



MINNESOTA ACADEMY OF AUDIOLOGY Newsletter



Featured Article

The Dallas Audiology Society and Community Service

Angela Pumford, EMBA

Community service activities can make a large positive impact on the world around you. To do this effectively there are several things to keep in mind. My aim is to share some of what I've learned in this regard, in the hopes that you can most effectively realize a positive community service experience for your members and the people you want to serve.

I am the founder and executor of the board for the Dallas Audiology Society (DAS), advisory board member for the Dallas Hearing Foundation (DHF), and Director of Sales for the Western U.S. for Cognivue. If you search my LinkedIn profile, you will see that I have worked within the hearing healthcare industry in various roles for over 20 years. I've devoted my life's work to helping audiologists become more successful within their practices while also giving back to the hard of hearing community through philanthropic acts of kindness. In this regard, a key initiative of DAS since its founding has been to focus on supporting our community through acts of service. I understand that the Minnesota Academy of Audiology is considering doing more community service and I was invited to share how we at DAS have accomplished the organization and execution of such events.



In This Issue

New Members	3
Member Spotlight	4
Election Results	4
Accuracy of ICD-10 Diagnostic Coding by Audiologists	5
Message from the Past President	7
Message from the President	8
Committee Reports	9
Student Spotlight	12
Start Providing More Value Now, or Start Looking for a New Career.....	13
Review of the M&RIE Receiver	15

Let me first start by telling you a bit about how DAS was born. In 2006 I noticed that many audiologists in the Dallas-Fort Worth (DFW) area were siloed and did not collaborate or network effectively with their colleagues or other business owners. I would hear time and time again that they wished there was an Audiology group in Dallas and hoped someone would form one. At that time, starting small, I strategically picked Audiologists within DFW area that were not in direct competition with each other and were open minded to sharing ideas. We would get together once a month, share best practices, update each other on new laws and regulations, and supported one another when questions popped up. The group grew and grew as the need was surely there to collaborate with like-minded people. Why not help support each other to be more effective and successful Audiologists? What happened next, is that I moved out of the country, so the group stopped. When I came back to Texas in 2015, all my former customers said, "Angie, let's start the group back up again!"

cont.

Dallas, cont.

I did some research on the Austin and Houston audiology groups and how they were run, then gathered a board so we could discuss what we wanted the DAS to look like in 1-5 years. In choosing the first board, it was important to include individuals from diverse backgrounds that came with different levels of expertise and perspectives. My goal was to end up with a collaborative well rounded board. Our first board consisted of key opinion leaders, industry experts, clinic owners, and clinical audiologist. Through many discussions, the consensus of the DFW group was to develop a society where members could network, help educate one another, support one another with questions and resources – and most importantly, give back to the community.

We hit the ground running and started a website where members would sign-up for free. This would automatically gain them access to all the other members in the DFW area, provide them a place to post questions, see available jobs, post if they needed to hire an Audiologist, check out upcoming events, and gave the board a way to send out mass emails to all its members. Within the first year we had about 150 members, year two over 250 members and year three had over 350 members! We established a happy hour every other month, a quarterly meeting where we invite a guest speaker to present and teach our members how to be more successful within their practices, and we have a goal to do one community service event per quarter.

So how did we get the community service events going? First, we met as a board to research which non-profits or organizations we wanted to serve. What we found was that there were many groups that could use our help and there were similar-minded groups that we could collaborate with to accelerate how we were able to serve the community. For the most part, children are generally

What we found was that there were many groups that could use our help and there were similar-minded groups that we could collaborate with to accelerate how we were able to serve the community.

taken care of by state programs and the school systems so we knew our focus should be on adults and those with special needs. Of course, I realize this could be different state to state, so do your due diligence to research which areas your society would like focus on. There is not a wrong answer here as long as you come to a consensus.

We first focused on two organizations; The Senior Source (an association that supports seniors and runs two programs within the community: Senior Companion Program and the Adopt a Grandparent Program. Both groups of seniors volunteer their time visiting other seniors within their homes for companionship or going into schools to spend time with a child) and My Possibilities (the only college education program in the country for special needs adults. The program teaches them skills to obtain a job and then helps find them work within the community.) Currently we conduct hearing tests twice a year for the Senior Source and once a year for My Possibilities.

If your audiology society is wanting to give back to the community, you need to decide early on how that will be done. For instance, will you need non-profit status, and will you be collecting donations or raising money for hearing aids? If so, this approach takes a lot of work and has much to consider. Initially, we decided that we wanted to be a non-profit and went through all the steps to

gain that status, working our way to a 501(c)3. Ultimately, we found that we didn't have the capacity or manpower for both fundraising and community service outside of our full-time jobs. As a result, we instead partnered with another local non-profit for funding of hearing aids and let our non-profit status go.

Researching non-profits within the Dallas area, we were fortunate enough to have a fantastic organization called the Dallas Hearing Foundation (DHF), that was fitting children and adults with cochlear implants or hearing aids if they were below poverty level. I reached out and met with that board and we agreed that by working together, we could help more people. DAS brought a network of 350+ audiologist that could serve the people seeking help through DHF and DHF would allow for funding of hearing aids for those we identified during our community service events. We were a match made in heaven. The moral of the story is, look at all your resources around you, and you will be amazed at what you can make happen.

To organize our events, we have a community service chair that serves as the head of DAS and is the point person for our members and organizations we are serving. Through trial and error, we have significantly improved the process. For instance, when we started, it took us a lot of time to set up for our community events, but now we can be ready to go in less than 20 minutes. Normally we have 3-5 rooms for hearing tests and have created boxes containing everything you would need to set up each room, minus the Audiometers. For the Audiometers, we partnered with local Universities that allow us to borrow their equipment for the day. They have always been happy to do this for us because their students love to come and support the events. For stations at our events, we have a check-in table for paperwork (we have necessary

cont.

Dallas, cont.

documentation needed to treat patients for the day, patient history, a checklist as they go through the stations and if a hearing aid is needed, a suggested hearing aid style/model/color, etc.), otoscopy station, ear cleaning station, tympanometry station, hearing test station and check out station. A Licensed Audiologist needs to be at each station and within each room for audiometry. Normally we have 2-3 students at each station, that way they get hands on experience as well as observation time. Any person identified with a hearing loss, is connected with an Audiology clinic in the DFW area, that will serve them.

Now, lets talk a little bit about how community service events, through DAS, have impacted our students at University of North Texas, University of Texas-Dallas and Universities all over the country...fact....they love it! We have no issues with students showing up to serve. As a matter of fact, even students from other states, doing their 4th year placements in Dallas, will come and attend because of DAS' reputation.

Let me tell you something, we have seen students do their first hearing test at our events and touch their first hearing aid. Its pure magic seeing how engaged they are and how excited it makes them to become an Audiologist. They get to work with experienced Audiologists, and under supervision, treat patients. I see students each time, come to events for their first time, timid and not knowing what to expect. Then they do their first hearing test and they come back into the room with a smile on their face and confidence knowing they can do this, and not only can they do it, they love it! A first-year student that came to our first event, started bringing more of her classmates to our following events. As she progressed in her education, she told other classes below her to come, mentored all three classes under her and

is now a full time working AuD in DFW and our current president! How fantastic is that!? We've helped train students, give them experience, help them get 4th year placements and helped them get their first jobs. Students are important because they are the future of this profession we are in. Foster them and include them always!

Summing up—in the last 7 years since DAS was founded, we have helped countless people get hearing aids while helping countless students and audiologists gain further knowledge and further their careers. It's been a fantastic journey and one of my proudest accomplishments. It takes a village to run a successful society, but when you have the right people to help devote their time, it truly makes an impact on the profession and is incredibly rewarding. We've been very fortunate to have so many organizations, Universities and clinics support us in giving back. We continue to get donations, and even recently had a donation of over \$20,000 worth of audiological equipment. It's amazing what can be accomplished if you work together. It's fantastic to see a new Audiologist or student moving into the area showing up at their first DAS event because they heard about the group. Audiology societies can make a greater positive impact on the profession than some might think, so never stop growing, learning or giving back because you can make that difference in someone's life, profession or future.

If you should have any questions or would like to collaborate on ideas within your audiology society/organization, please reach out to me directly and would love to help! We are always stronger together.

Angela Lightfoot-Pumford, EMBA, is the Founder for the Dallas Audiology Society & Director of Sales – West for Cognivue. Angela has spent the last 19 years of her career within the field of Audiology

and Hearing Aid Manufacturing. She started in the industry through managing hearing aid and audiology practices in Texas. Angela has spent the last 17 years of her career serving many different roles within the field of Audiology; Director of Sales, Regional Sales Manager, Training Specialist, and also collaborated within the research and development of hearing aids. She has worked both in the United States and in Canada. Angela serves on the board for the Dallas Hearing Foundation in Dallas and obtained her Executive Certificate in Nonprofit Governance in 2019. She enjoys giving back to the community, traveling and cooking in her free time.



Welcome New Members

Audiologists

Carey Bailey, Au.D.
Katrina Balvance, Au.D.
Grace Buchholz, Au.D.
Brent Fisher, Au.D.
Melanie Gregan, Au.D.
Jacqueline Hoppenrath, Au.D.
Jeffrey King, Au.D.
Jordan Krentz, Au.D.
Melodie Maerz, Au.D.
Thomas Sanchez, Au.D.

Students

April Dahlen
PuiYii Goh
Emily Hugo
Athara Ibrahim
Chieh Kao
Tatiana Lyons
Jung Namgoong
Jasmin Rodriguez
Grace Song

Member Spotlight

Monica Kimitch, Au.D.

Hennepin Healthcare

How did you first become interested in the field of audiology?

There was a little girl in my neighborhood who had profound hearing loss and wore hearing aids. When we ran through the sprinkler, she would have to remove them so they wouldn't get wet, and communicating with her during this time became challenging. In 2nd grade, we had an ASL interpreter for a student in class. We learned some specific ASL to help us better communicate with them. While studying at the University of Minnesota I was part of a study on noise-induced hearing loss with the marching band, which piqued my interest. The next semester I began taking undergrad

classes in Speech Language Hearing Sciences and I knew I was in the right place.

What do you find the most rewarding part of working in a clinical setting?

The most rewarding experiences are seeing how people benefit from hearing aids. About 5 years ago, I fit a 55-year-old woman with hearing aids for the first time. She had severe to profound hearing loss bilaterally. She was quiet and reserved. After fitting her with hearing aids, she lit up. Her interactions with others and me had changed drastically. Now, I get to see her every two months for a hearing aid check and we enjoy catching up each time.



What types of Audiology patients do you see at your job?

At Hennepin Healthcare, we see newborns through adults. We offer hearing evaluations, VRA, CPA, ABR, and ASSR. We currently have six audiologists, some of whom also see vestibular patients and BAHA patients.

Why do you feel being a member of MAA is important?

I joined MAA because it is a valuable resource as an audiologist in the state of MN. Having access to continuing education courses and staying up to date on changing regulations in the state is important. Being able to learn and grow from my peers as the world of audiology continues to advance is lots of fun.

New & Returning Board Members Elected

As a result of our recent election, we've welcomed two new board members and two members returning for additional terms. Thank you all of your service!



Rachel Allgor, Au.D. (3 years): Audiologist at Audiology Concepts in Edina, MN. She has served as co-chair for the Communications and Publications Committee for the past four years and is also a member of the Finance Committee.



Eric Robert Barrett, Au.D. (President-Elect): Field Training Audiologist at GN ReSound for MN, ND, SD, and WI. He has served as co-chair to the Communications and Publications Committee for the past three years and is a member of the Finance Committee.



Heidi Kludt Hill, Au.D. (3 years): Owner and audiologist at Hearing Health Clinic in Osseo, MN and founder of Hearing the Call - Twin Cities, a nonprofit providing access to quality and affordable hearing health care for qualified individuals in the Twin Cities.



Robert "Bobby John" Lang, Au.D. (2 years): Audiologist at ENT Specialty Care in St. Louis Park and Coon Rapids. He is a member of the Audiology Awareness Committee and excitedly fills the vacant spot created by the election of Eric Barrett to president-elect.

What do you do for fun outside of work?

When I am not at work, I enjoy spending time with my wife, Jenn, and our family. We love to walk our dogs, Jesus and Chloe, around the Minneapolis lakes and trails. In the summer we bike, kayak and paddleboard and in the winter you'll find us in snowshoes. When it's too cold to be outdoors, we enjoy jigsaw puzzles, reading, and binge-watching the occasional Netflix show. A favorite hobby of mine is to talk big about various house projects I have planned and occasionally follow through with them!



Accuracy of ICD-10 Diagnostic Coding by Audiologists



Ryan Shea, MA; Lori Zitelli, AuD; and Catherine Palmer, PhD



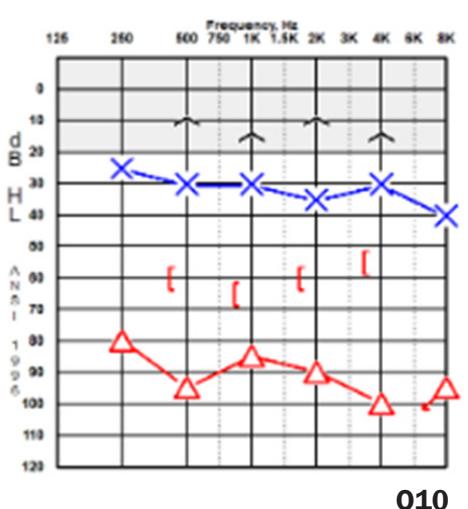
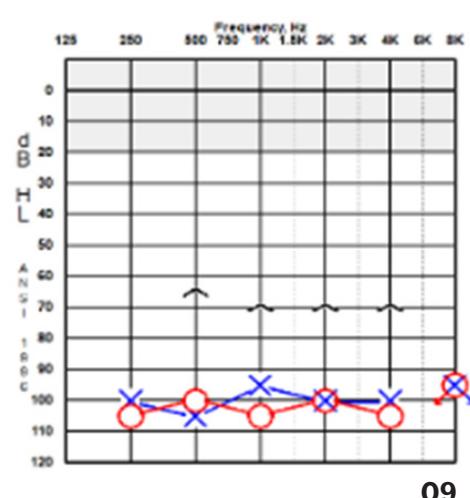
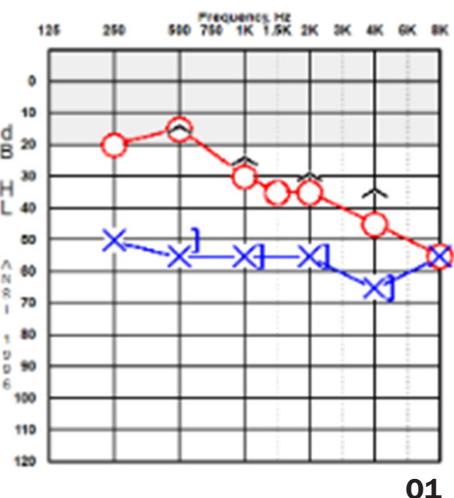
The intent of creating ICD-10 codes was to standardize disease and procedure classifications throughout the United States as well as to gather data about health statistics. Since previous ICD-9 codes were not specific enough to mirror advances in healthcare, the introduction of ICD-10 diagnostic codes, mandated by the Department of Health and Human Services to be implemented by October 1st, 2015, created more specific ways to code for different patterns of hearing loss¹. Accurate coding is important for appropriate reimbursement, maintaining patient documentation, detecting healthcare fraud, developing patient safety criteria, setting healthcare policy and developing public health initiatives, improving clinical performance and allowing large-scale analyses for medical research². However, studies in medicine and other healthcare fields have shown that many ICD-10 codes are often miscoded²⁻⁶.

Our study aimed to assess the accuracy of audiologists in their ICD-10 code use. A survey was created of 10 different audiometric configurations with a list of ICD-10 diagnostic codes for hearing loss. Audiologists from 3 different medical centers were asked to select the code or codes that they would typically use if a patient with this type of hearing loss

was seen in their clinic. Audiologists from one medical center had access to a written tutorial that was created through their department that had examples of correct coding (the “trained group”, n=28). The audiologists from the two other medical centers had been exposed to information from professional societies and their local medical centers trying to support healthcare professionals in this transition (the “untrained group”, n=36). The most appropriate response for each configuration was confirmed by the American Academy of Audiology Reimbursement Team. Please see the selected examples below.

After reviewing responses from the survey, it was noted that certain audiometric patterns were incorrectly coded more often. When there is an asymmetric hearing loss of the same type (e.g. a mild to moderate sensorineural hearing loss in the right ear and a moderate sensorineural hearing loss in the left ear, as noted in the Q1 example), there was more variability in the responses from the “untrained” group. In this instance, the most appropriate code to use would be H90.3 [Sensorineural hearing loss, bilateral] because the hearing loss is sensorineural in nature in both ears even though it is not symmetrical.

cont.



Coding Accuracy, cont.

The ICD-9 coding system did have a code for asymmetric loss, but the ICD-10 coding system does not.

For our study, there was a difference in the response between the trained and untrained group, which may indicate that the written protocol made a difference in audiologists' understanding of appropriate coding. When there is an unspecified hearing loss (e.g. air conduction thresholds at an intensity level where effective masking for bone conduction cannot be reached, as noted in the Q9 example), there was more variability in responses from audiologists in both groups. In this case, the highest degree of certainty is that there is a mixed hearing loss in at least one ear although the specific ear cannot be specified. In this specific example, the most appropriate code would be H90.8 [Mixed hearing loss, unspecified].

When there was a hearing loss that required two codes (e.g. a different type of hearing loss in each ear; a conductive hearing loss in the left ear and a mixed hearing loss in the right ear, as noted in the Q10 example), there was more variability in the responses as well. In this case, the two most appropriate codes are H90.A12 [Conductive hearing loss, left ear, with restricted hearing on the contralateral side] and H90.A31 [Mixed hearing loss, right ear, with restricted hearing on the contralateral side]. Both codes should be used because there are 2 different types of hearing loss represented.

Our results indicate that some form of training should be implemented to familiarize audiologists with the updated ICD-10 diagnostic codes. Interactive, case-based examples may be beneficial in this type of training. Informally, the University of Pittsburgh students have reported that having access to a written protocol and case examples has

improved their understanding of how to appropriately use ICD-10 diagnostic coding system.

For more information regarding coding resources offered by professional organizations, please contact reimbursement@audiology.org. For more information regarding this study, please contact Lori Zitelli at zitellild@upmc.edu.

- 1 ICD - ICD-10-CM - International Classification of Diseases, (ICD-10-CM/PCS Transition. (n.d.). Retrieved from https://www.cdc.gov/nchs/icd/icd10cm_pcs_background.htm
- 2 Horsky, J., Drucker, E. A., & Ramelson, H. Z. (2017). Accuracy and Completeness of Clinical Coding Using ICD-10 for Ambulatory Visits. In *AMIA Annual Symposium Proceedings* (Vol. 2017, p. 912). American Medical Informatics Association.
- 3 Burles, K., Innes, G., Senior, K., Lang, E., & McRae, A. (2017). Limitations of pulmonary embolism ICD-10 codes in emergency department administrative data: let the buyer beware. *BMC medical research methodology*, 17(1), 89.
- 4 do Nascimento, R. L., Castilla, E. E., Dutra, M. D. G., & Orioli, I. M. (2018). ICD-10 impact on ascertainment and accuracy of oral cleft cases as recorded by the Brazilian national live birth information system. *American Journal of Medical Genetics Part A*, 176(4), 907-914.
- 5 Farzandipour, M., Sheikhtaheri, A., & Sadoughi, F. (2010). Effective factors on accuracy of principal diagnosis coding based on International Classification of Diseases, the 10th revision (ICD-10). *International Journal of Information Management*, 30(1), 78-84.
- 6 Pinyo Rattanaumpawan, M. D., Wongkamhlao, T., & Thamlikitkul, V. (2016). Accuracy of ICD-10 coding system for identifying comorbidities and infectious conditions using data from a Thai University Hospital Administrative Database. *Journal of the Medical Association of Thailand*, 99(4), 368-73.

Lori Zitelli, Au.D., is a senior audiologist at UPMC. She received her clinical doctorate in audiology from the University of Pittsburgh. She is a part-time lab instructor at the

University of Pittsburgh and teaches a Clinical Procedures Lab for first year AuD students. Her special interests include clinical education, tinnitus/decreased sound tolerance evaluation and treatment, clinical research, and interventional audiology. She is an active fellow and volunteer of the American Academy of Audiology and a trustee of the American Academy of Audiology Foundation.

Catherine Palmer, Ph.D., is a professor in the Department of Communication Science and Disorders and serves as the director of Audiology and Hearing Aids at the University of Pittsburgh Medical Center including the UPMC Children's Hospital. She conducts research in auditory learning post hearing aid fitting, the relationship between hearing and cognitive health, and matching technology to individual needs. She has published over 80 articles and book chapters in these topic areas as well as provided over 100 national and international presentations. Palmer teaches the graduate level amplification courses at the University of Pittsburgh and serves as Editor-in-Chief of Seminars in Hearing. She has been awarded the Editor's Award for the American Journal of Audiology, the Dean's Distinguished Teaching Award SHRS, the Provost's Award for Excellence in Mentoring, and the PA Academy of Audiology Award for Outstanding Service.

Ryan Shea, Au.D., attended the University of Pittsburgh in Pittsburgh, PA, where he received his Doctor of Audiology degree. He also received his Master of Arts in Audiology and Bachelor of Arts in Communication Science and Disorders from the University of Pittsburgh. He completed his residency at the Pittsburgh Veterans Affairs Medical Center in Pittsburgh, PA. He currently works in suburban Philadelphia in a private practice, working with pediatric and adult populations.



Message From Your Past-President

Passing the Baton

Ashley Hughes, Au.D.
2021 MAA President

I am excited to pass on the role of MAA President to Jason Leyendecker, AuD. Jason was elected to join the MAA Board of Directors as Member-at-Large in 2019. During and before that time, he served on a variety of committees, including serving as a subcommittee

chair for the Government Relations Committee. As a private practice owner, he comes in with leadership and team-building experience. Knowing Jason both personally and professionally, I am confident he will keep the group moving forward towards MAA's mission and vision.

I am so thankful for MAA; the members, committee chairs, Board, sponsors, and most importantly, our shared goals. I've

been very lucky to have the opportunity to serve in a variety of roles, in all of which I acknowledge that I was standing on the shoulders of giants. Each year, we as individuals grow, and so does our organization. I'm grateful to have been a part of this change in such an amazing profession. Cheers to a new year, new leadership, and a constantly growing profession and organization!

Solutions for Every Step in Your Dizzy Patient's Journey

DIAGNOSIS | TREATMENT | REHABILITATION

The collage consists of five images arranged in a grid-like layout:

- VisualEyes™ Orion Rotary Chairs:** A young man sits in a specialized rotary chair used for vestibular testing.
- VisualEyes™ 525 VNG Module:** A patient wearing a head-mounted display is connected to a computer system for video nystagmusography (VNG) testing.
- Bertec TRV Chair, BPPV:** A patient is seated in a specialized chair designed for benign paroxysmal positional vertigo (BPPV) treatment.
- VisualEyes™ EyeSeeCam vHIT Module:** A young girl wears a head-mounted camera system used for video head impulse testing (vHIT).
- Bertec CDP/IVR:** A patient stands in a circular platform used for computerized dynamic posturography (CDP) or interactive visual rehabilitation (IVR) training.



Contact Midwest Special Instruments to learn more.
Matt Williams, MN and ND Sales | 800-328-6709, ext 6353
www.midwestsi.com


Interacoustics
www.interacoustics.com

Micromedical
by Interacoustics



Message From Your President

Jason Leyendecker, Au.D. 2022 MAA President

Welcome to 2022 and the year for growth. Thank you for giving me the chance to lead this amazing group of volunteers for the next year. It is truly an honor to get to work with such a great group of passionate audiologists. Following the footsteps of a very talented and effective leader in Dr. Ashley Hughes will not be easy but I hope to do my best. While Dr. Hughes has relatively small feet, she's created very large shoes to fill. Thank you for your leadership and creating a new level of structure to our organization!

We have a lot of change coming in hearing care with the current political climate and as I write this article it could easily be different before it is published. Having our voice heard in these changes can always be a challenge. I think of the quote from Peter Drucker, "The best way to predict the future is to create it." We need to be involved to make change.

I am proud to be an MAA member as we are one of the best state audiology organizations in the country! We have a well-established organization that provides significant value to our members. The volunteers within MAA have done a superb job of staying up to date on any legislative initiatives involving hearing care, hearing aids, and anything else that could affect our patients. Our efforts in fundraising have supported scholarships to hearing impaired students year after year. We have committees that are involved in

creating one of the best local audiology conferences around. Volunteers are also dedicating time to making sure we are financially stable and a committee to help facilitate growth in that area.

MAA brings so much value to our profession and the audiologists of Minnesota. It is fair to say that the more members we have in our organization the more value we receive and the more likely to affect positive change in our profession and more importantly, *our patients*. Our dues provide us funding to support this change. Our industry is small, but it can be mighty.

That said, to continue to protect the interests of our members we need more members. We currently have 158 fellow members of MAA with roughly 300 total audiologists in the state of Minnesota. While that is a significant amount and a great number, I can't help but think that maybe we aren't providing the right value to the rest of the audiologists in the state.

Membership to an organization is more than volunteering and providing funds to support change for our profession. Don't get me wrong, those things are important, but there is a much bigger picture to think about. Membership shows unity as a profession. It shows we care about what we do and how we can support our community. We are a great state organization, and our unity is just the start of what could be. If we continue to gain members that support our profession this could be a tipping point for other audiologists to start following their organization. Supporting our profession by joining our state organization needs to be an

epidemic. We are the right people to make the change. The great author Malcom Gladwell once said, "There are exceptional people out there who are capable of starting epidemics. All you have to do is find them." Minnesota audiologists are those exceptional people.

Now is the time to sit down and have an honest conversation with audiologists around the state and determine what is the magic bullet that will get all audiologists to support their profession at a state level. 2022 is the year of growth and an exorbitant amount of support for the audiology profession. I look forward to having conversations with members and non-members alike to determine what is valued most.

Thank you for trusting me in being your president and I look forward to working with the 2022 Board. We have a great group of people working on the profession's behalf and I couldn't be prouder to work with them.

"The ones who are crazy enough to think they can change the world, are the ones who do." Steve Jobs

A publication of the Minnesota Academy of Audiology, distributed to MAA members with information pertinent to the field of audiology. Information contained in this publication is obtained from sources considered to be reliable; however accuracy and completeness cannot be guaranteed.

Address all questions and comments to the editors:

[Rachel E. Allgor, Au.D., FAAA](#)
[Katie Awoyinka, Au.D., CCC-A, CH-TM](#)
[Eric Robert Barrett, Au.D., ABAC](#)

From the MAA Committee Chairs

Committees Accomplish Goals, Look Ahead

Audiology Awareness

The primary goal of the Audiology Awareness Committee is to spread awareness about audiology and hearing loss. Typically, this is accomplished through community or employer health fairs, community education events and participation in the hearing screenings at the Minnesota State Fair. Prior to the start of the pandemic, we had our annual silent auction at UMAC to raise funds for the Gloria Gross scholarship. We are excited and will continue to raise money for the Gloria Gross scholarship in 2022 at UMAC! Our committee reviewed 3 scholarship applications and this year awarded three \$1,500 scholarships to high school seniors who have hearing loss and will continue to post-secondary education.

We host recurrent classes on hearing loss, hearing aids, and tinnitus through St. Paul Community education in spring and fall. Generally, our biggest event is hearing screenings in the HealthFair 11 building at the Minnesota State Fair. Though we were disappointed that the State Fair was canceled again this past year after fully preparing to participate, preparing did yield the production of a new "Say What" T-shirt design which is available for purchase on our website and an MAA business card. Fortunately, prior to the fair this year we once again organized the opportunity to raise supplemental funds and awareness with a second "Say What?" Virtual 5K for Audiology Awareness in May of 2021; 81 humans and 12 pets enrolled and supported this event!

The committee is co-chaired by Drs. Carissa Kucala, Evan Maraghy, and Katie Awoyinka. We would never be able to accomplish any of this without our powerhouse team made up of Drs. David

Geddes, Jennifer Reside, Sarah Almquist, Jessica Presley, Gwen Washburn, Robert Lang, Beth Thomas and Michaela Nikolai. We would love anyone with excitement for audiology to join our team! Contact us at audawareness@minnesotaaudiology.org.

support from Drs. Ashley Hughes, Katie Awoyinka, and Krista Lam.

Our primary responsibilities are to maintain communication within the MAA and increase our online presence. These are accomplished through regular publication of our newsletter and administration of MAA social media accounts. We meet regularly to discuss committee activities and share ideas.

In 2021 we continued working on the website to make it as user-friendly as possible and increased collaborations with other committees to promote a diverse set of efforts. While the pandemic has made it harder to meet in person still, we have plans to continue distributing a fantastic newsletter to members and keep everyone up-to-date with our MAA Facebook Page!

Do you love scrolling on Facebook? Have a vast, untapped knowledge of Instagram? Dream of editing websites and newsletters? We would love to have you #joinus at communications@minnesotaaudiology.org.

Continuing Education

Co-chairs, Drs. Josie Helmbrecht, Jennifer Ward, Rebecca Younk and committee members Drs. Ashley Hughes, Bobby Lang, Morgan Klingsporn, Sarah Kahley, Kerry Witherell, Kristi Albers, and Kristi Gravel.

After a year of constant change, the Upper Midwest Audiology Conference (UMAC) 2021 was virtual for the first time. This was a difficult decision to make, and while a virtual conference will never be able to provide the same elements as an in-person conference,

cont.

Coding & Reimbursement

The Coding and Reimbursement Committee is chaired by Dr. Melisa Oblander with committee members Drs. Jason Leyendecker, Carrie Meyer, and Evan Maraghy. The mission of the committee is to disseminate accurate coding, billing, and reimbursement methodologies. While we cannot provide practice specific billing and coding recommendations, we can help investigate questions and concerns from membership, especially trends that may be specific to Minnesota. 2021 was a quiet year; new ABR and VEMP codes were published in the MAA newsletter.

For 2022, the committee hopes to re-engage with the Managed Care Plan team and DHS leadership, where we left off following a meeting in early March 2020. The goal being to help audiologists more easily navigate billing rules for managed care PMAPS.

If you want to enhance your understanding of billing and coding while networking with other MAA audiologists, this committee would be a great fit! Please contact us at coding@minnesotaaudiology.org.

Communications & Publications

The Communications & Publications Committee is co-chaired by Drs. Rachel Allgor and Eric Barrett with

Committees, cont.

UMAC 2021 attempted to make it feel as familiar as previous UMAC conferences. UMAC 2021 was themed “Navigating the Future” and brought together 91 Audiologists, students and key members of the Audiology community. A total of 6.5 hours of CEUs were offered, including 3 Tier 1 hours. We were fortunate to have the generous support of Cochlear, Phonak, ReSound, Midwest Specialty Instruments, Starkey, Widex, Signa, Advanced Bionics and the Minnesota Department of Health which made UMAC 2021 possible. We even had Gloria Gross Silent Auction virtually and we raised nearly \$3200.

Shortly after UMAC 2021, we started planning for UMAC 2022- back in-person! Please join us on Feb 4-5, 2022 at the Sheraton Bloomington. See the newsletter ad highlighting the speakers who are presenting. We hope to see you there. If you are interested in being on the committee to plan UMAC 2023 please reach out to education@minnesotaudiology.org.

Finance

Finance Committee chair is Dr. Kristi Gravel and she is supported by our current treasurer, Dr. Jumana Harianawala. Other committee members include Drs. Cindy Hogan, Ashley Hughes, Jason Leyendecker, Eric Barrett, and Rachel Allgor.

The Finance Committee supports the planning, analysis, and reporting processes for MAA financial activities. It provides financial management tools to MAA committees and the Board of Directors that allow informed, accurate planning and management of the Academy's financial resources.

In the past year, the Finance committee has created an improved process for expense reimbursement by

implementing a centralized email (mnaudtreasurer@gmail.com) and contributed to the MAA Policies and Procedures manual for the organization, establishing prioritization of MAA's financial endeavors for the current and future board members to use as guidance. We continue to improve our budgeting efforts in 2022. The Finance Committee strives to have representation from each MAA committee so that each arm of the organization is able to understand where membership dollars are being put to work. If you're looking to get an insider's view of how each committee contributes to MAA's vision and mission, consider joining us on the Finance Committee! Email the MAA Admin to share your interest at administrator@minnesotaudiology.org.

Government Relations

This committee is co-chaired by Drs. Josie Helmbrecht and Rebecca Younk with support from Drs. Kristi Albers, Shanna Allen, John Coverstone, Shannon Garlitz, Kristi Gravel, Ashley Hughes, Sarah Kahley, Angie Mucci, Jim Pehringer, Victoria Pecharek, Jennifer Tunnell, and Gwen Washburn. Primary responsibilities are to plan, support, and promote legislative and other activities as they pertain to Minnesota audiologists, scope of practice, reimbursement, and public safety. These are accomplished through active involvement with our lobbyist, Rob Vanasek at Capitol Hills Associates, and grassroots advocacy. We meet in-person and over the phone to discuss committee activities and topics which are important to and impact the field of audiology.

The GRC's current initiatives include focusing on legislation to improve licensure portability. A sub-committee to address issues arising due to expanding third party networks is led by Drs. Jason Leyendecker and Amy Swain.

Our committee is also working with the Department of Health to update the Hearing Instrument Dispensing Examination.

Given the success of the last survey in late 2019, we will send another email survey in early 2022 to all audiologists in Minnesota asking for feedback on important matters in the state to set short- and long-term legislative priorities. Watch for the survey so we can begin to tackle the issues most important to our profession. Interest in serving on the committee or have ideas to share? Contact us at govrelations@minnesotaudiology.org.

Membership Development

Hello there! If you read your emails or check the MAA Facebook page, maybe you've heard of us! We are the MAA membership committee. This fabulous group is co-chaired by Drs. Sarah Ostlie and Kirsten Bock. Our amazing committee members include: Drs. Maureen Cannon, Kirsten Coverstone, Hannah Herd, Carly Kempton, Margaret Koeritzer, and Kerry Witherell.

Our group's vision is to foster a growing committee of engaged audiologists, ensure consistent leadership of MAA, and recognize individual excellence in audiology. How do we do that? We start with conference calls every other month to discuss ways to encourage involvement with MAA and ensure representation of audiologists. We collaborate on our annual membership drive, host the awards ceremony at UMAC, and find projects throughout the year to encourage membership visibility and engagement. In addition, our committee facilitates a Mentorship Program between Au.D students at the University of Minnesota and MAA

cont.

Committees, cont.

Fellows. As we enter 2022, our goals will focus on driving membership through newly hired audiologists and doing our part to improve diversity and equity among our members.

At its heart, our focus is you, the MAA community. If serving the wonderful people of MAA gives you the “warm fuzzies”, or if you have ideas about how to engage and reach both current and future MAA members, Membership Development is the committee for you! Contact us at membership@minnesotaaudiology.org.

Sponsorship

The committee is chaired by Dr. Amanda Bohn and accompanied by

committee members Drs. Kristi Gravel, Carrie Meyer, and Melisa Oblander. Our primary goal of Sponsorship is to foster and maintain relationships between MAA and industry partners, community groups, and other organizations that support MAA's efforts. In addition to exhibiting at the Upper Midwest Audiology Conference (UMAC), our sponsors enable MAA's other events throughout the year, including hearing screenings at the Minnesota State Fair and the relatively new 5K Walk/Run/Roll. Our sponsor partners also provide content throughout the year for the MAA newsletter.

Last year had us shift to a virtual conference and 5k event and sadly canceled our State Fair support. With

that said, the virtual events seemed to have been a great success! We are very excited to bring the events back to in-person for 2022, with fingers crossed! We will continue with our newsletters, with sponsors sharing exciting news from their organizations with our membership. As the Sponsorship committee has been recently revived, our goals for this upcoming year are to continue to find additional partners and in return helping them share their information with the audiology world! If you love staying in contact with your local industry representatives and making new friends in the hearing care community, this committee would love to have you! Please contact us at sponsorship@minnesotaaudiology.org.

WIDEX MOMENT™

THIS SOUND CHANGES EVERYTHING.

Widex USA is a proud sponsor of the Minnesota Academy of Audiology 2022 Conference.

WIDEX
SOUND LIKE NO OTHER

Widex is a registered trademark of WS AUD A/S.

Student Spotlight

Chieh Kao, PhD

First Year Au.D. Student, University of Minnesota

You very recently graduated with your PhD degree. Tell us a bit about your research interests.

I am interested in how infants pay attention to emotions in human voices by studying their behaviors and neural activities. Emotion is one of the essential social cues in infants' daily listening environment, and it directs infants' attention to important speech information. Understanding the link between emotional speech perception and language learning can guide future services and resources for children with difficulties hearing or processing vocal emotions.

What is it about clinical audiology that is of interest to you now as you pursue your AuD degree?

The opportunity to know people as individuals with unique backgrounds and hearing statuses and provide them individualized plans that best align with their goals. With years of research training, it is easy for me to view people as a group and miss that they are individuals. Clinical audiology program trains me to have a more comprehensive perspective when interacting with people with hearing concerns.

What is your favorite season here in Minnesota and why?

Fall is definitely my favorite season here because of the gorgeous fall colors! I also appreciate the three weeks for fall outfits without a winter jacket.

What clinical setting, skill, or population are you most looking forward to learning or working with during your AuD program?

I look forward to working with the pediatric population because of the importance of early intervention for their future outcomes. I am also interested in cochlear implants, their current benefits and limitations, and the future development of the device.

If you could describe your perfect meal, what would it include?

Seafood, roasted veggies, baguette, and ice cream on top of a warm brownie! Dessert is a must for a perfect meal.

Do you have a favorite non-audiology book?

I am currently reading *The Signal and the Noise: Why So Many Predictions Fail* by Nate Silver. It is not about audiology or hearing science (even though the title looks relevant) but discussing how we navigate through the massive amount of information in today's world.

The advertisement features the Starkey Evolv AI logo at the top. Below it, the text "A new era is here." is displayed in blue, followed by "Discover the world's most innovative hearing technology." A row of hearing aids is shown above a photo of a woman and a young girl sitting on a couch, both wearing hearing aids. The Starkey logo is in the bottom right corner, with the text "Explore Evolv AI, visit StarkeyPro.com/Evolv-AI".

Start Providing More Value Now, or Start Looking for a New Career

Cliff Olson, Au.D.

Founder, Applied Hearing Solutions, Phoenix AZ



It is no secret that in the past few years the hearing aid landscape has been changing at breakneck speeds. Costco now sells hearing aids that are literally identical to what private practice audiology clinics dispense, at prices lower than devices can be acquired from a manufacturer directly. Online companies are selling low-cost generic amplifiers, that they claim to be hearing aids, with no legal ramifications.

President Donald Trump signed the Over-The-Counter (OTC) hearing aid act into law back in 2017, only to have President Joe Biden sign an executive order to accelerate OTC hearing aid availability in the next 180 days. Major consumer electronics brands like Apple and Bose are creating DIY low-cost amplification options for individuals with perceived hearing loss. Last but not least, managed care groups have all but taken over insurance provider's hearing aid benefits, cutting reimbursement to hearing care professionals, and the profession of audiology as a whole is so fractured that nothing can be done about it.

These are just some of the changes that have occurred recently that brings into question the viability of our profession. It is likely that audiologists in every state are starting to experience the consequences of these changes. Yes, audiology is much more than just dispensing hearing aids, but these changes are likely to have an impact on all aspects of audiology. In many cases, audiology positions that work in other areas of our scope of practice, besides hearing aid dispensing, are subsidized by the revenue generated from hearing aid

sales. Meaning, that all of audiology will be affected by these changes if we decide to do nothing.

This begs the question, if individuals with hearing loss elect to start pursuing hearing aids through alternative channels that no longer require audiologists, will the profession of audiology even exist in the coming years? The answer to this question is... it depends. The necessity of any profession is determined by the value that they create for the people who would use their services. If you cannot or choose not to provide your patients with enough value to justify the need of your services, then you do not deserve to have a profession.

Let's explore how hearing aid dispensing in audiology has worked for the past few decades. Patients typically come in for a free hearing test. After spending a few minutes explaining the X's and O's, we recommend they *try* hearing aids for a few weeks to see how well they work. If they agree, we program a pair of devices to first-fit settings and send them on their way. They then come back for a single follow-up reporting anywhere from a mild amount of benefit to a significant amount of benefit. Approximately 50% of these patients determine that their level of benefit is adequate enough to justify the cost of a \$6,000-\$7,000 pair of hearing aids. Then these patients are told to come back if they have any issues with their hearing aids. After three years, and maybe a few visits for repairs and maintenance, they are told that they should try different hearing aids that have some NEW

AMAZING FEATURES to see if they work better than their old devices. Because their older devices have not been optimized consistently over the past few years, they elect to spend another \$6,000-\$7,000 on this new set of devices because they do help a bit more. Rinse & repeat.

By following this model of hearing aid dispensing that provides little value beyond just selling hearing aids, it is hard to blame patients from looking at other options for hearing care. It's no wonder our profession is under attack from every possible angle.

So what can we do about it? Well, I believe we need to change the way we provide treatment with hearing aids. We need to stop complaining about all these changes and do what United States Marines do—improvise, adapt, and overcome. We need to start providing our patients with more value!

What if, instead of following the traditional model of dispensing hearing aids, we did the following? What if we started to charge for comprehensive hearing evaluations and spent the necessary time to help our patients actually understand their hearing loss? What if, instead of encouraging a "free trial," we charged for a fitting sequence that covered the cost of following comprehensive best practices to maximize the perceived benefit our patients receive from their hearing aids?

cont.

Value, cont.

What if we followed a person-centered care approach to hearing treatment by spending the time necessary to understand our patient's wants, needs, and values? What if we encouraged regular follow-up care and took the time to educate our patients on how regular access to our services help to maintain their optimal hearing performance? What if, we made the services we provide the main thing our patients are paying for instead of the technology? I pose all of these changes as questions because it is still too early to know if these proposed changes will actually work well enough to keep audiologists relevant and employed.

The harsh reality of this changing landscape is, if your patients don't find

The harsh reality of this changing landscape is, if your patients don't find you valuable enough to pay money for your services, then you don't deserve to stay in this profession.

you valuable enough to pay money for your services, then you don't deserve to stay in this profession. It doesn't matter if you think you are worth it. Your patients need to think you are worth it. Therefore, if you are not currently laser focused on providing a high level of patient care and an exceptional patient experience, then your head is already on the chopping block. At the same time,

while I personally believe that providing our patients with an absurd amount of value will be enough, it is not for me to decide, it is ultimately up to our patients. I know I'm willing to go all-in on this theory. My final question is... are you?

Dr. Cliff Olson is a Board Certified Audiologist and holds his doctoral degree from the University of Illinois at Urbana-Champaign. He is a member of the Academy of Doctors of Audiology, and a Fellow of the American Academy of Audiology. Dr. Olson is the founder of Applied Hearing Solutions in Phoenix Arizona. He is also an adjunct lecturer for the Department of Speech & Hearing Science at his alma mater.

Industry-leading rechargeability



ReSound ONE™ rechargeable hearing aids feature up to 30 hours of battery life* or up to 25 hours with unlimited streaming from your favorite devices.

*Expected battery life depends on active features, the use of wireless accessories, hearing loss, device age and sound environment.

© 2020 GN Hearing A/S. All rights reserved. ReSound is a trademark of GN Hearing A/S.



Rodger Bakke

Territory Sales Manager
612.865.3507
rbakke@gnresound.com



Erika Gesme

Inside Sales Representative
1.800.248.4327 x 8610
egesme@gnresound.com



Eric Barrett

Field Training Audiologist
612.456.8148
erbarrett@gnhearing.com

Sponsored Article

Why Place a Microphone in the Ear Canal? A review of the M&RIE receiver

Laurel Christensen, PhD; Jennifer Schumacher, AuD

In 2003, ReSoundAIR™ was introduced as the first small, behind-the-ear (BTE) hearing aid with a thin tube that could be coupled to the ear using a completely open dome. At this time, approximately 80% of the hearing aids fit in the US were custom, in-the-ear hearing aid styles, as suggested by the sample surveyed in Kochkin (2002). Custom in-the-ear hearing aids were popular because of their relatively small size, but occlusion was a common side effect that kept people who purchased hearing aids from using them (Kochkin, 2000).

The combination of the open dome fitting and digital feedback suppression in ReSoundAIR solved the occlusion problem while also providing cosmetic appeal with the thin tube and small size (Nelson, 2005). Today, it is commonplace for these small, thin-tube hearing aids to place the receiver in the ear. This style, that can still be worn completely open, is known as a receiver-in-the-ear (RIE) hearing aid. In 2019, RIE hearing aids made up 78.4% of the hearing aids dispensed in the US (Strom, 2020), completely reversing the trend toward fitting custom in-the-ear products.

Unfortunately, while solving one major problem for users of hearing aids, RIE and BTE hearing aids created another one. The microphones on BTE and RIE hearing aids are located above the user's ear. This means that sounds processed by the hearing aid are not filtered by the user's pinna and ear canal. This change in the natural location of incoming sounds impacts sound quality and ultimately interferes with a listener's spatial perception.

To better understand why hearing aid microphone location matters, a review of outer ear acoustics is worthwhile. The pinna and ear canal shape and amplify sound due to their resonant effects. Resonance varies due to the length of the ear canal and the shape and size of the pinna, thus resonant effects are unique to every person. In general, the combined effect of the ear canal and concha resonances results in an approximately 15 dB increase in SPL at the ear drum from 2000 to 5000 Hz (von Békésy, 1960). Hearing healthcare professionals (HCPs) insert a microphone in the ear to measure these resonances as part of our hearing aid fitting because the individual differences matter for an accurate fitting.

Imagine a situation where there are several sounds in the environment, like the living room in your home. There might be a TV on and then some conversation happening. For a listener with normal hearing, it is quite easy to switch attention between the TV and the conversation. One reason for this is that listeners with normal hearing can interpret the varying spatial relationships between sound sources. Without these spatial cues, listeners feel as if all the sound is "inside their heads" rather than externally located in the environment. Listeners lose the ability to detect depth and details of sound if spatial cues are taken away. Stated simply, a listener loses spatial perception without pinna acoustics. While spatial perception is not required for listeners to experience better audibility with hearing aids, Gatehouse and Noble (2004) have pointed out that it is important that listeners can "locate,



identify, attend to, and switch attention between signals so as to maintain communicative competence and a sense of connection with their surroundings" (p. 86). Indeed, MarkeTrak 10 found that the strongest factor driving user satisfaction was "hearing aid performance and sound," which includes the ability to tell the direction of sound (Picou, 2020).

The pinna and ear canal also impact sound source localization. Due to the different wavelengths of sound and the shape and size of the ear, head and body, frequencies above 1000 Hz are "shadowed." How much they are shadowed depends on the location of where the sound is coming from, and these changes are our clues to localization. The technical term for this unique shaping is the head-related transfer function (HRTF). No two people have the same HRTF, meaning that every person hears in a way that is unique to them. These cues help us with localizing sound sources, sound source separation, determining what sounds natural to us, and perceiving auditory distance. In fact, hearing via one's own HRTFs is the only way to truly experience immersive, natural sound. Ask any gamer about the importance of spatial perception and they will talk at length about headphones with special listening features that incorporate processing with HRTFs to create a more realistic experience. This type of audio incorporated into headphones allows a gamer to hear

cont.

M&RIE Receiver, cont.

approaching footsteps and exactly the distance and direction they are coming from. It can mean the difference between living and dying “virtually.”

ReSound ONE microphone and receiver in ear (M&RIE)

ReSound has a history of taking inspiration from the natural ways we hear and listen. Therefore, we developed a receiver with a built-in microphone to be placed inside the ear canal in one small wearable module, putting the sound pick-up location where it naturally belongs. The microphone-and-receiver-in ear (M&RIE) is an option on ReSound ONE RIE hearing aids. ReSound ONE features two microphones on the body of the RIE device, while using M&RIE as a third microphone that picks up sound at the entrance of the ear canal (Figure 1). The sound input from M&RIE is shaped by the user’s own unique acoustic cues for individualized sound quality, spatial perception and localization. The M&RIE microphone is active in quiet and moderately complex listening environments, where spatial hearing contributes importantly to the listening experience. In noisier situations, the directional microphones on the hearing

aids are activated for an additional signal-to-noise ratio (SNR) advantage. Current RIE and BTE hearing aids often employ a feature based on the directional microphone system to “recreate” the spatial cues of the pinna. These pinna compensation techniques shift the directivity patterns of the hearing aid microphones, based on estimates of an average adult HRTF for sound in the horizontal plane. M&RIE differs from this technique by preserving the user’s actual acoustic cues in three-dimensional space, so that it is similar to listening with an open ear.

Figure 2 shows measurements taken inside the ear canal of a listener as sound is presented 360 degrees around the head in the horizontal plane. The measurements indicate the intensity of the sound at varying frequencies and azimuths for an open ear, a RIE hearing aid using pinna compensation and a M&RIE hearing aid. Note how the color patterns, which represent the sound intensity, more closely match between the open ear and M&RIE plots. While the pinna compensation algorithm has a general pattern similar to the open ear, there is more detail preserved in the M&RIE measurement.

Candidacy

The placement of a microphone in the canal within the receiver module is made possible by digital feedback cancelation. People with hearing losses ranging from mild to severe can benefit from M&RIE; like any hearing fitting, the coupling to the ear canal depends on the balance between need to reduce occlusion, likelihood of feedback, and need for low frequency gain. For this reason, there are two fitting ranges for M&RIE, which are displayed in Figure 3. For users with normal hearing or a mild hearing loss through 1000 Hz (indicated by the light grey range), a closed dome, tulip dome, or micromold should be fitted. The closed dome and tulip dome provide the same degree of openness, with a 10 dB vent effect at 500 Hz. Note that high frequency thresholds for these users should not exceed 70 dB HL, as there will be virtually no attenuation in the feedback path from the receiver back to the M&RIE microphone with an open fitting. For users with moderate-to-severe hearing loss in the low frequencies (indicated by the dark grey range), a power dome or closed micromold should be fitted and in this case, high frequency thresholds can exceed 70 dB HL, as seen on the figure.

cont.



Figure 1. Illustration of the ReSound ONE hearing aid and microphone-in-receiver (M&RIE). Two microphones (1 and 2) are located on the top of the hearing aid, while the third microphone (3) is built into the receiver module that sits inside the user’s ear canal.

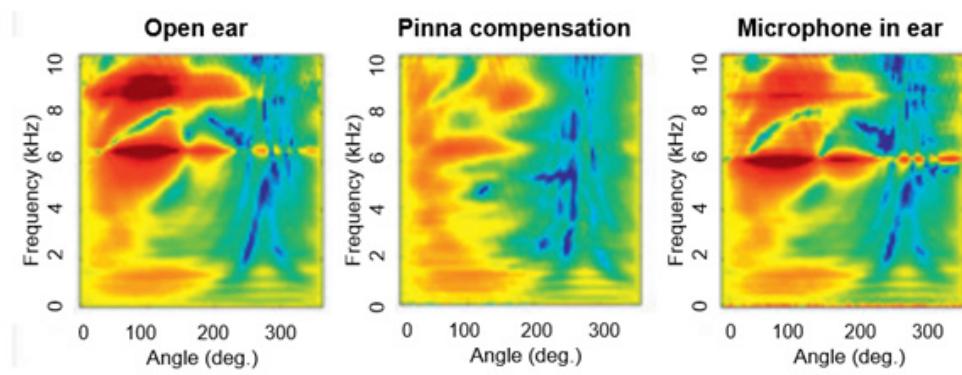


Figure 2. Three-dimensional in-ear measurements of sound presented 360 degrees around the head and body. Sound intensity is indicated by color, with blue = low intensity and red = high intensity. These plots show how the head related transfer function (HRTF) impact sound intensity at varying frequencies and azimuths. From Groth (2020).

M&RIE Receiver, cont.

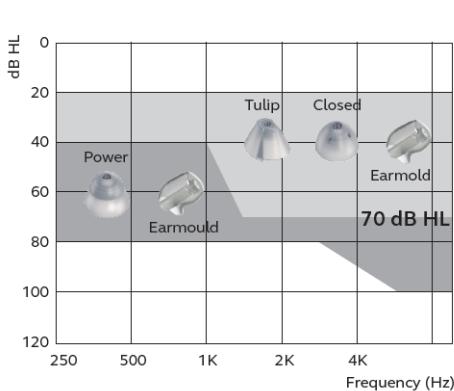


Figure 3. Fitting ranges for the M&RIE receiver. The light gray range indicates the fitting range for listeners with normal hearing to mild hearing loss in the low frequencies who are candidates for open fittings. The dark gray range indicates the range for listeners with moderate-to-severe low frequency hearing loss who are candidates for closed fittings.

Benefit

For users that are candidates, there is substantial evidence that M&RIE provides benefits compared with listening with microphones above or behind the ear in four areas: sound quality, localization, listening effort, and wind noise reduction.

Sound Quality

The first studies on M&RIE tested the idea that customization of pinna cues would lead to better outcomes on measures of sound quality and spatial perception, compared to a pinna compensation algorithm (Groth, 2020). Five normal-hearing participants evaluated overall sound quality and spatial sound quality of M&RIE under headphones using a sound quality evaluation method developed by Legarth et al. (2012). To make this test possible, the sound stimuli for each listening condition were filtered for each individual participant from varying distances and directions. This created a custom set of filters for each of the five listeners' ears, that could then mimic M&RIE microphone placement and RIE microphone placement above the pinna (pinna compensation).

For overall sound quality, they were to listen for clarity, timbre and naturalness. For spatial sound quality, they were to listen for ability to localize sounds, definition of sound, and spaciousness or sense of the room. The stimuli included an office scene, a cafeteria scene and jazz music. Results can be seen in Figure 4. The average overall quality rating and the average overall spatial quality rating for M&RIE was twice as high as for pinna compensation. What is most striking is the lack of variability in the M&RIE rankings versus the pinna compensation. The ratings of pinna compensation across individuals ranged from poor to nearly as good as M&RIE. This variation is an expected finding because when

people have very different anatomical characteristics than the average HRTF, the sound delivered via pinna compensation will be less natural and of inferior quality to that picked up at the M&RIE microphone location.

To determine if the results discussed above would hold when participants were fitted with hearing aids and M&RIE, Jespersen et al. (2020) carried out a sound quality test with ten normal-hearing listeners and ten listeners with bilateral mild-to-moderately sloping sensorineural hearing loss. The participants listened to three sound scenes - a cafeteria setting with a target talker, traffic noise and a train station – with three different hearing aid programs: omnidirectional, pinna compensation (ReSound Spatial Sense feature), and M&RIE. The participants were asked to rate sound quality using attributes such as naturalness, clarity and spatial perception in a paired comparison task.

Results from this experiment are shown in Figure 5 for participants with normal hearing (top row) and participants with hearing loss (bottom row). Data across the listening scenarios were combined for a total of four comparisons. M&RIE was the top choice for sound quality in three out of four comparisons. The listeners with normal hearing preferred M&RIE 87% of the time over omnidirectional and 70% of the time over Spatial Sense, which was a statistically significant preference in both cases. The listeners with hearing loss also showed a preference for M&RIE, with M&RIE chosen 70% of the time over omnidirectional and 57% of the time over Spatial Sense, though this difference was only statistically significant in the M&RIE/omnidirectional comparison. At the conclusion of the data collection, comments from the participants in

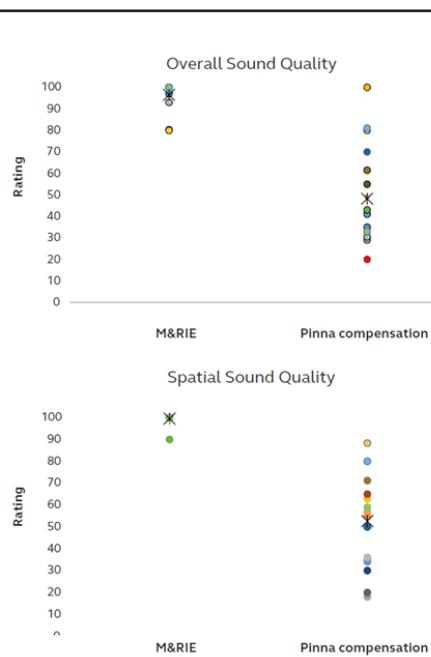


Figure 4. Individual participant ratings of overall sound quality and spatial sound quality for the M&RIE and pinna compensation. The black "X" shows the mean rating for each condition. Consistently favorable ratings with a small distribution were observed for the M&RIE. More variation in the results with pinna compensation reflect the variation of individual differences in how sound is filtered by the listener's individual anatomy. From Groth (2020).

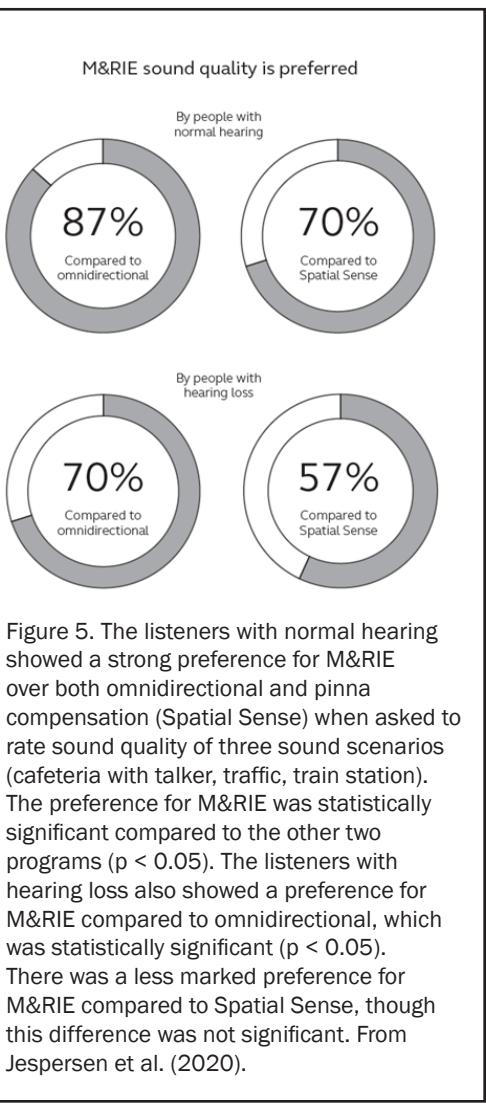
cont.

M&RIE Receiver, cont.

both hearing groups suggested that M&RIE was chosen based on reduced background noise, increased clarity of speech and better spatial perception.

Localization

The ability to locate the source of a sound in an environment is often a difficult task for people with hearing loss, and one that can be degraded by hearing aid use because of the loss of pinna cues (Akeroyd, 2014). However, localization performance has been shown to improve in users fitted with M&RIE, as compared to hearing aids with traditional microphone placement at the top of the device.



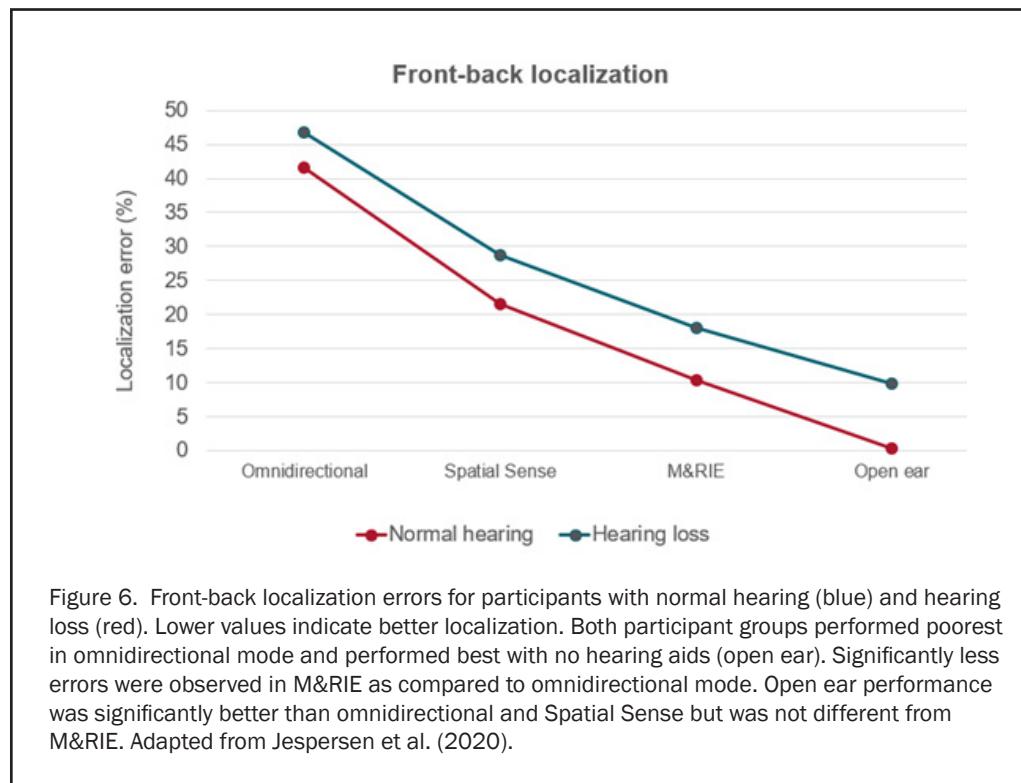
Jespersen et al. (2020) conducted an evaluation of localization comparing unaided, omnidirectional, Spatial Sense, and M&RIE conditions. Ten adults with normal hearing and ten adults with bilateral mild to moderate sensorineural hearing loss participated in the study. The listeners were seated in an array of 12 loudspeakers spaced 30 degrees apart and listened to short bursts of white noise. Their task was to identify the loudspeaker from which the sound originated. Localization performance was measured in "front-back error," which reflects the percent of time confusions between front and back sound locations were made. The results are shown in Figure 6. Note that lower scores indicate less errors and therefore better localization.

Both participant groups performed poorest in omnidirectional mode and best with no hearing aids (open ear). The mean percent of front-back errors in the group with normal hearing was 42% in omnidirectional, 22% using Spatial Sense

and 10% using M&RIE, with 0% errors in the unaided condition. The group with hearing loss had mean percent of front-back errors of 47% in omnidirectional, 29% using Spatial Sense, 18% using M&RIE and 10% while unaided. The pattern of performance was similar between the two participant groups, which demonstrates how microphone placement on the top of a hearing aid can alter localization cues for even people with normal hearing.

M&RIE significantly improved front-back localization in both groups over omnidirectional mode ($p < 0.05$). In addition, unaided open ear performance was significantly better than omnidirectional and Spatial Sense modes for both participant groups; however, there was not a significant difference in unaided and M&RIE performance. M&RIE was the only hearing aid condition that allowed users to localize in a way similar to the open ear.

cont.



M&RIE Receiver, cont.

An additional investigation into localization performance was conducted as part of a two-year longitudinal study following twelve adult users fit with ReSound ONE fit and M&RIE (Jespersen, 2021). Localization using M&RIE was evaluated at the initial fitting (as in the above study) and after four months of wear time. The results can be seen in Figure 7. The front-back error score at the fitting with M&RIE was nearly 20%, which is very similar to the score for participants with hearing loss using M&RIE from Jespersen et al. (2020). After four months of wearing ReSound ONE with M&RIE, front-back localization errors decreased to 12%. This improvement in front-back localization was statistically significant ($p < 0.05$), suggesting that users can gain benefit from M&RIE following an acclimatization period of use.

Listening effort

Listening effort can be defined as the mental resources deliberately allocated for listening and attending to auditory tasks (Pichora-Fuller et al., 2016). People with hearing loss can expend a lot of effort when listening in noisy or

complex situations, which is correlated with increased listener fatigue (Hornsby, 2013). Various laboratory experiments suggest that hearing aids do appear to reduce listening effort, though it is less clear how particular features (e.g., digital noise reduction) may contribute (Hornsby, 2013; Desjardins & Doherty, 2014; Desjardins, 2016). It was hypothesized that M&RIE could reduce listening effort for hearing aid wearers, due to its inclusion of user-specific auditory cues.

To test this idea, an investigation was carried out at Hörzentrums (Hearing Center) Oldenburg in Germany (Quilter et al., 2021). Twenty-four experienced hearing aid adult users with bilateral mild-to-moderate hearing loss participated in the study. The participants were fit with ReSound ONE hearing aids. The Adaptive Categorical Listening Effort Scaling procedure (ACALES) (Krueger et al., 2017) was used to measure listening effort in three conditions: unaided, a traditional receiver and M&RIE. ACALES measures subjective listening effort as a function of signal-to-noise ratio (SNR) – as SNR

becomes poorer, listening effort tends to increase. On this test, a lower dB SNR score means less listening effort was needed in that condition. Compared to unaided listening, there was a 2.6 dB reduction in listening effort for M&RIE, and a 1.8 dB reduction for the traditional receiver. This reduction in listening effort was statistically significant when compared to unaided ($p < 0.05$), though not different between the two receiver conditions. However, upon examination of listening effort ratings between the two receivers, M&RIE shows a consistent trend towards better scores, especially in conditions where less listening effort was required (Figure 8). This suggests that M&RIE may provide an advantage over a traditional receiver in less noisy or complex situations that users typically spend most of their time listening.

Wind Noise Reduction

M&RIE provides natural wind noise protection because the microphone is located inside the ear canal where wind does not create as much turbulence over the microphone opening as it does on top of the pinna. The amount of wind noise

cont.

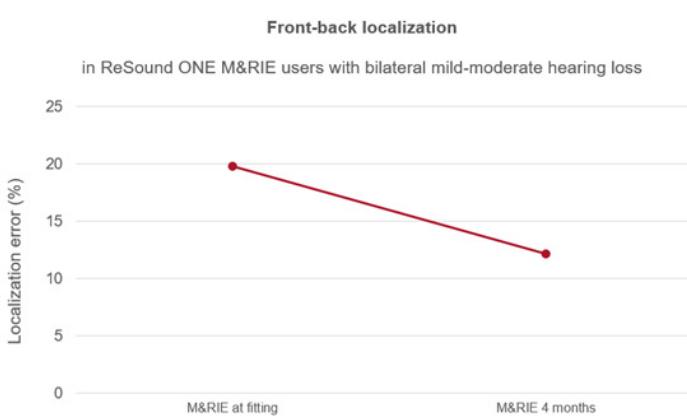


Figure 7. Front-back localization errors (in %) for participants with hearing loss at fitting with M&RIE after four months of wear time with M&RIE. Front-back errors were 19.8% at fitting and 12.2% at the four-month follow up. The improvement in front-back localization following four months of use was statistically significant ($p < 0.05$). Adapted from Jespersen (2021).

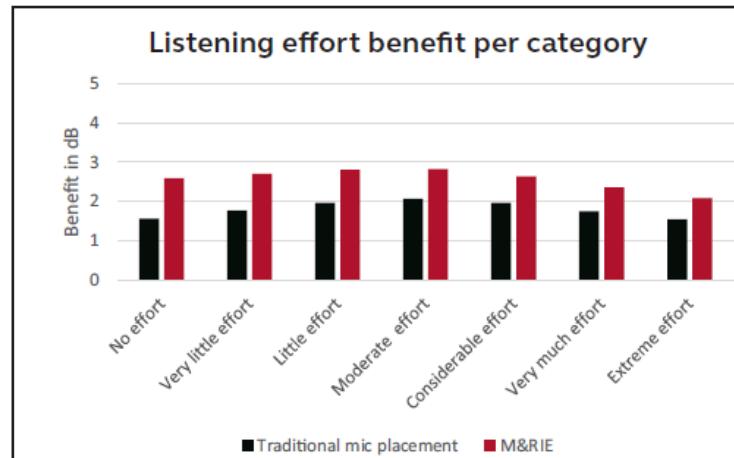


Figure 8. Listening effort benefit for traditional microphone placement versus M&RIE using Adaptive Categorical Listening Effort Scaling (ACALES) procedure. When participants reported “No effort” during the listening task, M&RIE showed more than 1 dB of benefit over the traditional receiver, while situations requiring “Extreme effort” showed less than a 0.5 dB difference. From Quilter et al. (2021).

M&RIE Receiver, cont.

reduction afforded by M&RIE was measured in a wind tunnel using an RIE hearing aid and M&RIE mounted on a KEMAR (Groth, 2020). The intensity level of wind noise was measured at varying angles around KEMAR, using three wind speeds: 2 meters per second (m/s), 5 m/s and 8 m/s. For reference, a wind speed of 2 m/s corresponds to a light breeze that can rustle leaves, while a wind speed of 8 m/s is a stronger breeze that can cause small trees to sway (University of Maine, School of Marine Sciences). Wind noise reduction was measured by comparing the intensity level of the wind at the omnidirectional microphones on top of the pinna, and with M&RIE located inside the ear opening. Figure 9 displays the average reduction in wind noise across all angles for the M&RIE versus the traditional microphone location on top of the pinna. At 2 m/s, wind noise was reduced by 19 dB by use of M&RIE, reduced by 15 dB in wind at 5 m/s and 14 dB in wind at 8 m/s.

Andersen et al. (2021) evaluated perceptual annoyance with wind noise using RIE hearing aids and M&RIE. Sixteen adults with normal hearing evaluated the sound quality of wind noise with a speed of 5 m/s, prerecorded on an acoustic manikin in a wind tunnel at three azimuths (0 deg., 135 deg., and 270 deg.). They used three hearing aid settings: traditional omnidirectional microphones with digital wind noise reduction (ReSound Wind Guard feature), omnidirectional without Wind Guard and M&RIE (also without Wind Guard). They rated the annoyance level of each listening condition using a 7-point Likert scale, with 1 = no noticeable wind and 7 = extremely annoying. Results for the study are displayed in Figure 10. Wind originating from in front of the listener (0 deg.) showed the greatest annoyance, while wind from behind (270 deg.) was rated as least annoying – this was regardless of microphone location or Wind Guard. The median ratings of annoyance ranged from 4.5 – 7 in omnidirectional mode, from 5-6 in omnidirectional + Wind Guard, and from 2-5 using M&RIE. This decrease in annoyance with wind noise from M&RIE was statistically significant compared to the other programs, regardless of wind direction ($p < 0.05$).

Conclusion

M&RIE is an innovative concept that gives hearing aid users the benefit of utilizing their own unique pinna cues in a small, cosmetically appealing over-the-ear device. M&RIE has demonstrated a variety of advantages for users – less perceptible wind noise and its accompanying annoyance, improvements in localization, especially after a period of acclimatization, reduced listening effort in noise, and better sound quality ratings related to naturalness, clarity and spatial perception.

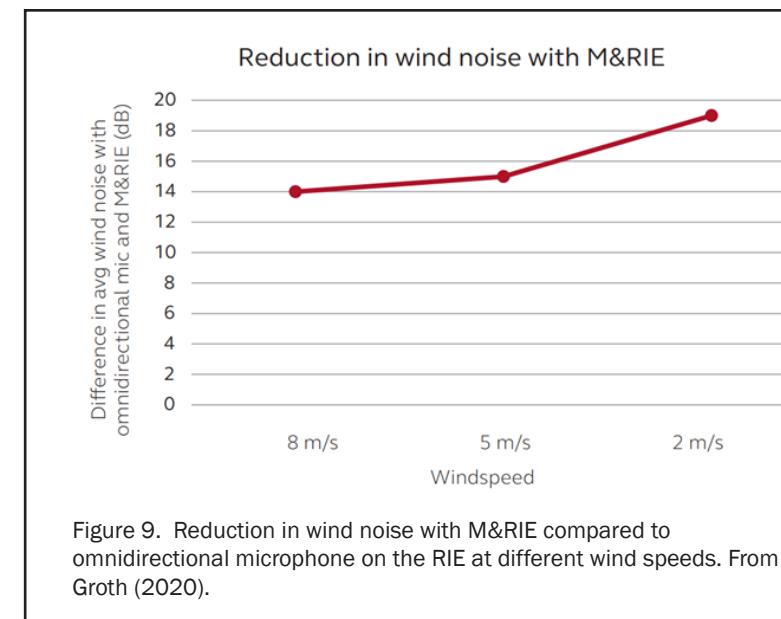


Figure 9. Reduction in wind noise with M&RIE compared to omnidirectional microphone on the RIE at different wind speeds. From Groth (2020).

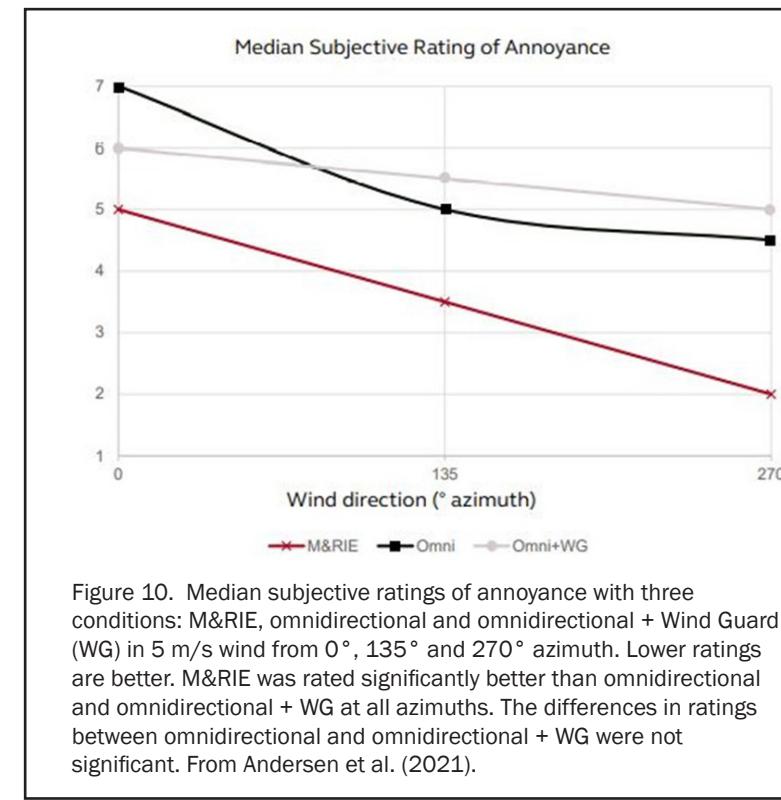


Figure 10. Median subjective ratings of annoyance with three conditions: M&RIE, omnidirectional and omnidirectional + Wind Guard (WG) in 5 m/s wind from 0°, 135° and 270° azimuth. Lower ratings are better. M&RIE was rated significantly better than omnidirectional and omnidirectional + WG at all azimuths. The differences in ratings between omnidirectional and omnidirectional + WG were not significant. From Andersen et al. (2021).

References

- Andersen, P., Schindwolf, I., & Jespersen, C. (2021). Less wind noise with M&RIE leads to better sound quality. *ReSound white paper*.
- Akeroyd, M. A. (2014). An overview of the major phenomena of the localization of sound sources by normal-hearing, hearing-impaired, and aided listeners. *Trends in Hearing*, 18, 1-7.
- von Békésy, G. (1960). *Experiments in Hearing*. McGraw-Hill.
- Desjardins, J. L., & Doherty, K. A. (2014). The effect of hearing aid noise reduction on listening effort in hearing-impaired adults. *Ear and Hearing*, 35(6), 600-10.

cont.

M&RIE Receiver, cont.

- Desjardins, J. L. (2016). The effects of hearing aid directional microphone and noise reduction processing on listening effort in older adults with hearing loss. *Journal of the American Academy of Audiology*, 27(1), 29–41.
- Gatehouse, S., & Noble, W. (2004). The Speech, Spatial and Qualities of Hearing Scale (SSQ). *International Journal of Audiology*, 43(2), 85–99.
- Groth, J. (2020). An innovative RIE with microphone in the ear lets users “hear with their own ears”. ReSound white paper.
- Hornsby, B. W. (2013). The effects of hearing aid use on listening effort and mental fatigue associated with sustained speech processing demands. *Ear and Hearing*, 34(5), 523–34.
- Jespersen, C., Kirkwood, B., & Schindwolf, I. (2020). M&RIE receiver preferred for sound quality and localization. ReSound white paper.
- Jespersen, C. (2021). Localization with M&RIE improves with experience. ReSound white paper.
- Kochkin, S. (2000). MarkeTrak V: “Why my hearing aids are in the drawer”: The consumers’ perspective. *Hearing Journal*, 53(2), 34–42.
- Kochkin, S. (2002). 10-year customer satisfaction trends in the US hearing instrument market. *Hearing Review*, 9(10), 14, 18–20, 22–25, 46.
- Krueger, M., Schulte, M., Brand, T., & Holube, I. (2017). Development of an adaptive scaling method for subjective listening effort. *The Journal of the Acoustical Society of America*, 141(6), 4680–93.

- Legarth, S. V., Simonsen, C. S., Dyrlund, O., Bramsloev, L., & Jespersen, C. (2012). Establishing and qualifying a hearing impaired expert listening panel. Poster presentation at International Hearing Aid Research Conference, Lake Tahoe, CA, USA.
- Nelson, J. (2005). Open solutions – Why, how, and when? Proceedings of the 21st Danavox Symposium, Denmark.
- Picou, E. M. (2020). MarkeTrak 10 (MT10) survey results demonstrate high satisfaction with and benefits from hearing aids. *Seminars in Hearing*, 41(1), 21–36.
- Pichora-Fuller, M. K., Kramer, S. E., Eckert, M. A., Edwards, B., Hornsby, B. W., Humes, L. E., Lemke, U., Lunner, T., Matthen, M., Mackersie, C. L., Naylor, G., Phillips, N. A., Richter, M., Rudner, M., Sommers, M. S., Tremblay, K. L., & Wingfield, A. (2016). Hearing impairment and cognitive energy: The Framework for Understanding Effortful Listening (FUEL). *Ear and Hearing*, 37 Suppl 1, 5S–27S.
- Quilter, M., Groth, J., & Krueger, M. (2021). ReSound ONE with M&RIE reduces listening effort. ReSound white paper.
- Strom, K. (2020). Hearing aid unit sales increase by 6.5% in 2019. *Hearing Review*, 27(2), 6, 34.
- University of Maine, School of Marine Sciences. (n.d.). *Beaufort wind scale*. http://gyre.umeoce.maine.edu/data/gomoos/buoy/php/variable-description.php?variable=wind_2_speed



February 4-5, 2022
Sheraton—Bloomington

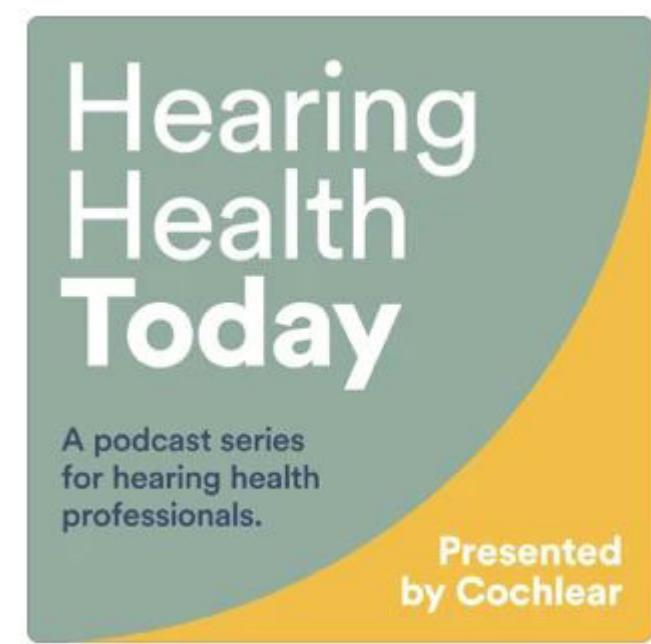
Upper Midwest Audiology Conference

speakers include:

- Kirsten Coverstone, AuD
 - Kris English, PhD
 - Heidi Hill, AuD
 - Robert Lang, AuD
 - Tricia Nechodom, AuD
- Melissa Polonenko, PhD
 - Mark Schleiss, MD
 - Elizabeth Walker, PhD
 - Lori Zitelli, AuD

www.minnesotaaudiology.org/conference

registration is still open!



Hearing Health Today is a series for hearing health professionals that explores the key challenges, trends and opportunities in the delivery of hearing care. Listen to episodes of **Hearing Health Today** now.