporary standards. However, this drive to quality is problematical in the current situation where audiology has two accreditation organizations. It is common sense that weak programs will choose the agency with the weaker standards and vice versa. We cannot expect the accreditation process to reduce the number of academic programs to a more reasonable number (whatever that is) unless we consistently demand the highest level of accreditation.

It is ironic that the profession has two accreditation agencies. Audiology is a relatively small profession, but the current situation reflects a problem the profession has always faced. Audiology is like the middle-aged adult still living at home with his or her parents. There may be lots of valid reasons why this situation exists. Nonetheless, can the profession be considered autonomous and independent if still living at home with the folks? Audiologists must control their own destiny through accreditation, of, by, and for audiologists.

The profession has successfully transitioned from an MA to a doctoral entry-level degree. The profession has “talked the talk.” It is now time to prove that the AuD degree is truly a doctoral-level degree. A way to do this is to have an accreditation system and standards that reflect doctoral rather than modified MA-level standards and that represent the highest level of scientific knowledge and professional practice.

But what is an individual audiologist to do to help remedy the current situation we find ourselves in? First, let us all affirm the importance of audiology education in transforming our profession to achieve what we envisioned in the AuD. Then determine for yourself which accreditation agency has the strongest standards. Which standards better represent the profession? Second, contact the accreditation agencies and tell them which standards should be strengthened, replaced, or dropped. Finally, only hire graduates from programs accredited with the standards you agree with. The profession has transitioned itself from an MA to an AuD entry-level degree. But the process is not over. We must continue our quest for professional excellence.

Gerald T. Church, PhD, is a professor in and the director of the AuD program at Central Michigan University.
Academy News

Have You Taken the State Advocacy Challenge?

By Melissa Sinden

Beginning October 1, 2011, Academy president Therese Walden, AuD, threw down the gauntlet to the states and asked Academy members to actively advocate on behalf of direct access (H.R. 2140) to their members of Congress. The state whose members make the most unique contacts to their representatives through the Academy’s Legislative Action Center (http://capwiz.com/audiology/home/) before December 31, 2011, will receive bragging rights and special recognition at AudiologyNOW!® 2012.

A recent survey of congressional staff (individuals who work for the elected representative) conducted by the Congressional Management Foundation (xxx) indicates that constituent messages have become diluted through increased use of the Internet. One easy way to make your message more effective is to edit the letters provided on the Legislative Action Center. Use the opportunity to share how direct access or other legislative initiatives would personally affect you and your patients.

Also in the survey, 94 and 97 percent of the respondents reported that visits to the district office and the Washington office, respectively, have “some or a lot” of influence on an undecided member. It’s true: sometimes all you really have to do is ask. After all, members of Congress often do not realize how many of their constituents will be impacted by a certain piece of legislation until you tell them. Remember, they are elected to represent you!

If you are going to be in the Washington, DC, area, do make plans to stop by your member of Congress’ office. Meeting with your representative while they are back in their district offices can also be very effective because they don’t have the pressures of congressional action bearing down on them as they do when they’re in our Nation’s capital. If only congressional staff is available to meet with you, don’t discount the opportunity, they are subject matter experts with a direct line to the representative. Academy staff can assist you in setting up a meeting in either location.

The goal has been set: 112 cosponsors by the middle of the 112th Congress (December 31, 2011). This is easily achievable if all 11,000+ Academy members visit the Legislative Action Center and take less than 30 seconds to send an email. Encourage your patients, family, and friends to send an email explaining how access to audiology care has impacted their lives. Consumer-focused letters are available at www.howsyourhearing.org and through the Legislative Action Center.

May the best state win!

Melissa Sinden is the senior director of government relations for the American Academy of Audiology.

Reference

Just Joined

New Members of the American Academy of Audiology

Maria Colella-Santos, PhD
Annette Counsel, AuD
Annemarie Cox, AuD
Devangi Dalal
Robert DiDonato
Ryan Dunkin, MS
Samantha Dzedzy, AuD
Miso Lee, MA
Jian-Yuan Li
Amber Lindner, AuD
Amanda McKee, AuD
Bok Mortimer, PhD
Morten Nordahn, PhD
Amberly Nye, AuD
Hope Rowe, AuD
Daniele Ruhter, MS
Deborah Starr, AuD
Theresa Strobel, AuD
Darci Venem, AuD
Julee Zornes, AuD

New Members of the Student Academy of Audiology

Sandra Almlie
Kelly Cartwright
Rachael Cavenee
Allison Clark
Stephanie DeTone
Elise Gaines
Nicholas Giuliani
Erin Hawkins
Sarah Jacobs
Katie Johnson
Marcy Lau
Rachael Mangiore
Erin Munz
Mila Nelson
Lisa Oliphant
Gretchen Perkins
Meredith Poynot
Kira Pozdnyakova
Victoria Shinkarev
Amelia Shuster
Julie Stefanski
Lauren Stiles
Rachel Szepelak
Jacklyn Theis
Jacqueline Wiegand

Childhood Hearing Screening Guidelines Published

An Academy task force has recently completed the board-approved practice guidelines for screening hearing of children age 6 months through high school.

Visit www.audiology.org and search keywords “childhood hearing.”

Classroom Acoustics Position Statement Published

This position statement declares the Academy’s support of the improvement of acoustical properties of America’s classrooms in order that all students may better hear their teachers and peers. Thank you to the task force for their work on this document.

Visit www.audiology.org and search keywords “classroom acoustics.”

HAT Practice Guideline: Supplement B Published

Review this comprehensive document as it describes the considerations and procedures for classroom audio distribution systems.

Visit www.audiology.org and search keywords “HAT practice guideline.”
Academy Members Named on CAPCSD Board

Congratulations to the following Academy Fellows who were recently named to the 2011–2012 Board of Directors for the Council of Academic Programs in Communications Sciences and Disorders (CAPCSD): Craig Champlin, PhD (vice president of research and academic development), Mark DeRuiter, PhD (vice president of professional development), and Neil DiSarno, PhD (secretary).

Beck Wins BSA’s Jos Millar Shield Award

Academy Fellow Douglas L. Beck, AuD, has won the British Society of Audiology’s Jos Millar Shield Award. This award is given to the author of the best paper published in BSA News. Beck’s article, “Can Advanced Signal Processing Facilitate Spatial Hearing?” was featured in the BSA News. Congratulations, Dr. Beck.

A Long Trip Has Ended

Academy Publishes Ethical Practice Guideline for Relationships with Industry for Audiologists Providing Clinical Care

In the past decade, there has been a sweeping reconsideration of the ethical principles surrounding relationships between health-care providers and industry. New and old evidence on the influence of gifts has gained traction among policy makers in health-care organizations, academic health centers, and the pharmaceutical industry. The evidence clearly indicates that gifts to health-care providers exert influence that is not always in the best interests of patients. An important finding that drives our understanding about gifts is that the influence of gifts is unrelated to the value. Even small gifts influence behavior in ways that the receiver may be unaware and, thus, unable to avoid.

Against this backdrop in 2007, the board of directors of the American Academy of Audiology directed the Ethical Practice Committee to review and update the 2003 Ethical Practice Guidelines on Financial Incentives from Hearing Instrument Manufacturers and recommend changes that would bring the Academy’s guidelines in line with the evidence and with the health-care industry as a whole. The committee, with broad representation from all segments of our profession, produced a draft revision in 2007. That draft was debated and modified over a period of many months and then forwarded to the board in the fall of 2007. In September 2007 the draft was published on the Academy Web site, and a dedicated listserv was created to receive comments from members.

Many thoughtful and diverse comments were received. Some members were disbelieving of the proposition that seemingly harmless gifts could influence their clinical judgment. Others in industry expressed concern about the prospect of eliminating giveaways, which was one of their major marketing tools. All comments were reviewed by the committee and addressed in subsequent drafts.

It is important to understand that the evidence showing that gifts can influence patient care decision making is not a judgment about the ethical principles of audiologists. It is a recognition that gifts are intended to influence the receiver into responding with gratitude. Even when the response is managed appropriately, the appearance of a conflict of interest created by gifts from industry can be harmful to the patient-clinician relationship.

Following years of discussion, rewrites, and review (including select and widespread member peer review), the Academy board approved the new guideline in July 2011. The Academy’s Ethical Practices Committee is pleased to introduce this new “relationships with industry” guideline, providing insight, guidance, and leadership about the important and professional relationships we have with our industry colleagues.

Visit www.audiology.org and search keywords “ethical practice guideline.”
Did you know that in 2010, Americans made more than $291 billion in charitable gifts and that more than $235 billion of those gifts came from individuals? It’s because of those individuals—individuals like you—that we celebrate National Philanthropy Day* on November 15. The motto of National Philanthropy Day is “change the world with a giving heart.” We at the American Academy of Audiology Foundation recognize the giving heart in each of you, our donors. You realize that hearing is a gift, and you value the gift of hearing, so you choose to give that gift to others. This ear-to-heart connection in each of you is changing the world of those with hearing impairment as you faithfully support our programs.

The Foundation’s programs in research, education, and public awareness educate audiologists on how to better care for patients, make cutting-edge audiology research possible, provide valuable information to those with or at risk of hearing loss, and much more. We thank all of you who made a gift to the Foundation last year or supported our fundraising activities! You may have even heard from us by phone in October, as Foundation board members reached out to donors during the annual Thankathon. We encourage you to review our Annual Report 2010–2011 (included with this issue of AT). In this report, you will see the ways your gifts are making a difference in the lives of audiologists, audiology students, consumers, and those with hearing loss.

So on National Philanthropy Day—and every day—we celebrate you, our donors, who are changing the world of audiology one gift at a time. Your generosity allows us to accomplish much, but there is still more to do. As we continue our work, we hope that you will continue to see the value of each dollar you donate.

Thank you for your past and future support. Keep making that connection between your ears and your heart, and help us continue our research, education, and public awareness programs far into audiology’s future.

Lindsey Taylor, Foundation summer intern, is a Virginia Tech communications major interested in professional writing and nonprofit management. Her 2011 internship was funded by a grant from ExxonMobil Foundation Community Summer Jobs Program.

Foundation board chair Dick Danielson, PhD, and board member Pamela Keenan, AuD, express their thanks to the Foundation’s supportive donors during the Thankathon.
Apply for Assistance to Attend AudiologyNOW! and Other Educational Conferences

The Foundation is pleased to offer two distinct grant programs so audiologists and audiology students may expand their educational experiences.

Member Assistance Program (MAP)
Audiologists who wish to attend AudiologyNOW! 2012 but are experiencing financial hardship (for medical, family, professional, or other personal reasons) are encouraged to apply for convention travel and registration support through this program. Assistance provided may include hotel accommodations, convention registration, and/or a travel stipend.

MAP applications are due January 13, 2012, and are available at www.audiologynow.org and www.audiologyfoundation.org. The Foundation thanks Auban, Inc. and Oaktree Products for their philanthropic support of this initiative.

Student Travel Awards Reimbursement (STAR)
Students who plan to attend meetings in the hearing sciences, as well as other sciences relating to student coursework, are encouraged to apply for a STAR stipend of up to $500 for conference registration, transportation, and/or lodging expenses. Applications are due January 1, 2012, and available at www.audiologyfoundation.org.

Foundation Awards Seven Scholarships Through Newly Expanded Program

Each time the Foundation opens application submissions for a scholarship opportunity, the Educational Grants Review Committee is impressed with the quality of the applicants. These students are intelligent, committed to volunteering in their community, and dedicated to becoming leaders in the field. There is no doubt that the future of audiology is in good hands.

Created in honor of beloved educator, mentor, and supporter of the Foundation, the 2011 Roger Ruth Memorial Scholarships were awarded to Meredith Robotti of James Madison University (JMU) and Viral Tejani of the University of Maryland. The Foundation is pleased to pay tribute to Dr. Ruth with these $1,000 annual grants. “I would like to sincerely thank the Foundation and the Educational Grants Review Committee for selecting me as the recipient of this incredible scholarship,” Robotti wrote to us shortly after receiving the award. “Dr. Ruth had such a presence at JMU, and I feel truly honored to receive a scholarship in his memory.”

In September, five students were selected as recipients of the Empowering People Scholarships. Funded with a grant from the Oticon Hearing Foundation, these $5,000 scholarships were awarded to students who show exceptional promise as clinical audiologists. The 2011 recipients are Amy Badstubner of University of Florida, Samantha Gustafson of Arizona State University, Alison Kemph of Vanderbilt University, Caithlin MacNeil of Syracuse University, and Imola Major of San Diego State University/University of California, San Diego.

In early 2011, the Foundation board designated $50,000 as seed money for the scholarship program. Thanks to support from many individual donors, an additional $9,000 was raised as part of the matching gift offer made by the Singh Family for the Sadanand Singh Scholarship to be launched next year. You can help the Foundation continue to expand scholarship support by making a donation restricted to Foundation educational initiatives. For more information, visit www.audiologyfoundation.org.
Auction 4 Audiology: Boston Preview! Opens November 28

We’re doubling the auction excitement with a mini-auction focused on the “best of Boston.” From November 28 to December 9, score big on Boston dining and entertainment you can use while at AudiologyNOW! 2012. Why wait to plan your free time when you can find great bargains now? Or grab a great holiday gift for your Boston family, friends, and colleagues. Best of all, proceeds benefit the American Academy of Audiology Foundation! To see all of the items up for bid, visit www.biddingforgood.com/auction4audiology.

Ruth Scholar Update

We recently caught up with 2011 Roger Ruth Memorial Scholarship recipient Jessica Richardson as she continues her education at A.T. Still University.

What has your academic experience been like over the past year?
My third year as a graduate student has been one of learning and growth! Spending more time in clinic and less time in the classroom has been beneficial in solidifying my clinical skills and bridging the gap between theory and daily practice. In taking classes related to the practice of audiology including medical imaging, practice development, and ethics, my educational experience has been greatly enhanced.

Of all of the academic experiences I have had this past year, the greatest include completing third-year comprehensive exams and receiving A.T. Still University’s 2010–2011 AuD Student Excellence Endowed Scholarship.

How has the Roger Ruth Scholarship been helpful or meaningful to you?
To be selected as a recipient of the Roger Ruth Scholarship has been an honor and blessing. Beyond the financial support that I am so grateful to have received, this scholarship is a continual reminder of the contributions made by a passionate and dedicated individual, whose work has helped advance the field of audiology. Dr. Ruth’s example inspires me to excel as a student and future professional.

What are your plans for the future?
I will complete my fourth-year clinical externship this next year at multiple clinical sites. I hope to gain greater hands-on experience with pediatric audiology at Cardon Children’s Medical Center in Mesa, AZ, and expand my knowledge of private practice at Affiliated Audiology Consultants in Phoenix, AZ. In the future, I hope to open my own clinic that serves patients of all ages.

Save the Date!

Happy Hour with a View

Wednesday, March 28, 2012, 5:30–7:30 pm
Seaport on the South Boston Waterfront
Tickets available on the AudiologyNOW! registration site: www.audiologynow.org.
$200K PAC

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Help us reach our goal by contributing today.

Visit www.audiology.org and search keywords “PUSH the PAC” to contribute and track the PAC’s progress in 2011.

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Kent State University
Assistant/Associate Professor of Audiology

The Speech-Language Pathology and Audiology program at Kent State University offers the BS, MA, AuD, and PhD degrees and is a member institution of the Northeast Ohio AuD Consortium (NOAC). We are seeking a colleague with a commitment to excellence in teaching, research and service. PhD/ABD candidates considered. Expertise in anatomy and physiology, amplification, and/or aural rehabilitation and a demonstrated or developing area of research preferred. CCC-A and eligibility for Ohio licensure desired.

Screening of applications will begin on November 11, 2011 and continue until the position is filled. Apply at http://jobs.kent.edu for position #998018 and send letter of interest, current CV, official transcripts and three letters of recommendation to Mark Krumm, Audiology Search Chair, 1325 Theatre Drive, Music and Speech Bldg., Kent State University, Kent, OH 44242-0001. Address questions to mkrumm@kent.edu or 330-672-0255/330-957-7332.

University of Iowa

The Department of Communication Sciences and Disorders at the University of Iowa invites applicants for a tenure-track, nine-month position at the rank of Assistant Professor to begin Fall, 2012. Applicants are being sought who have clear potential for excellence in research and teaching with interests in any of the following areas: adult aural rehabilitation, aging, and/or the diagnosis and management of vestibular disorders. A PhD or equivalent is required. CCC-A is desirable. The successful candidate will be expected to advise, teach, and mentor research activities at the graduate (AuD and PhD) and undergraduate levels. Salary is competitive and negotiable, depending upon qualifications. Applicants must submit applications on-line at the http://jobs.uiowa.edu/ website and refer to requisition 59988. The University of Iowa is an Equal Opportunity/Affirmative Action Employer. Women and minorities are encouraged to apply.

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Agency discount of 10% is valid to recognized agencies only, not valid on line listings.

Contact Heather Troast at The YGS Group at heather.troast@theygsgroup.com for more information or to place an ad.

Web Employment Postings

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Resume search included with job posting.

Contact Sarah Sebastian at ssebastian@audiology.org for more information.
Upcoming Live

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New to the On-Demand Library

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