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Me & My Audie: The Importance of the Consumer-Professional Partnership

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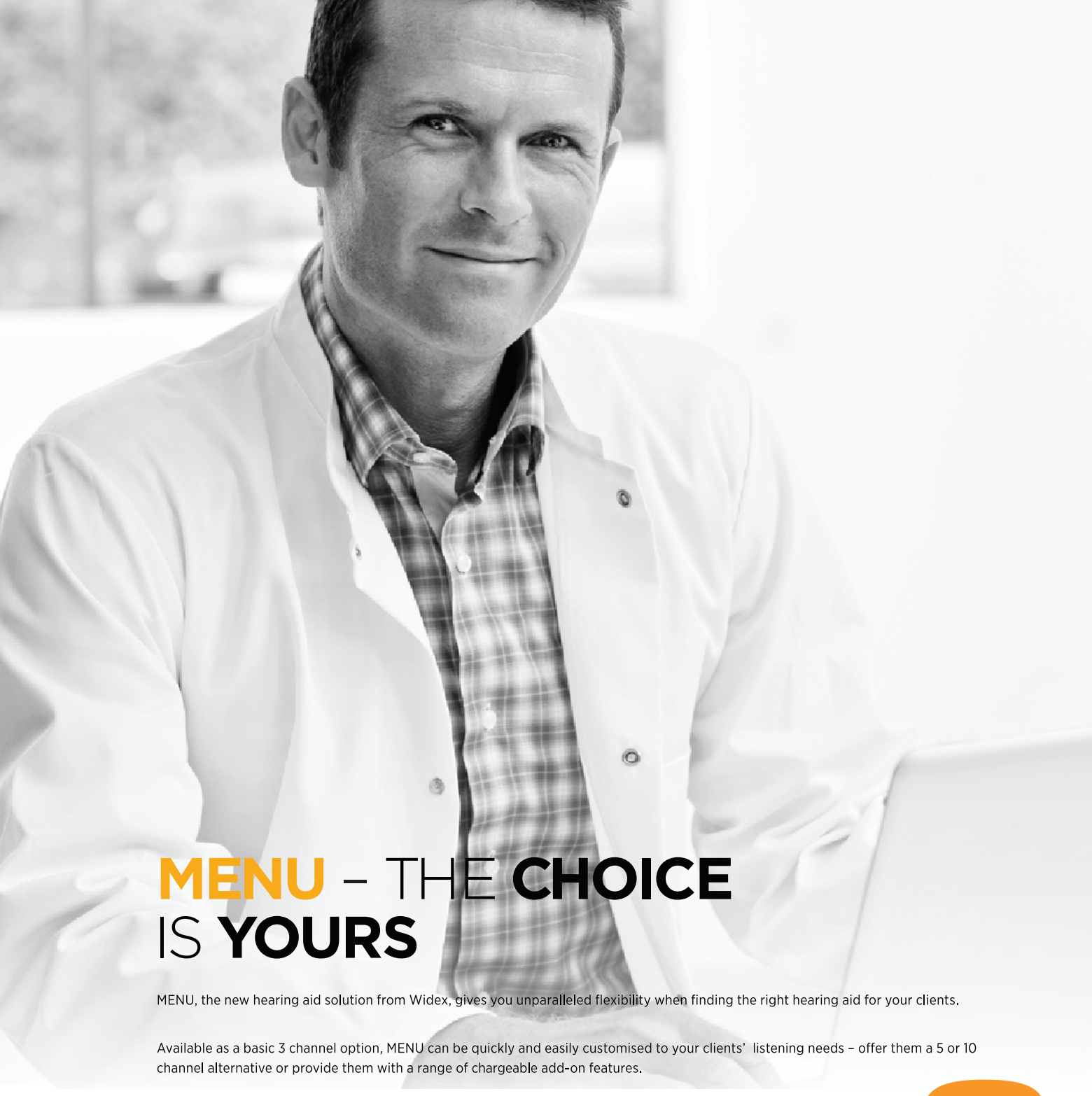

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Years ago I wrote an article with the title, "Outside of the audiology room". I am not sure where I submitted it or if it ever was published, but I was gradually starting to realize (or remember?) that it was what I did outside of normal audiometry that was really audiology, and also that this was really quite important to our clients. I am not sure that the art of audiology is something that can be explicitly taught, but it is something that can be learned. I suspect that it should not be in the university audiology curriculum as a specific course with a specific course number, but it is something that should permeate all of the audiology courses and clinical practicums.

Accurate audiometry is certainly important, and this is where the various provincial medicare programs pay for things, but that is only the very beginning. What is sometimes just as important, if not more so, is the interaction that I have with my client– audiology is as important as an art as it is a science. Actually this is precisely what drew me to audiology in the first place. Having completed a degree in theoretical mathematics, I was looking for a field that would allow me to apply the science and also the art – audiology provided the perfect balance. (Actually speech-language pathology does that as well but I am not smart enough to keep track of the many tests that my speech colleagues need to perform.)

All too often, an audiologist does what is "paid for." Many of us work in the realm of hearing aids since this is "what pays the bills." Hearing tests can be billed through the provincial medical schemes, but the many things that comprise the art of audiology are not "billable." It is unfortunate that we live in a market society where the worth of something is defined by its price or the value of a code that can be billed.

This issue of the *Canadian Hearing Report* has been guest edited by two of my favourite people, Dr. Joanne DeLuzio and Gael Hannan. Joanne DeLuzio has the unique combination of being a clinical audiologist with a PhD in speech-language pathology. She has been teaching applied audiology in the Speech-Language Pathology Program at the University of Toronto since 2000. Her primary area of interest is the importance of social skills development and peer interaction for young children with severe and profound hearing loss. Joanne is an advocate for the removal of barriers for people who are D/deaf and hard of hearing. She has served as vice-chair and chair of the board of The Canadian Hearing Society and is currently on the interim board of Hands and Voices. Despite having an odd spelling for her first name, Gael Hannan is a writer, actor, and public speaker who grew up with a progressive hearing loss that is now severe-to-profound. She is a director on the national board of the Canadian Hard of Hearing Association (CHHA) and an advocate whose work includes speechreading instruction, hearing awareness, workshops for youth with hearing loss, and work on hearing access committees. Gael also writes a blog from the consumer's point of view for HearingHealthMatters.org and is a regular columnist as the Happy HoH for the *Canadian Hearing Report*.

Joanne and Gael have teamed up to remind us all what is really important in the field of audiology – the interaction between the hearing health care professional and the client. And, they have coordinated an amazing list of authors ranging from Dr. Laya Poost-Foroosh to Dr. Andre Marcoux. Andre was the first editor-in-chief of the *Canadian Hearing Report*. They even convinced Dr. Charles Laszlo to write something for them – actually they probably only needed to ask him once, and he likely jumped at the chance. For those who do not know Charles, he was the guiding force that resulted in the eventual formation of the Canadian Hard of Hearing Association. And, he was the guy who sat beside me at many of the CRTC meetings on hearing aid telephone compatibility in the early 1980s. Thank goodness he was on my side!

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Canadian Hearing Report 2012;7(6):3.

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Il y a quelques années, j'ai écrit un article intitulé, "Hors de la chambre d'audiologie". Je ne suis pas certain où je l'avais soumis ou s'il a jamais été publié, mais petit à petit, j'ai commencé à réaliser (ou me rappeler?) que ce que je faisais en dehors de l'audiométrie normale était vraiment de l'audiologie, et que c'était vraiment important pour nos clients. Je ne suis pas certain que l'art de l'audiologie peut être enseigné explicitement, mais il peut être appris. Je doute bien qu'il ne devrait pas être dans le programme universitaire de l'audiologie comme cours spécifique avec un numéro correspondant, mais il devrait infiltrer tous les cours d'audiologie et pratiques cliniques.

L'audiométrie précise est certainement importante, et ce que les différents programmes provinciaux de l'assurance santé couvrent, mais c'est seulement le tout début. Ce qui est tout aussi important des fois, si ce n'est plus, est l'interaction que j'ai avec mon client-l'audiologie est tout un art, aussi important que c'est une science. En fait, c'est précisément ce qui m'a attiré vers l'audiologie de premier abord. Ayant obtenu un diplôme en mathématiques théoriques, j'étais à la recherche d'un domaine qui me permettrait d'appliquer et la science et l'art–L'audiologie a été l'équilibre parfait. (En fait, l'orthophonie fait pareil mais je ne suis pas assez intelligent pour me tenir au courant de tous les tests que mes collègues orthophonistes ont à effectuer.)

Tout aussi souvent, un audiologiste exécute ce qui "remboursé." Plusieurs d'entre nous exerçons dans le domaine des appareils auditifs étant donné que c'est ce qui "couvre nos dépenses." Les tests auditifs sont facturés à travers les programmes médicaux provinciaux, mais plusieurs composantes de l'art de l'audiologie ne sont pas "facturables." C'est malheureux de vivre dans une société de marché où la valeur des choses est définie par leurs prix ou la valeur d'un code à facturer.

Ce numéro de *La revue canadienne d'audition* a comme éditrices invitées deux de mes personnes favorites, Dr. Joanne DeLuzio et Gael Hannan. Joanne DeLuzio a la combinaison unique d'une audiologiste clinicienne et titulaire d'un doctorat en orthophonie. Elle enseigne l'audiologie appliquée dans le programme de l'orthophonie de l'Université de Toronto depuis l'année 2000. Son domaine d'intérêt primaire est l'importance du développement des compétences sociales et l'interaction entre paires pour jeunes enfants qui présentent une perte auditive sévère et profonde. Joanne milite pour la suppression des barrières pour les personnes culturellement sourdes, sourdes et avec perte auditive. Elle a siégé en tant que vice-présidente et présidente du conseil d'administration de la société canadienne de l'ouïe et actuellement siège au conseil intérimaire de Hands and Voices. En dépit de son prénom à grammaire inusuelle, Gael Hannan est un auteur, actrice, et oratrice qui a grandi avec une perte auditive progressive qui est maintenant sévère à profonde. Elle est directrice au conseil d'administration national de l'association des malentendants canadiens et militante dont le travail inclus la formation en lecture labiale, sensibilisation à l'ouïe, ateliers pour les jeunes qui présentent une perte auditive, et les travaux sur les comités d'accès à l'audition. Gael a aussi un blog du point de vue du consommateur pour HearingHealthMatters.org et est chroniqueuse régulière en tant que the Happy Hoh pour *la revue canadienne d'audition*.

Joanne et Gael font équipe pour nous rappeler à nous tous ce qui est vraiment important dans le domaine de l'audiologie – l'interaction entre le professionnel des soins de santé auditifs et le client. Elles ont coordonné une liste extraordinaire d'auteurs allant de D[r] Laya Poost-Foroosh au D[r] André Marcoux. André est le premier éditeur en chef de *la revue canadienne d'audition*. Elles ont même convaincu D[r] Charles Laszlo qui a écrit pour elles– en fait, elles n'ont eu probablement à lui demander qu'une seule fois, et vraisemblablement, il a sauté sur l'occasion. Pour ceux et celles qui ne connaissent pas Charles, il est la force qui a abouti à la formation de l'association des malentendants canadiens. Et, il est le gars qui s'est assis à mes côtés à plusieurs réunions du CRTC au sujet de la compatibilité téléphonique des appareils auditifs au début des années 80. Dieu merci, il était de mon côté!

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Canadian Hearing Report 2012;7(6):7.

Me & My Audie: The Importance of the Consumer-Professional Partnership

About the Guest Editors

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Gael Hannan (far left), is a hearing health advocate and a writer on consumer hearing loss issues. gdhannan@rogers.com.

The hearing loss population is booming. Hearing assistive technology has reached unprecedented levels of sophistication and accessibility. Universities and colleges across the country are producing hundreds of educated and skilled hearing health care professionals each year. The number of hearing health clinics and hearing aid retailers is increasing rapidly, and public awareness of hearing loss issues is on the rise. Still, only 20–25% of people who could benefit from hearing aids and aural rehabilitation actually access hearing health care, and those who do often express dissatisfaction with the care they receive. While affordability of hearing aids is acknowledged as a major problem, how hearing health care professionals provide service to their clients is being recognized as an equally important issue.

As a consumer with hearing loss (Gael) and a hearing health care professional (Jo), we've been interested in this subject for many years. In 2003 we gave a presentation at the Hearing Loss Association of American (HLAA, then SHHH) conference in Atlanta, Georgia. "Me and My Audie" looked at the importance of the consumer-audiologist partnership. Although the turnout was poor – we were competing with an ice cream social – the workshop participants who did attend were thrilled with what they heard. We were convinced (and remain so) that people with acquired hearing loss can reach their optimal level of communication – that is, living successfully with hearing loss – if they and their hearing health care professionals engage in a positive, long-term relationship.

The concept is simple, but it has been a tough sell. There is a history of mistrust between these two groups. Consumers are not happy with the medical view of hearing loss and the paternalistic perspective of the professional who presumes to know what is best for them. There is widespread suspicion that hearing aids are too often recommended based on monetary gain for the professional, and not on the best fit for the consumer. On the other side of the fence, many hearing health care professionals are defensive. It's not always easy working with consumers who have unrealistic expectations that are almost impossible to achieve, and who are often angry and in denial about their hearing loss. Many hearing health care professionals feel burnt out. As professionals who have worked hard to perfect their craft, many are tired of being constantly criticized. This is compounded by the fact that, even when they recognize that a client may need more extensive counselling, under the current fee structures, they are not compensated for this service.

So, is it possible to change the existing dynamics to create positive and effective partnerships? Acquired hearing loss has a profound impact on all aspects of a person's life. When people encounter difficulty with their hearing, they experience a variety of emotions and often do not know where to turn for support. The aural rehabilitative process is complex and often difficult to navigate, especially when the consumer does not know what to expect and/or the professional is not providing it. Technology is changing rapidly and there are copious amounts of information available on the Internet, some of which is misleading. Slick advertisements promise people with acquired hearing loss the latest in invisible hearing aids, perfect hearing in quiet situations, and DVD-quality sound.

Consequently, consumers need a hearing health care professional who will take the time to understand their unique listening needs and help them to sift through a variety of amplification products and other necessary communication strategies. This is not a "one shot" deal. Acquired hearing loss is for life and so is the need for constructive hearing health care, which ideally includes the cultivation of a long-term relationship between the consumer and the hearing health care professional. This relationship must be based on mutual trust and respect to be successful. Consumers need to understand and be involved in all recommendations and aspects of their care. They need to develop reasonable expectations about how they can achieve the best possible outcomes. Both parties have important roles and share responsibility for creating a clear vision and a clear path to optimal communication. "Aural Rehab" is not limited to a course of action that a hearing health care professional prescribes. The process really begins with the first suspicion of hearing loss and continues throughout the lifespan.

Mark Ross, esteemed audiologist and professor emeritus at the University of Connecticut, has often reported on the 8-week, full-time aural rehabilitation program he attended at the Walter Reed Army Medical Center in 1952. According to Dr. Ross, diagnostic tests and hearing aid fittings were provided, but the program also focused on "lipreading" and auditory training, as well as memory and cognitive training. He also speaks of the invaluable support the participants in these groups provided for each other. Wearable hearing aids were not well developed at that time but they were nevertheless seen as an integral part of the whole program to improve communication and facilitate living with hearing loss. It is somewhat ironic that 60 years later hearing aids are no longer considered as a program component. They are viewed as an end in themselves, a self-contained treatment for hearing impairment. To be sure, hearing aids are now highly evolved, but we feel that the industry has lost sight of the real goal, and has shifted its focus from people and communication to instrumentation and technology.

In guest editing this issue of *Canadian Hearing Report*, we are offering the views of both consumers and professionals. We share the belief that there is a need for a new model of hearing care that provides better benefits for both parties, a course of care that presents the big picture of living successfully with hearing loss, an ongoing process that involves professional assessment, mental preparation, technology, and a wide array of communication strategies. Support comes from many sources including family, friends, co-workers, and support groups, but the single most important resource, other than the person themselves, is the trained hearing health care professional.

The central theme of the journal is the pivotal role of this relationship. From the very first meeting – the client with hearing loss and the hearing health care professional whose role is to be of service – a collaborative partnership must form which will provide powerful benefits to both parties. Both partners have clearly defined roles and they share the responsibility for success. Otherwise, audiologists will continue to struggle with clients who balk at every suggestion, and hard of hearing clients who, if they are not exposed to additional communication strategies beyond their hearing aids, will not develop the best possible skills to successfully manage their communication difficulties.

In this journal, you will read about a client-centered model for hearing aid delivery proposed by Poost-Foroosh. We agree with Poost-Foroosh that the impact of hearing loss on a person is highly complex, and cannot be understood without examining that person's perspective on how they function in environments that are specific and important to them. Her paper offers valuable insights on how clinicians can provide more client-centred service. Dr. André Marcoux, professor of audiology at the University of Ottawa, describes his active model for a client-centred practice. Charles Lazlo, a founding member of both the Canadian Hard of Hearing Association and the International Federation of Hard of Hearing People, writes about the pivotal role of technology in his life and why hearing health care professionals need to educate themselves and their clients about integrating technology into their daily activities.

At the time of writing, a joint communiqué was released by the Academy of Doctors of Audiology, the American Speech-Language-Hearing Association and the American Academy of Audiology. This ground-breaking statement recognizes the changing face of the hearing health care environment and calls on the hearing health care community to focus on consumer needs in their service delivery. This statement has been publicly applauded by the Hearing Loss Association of America. How these recommendations will be adopted by health care professionals remains to be seen, but it's our hope that Canadian hearing health care organizations will rise to the challenge, by adopting and promoting similar standards of health care delivery for

Canadians with hearing loss.

The ultimate goal of aural rehabilitation is "optimal communication" for the consumer/client. But what exactly does that mean? (As an aside, we are still searching for a better phrase to describe this concept that does not sound like a brand of hearing aid or yogurt.) Optimal communication will be different for everyone, involving an individual mix of communication tools. It necessitates addressing all of the feelings and emotions associated with hearing loss (e.g., anger, denial, frustration, isolation, stress on relationships, etc.) as well as understanding technology and how it can be used to maximize understanding of speech and overall functioning. Optimal communication for one person might require sound awareness and auditory training or it could mean speechreading training. As well, there are a host of other communication tips (environmental manipulation, preparatory, speaker and listener strategies) that can be used. Assertiveness training, advocacy skills, and obtaining support from others can all be part of someone's "optimal communication" package. Ideally the person with hearing loss and the hearing health care professional will implement a variety of technologies and strategies over the years that can be re-evaluated and changed as the person's hearing and listening needs change, or as technology evolves.

We hope you enjoy this issue that offers different perspectives on a service model in which, together, "me and my audie" can work in partnership to remove barriers to communication and promote living well with hearing loss. Hopefully – and soon – this concept will no longer be a tough sell, but the new reality.

Canadian Hearing Report 2012;7(6):8-10.

Recommendations

1. We call on the Canadian hearing health stakeholders – including professional and consumer groups – to jointly explore a client-centred delivery of health care that recognizes the following:
   - Hearing loss is a significant health issue that requires a targeted health strategy and/or initiatives.
   - Unaddressed hearing loss has far-reaching impact – not only on the quality of life for individual citizens, but on the overall health and economic successes of society.
   - The delivery of a clearly defined aural rehabilitation strategy goes beyond amplification.
   - The need for a coordinated strategy to successfully lobby appropriate levels of government.
2. We call upon the audiology programs in Canada to review their curricula to ensure a focus on client-centred care as the standard of audiology services going forward.
3. Partnerships are key to success. The client-professional partnership is just one of several that need to be created for a successful hearing health strategy:
   - Consumer advocacy and support organizations, such as the Canadian Hard of Hearing Association, need to be strengthened so that they can form strategic and meaningful alliances with professional organizations.
   - Hearing health professionals should connect with health-related organizations and disability groups to create a more powerful voice to provincial and federal governments, the insurance industry and provincial/federal bodies governing workplace issues.
4. As a starting point, we call upon CAA, CASLPA, and CHHA to hold a symposium to address these issues in 2013, either at the CHHA National Conference in May of 2013, or at the CAA or CASLPA conferences. Better yet, start the dialogue at CHHA, continue the discussions at CASLPA, and finalize recommendations at CAA in October of 2013.

Mon Audie & Moi: L'importance du partenariat consommateur-Professionnel

A propos des rédactrices invitées

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La population de la perte auditive est en pleine croissance. La technologie d'assistance auditive a atteint des niveaux sans précédents de sophistication et accessibilité. Les universités et les collèges à travers le pays forment et produisent des centaines de professionnels des soins de santé auditifs compétents chaque année. Le nombre de cliniques de santé auditive et de détaillants d'appareils auditifs augmente rapidement, et la sensibilisation du grand public aux enjeux de la perte auditive est en croissance. Toutefois, seulement 20–25% des personnes qui pourraient bénéficier de l'utilisation d'appareils auditifs et de rééducation auditive, ont accès aux soins de santé auditifs, et celles qui le font expriment souvent leur insatisfaction des soins qu'elles reçoivent. Tandis que l'abordabilité des appareils auditifs est reconnu comme problème majeur, la manière avec laquelle les professionnels des soins de santé auditifs offre leur service à leurs clients est un enjeu d'importance égale.

En tant que consommatrice vivant avec la perte auditive (Gael) et une professionnelle des soins de santé auditifs (Jo), le sujet nous intéressait depuis bien longtemps. En 2003, nous avons présenté à la conférence de the Hearing Loss Association of American (HLAA, jadis la SHHH) qui s'est tenue à Atlanta, dans l'état de Georgia. "Me and My Audie" explorait l'importance du partenariat consommateur-audiologiste. Même si le taux de participation a été faible – on présentait au même temps qu'une activité sociale impliquant de la crème glacée– ceux présents à l'atelier étaient frémissants par ce qu'ils avaient entendu. Nous étions convaincues (et le sommes encore) que les personnes avec une perte auditive acquise peuvent atteindre leur niveau optimal de communication– étant de vivre avec succès leur perte auditive– si elles et leurs professionnels de soins de santé auditifs s'engagent dans une relation positive au long terme.

Le concept est simple, mais très dur à vendre. Les antécédents de méfiance entre ces deux groups ne facilitent pas la tâche. Les consommateurs ne sont pas contents de la vision médicale de la perte auditive et la perspective paternaliste des professionnels qui présument savoir ce qui est mieux pour eux. Une suspicion généralisée que les appareils auditifs sont très souvent recommandés pour des profits pour le professionnel, et non pour l'intérêt du consommateur. De l'autre côté, plusieurs professionnels des soins de santé auditifs sont sur la défensive. Il n'est pas toujours facile de travailler avec des consommateurs qui ont des attentes chimériques qui sont presque impossibles à réaliser, et qui sont souvent en colère et en déni de leur perte auditive. Plusieurs professionnels des soins de santé auditifs se sentent épuisés. Comme professionnels qui ont travaillé très fort à perfectionner leur art, plusieurs sont fatigués d'être critiqués tout le temps. Ceci est cumulé avec le fait que, même quand ils reconnaissent qu'un client pourrait avoir besoin de counseling intensif, sous la structure de frais appliquée actuellement, ils ne sont pas indemnisés pour ce service.

Alors, est-il possible de changer la dynamique existante pour créer des partenariats positifs et efficaces ? La perte auditive acquise a un impact profond sur tous les aspects de la vie d'une personne. Quand les personnes se heurtent aux difficultés à cause de leur ouïe, elles font l'expérience d'émotions variées et

souvent ne savent pas où aller trouver le soutien. Le processus de rééducation auditive est complexe et souvent difficile à naviguer, spécialement quand le consommateur ne sait pas à quoi s'attendre et/ou le professionnel ne l'offre pas. La technologie est en changement rapide et de copieuses quantités d'informations sont disponibles sur internet, et certaines sont trompeuses. Les publicités adroites promettent aux gens qui ont une perte auditive acquise le dernier cri des appareils auditifs invisibles, parfaite ouïe dans des situations tranquilles, avec une qualité de son de DVD.

Par conséquent, les consommateurs ont besoin d'un professionnel des soins de santé auditifs qui prendra le temps de comprendre leurs besoins de réception uniques et les aidera à sélectionner parmi la grande variété des produits d'amplifications et autres stratégies de communications nécessaires. Ceci n'est certainement pas une transaction sans récurrence. La perte auditive acquise est pour la vie et tout aussi le besoin pour des soins de santé auditifs constructifs, qui idéalement incluent la culture d'une relation au long terme entre le consommateur et le professionnel des soins de santé auditifs. Cette relation doit se baser sur une confiance et un respect mutuels pour avoir du succès. Les consommateurs ont besoin de comprendre et d'être impliqués dans toutes les recommandations et aspects de leurs soins. Ils ont besoin de développer des attentes raisonnables des réalisations des meilleurs résultats possibles. Les deux parties ont des rôles importants et partagent la responsabilité pour la création d'une vision et d'une trajectoire claires à une communication optimale. "La rééducation auditive" n'est pas limitée à un plan d'action qu'un professionnel des soins de santé auditifs prescrit. Le processus commence réellement avec le premier soupçon de perte auditive et continue à travers la durée de la vie.

Mark Ross, audiologiste respecté et professeur émérite à the University of Connecticut, a souvent rapporté sur le programme à temps plein de 8 semaines en rééducation auditive auquel il a participé au the Walter Reed Army Medical Center en 1952. Selon Dr Ross, les tests de diagnostic et l'ajustement des appareils auditifs ont étés fournis, mais le programme s'est aussi centré sur " la lecture labiale" et l'éducation auditive, tout aussi bien que le développement des compétences cognitives et de mémorisation. Il évoque aussi le soutien inestimable des participants les uns aux autres dans ces groupes. Les appareils auditifs portables n'étaient pas très développés à l'époque pourtant ils étaient perçus comme partie intégrale du programme complet pour améliorer la communication et faciliter la vie avec la perte auditive. Il est plutôt ironique que 60 ans après, les appareils auditifs ne sont plus considérés comme composants du programme. Ils sont vus comme une fin en soi, un traitement autonome pour la déficience auditive. C'est sûr, les appareils auditifs sont maintenant très évolués, mais nous avons le sentiment que l'industrie a perdu de vue les objectifs réels, et a déplacé sa concentration sur les personnes et la communication vers l'instrumentation et la technologie.

En tant qu'éditrices invitées de ce numéro de la revue canadienne d'audition, nous présentons les points de vue des consommateurs et professionnels. Nous partageons le même point de vue que le besoin se fait sentir pour un nouveau modèle de soins de santé auditifs qui fournit de meilleurs avantages pour les deux parties, un plan de soins qui présente la grande perspective de vie avec succès sa perte auditive, un processus continu qui implique l'évaluation professionnelle, la préparation mentale, la technologie, et une large gamme de stratégies de communication. Le soutien provient de sources différentes, la famille, les amis, les collègues de travail et les groupes de soutien, mais la plus importante et unique ressource, autre que la personne en soi, est le professionnel de soins de santé auditif qualifié.

Le thème central de cette revue est le rôle clé de cette relation. Dès la première réunion– le client qui présente une perte auditive et le professionnel des soins de santé auditif dont le rôle est de servir– un partenariat de collaboration doit se former et va fournir des avantages puissants aux deux parties. Les deux partenaires ont des rôles clairement définis et ils partagent la responsabilité de la réussite. Autrement, les audiologistes continueront à avoir des difficultés avec les clients qui flanchent à chaque suggestion, et les clients malentendants qui, s'ils ne sont pas exposés à des stratégies de communication au-delà des appareils auditifs, ne vont pas développer les meilleures compétences possibles pour gérer avec succès leurs difficultés de communication.

Dans cette revue, vous aller en savoir plus sur un modèle de prestation de service des appareils auditifs centré sur le client proposé par Poost-Foroosh. Nous sommes d'accord avec Poost-Foroosh que l'impact de la perte auditive sur une personne est très complexe, et ne peut être compris sans examiner la perspective de la personne sur son fonctionnement dans des environnements qui sont spécifiques et importants pour elle. Son papier offre un aperçu précieux sur un service centré sur le client que les cliniciens peuvent offrir.

Dr André Marcoux, professeur en audiologie à l'Université d'Ottawa, décrit son modèle actif pour un cabinet centré sur le client. Charles Lazlo, un membre fondateur de l'association des malentendants canadiens et the International Federation of Hard of Hearing People, fait état du rôle clé de la technologie dans sa vie et de la nécessité que les professionnels des soins de santé auditifs forment et instruisent leurs clients sur l'intégration de la technologie dans leurs activités quotidiennes.

Au moment de l'élaboration de ce papier, un communiqué conjoint a été diffusé par the Academy of Doctors of Audiology, the American Speech-Language-Hearing Association et the American Academy of Audiology. Cette déclaration inédite reconnait le faciès changeant de l'environnement des soins de santé auditifs et appelle la communauté des soins de santé auditifs à se concentrer sur les besoins du consommateur dans leur prestation de service. Cette déclaration a été publiquement applaudie par statement recognizes the changing face of the hearing environment and calls on the hearing healthcare community to focus on consumer needs in their service delivery. This statement has been publicly applauded by the Hearing Loss Association of America. Comment seront adoptées ces recommandations par les professionnels des soins de santé reste à voir, mais c'est notre souhait que les organisations canadiennes des soins de santé auditifs vont se montrer à la hauteur de la situation en adoptant et en faisant la promotion de normes similaires pour la prestation des services pour les canadiens vivant avec une perte auditive. How these recommendations will be adopted by healthcare professionals remains to be seen, but it's our hope that Canadian hearing healthcare organizations will rise to the challenge, by adopting and promoting similar standards of healthcare delivery for Canadians with hearing loss.

L'objectif ultime de la rééducation auditive est "la communication optimale" pour le consommateur/client. Mais ça veut dire quoi exactement? (Comme en aparté, nous sommes toujours à la recherché d'une meilleure phrase pour décrire ce concept qui sonne comme une publicité pour une marque d'appareil auditif ou yogourt.) La communication optimale est différente pour tous, elle implique un mélange individuel d'outils de communications, elle nécessite une réponse à tous les sentiments et émotions associés avec la perte auditive (ex., colère, déni, frustration, isolement, stress dans les relations, etc.) et aussi une compréhension de la technologie et son utilisation pour maximiser la compréhension du discours et le fonctionnement en général. La communication optimale pour une personne pourrait exiger la sensibilisation au son et une éducation auditive ou signifier une formation sur la lecture labiale. Aussi, une multitude d'autres atouts de communication (Stratégies pour orateur et auditeur, de préparation et de manipulation environnementale) peuvent être utilisées. La formation sur la confiance en soi, les compétentes pour le travail de défense, et l'obtention de soutien d'autres peuvent faire partie du paquet "communication optimale" d'une personne. Idéalement, la personne qui présente une perte auditive et le professionnel des soins de santé auditifs vont mettre en œuvre une variété de technologies et stratégies à réévaluer et changer au fur et à mesure que les besoins en ouïe et écoute changent, ou à mesure que la technologie évolue.

Nous espérons que vous allez prendre du plaisir à lire supplément qui offre des perspectives différentes en un modèle de service dans lequel, ensemble, "Mon audie et moi" peut fonctionner en partenariat pour supprimer les barrières à la communication et faire la promotion du bien être avec une perte auditive. Espérons – et bientôt – que ce concept ne soit pas dur à vendre, mais plutôt la nouvelle réalité.

Canadian Hearing Report 2012;7(6):11-13.

The Canadian Academy of Ideology?

Steve Aiken
President, Canadian Academy of Audiology
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As I walked in the door after being away for a week at our conference, my youngest, Isaac, who has just learned to talk, jumped into my arms and shouted "Dada"! Is there anything better than this? When you stop and think about how important communication is for what it means to be human, it is truly staggering. We are defined by our relationships and our communities; we are social beings to the core.

Audiologists play an incredibly important role helping people with this most basic aspect of human existence. Our community has many dedicated members that work hard every day to help people overcome barriers in communication. It's easy to become lost in the details, to get caught up in the tensions of the moment – busy waiting rooms, hearing aid fitting problems, diagnostic puzzles and challenges with third-party payers – but it's worth stepping back and looking at the big picture. The challenges will always be there, but the challenges associated with untreated hearing loss are worse: educational problems, lost employment opportunities, dementia, and social isolation. That is why our work is so important.

In spite of this, audiology is still relatively unknown. Many people don't know who we are or what we do, and how we fit into the health care system. They know about optometrists and dentists, but not audiologists. Once, after telling someone that I was an audiologist, I was asked "How can you make money studying ideas?" I probably should have given her my card! People need to know about the importance of visiting an audiologist, of taking care of their hearing, and of seeking treatment for hearing loss and tinnitus. And governments need to know about the importance of our services and the need for adequate funding. Communication is not an optional part of the human experience.

I believe we can make the biggest difference by being strategic – by working as a team to promote our profession in a focused way, through promotion, education and advocacy. This year the CAA is embarking on efforts to vastly improve our communications to the public, to connect people with audiologists, and to educate our members about important issues in audiology. This will involve a redevelopment of our website and social media presence, excellent new content from Canadian audiologists, and continued advocacy efforts with federal health partners. We've already come a long way. Our professional journal, the *Canadian Hearing Report*, has become the definitive Canadian audiology publication, and the annual conference is, by far, the largest meeting of Canadian audiologists, with unparalleled opportunities for education and connecting with colleagues. But we can do more, and we will do more. If you've ever considered getting involved, please know that there has never been a better time. The academy is driven by its members, and we have some big plans.

I am honoured to be a part of the Canadian audiology community, and to call many of you friends. And I am glad to be able to play a small role in supporting you through the CAA. Thank you for all that you do to help people hear the important things in their lives.

Canadian Hearing Report 2012;7(6):14.

Unitron Canada Partners with the National Youth Orchestra of Canada (NYOC)

Shakespeare once wrote "if music is the food of love; play on." Music nurtures the soul and provides much joy to those who listen, and those who perform. But for a musician with hearing loss, the impact professionally can be devastating.

To raise awareness of hearing loss and prevention among professional musicians, Unitron Canada has partnered with the National Youth Orchestra of Canada (NYOC) as the exclusive sponsor for a series of Hearing Loss and Prevention Workshops, aimed at educating and equipping today's young musicians with the skills and knowledge necessary to sustain a long and successful performing career.

For the last 52 years, the NYOC has established itself as the primary destination for young musicians seeking to carve out a professional music career. More than 40% of professional musicians in Canada are alumni of the NYOC and graduates of the program have gone on to work in professional orchestras across Canada and the world, including the Toronto Symphony Orchestra, the Canadian Opera Company, the London Symphony Orchestra, the Chicago Symphony Orchestra, Berlin Philharmonic and the Cleveland Orchestra to name just a few.

The NYOC's training curriculum consists of chamber music, full orchestral rehearsals, sectionals, private lessons; workshops in career development, wellness and injury prevention; tour performing at some of the best concert halls including Koerner Hall in Toronto and Maison Symphonique in Montreal; and a recording session at McGill University. Unitron's sponsorship now allows for the additional inclusion of workshops on hearing loss and prevention.

Hearing loss is an unspoken reality for many musicians. Virtually every musician experiences hearing loss in some form or another, a reality that creates significant professional challenges for individuals for whom a "good ear" is imperative.

The NYOC's Hearing Loss and Prevention Workshop, developed by NYOC lead advisor Dr. Marshal Chasin of Musician's Clinics of Canada, creates awareness of hearing loss among musicians and provides performers with practical strategies for preventing and treating hearing loss. It is hoped that through better education, young musicians of the NYOC will take the necessary steps and precautions to protect their hearing and prevent hearing loss, resulting in the avoidance of serious damage and a long and fruitful musical performing career.

"Hearing matters," says Rob Walesa, general manager, Unitron Canada. "At Unitron, we are deeply committed to carrying this message forward, and to helping raise awareness of hearing loss within the communities where we live and work. We applaud the NYOC for their strong emphasis on hearing loss prevention, and for their programs to educate tomorrow's professional musicians on the importance of hearing preservation and protection. It is a terrific, forward-looking program and we are delighted to be the NYOC's exclusive sponsor in this initiative."

Canadian Hearing Report 2012;7(6):15.

The Canadian Academy of Audiology

2012 CAA Award Winners

Moneca Price Humanitarian Award

Gilbert Li

Jean Kienapple Award for Clinical Excellence

Lynne McCurdy

Student Award

For academic, research, clinical, or community service excellence.

Rhys Kooistra - University of Western Ontario
Ido Bornstein - University of British Columbia
Nicolas Rouleau - Université de Montréal
Tanya Vaillancourt - Université d'Ottawa
Jennifer Mulle - Dalhousie University

Student Outstanding Research Award

Mathieu Hotton

Student Bursary Recipient

Simon Landry

The President's Award

In recognition of outstanding contribution to the development of CAA.

Erica Wong

Research Grant for Clinical Investigators

Akram Keymanesh, Marilyn Reed, Heather Finkelstein,
Debbie Ostroff (Mentor: Dr. Kathy Pichora-Fuller)

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By Calvin Staples, MSc
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A few weeks ago, the CAA (Canadian Academy of Audiology) conference occurred in Ottawa where many audiologists sat in lectures and walked through the hearing aid manufacturers' exhibits. I thought my blog today would focus on hearing aid technology and the essential need for clinical competence with our newer technologies. Hearing aid manufacturers are providing clinicians with new advances in technology on nearly a monthly basis. It would be unrealistic for the clinician to fully understand all of these technologies, but they should intimately know the core products and be able to easily explain them to our patients and all who support or work with them. The blogs below provide some "good food for thought" on items we use daily with our patients.

WHEN RITE MAY BE WRONG AND RIC MAY BE RIGHT

By Wayne Staab

MEASUREMENTS: RIC, RITE, AND THIN TUBE BTE (RIA) HEARING AIDS

RIC (receiver-in-the-canal, or what some call RITE: receiver in the ear) hearing aids are major products in a dispenser's hearing aid sales. This article will use the term RIC because it is thought to be a more accurate description when properly fitted, and some of the advantages identified as being associated with a RITE hearing aid are achieved primarily in a RIC configuration. In essence, a RITE hearing aid could have the speaker fit in the concha, and as a result, would not be able to provide the same acoustic benefits as would a RIC, where the hearing aid is positioned more deeply in the ear canal, and not in the concha.

RIA (receiver-in-the-aid) hearing aids contain all electronics in the hearing aid processor itself, and do not separate the speaker from the hearing aid. An RIA hearing aid could be either a conventional BTE or a thin tube BTE. RIC, RITE, and Thin Tube RIA category hearing aids are generally readily fit with patient acceptance and satisfaction high. However, a few hints/suggestions may assist in some problem solving or provide assistance in how to fit and test them more easily. For this discussion, the RIC and RITE hearing aids are considered to be closed coupled to the ear, rather than having vents.

WHEN RITE MAY BE WRONG AND RIC MAY BE RIGHT – SPEAKER INSERTION DEPTH

Manufacturers of all three of these hearing aid types generally offer a selection of speaker links to be able to appropriately fit different top-of-auricle-to-ear-canal lengths. Along with these dimensions, the speaker link insertion depth into the ear canal is directly related to its overall length as well. For example, a long speaker link inserts further into the ear canal than does a short speaker length (Figure 1).

The following discussion relates to the speaker insertion depths with RIC and RITE closed coupler hearing aids, and not to RIAs. Is this length, and subsequent insertion depth, critical to a successful fitting? The answer is that the depth that the speaker is inserted into the ear canal has a direct effect on the

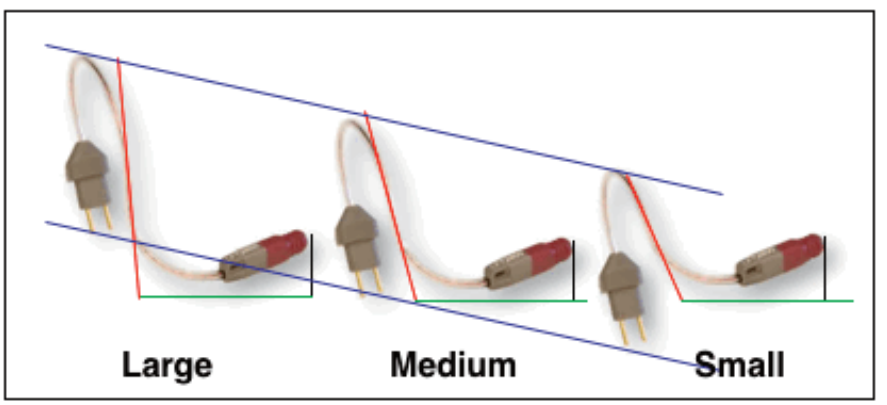


Figure 1. Speaker link design, showing three different sizes: large, medium, and small (left to right). The lengths (red lines) show the general differences in link length from top of auricle to bottom of speaker angle into the ear. The green lines below the speakers are the same length, showing that the distance into the ear canal is shorter as the speaker links move downward in size, and the parallel blue lines show that the changes in length relate to the length from the top of the auricle to the entrance of the ear canal, and not to changes in the length connected from the hearing aid processor to the turn on top of the auricle.

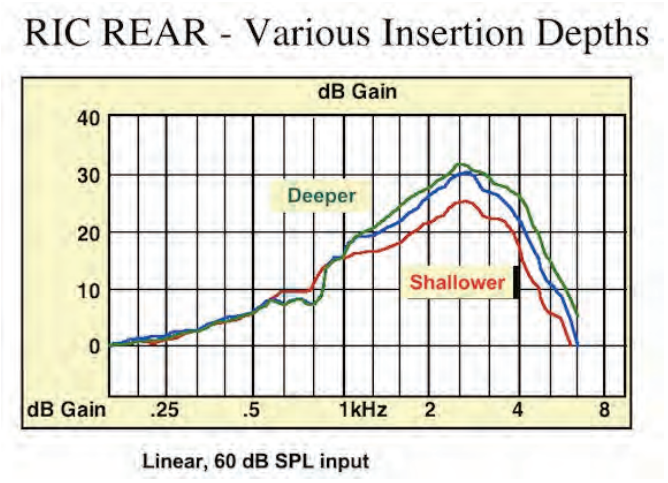


Figure 2. REAR (Real-Ear Aided Response) of RIC speaker lengths in the ear canal. Significant high-frequency amplification can be lost using a speaker link that is fitted too shallow in the ear canal.

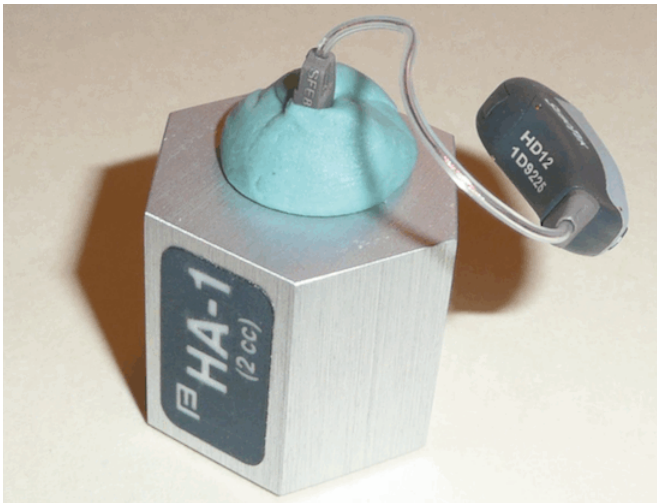


Figure 3. Standard method for electroacoustical measurement of RIC and RITE hearing instruments, especially for those fitted in an occluded procedure. The speaker, either with or without the tip attached, is sealed to the HA-1 2cc coupler with the use of Funtack.

Figure 4. Modified HA-1 2 cc SB coupler. A 9 mm diameter permanent "nest" has been attached to the top of the coupler. The nest is designed to accept an ear tip with its bullet-shaped end and directs the sound from the speaker directly into the coupler input opening. A 9 mm tip provides a friction fit, thereby eliminating the need for Funtack. Additionally, the speaker link cannot be inserted down into the coupler as often occurs. This arrangement allows for consistent measurements, and with ease.

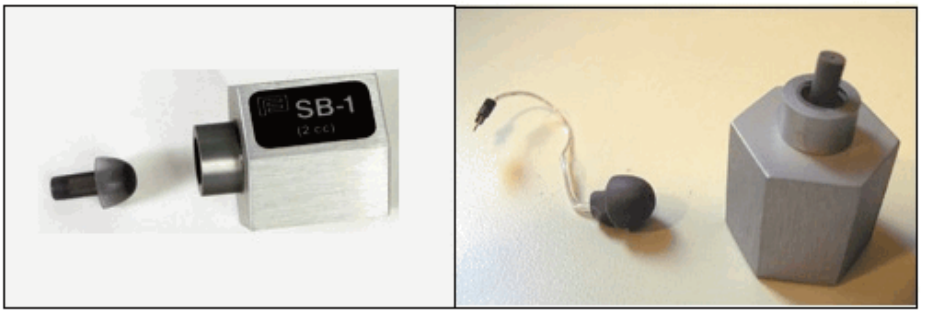


Figure 5. A 9 mm diameter tip is supplied with the coupler to fit into the speaker tip nest. The tip is able to fit essentially all traditional RIC speaker links because of its ability to expand in the stem portion.

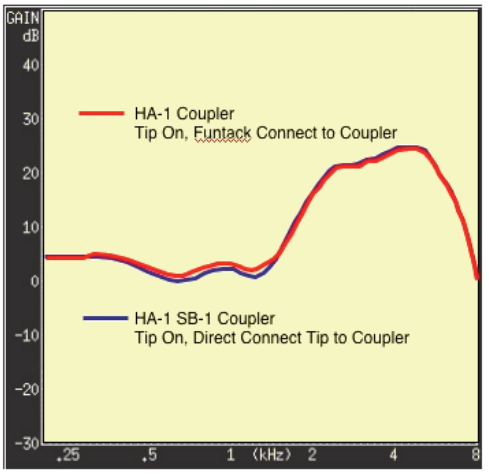


Figure 6. Response comparison of HA-1 coupler (red) with HA-1 SB-1 coupler (blue).

overall response of the instrument.

A casual observation of RIC and RITE hearing aids worn by individuals seen in daily life often reveals that many seem to be barely "sticking" into the ear canal. This provides ample armchair evidence that these individuals may not be obtaining as much satisfaction from the hearing aids as they should. Figure 2 shows REAR (Real-Ear Aided Responses) of different depths of insertions into the ear canal. In these measurements, the green-collared curve resulted from the proper fit and insertion. However, as can be seen, significant high-frequency amplification, as much as 8 dB or so, can be lost when the instrument is not fit as deeply into the ear canal. The shallower, and hence looser fit, is then also more prone to acoustic feedback because a good seal is less likely, even though feedback cancellation may have been activated in the hearing aid. With most RIC instruments, the proper depth of insertion occurs when the speaker and tip appear to slide around the turn in the ear canal. This position also provides for the best security of the device.

RITE hearing aids, where the speaker is positioned in the concha or just into the opening of the ear canal, are more likely to mimic the results of shallower ear canal insertion in Figure 2.

RIC AND RITE COUPLER ATTACHMENTS

The standard method for electro-acoustical measurements of RIC and RITE hearing instruments, especially those that are fitted occluded, is to use an HA-1 2 cc coupler. Methods normally used are to seal the tip, either with the tip attached or with the tip unattached, using Funtak (Figure 3), to the coupler to prevent acoustic feedback and to hold the speaker in proper position for the sound bore to be directed into the coupler opening.

Modified HA-1 2 cc SB-1 Coupler

This method seems to work well, but when making measurements on multiple instruments, or even measuring over time, a visualization check would show that the sound bore may no longer be positioned properly with the entrance opening of the coupler. In other cases, the speaker tip may be extended downward into the coupler, thus reducing the distance from the speaker sound bore to the measurement microphone, or may have been displaced due to movement. A newly modified HA-1 2 cc coupler seems to help resolve this problem, and at the same time, speeds up measurement. The modification is illustrated in Figure 4.

The SB coupler comes with 9 mm diameter tips that can slip easily onto essentially any speaker used with RIC or RITE hearing instruments (Figure 5), regardless of the diameter or design of the speaker. The author has been using this coupler for hundreds of RIC and RITE measurements over the past two years. Until now, it has not been commercially available. However, the coupler is now available from Frye Electronics Inc. of Tigard, OR, developer and supplier.

RESPONSE COMPARISONS – PUTTY SEAL VS. SB SEAL

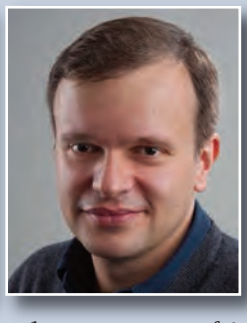
A comparison of measurement results from the SB coupler versus the HA-1 2cc coupler with Funtack shows that they are comparable (Figure 6).

http://hearinghealthmatters.org/waynesworld/2012/when-rite-may-be-wrong-and-ric-may-be-right/

What Is the Auditory Brain Doing In the Absence of Acoustic Input?

By Stephen G. Lomber, PhD, M. Alex Meredith, PhD, and Andrej Kral, PhD
steve.lomber@uwo.ca





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A remarkable property of the brain is its capacity to respond to change. Among other functions, this plasticity endows the nervous system with the ability to adapt itself to its environment but, at the same time, makes it vulnerable to impoverished sensory or developmental experiences, such as deafness or blindness. When the brain is deprived of input from one sensory modality, it often compensates with supranormal performance in one or more of the intact sensory systems.[1] Therefore, we were interested in examining the function of auditory cortex when it is deprived of normal acoustic input. In this context, it has been proposed that auditory cortex of the deaf may be recruited to perform visual functions.[2] However, a causal link between supranormal visual performance and the visual activity in the reorganized auditory cortex has never been demonstrated. Furthermore, if auditory cortex does mediate the enhanced visual abilities of the deaf, it is unknown if these functions are distributed uniformly across deaf auditory cortex, or if specific functions can be differentially localized to distinct portions of the affected cortices. It is also unknown whether reorganized cortex retains any relationship to functions performed in these regions in hearing subjects. These fundamental questions are of significant clinical importance now that restoration of hearing in prelingually deaf children is possible through cochlear prosthetics.

ENHANCED VISUAL ABILITIES OF THE CONGENITALLY DEAF

Studies of deaf or blind subjects often report enhanced perceptual abilities in the remaining senses. Compared to hearing subjects, human psychophysical studies have revealed specific superior visual abilities in the early-deaf[3,4] as well as enhanced auditory functions in the early-blind.[5–7] To more closely investigate this issue, we examined the visual abilities of congenitally deaf and hearing cats to identify those visual functions that are enhanced in the early deaf.[8] Using a battery of seven visual psychophysical tasks, we found that congenitally deaf, compared to hearing, cats have superior visual localization in the peripheral field and lower visual movement detection thresholds. However, for the majority of visual tasks examined, the performance of the congenitally deaf cats and hearing cats was no different. Therefore, the enhanced visual performance in the deaf cats was specific to certain visual tasks and did not result in a general overall improvement in visual function. The superior visual functions of the congenitally deaf cats are in close agreement with the enhanced visual abilities described in congenitally deaf or early-deaf human subjects.[4]

THE CONGENITALLY DEAF CAT

The cat is an appealing model system to use for these types of investigations on cerebral networks in auditory cortex. It is a simplified and tractable version of the more complex networks present in monkeys and humans. Cats are ideal because: (1) they can quickly be trained to perform complex auditory tasks; (2) unlike the monkey, the majority of the auditory areas are easily approachable because they are exposed on the surfaces of gyri, rather than being buried in the depths of a sulcus; and (3) they develop to maturity relatively quickly (over the course of months rather than years). Adult congenitally deaf cats show a Scheibe-type of dysplasia in the organ of Corti with no hair cells present, although the spiral ganglion and cochlear bony structure are preserved.[9] The central auditory system of the congenitally deaf cat shows expected deprivation-induced changes[9,10] although the central visual system appears normal in structure and function.[11,12] Deafness is confirmed by a standard screening method using auditory brainstem responses.

REVERSIBLE COOLING DEACTIVATION OF AUDITORY CORTEX

The brain regions mediating superior sensory abilities have been proposed to reside in the deprived cerebral cortices that are thought to be utilized by the remaining sensory systems. Therefore, it has been hypothesized that auditory cortex of the deaf may be recruited to perform visual functions. To test this hypothesis, portions of auditory cortex were collectively and individually deactivated to determine if specific cortical areas mediated the enhanced visual functions. In both the deaf and hearing cats, individual cooling loops were placed over primary auditory cortex, and regions of dorsal, anterior, and posterior auditory cortex.

The cooling method to reversibly deactivate neural tissue is an exciting, potent, and appropriate technique for examining cerebral contributions to behaviour and has a number of highly beneficial and practical features.[13,14] (1) Limited regions of the cerebral cortex can be selectively and reversibly deactivated in a controlled and reproducible way. Baseline and experimental measures can be made within minutes of each other.[15] (2) Repeated coolings over months or years produce stable, reversible deficits, with little evidence of attenuation or neural compensations.[13,16] (3) Repeated cooling induces neither local nor distant degenerations that might compromise conclusions.[17] (4) Compared to traditional ablation studies, fewer animals are needed because within-animal-comparisons and double dissociations are possible, permitting large volumes of high quality data to be acquired from each animal.[15,18] Overall, the technique induces localized hypothermia in a restricted region of the brain. The locus of the deactivation is kept small by the constant perfusion of warm blood into, and around, the cooled region.

DOES AUDITORY CORTEX CONTRIBUTE TO ENHANCED VISION IN THE DEAF?

In the deaf cats, reversible deactivation of posterior auditory cortex selectively eliminated the superior visual localization abilities. This is an intriguing finding because, in hearing cats, posterior auditory cortex is normally involved in the accurate localization of acoustic stimuli.[18] Therefore the present results demonstrate that in deafness, posterior auditory cortex maintains a role in stimulus localization, albeit visual rather than acoustic. In addition, reversible deactivation of dorsal auditory cortex selectively eliminated superior visual motion detection. This result is also interesting as recent studies have also demonstrated that dorsal auditory cortex makes important contributions to acoustic motion processing. This result suggests that following deafness, dorsal auditory cortex maintains a role in visual motion processing, rather than acoustic motion processing. Taken together, these results demonstrate that regions of "deaf" auditory cortex are responsible for mediating the enhanced visual abilities of the congenitally deaf that cortical plasticity in the congenitally deaf switches sensory, but not behavioural roles of auditory cortex.

The present data demonstrate a causal link between crossmodal plasticity in auditory cortex and specific visual functional improvements in the congenitally deaf. Most importantly, cortical deactivation demonstrated that different perceptual improvements were dependent on specific and different subregions of auditory cortex. The improved localization of visual stimuli in deaf animals was eliminated by deactivating posterior auditory cortex, while the enhanced sensitivity to visual motion was blocked by disabling dorsal auditory cortex. Because neither cortical area had an influence on visual processing in hearing animals, these data demonstrate not only that cortical reorganization occurred in posterior and dorsal auditory cortex, but that the reorganization was functional and highly specific as well. This close relationship between cerebral plasticity, specific cortical loci, and discrete perceptual enhancements, has not been previously demonstrated.

Rather than being uniformly distributed across deaf auditory cortex, the present results demonstrate that the neural bases for enhanced visual functions in the deaf is localized to specific auditory cortical subregions. In addition, the present study went a step further and not only showed that a particular enhanced function could be localized within deaf auditory cortex, but also that the two different compensatory visual effects could be localized to two distinct regions of deaf

auditory cortex. These results demonstrate a double-dissociation of visual functions in reorganized auditory cortex of the deaf cat (Figure 1). A double dissociation is considered to be the "gold standard" of behavioural neuroscience because the results show that two cortical regions mediate independent functions/behaviours. Classically, double dissociations are sought by testing two independent groups of subjects, each with a different locus of brain damage.[19] However, the present study did not examine two different populations of animals but, through the use of reversible cooling deactivation, was able to demonstrate the dissociations within the same experimental animals.

DEAF AUDITORY CORTEX DOES NOT MEDIATE UNENHANCED VISION

In addition to deaf auditory cortex serving as the neural substrate for enhanced visual functions, it is also possible that there was an overall redistribution of visual functions in the deaf brain. Therefore, it might be hypothesized that visual functions normally localized within visual cortex may become distributed into deaf auditory cortex. Therefore, to investigate the possibility that the visual functions that are not enhanced in deaf cats are redistributed over both visual and auditory cortex, we simultaneously deactivated all four auditory areas examined. For the five visual tasks that were devoid of enhancement in the deaf cats (grating acuity, Vernier acuity, orientation discrimination, direction of motion discrimination, and velocity discrimination), deactivation of primary auditory cortex, and regions of dorsal, anterior, and posterior auditory cortex did not altered performance. This evidence suggests that the unenhanced visual functions of deaf cats are not redistributed into auditory cortex.

Task	PAF Deactivation	DZ Deactivation
Visual Localization in the Peripheral Field	Deficit	No Deficit
Movement Detection	No Deficit	Deficit

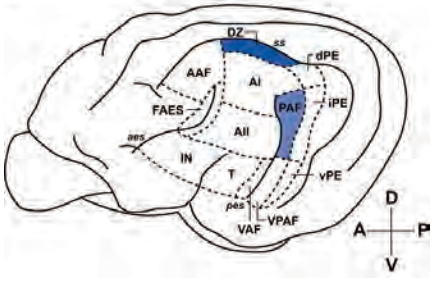

Figure 1. Summary diagram illustrating the double-dissociation of visual functions in auditory cortex of the deaf cat. Bilateral deactivation of posterior auditory cortex (area PAF), but not dorsal auditory cortex (area DZ), results in the loss of enhanced visual localization in the far periphery. On the other hand, bilateral deactivation of DZ, but not PAF, results in higher movement detection thresholds. Lower panel shows a lateral view of the cat cerebrum highlighting the locations of PAF and DZ.

DEACTIVATION OF AUDITORY CORTEX IN HEARING CATS

As we have demonstrated that deaf auditory cortex is the neural substrate for the enhanced visual abilities of the deaf, it was essential to also demonstrate that the auditory cortex of hearing cats does not contribute to visual function. Therefore, for the group of hearing cats, we both simultaneously and individually deactivated the four auditory areas on each of the seven visual tasks. Overall, neither simultaneous nor individual deactivation of the four auditory regions altered the ability of the hearing cats to perform any of the seven visual tasks. These results demonstrate that in the presence of functional hearing, the auditory cortex does not contribute to any of the visual tasks examined. Therefore, deficits in visual function identified during deactivation of posterior or dorsal auditory cortex in the deaf cats must be caused by underlying cross-modal plasticity in each area.

CONCLUSIONS

In summary, using a spatially discrete technique of reversible neural deactivation, the present findings demonstrate that superior visual perceptual abilities in the congenitally deaf are based on the crossmodal reorganization of specific regions of auditory cortex, demonstrating a causal relationship (Figure 2). These observations also show, for the first time, that crossmodal effects do not occur uniformly across regions of deaf cortex, but principally occur in an adaptive fashion in those regions whose functions are also represented in the replacement modality. Likewise, crossmodal compensatory effects are specific and appear to enhance those functions that the deprived and replacement modalities hold in common. Ultimately, these considerations are important when evaluating the potential for compensatory forms of crossmodal plasticity resulting from any form of sensory loss.

WHY UNDERSTANDING THE DEAF BRAIN IS IMPORTANT

Collectively, these results provide new and comprehensive insight into the specific brain changes induced by early deafness to a level that is essentially unobtainable through other methods. In addition, these observations form the basis for a robust and repeatable model of adaptive cortical plasticity that will be used to uncover the basic principles that characterize this phenomenon as well as better understand its relation to neuroplastic processes as a whole. By characterizing the regions of auditory cortex that are susceptible to cortical plasticity following deafness, we may be able to reveal the roles of intrinsic constraints and environmental input in determining cortical functional specificity. Such information will be critical for predicting and evaluating the success of sensory implants in humans.[20,21] Specifically, cross-modal reorganization in

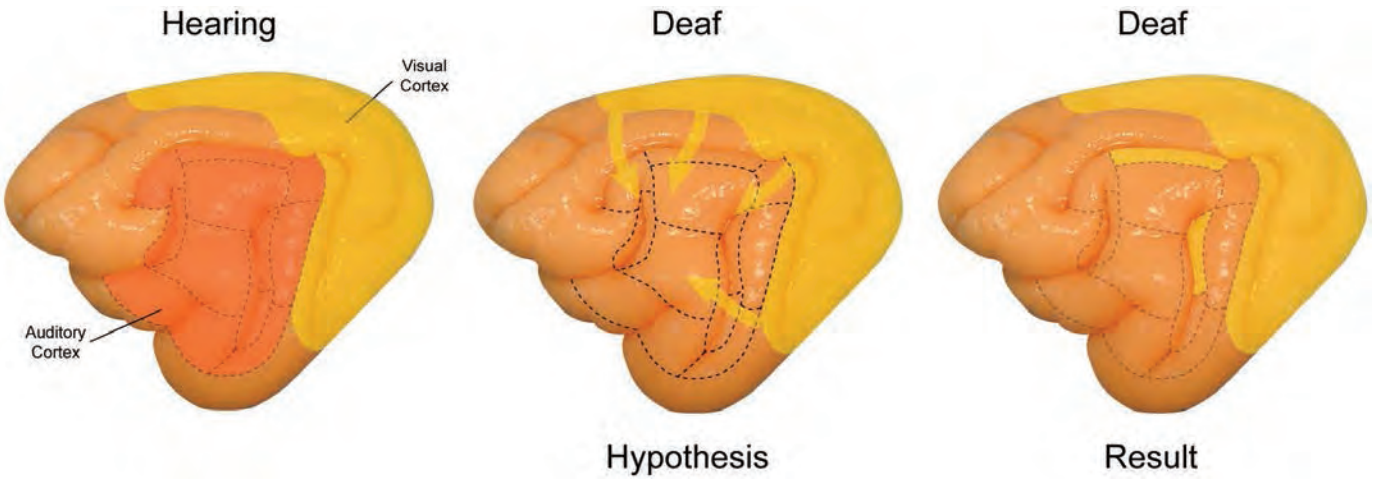

Figure 2. Left panel: In hearing subjects, large regions of the cerebral cortex are dedicated to processing visual (yellow) or acoustic (orange) information. Dashed lines show individual areas within auditory cortex. Middle panel: Lomber, Meredith and Kral[8] hypothesize that in congenitally deaf subjects that enhanced visual abilities would invade (yellow arrows) deaf auditory cortex. Right panel: Indeed, their study identified that specific regions of deaf auditory cortex become visual, and are responsible for the enhanced visual abilities of the deaf (left panel).

deprived auditory cortex, like than identified in the present investigations, may hinder the ability auditory cortex to process new auditory input provided by a cochlear implant.[2] Studies suggest that deaf subjects, in whom cross-modal plasticity was the most extensive, were the least likely to benefit from cochlear prosthetics.[22] Therefore, further investigations are necessary in order to more closely examine the link between cross-modal plasticity in deprived auditory cortex and the functional outcomes of cochlear implants. Ultimately, future experiments could use this model of cross-modal plasticity to empirically assess potential windows for therapeutic interventions, such as cochlear prosthetics.

ACKNOWLEDGEMENTS

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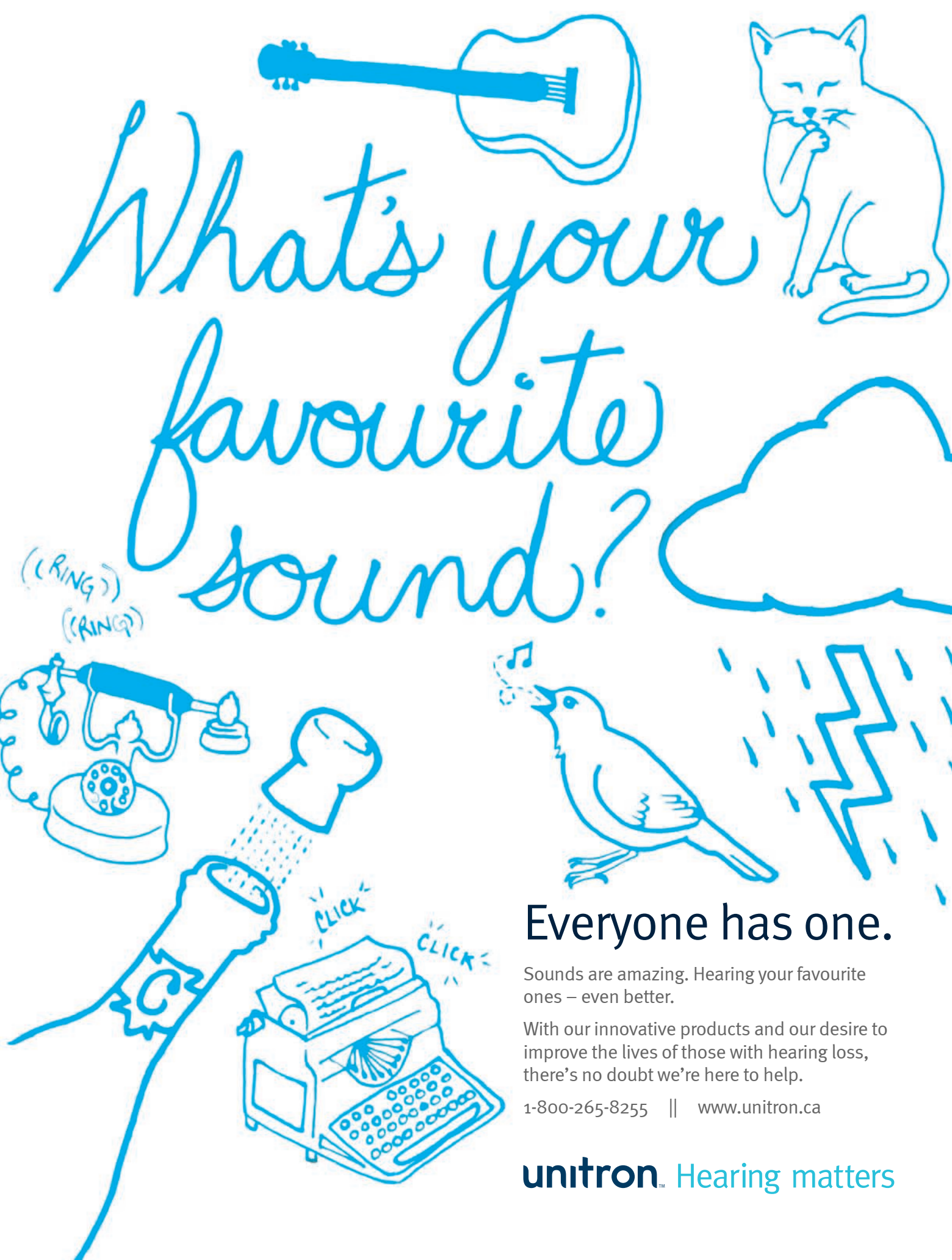

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How I Learned To Love My Audiologist

By Gael Hannan
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My audiologist is a Very Important Person in my life. She may not be as high on my "Favourite People" list as family, close friends or even my cats, but she's right up there with my family doctor and any provider who helps me enjoy a good quality of life.

This makes me a bit of an oddball. The very fact that I use the services of an audiologist puts me in the minority among my universal brothers and sisters with hearing loss. A recent study says that only 14% of people who could benefit from hearing aids actually have them.[1] And, according to the ASHA-AARP National Hearing Health Poll of 2,300 adults aged 50+, over 75% of respondents say that hearing health is important to them, yet half reported having a hearing loss for which they have not sought help.

Apparently, I'm also unusual because I'm actually happy with my audiologist. I know what to expect from her and she delivers it – quality service and successful technology. When I'm in the market for a new provider, I know what I'm looking for. Is she or he clearly knowledgeable about hearing loss and its real-life barriers? Is she or he willing to search for solutions to out-of-the-ordinary technical or communication problems? If so, then I'm willing to work with them in any of their weaker professional areas, such as face to face communication skills. (I once had an audiologist who continued to talk to me while he was cleaning my hearing aids, even though I was temporarily deaf and unable to read his lips. Fortunately, he was train-able and he flourished under my care. We parted company only because he moved away.)

The reasons why people are reluctant to seek professional help are well-documented. These include denial that hearing loss exists (or exists to the degree that their family believes), the lingering stigma that ties hearing loss to dementia or aging, the belief that their condition is not serious enough to warrant help ("it's part of life"), resistance to hearing aids (high cost, appearance, distrust of effectiveness), and a belief that hearing health professionals "only want to sell me a hearing aid"

But why then, when we do move beyond these barriers to seek professional services and obtain hearing aids, are our communication problems not ultimately solved, so that we can all live happily ever after?

In a 2005 "Canadian Hard of Hearing Consumers Survey Report," the Canadian Hard of Hearing Association (CHHA) found that the majority of the 730 respondents did not receive adequate information necessary to successful adjust to hearing loss. In the parallel "Canadian Hearing Healthcare Professionals Survey Report," service providers confirmed that they did not provide enough information to consumers on coping, communication strategies (beyond technology) and other available supports.

Technology alone is not the ultimate cure for hearing loss, and people with hearing loss require more than a battery-operated device. If sheer amplification could cure our communication problems, then we would be a nation of happy hearing-aid users.

Clearly, for some people, a hearing aid seems to do the trick. But for most of us with hearing loss, it's not that simple. Hearing loss affects communication, which is the glue that connects us to each other. When we lose our hearing, our ability to connect is fractured, and cannot be "cured" by the flicking of a switch.

A person with hearing loss needs additional help and supports to overcome physical, acoustical and attitudinal barriers. I'm an experienced hearing aid user, but it has taken me years to build an arsenal of communication strategies that can successfully augment my hearing aid technology. I did not get my first hearing aid until age 20, at which time I did not receive communication counselling beyond how to clean my hearing aid properly. It has been a long and, in hindsight, painful process. Through the

years, I worked my way through a legion of hearing instrument specialists and audiologists (I didn't know the difference in those early years) who talked about hearing aids and hearing aids only. While my hearing aids are now my favourite fashion accessory, I can honestly lay credit for my ultimate success with hearing loss at the feet of the Canadian Hard of Hearing Association and the Canadian Hearing Society. These organizations and their members gave me information and inspiration for a better quality of life with my hearing loss. .

But this didn't happen until after I had been wearing hearing aids for 20 years! The process could have been shortened considerably if my former audiologists and hearing instrument specialists ad focused more on my overall communication needs – and involved me in the process. Even now, my current providers tend to focus on technology to the exclusion of other strategies, but it may be that we are still in the training phase.

Resistance to hearing help is rooted in an historical sense of shame surrounding hearing loss, and a prevailing ignorance of its causes and how it can be effectively managed. People with hearing loss still view the hearing health care industry with suspicion.

The impact of hearing loss is profound; it affects every corner of my life and touches almost everything that I do. It still has the power to frustrate, scare and sadden me, put me in danger, and isolate me from the people and activities that I love. And I'm considered high-functioning! Imagine the person – new to hearing loss – who doesn't know what to do, or understand what's supposed to happen, or what they can hope for in terms of being able to hear well again?

With the pending explosion in the number of people with hearing loss due to aging and noise damage, it's time to explore a new service delivery model for successfully managing hearing loss. We need to form better relationships, and effective partnerships on two levels. The first is a better relationship between consumer and provider, one that that will meet the real needs of the client. The second is a stronger alliance between professional organizations and associations of consumers that will provide support for the consumer-provider relationship.

A good place to start would be to define our mutual goals. As a person with hearing loss, I have to accept that my hearing loss is permanent and possibly progressive. Despite scientific advancements, I probably will never hear well again without technical support. My goal should not be to "hear again" or "hear better," but to communicate to the best of my ability in all areas of my life. By shifting my focus from "hearing" to "communicating," my audiologist and I have an achievable goal, and we both have responsibilities in making sure we get there.

I can't speak for the hearing professional, but as a person with hearing loss, I know what I have to do.

1. I must be honest: Yes, I do have a hearing loss. It causes problems in my life that I would like to solve.
2. I must be knowledgeable: What type of hearing loss do I have? What can be done about it so that I can communicate to the best of my ability?
3. I need professional expertise: I can't do this on my own. I must seek solutions from hearing health care professionals, consumer support organizations, and reputable Internet information sites. I will adopt affordable technology and other strategies.
4. I must be assertive about my needs in all areas of my life: I have hearing loss and this is what you can do to help me understand what's being said.
5. I must advocate for myself and others: Better accessibility for me means better accessibility for all people with hearing loss.

I feel that I understand my hearing loss, I'm a crackerjack speechreader, know how to control my communication environment, can express my needs, and I have a mostly-positive attitude. But I am not able to self-administer hearing aids; for that I need a good hearing health care professional. But, if I were new to this whole, frightening world of hearing loss, I would need more than technology. I need someone who would listen to me, validate my concerns, understand my challenges and discuss solutions with me.

I knocked on the door, now I need you to take my hand and walk with me.

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The Art of Audiology

By Joanne Deluzio, PhD

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I recently googled "state of the art of audiology" and 437,000 websites materialized. The majority of these sites describe the latest in hearing health care technology, and the professional use of sophisticated diagnostic equipment and test techniques, including auditory evoked potentials and otoacoustic emissions. Information on the most advanced developments in hearing aid and cochlear implant technology was also abundant. By the second page of websites, information on auditory processing problems and management of tinnitus and balance disorders emerged. A cursory examination of the first few pages resulting from this search revealed that much of the information on the web involved science and technology, although a sizeable number of sites were dedicated to marketing a particular product or service. Regardless, the take home message was quite clear: audiologists diagnose and treat hearing and related disorders. With all due respect to the people who constructed these sites, I take issue with this. Audiologists do not treat hearing disorders. We work with people.

Audiology is a dynamic field and keeping current is important. There is no doubt in my mind that present-day technology has had a positive and profound impact on many people with hearing loss. Speech audibility for most people with hearing loss is now more achievable than ever before. But, the loss of hearing is not the real problem; the difficulty lies in the resulting isolation, breakdown in communication, and societal barriers. Acknowledging and confronting the social-emotional and interpersonal relationship issues related to hearing loss are as essential to communication health as adopting the finest in digital technology. This is the art of audiology, and it is as critical, if not more so, than the science of the profession.

The idea that audiology is both a science and an art is not new, and the concept of aural (re)habilitation is intended to encompass in a holistic way the management of hearing loss. Mark Ross defines aural rehabilitation as "any device, procedure, information, interaction, or therapy, which lessens the communicative, psychosocial, and economic consequences of a hearing loss."[1] While the literature has discussed the importance of combining technology with various communication strategies, instruction, perceptual training, and counselling[2] in reality, "counselling" for adults with acquired hearing loss tends to consist of basic hearing aid orientation at the time of the hearing aid fitting. The focus remains on the technology.

There is evidence in the literature that hearing aids alone can make improvements to a person's ability to function and their quality of life. A systematic review of 16 studies on independent adults with mild to profound hearing loss determined that there were significant improvements in health and large reductions in social and emotional impacts of hearing loss following fitting of hearing aids.[3] Clearly, people who could benefit from amplification should be fitted with the utmost care using the most advanced technology. However, despite the improvement offered through hearing aid use, hearing aids alone do not come

close to addressing the complex issue of the impact of hearing loss on a person's life.

The Royal National Institute for Deaf and Hard of hearing People in the United Kingdom conducted a survey of 1000 people with hearing loss.[4] In their study, 71% reported feeling isolated because of their hearing loss; 39% avoided meeting new people; 59% believed that people think they are stupid, 47% had been made fun of because of their hearing loss, and 23% left a doctor's office unsure of what was wrong with them. All of these statistics are just the tip of the iceberg. Professionals who treat hearing loss but do not interact with people push the real emotion of hearing loss below the surface. I cannot help but believe that this is absolutely obstructive to a person who is hard of hearing's acceptance of themselves, their adaptation to technologies, and their ability to move forward and learn how to function and thrive in their world.

Clinically, many patients report that their medical doctor or specialist was quite dismissive of their difficulties with their hearing. Apparently, this is particularly true if the hearing loss is mild, only in the higher frequencies, or unilateral. After all, loss of hearing is not life threatening, and it is common. Patients may even be told that their hearing is "normal" for their age, even though lack of human communication is anything but normal. There is nothing medically that can be done for the majority of hard of hearing people. Many of my patients have told me that when the physician relays this message, they feel like they have been given a life sentence of isolation and no hope. To make matters worse, they are essentially told they shouldn't really worry about it. Perhaps managing their hearing loss would have been easier if right from the beginning someone acknowledged their feelings and their loss, and let them know that there are numerous non-medical interventions they can explore when they are ready.

It is not my intent to be critical of medical professionals and I am not going to pretend that audiologists are doing an exemplary job addressing the psychosocial impact of hearing loss either. As a profession, we receive little or no actual training on how to listen. After testing someone's hearing, the audiologist typically explains the audiogram. They might provide information on which speech sounds the person is missing, why it sounds like everyone mumbles, and that it will be difficult for them to hear in noisy situation. The discussion, which is often a monologue, usually progresses fairly quickly to information on obtaining a hearing aid. This is perhaps simplistic. But the key point is that for the most part, the person with hearing loss is not usually provided with an opportunity to express what they feel. Throughout the entire diagnostic process, it is unlikely that anyone has taken the time to ask what their loss of hearing means to them. It may not even be acknowledged that a change in hearing can have a devastating effect on all aspects of their life, or even that the experience of losing hearing must be very difficult.

My sister recently experienced sudden hearing loss on one side. I am grateful to the medical specialists who accommodated her the same day with a multitude of drugs, including transtympanic steroids. (Anabolic steroids within 48 hours of sudden hearing loss provide the best chance at recovery.) She received the finest possible medical care and follow-up. In this respect, she is very lucky. Unfortunately, her hearing never returned. She reports that throughout all of the medical treatments, although everyone was very nice, none of them asked how it felt to suddenly hear out of only one ear. Once the dizziness and tinnitus had subsided, she was told that there was little chance that her hearing would recover. It was recommended that she return to work and resume her life. It all sounded so easy. The problem was, the entire ordeal was anything but simple. Everything had happened so fast that she was not even close to processing all that had occurred and what it meant. She was grieving and needed the recognition and the reassurance that it takes significant time to adapt. Her entire family was affected. My sister kept a journal of her experience, and with her permission, I share a very small bit of it below.

> I must share with you all that there is a huge emotional response to going deaf over night as well as a huge learning curve about what this feels like and what it means in terms of functioning in the world…I found myself becoming increasingly reclusive. I did not want to leave my home. I refused to drive.
>
> I feel as if I have no control of what is happening in my life and so I seek anything that allows me to feel as though I am taking charge of what is going on inside my body…The reactions of people are also interesting. I have been told so many times that I shouldn't worry because the person I was talking to only has (pick a percentage – 20% / 30% etc.) of their hearing in one ear and did just fine. Other people know people deaf in one ear who have no problem at all. Some people yell when they talk to me

> and I have to ask them to speak normally. A number of people have made jokes, thinking they were funny, by repeatedly asking me if I could hear them, yelling or moving their lips without actually speaking. I found some of these jokes to be devastating… Right now, I feel tired and afraid and I want to be safe in my own home.

There is nothing I could write that would be more powerful than my sister's words. I can only reemphasize that as audiologists we do not diagnose and treat hearing loss. We work with people. Medical and audiological intervention can and do produce positive and desirable outcomes. I am not suggesting that these things are trivial or unnecessary. But when thinking about the aural rehabilitation process for adults with acquired hearing loss, we need to keep forefront in our minds that we interact with people. Technical skills alone, no matter how sophisticated, are just not enough. Loss of hearing is an intensely personal experience and it is crucial for overall functioning that the person is provided with the opportunity to speak about what they think and feel. It is also important that they are able to take control of their situation, and not let the hearing loss limit them. The obstacles encountered as a result of the hearing loss are difficult enough. The diagnostic and rehabilitation system they encounter should not be creating even more barriers.

Many different professions such as social work, nursing, and psychology have all utilized the empowerment model in providing service.[5] In this model, the responsibility for the patient's "care" or therapy is shifted away from the service provider to the patient, and the patient is involved in all aspects of the decision making.[6] For adults with acquired hearing loss, an empowerment model would seem to be a good fit. The person with the hearing loss is best equipped to determine the impact the hearing loss has on their life. Only they can identify their most challenging listening situations and prioritize them in order of importance. The professionals should provide them with as much relevant information as possible so that they can make informed decisions about what recommendations they will implement. Since it is possible that not all patients will want or benefit from assuming this control, the service provider must take care to ensure that they listen to the patient's point of view. Ultimately, the goal is to provide persons with hearing loss with the support and tools they feel they need to participate in all aspects of their life.

How do we begin to empower our patients? First, the audiologist needs to present themself as an equal partner, not as a superior expert. The paternalistic view that "I am the professional and I will tell you what is best" is not effective in moving the rehabilitative process towards a more holistic view of the person. Empowering the patient necessitates that the professionals acknowledge the insights and expertise the person brings to the process. It requires the clinician to ask open-ended questions about the person's life and their listening needs without making any judgments or assumptions. It also means that the audiologist and the patient work together to develop their recommendations. Empowering patients in no way diminishes the professional, or their expertise. Rather, it brings equity to the patient's role in the process. Of course, partnerships are not one-sided. To that end, the audiologist cannot do most of the talking. They also need to listen. Listening is not always easy, it is not necessarily intuitive, and it has to be learned. Once the audiologist actively listens, the patient will have the opportunity to confront and discuss their feelings. Only then will the information the audiologist provides be assimilated, technologies more accepted, and interventions more effective.

Persons with acquired hearing loss have many raw emotions. They can be frustrated and angry and may need some time to vent. However, it is important to point out that being an effective listener does not mean agreeing with everything the person says. For example, it is important that the audiologist not participate in professional "bashing." If your patient is upset by another professional or is seeking a second opinion you can say things like "I'm sorry that you had a negative experience" or "I can see this has been very difficult for you" without agreeing with them that another professional is insensitive or incompetent. Being a good listener does not mean that you abandon your professionalism and become the patient's best friend. It is always important to establish boundaries. If a patient is making inappropriate comments, or straying off topic you need to say so. It continues to be the role of the audiologist to manage the appointment time. Providing empowering service takes skill. Audiologists routinely attend professional conferences and seminars to keep abreast of the newest technologies – the science of audiology. It is equally important for them to seek continuing education in the area of counselling, and establishing patient empowerment – the art of audiology.

Reaction to art is visceral and people respond to it with their senses, intelligence, and emotions. The same thing is true for hearing. The real value of audiology doesn't come from

expansion algorithms. It comes from its art. Audiologists do not treat auditory disorders, we facilitate human communication. We do not "help" people cope with their hearing loss. They find the strength and courage within themselves to move forward. We can provide a collection of tools along with information, training and support but it is up to each individual person to select how and where to utilize them. In order to make a difference as professionals, audiologists need to genuinely listen to the intensely personal and profound experiences of each and every person with hearing loss who stands before them. Listening actively, attentively, and with great care. Only then can we begin to work together in partnership. This relationship is at the heart of the aural rehabilitation process.

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Hearing Aids, Assistive Devices, and the Need for A Communication Specialist

By Charles A. Laszlo, CM, OBC, PhD, PEng

About the Author

Charles A. Laszlo, is professor emeritus of electrical and computing engineering at the University of British Columbia. His professional career focused on technologies and systems that allow hard of hearing people to function effectively in their everyday lives. He was the founding president of the Canadian Hard of Hearing Association, and served as president of the International Federation of Hard of Hearing People. While retired, he remains active in professional and volunteer activities on behalf of the hard of hearing community.
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I am a hard of hearing person who wears hearing aids. People think that this solves all my communication problems. After all, this is what all the hearing aid advertisements say, don't they? But this is not the case, as I have many communication needs that require more than hearing aids can provide.

As a hard of hearing person, I have many faces. I am a hard of hearing student who wears hearing aids. At home my Mom spoils me. She wakes me up, and turns off the taps I've left running. But next year I will be at university and living alone. I am afraid that I may over sleep and be late for classes. I now use an FM system in classes that allows me to hear what the teacher says. Will the new teachers understand and wear the microphone? Making new friend concerns me because the halls are noisy and so is the cafeteria. I am left out of many conversations and social activities. I am told that there are some personal devices that could help, but nobody knows much about them. My telephone is another problem as I cannot always understand the caller. I can text, and that is good. I loved watching some TV programs, but could not understand the conversation until someone told me about captioning. I wonder how I will do at the university and I am worried. I work hard but I know that I am not always able to communicate in this world.

I am an adult office worker and I wear hearing aids on the job. When I travel on assignments I need a device to ensure that I am awakened. I am concerned about fire alarms in hotels as I will not hear them once I take my hearing aid off. My job requires that I participate in conferences and to function properly. In some conference rooms there are microphones for each speaker, but that is useful only if there is an FM, infrared, or loop system attached. In some rooms the lighting is poor and I cannot see the speakers' faces. In a few instances I manage to convince organizations to provide me with speech-to-text service (CART - Communication Real Time Access). Our office has an open plan and it is noisy. I use a personal FM and that helps. I have to use different phones, and I wish that coupling between my hearing aids and the phone would be easier and more effective. To keep up with news that may affect my work, I need to listen to the radio and TV, but that is difficult. Earphones don't work for me and I need to connect my hearing aids to the radio and TV. I use both loops and infrared systems.

I am a senior and I am hard of hearing. I live alone. My hearing aids help but they do not do everything that I need. I need a device to make me feel secure in my home. I cannot hear the doorbell, or the telephone, and I am afraid that I may be trapped in case of fire as I cannot hear the fire alarm either. My ability to use the phone is limited as the phones do not work well or easily with my hearing aids. There are too many options and there is

nobody to explain to me how they work. To make an appointment over the phone with my doctor's office is very stressful. I like to go to the seniors' centre but the place is noisy and I cannot follow conversations. I am lost in my place of worship, at the movies, and the presentations that I love to attend. It is getting harder for me to remain part of family activities as I don't understand what is said in the bustle of gatherings. I am told that there are ways of coping and devices that I could use, but I find it difficult to find someone to give me professional advice that I understand. My main entertainment now is TV, but I find it hard to read captioning.

No matter which of my faces you see, I have needs that hearing aids alone do not provide.

Let me explain. The conventional wisdom is that if I am provided with the means of hearing sounds better, the problem is solved for me. But hearing sounds is not the same as the understanding of speech that I need to function in a noisy world and to recognize which sounds have meaning. I, as a hard of hearing person, need more than just to hear. I need and want to communicate! That means the ability to understand and interpret sounds properly, to understand speech and be able to extract information, and to react appropriately to what is said and to what is happening around me.

Hearing aids are wonderful devices but they have limitations. It is perhaps more accurate to say that the hearing aid, a technical device, and I, the person wearing it, a physiological entity, together have limitations. The intact auditory system together with the brain has the incredible ability to understand even severely distorted speech, and to extract meaningful information when masked by noise and interference. I, as a hard of hearing persons have lost this ability to varying degrees, even when the sound is loud enough. Hearing aids are designed to both amplify sound and to compensate for this loss of ability. They do the amplification well, but can only compensate for what you call "discrimination loss" only to a limited extent.

This is where assistive devices come into the picture. It is useful to summarize some of my major activities and the assistive devices that I may require in those circumstances (above).

EVENT DURING THE DAY	ASSISTIVE DEVICES THAT I USE
Wake up	Alarm clock with vibrator and flashing light.
Phone calls at home and at work, land lines	Hearing-aid-compatible phone Texting Built in amplification Ringer connected to visual or vibrator indicator Computerized speech recognition
Driving to work, to the doctor, to school	Emergency siren recognizer
One-to-one discussion with a friend, worker, the doctor, in the bank	Personal communication device a co- (FM or infrared)
Meeting with a group of people present at work, at the seniors centre, in school	Portable FM or infrared device placed in the middle of the table, loop Real-time captioning One-to-one personal communicator
Noisy restaurant	Personal communication device with directional microphone.
Conference in a large hall holding 300 people	Large area infrared, FM or loop system
Cell phone call	Phone with vibrating option. Texting Hearing aid compatible High output
Travelling in car with passenger	Personal one-to-one communication device with directional microphone
Family dinner	Portable infrared or FM device placed in the middle of the table
Watching TV	Captioning Infrared, FM, or loop device connected to TV
Door bell rings	Vibrator worn on body and flashing lights
Child care	Baby monitoring device with vibrating annunciator
House and fire-alarm	Flashing lights and/or vibrating annunciator

Looking at this list we see that the technologies that I use do not "stand alone" in isolation but in fact form a system of communication for me. I need this system to remain active, productive,

emotionally balanced, and not isolated.

Some of these technologies aim to deliver "clear speech" to me without distortion and noise. This allows me to use my remaining speech-understanding ability to the fullest. Other devices sense warning and other sounds in the environment and alert me. Yet other technologies allow me to use modern electronic communication devices. For me, each of these devices provides an essential component of my daily communication needs and allows me to function in, society, in the workplace, with my family, and in school. With an appropriate system of communication in place, using assistive listening technologies, I can cope, I can overcome the limitations of my hearing loss, and I can remain part of the world that increasingly depends on communication.

As I search the Web I discover that there are many technologies and devices available that can provide the individual functions described above. I can go out and buy the devices that I need and that should be the end of it. But unfortunately, it does not work this way.

So then what is the problem? The first problem I have is that of selecting proper equipment. I need to have technical expertise or expert guidance. No equipment is suitable for every situation and I often don't have the experience or the technical knowledge to judge or even to understand what the specifications say.

My second problem is that I have to make the various devices work with my hearing aids. This is a great challenge for me as different "interfacing" approaches have different limitations and may or may not fit my circumstances. I have been told at times that I should have had different options in my hearing aid, such as a T-switch, at the time of fitting the aid. It would have been a tremendous benefit for me if my hearing aid specifications had included my need for assistive devices.

The third problem is that different devices work somewhat differently and it seems that there are not enough standards that would allow me to buy the best equipment that fits my needs using different brands. You can buy a hi-fi from one company and speakers from another, but I am often tied to a specific line of assistive devices.

These problems of mine show that what I need is a comprehensive approach to hearing aids and assistive devices so that I can derive maximum benefits from them. I often look for help rather desperately. Sometimes I get it from peer contacts, volunteer consumer organizations, or through service organization, but often I don't have anywhere to turn.

Yet, there is one professional who has the expertise to advise and to guide me in my quest for communication accessibility. I am talking about you, the audiologist.

The profession of audiology is highly respected by me and I trust your advice. Some of you provide support with custom hearing aids that are digital and/or programmable and check my functionality with assistive devices and I am grateful. Yet I feel that far too often you don't seem to be involved with my struggle to communicate and to function effectively.

Yes, you fit my hearing aids and you do a marvellous job, but beyond that we have no contact! It seems to me that you are in the best position to be my guide in my quest to communicate, to achieve security and to participate in everyday life. You have the training, the technical knowledge, and you are the professional who fits my hearing aids.

What I need and what I want is for you to look beyond your conventional role and become a communication specialist for me!

Becoming such a communication specialist will require you to understand how I function and what my specific communication needs are, and then help me acquire the integrated, comprehensive communication system that suits me. You will also need to monitor my ability to cope and remain functional. This includes technology but also goes beyond technological measures. After all, communication goes beyond "hearing."

The hard of hearing community as a whole challenges the audiology profession to embrace this role with enthusiasm.

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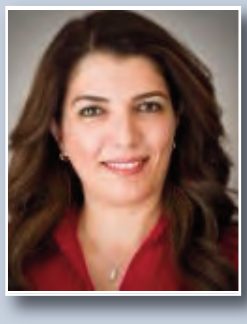
A Client-Centred Approach to the Delivery of Hearing Aids

By Laya Poost-Foroosh



About the Author

Laya Poost-Foroosh, PhD, is a part-time lecturer at the School of Communication Sciences and Disorders at Western University and works part time as a clinical audiologist. Dr. Poost-Foroosh's research interests are client-centred care and quality of hearing health care. Her doctoral research was focused on client-clinician communication and its impact on hearing aid adoption.

This article presents an overview of a preliminary client-centered model for the hearing aid delivery process and suggestions on how to adopt client-centered care when recommending and fitting hearing aids.

While client-centred care has been established as the gold standard approach in most health care domains, since its origination over 70 years ago, audiology has shifted from a rehabilitative profession with an emphasis on the client, to a health care profession focused on diagnosis and management of the hearing impairment.[1,2] This change in focus tends to reduce the client's problems to a set of signs and symptoms that are assessed and interpreted in a biomedical framework.[3] In addition, hearing aids, as the most common intervention for rehabilitation of hearing impairment, are both a consumer and a health care product.[4] This creates tensions in prescription and fitting of the hearing aids that raises the following question: what distinguishes audiology services from other sales activities? Clinicians should focus on their relationship with the client and be flexible in their approach to client care. In order to shift the focus of the profession back to the person and to distinguish the hearing aid delivery process from a sales approach, audiologists need to adopt client-centered care in clinical encounters.

CLIENT-CENTERED MODEL OF CARE IN HEARING UPTAKE PROCESS: A PRELIMINARY FRAMEWORK

A recent study that investigated factors in client-clinician interactions influencing hearing aid adoption identified specific concepts that were perceived to influence the hearing aid purchase decision.[5] These concepts were developed jointly by a group of clients who had received a recent hearing aid recommendation and audiologists who prescribed and fitted hearing aids. The concepts were used as a framework to develop a preliminary model of client-centered care in the provision of hearing aids. The proposed model has six constructs, including one pre-requisite element and five interactive components. The pre-requisite element is client-centered traits and actions of the clinician that is a requirement for providing client-centered care. The five interactive components of the model are: (1) Acknowledging and understanding

Figure 1. The preliminary model of client-centered care for the hearing aid uptake process.

the client as an individual, (2) Ensuring client comfort, (3) Provision of information, (4) Facilitating shared decision making, and (5) Considering client motivation and readiness (Figure 1). A client-centered interaction should include all the components. The components are interactive and cannot be separated and used as stand-alone elements.

ACKNOWLEDGING AND UNDERSTANDING THE CLIENT AS AN INDIVIDUAL

Audiologists understand the negative consequences of untreated hearing loss. However, this does not necessarily enable clinicians to comprehend the impact of the hearing loss on a particular individual. According to the World Health Organization's International Classification of Functioning, Disability and Health (ICF),[6] impairment and disability are different concepts. Impairment is a problem in the function of a body part, while disability goes farther to include limitation and restriction in participation in daily activities. According to the ICF, contextual factors (personal and environmental factors) can also influence the functioning and disability domains of health. Thus, clinicians cannot rely only on the hearing assessment results to evaluate the impact of the hearing impairment on the client. Two individuals with similar audiograms may report different degrees of disability. The difference in the perceived disability may be due to the individuals' lifestyle and limitations in participating in their preferred activities or in engaging in new activities. The impact of the hearing loss on the individual is best understood by entering the person's world and evaluating the hearing impairment from their perspective. This first component of the client-centered model of care implies the need for a holistic approach to the assessment of the client's difficulties. Individual needs of the client should be considered and elicited at each and every step of the hearing assessment. The commonly used case history questionnaires and hearing assessments do not elicit all the client's communication needs. In a client-centered interaction, audiologists can ask what situations are difficult for the client and consider the client's life style and listening requirements. In addition, the clinician can help the client to assess and become more aware of her/his communication needs and difficulties. Self-assessment tools are valuable in exploring a client's personal communication concerns and should be incorporated into routine practice. When explaining assessment results, the client's individuality should also be considered. The information should be explained at the appropriate level for the individual and technical jargon should be avoided or simplified. Explaining the audiogram as the "graph of the client's hearing thresholds" may not be meaningful. The audiogram can be better explained by relating the graph to the client's experienced difficulties. The self-assessment tool can also be used to explain the results by relating the individual's expressed difficulties and needs to the client's hearing impairment.

ENSURING CLIENT COMFORT

Client comfort includes comfort in both the physical and emotional domains. For example, emotional comfort in the interaction means the client will trust and have confidence in the clinician's expertise, and will be better able to communicate with the clinician. Examples of ways to ensure client comfort include scheduling sufficient time for appointments, being patient with the client at all times, ensuring the client understands what the clinician is saying, not giving the client too few or too many choices, and avoiding a "sales approach" when recommending hearing aids. Adopting a client-centred interaction in hearing aid provision ensures client comfort by focusing on the person and what is important for them. As such, a clinician who adopts client-centered care would schedule enough time with the client without rushing the appointment, would not pressure the client into purchasing hearing aids, and would not insist on hearing aids that are beyond the client's needs.

PROVISION OF INFORMATION

Provision of information is one of the most important elements of client-centered care.[7] In a recent study that compared clients' and clinicians' perspectives of the importance of the factors in client-clinician interaction influencing hearing aid adoption, clients placed substantially more value on device-related information than did clinicians.[8] There is widespread variation in what information clients consider to be important. Clinicians need to be cognizant of these variations and be flexible in provision of information.[9] By engaging clients in the discussion, the information transfer can move from uni-directional (from clinician to client) to a bi-directional process in which information is exchanged between client and clinician. Clinicians can use the client's input to develop recommend-ations based on the individual's needs, wishes, and knowledge of the topic area.

In a client-centred approach to care, sufficient content and amount of information should be provided in the appropriate format for a client. Poor transmission of information from client to clinician, low client understanding of the information provided, and low level of recall of the information by the client are associated with dissatisfaction with communication and lack of adherence to recommendations.[10] Clinicians need to remember that information overload may

reduce their clients' ability to make a rational decision or even hinder clients from participation in decision making.[11] Clients who undergo a hearing assessment, hearing aid evaluation, or hearing aid fitting for the first time are faced with an overwhelming amount of new information. Clients often forget important information that is presented to them. In a large sample of clients who visited family physicians in a community practice, clients recalled less than 50% of the information they received. Clinicians very rarely assess clients' understanding of the information.[12] Unless verified, clinicians cannot know how much of the information is understood and retained by clients.

There are several ways to facilitate information transfer. Clinicians can allot more time for new clients, prioritize and provide information over the course of several visits, verify with clients how much of the information they have understood, assess clients' recall of information in the follow up visits and review important and relevant information. Recall of information is strongly associated with the duration of the visit.[13] The content and the format of the information is important in the processing of the information by clients.[9,14] Providing information in alternative formats such as written material and diagrams can be helpful in the processing of the information.

FACILITATING SHARED DECISION MAKING

Providing opportunities for shared decision making is a fundamental requirement in client-centered care.[7] Shared decision making involves several steps including that the client and clinician exchange information, express their preferences of intervention, make intervention decisions together, and finally the client agrees to implement the decision.[15] Most of the initial audiologic encounters in which hearing aids are recommended are spent on hearing assessment and technical aspects of the hearing aid evaluation while clients remain mostly passive.[16] Providing a large amount of unfamiliar information over a short time period may come at the expense of eliminating the client's active participation. However, shared decision making is only possible when the client receives adequate information. The clinician must ascertain what each client needs based on understanding the client's motivation, lifestyle and needs, and eliciting individual client's experiences of living with hearing impairment. By eliciting a client's point of view, the clinician can understand the client's lifestyle, needs, and wishes – and then can decide on appropriate interventions and what information to provide to each client.

CONSIDERING CLIENT MOTIVATION AND READINESS

To counsel clients in a client-centred way, clinicians need to include in the discussion the client's motivation and readiness for interventions. For example, discussion of styles and models of hearing aids with a client who is primarily seeking information, or is trying to placate his/her spouse or children is not a client-centred interaction. In this case, the clinician may project an image of a sales person rather than a health care professional. Moreover, the time that can be used to counsel a client about modifying his/her attitude toward hearing loss is lost when providing information that is not appropriate or adequate for the client. Facilitating shared decision making in this scenario should not focus on different options of hearing aids and asking the client to choose one. In a client-centered interaction, the clinician modifies the interaction based on the client's attitude toward hearing loss and hearing aids and considers what has motivated the client to seek professional help.

CLIENT-CENTRED TRAITS AND ACTIONS OF THE CLINICIAN

This element of the client-centred model of care focuses on clinician attributes such as honesty, caring, and manner. Clinician attributes also include interpersonal skills and professional competence. A clinician who has well-developed interpersonal skills can communicate easily with clients. Professional competence focuses on being knowledgeable and developing clinical expertise. Client-centred attributes support clinicians in eliciting and understanding clients' experiences with hearing impairment, creating a comfortable environment for interaction, and facilitating the exchange of information and shared decision making.

INCORPORATING CLIENT-CENTRED CARE INTO PRACTICE

Incorporating client-centered care elements into everyday busy clinical encounters may be a challenge for audiologists. Health care professionals' sincere desire to do what they think is best for clients, may become a barrier in practicing in a client-centered way.[17] For example, a clinician may recommend binaural hearing aids for a client and provide justification for their recommendation by presenting the benefits of binaural amplification. However, the client's agenda may be different. The client may be only interested in trying one hearing aid. Insisting on binaural hearing aids because it is the best intervention for bilateral hearing loss from the clinician's perspective is not client-centered, even though the clinician's view is knowledge and evidence-based. In this example, the focus of the encounter is on the impairment and not the person. The clinician in this example acts as an expert who knows what is best for the client. In

contrast, in a client-centred interaction the clinician focuses on the person, elicits the client's point of view and tries to consider the client's attitude and motivation. Understanding the client's perspective can help the clinician realize why binaural amplification may not be an appropriate option for the client at that point in time.

Reflection is recommended as a way to support client-centred care in audiology practice; clinicians can use reflection as a tool to evaluate the client-centeredness of their interactions. Ng[18] reported that reflection can inform and inspire client-centered care in audiology students and novices. Clinicians are encouraged to reflect on their actions and behaviour and the extent to which these actions have been client-centred. To help clinicians to reflect on the client-centeredness of their interactions, some questions are presented below:

1. Did I determine the actual motivation for the visit?
2. Did I elicit my client's views and did the client feel comfortable expressing them?
3. Did I ask if the client would like information beyond what I provided?
4. Were the content, format, and level of the information presented appropriate for the client?
5. Did I verify that the client understood the information?
6. Did I consider the client's views and input in our recommendation/ intervention?
7. What was the basis for the recommendation/intervention?
8. Was the client actively participating in the interaction?

Answering these questions at the end of each clinical encounter can help clinicians become more aware of the client-centeredness of their interactions and find areas that need to be improved to achieve client-centeredness.

In order to shift the focus of the hearing health care from the hearing impairment to the person, clinicians must not only be aware of, but willing to apply a model of care that meets the exigencies of differing client situations.

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Consulting Patients to Establish Service Delivery in Audiology

By Andre Marcoux, MScA, PhD.

About the Author

Dr. Andre Marcoux is president of The Sound Room Hearing Centres and an adjunct professor at the University of Ottawa. Dr. Marcoux has long been involved in research and develoment of assessment and rehabilitation solutions for children. He current interests aim at studying service design in audiology and methods to increase patient satisfaction in relation to amplification. amarcoux@uottawa.ca.

Audiologists strive to provide a level of care which is pleasing to their patients. While all must adhere to a minimal standard of care, the provision of services can often be directed by an employer who is not held to the same standard. For example, vertical integration of hearing aid manufacturers into the hearing health care retail segment and the creation of large retail chains has certainly changed the way many consumers are provided with audiology products and services. Discussions abound as to whether audiologists are able to provide adequate care to their patients under the duress of providing a single product line. While the introduction of these new entities has created some changes on the dimension of cost, a question which I often received from colleagues is what consequences these changes may have on consumer confidence for the future. Will consumers perceive the lower costs of hearing aids as an indication of their value or will these lower costs permit more consumers to purchase hearing aids they need? Judging by the number of clinics which appear to be competing on the dimension of cost, outsiders from our field may conclude that consumers have a need for lower cost products and services. However, certain surveys have demonstrated that any price is too much if a hearing aid does not provide benefit, which ultimately explains why many hearing aids end up in the dresser drawer.[1] Not surprisingly, consumers have needs other than low cost when accessing hearing health care services, but what are these?

Operations strategies define performance from a consumer perspective on five important objectives: quality, speed, dependability, flexibility and cost.[2] Certain theories, such as the sandcone model[3] further propose a sequencing of these objectives where quality is defined as the foundation of strong performance. As such, clinicians may wish to understand what represents quality for its patients in order to ensure a practice's success and longevity.

Curiously, a quick survey of clinics, both large and small does not provide a sense that patients are frequently asked about the distinguishing features of a practice for the provision of hearing health care. While some have indicated that they consult their patients on an individual basis and are able to obtain more anecdotal information, there are very few practices which undergo broader survey activities to obtain patient input. Further, as audiologists we have often taken the role of gatekeepers to our profession and rightfully so. Our field is often misunderstood due its low representation and differences in scopes of practice both nationally and internationally. On the national stage, audiology has seen its share of issues in its attempts for professional regulation and public subsidization. As an extension to these efforts, we have long advocated for the needs of our patients and clients. However, some introversion, at least on my behalf, could certainly lead me to question whether I truly understand the needs of my patients (e.g., my patients need counselling services, my patients need a means to appraise hearing aids,

etc.) or whether patient advocacy goes no further than professional promotion (i.e., hearing-impaired patients need an audiologist). In fact, it appears that patients are rarely consulted for their input on patient issues either because we have not realized the importance of this consultation or, more hazardously, because we assume to already know what those needs are from the sole perspective of our profession.

A recent workshop on consumer issues, which I had the pleasure of chairing at the national conference of the Canadian Hard of Hearing Association (CHHA), conveyed significant frustration at how audiology had become more of a business at the detriment of patient needs. The underlying frustration was aimed at how services for the hard-of-hearing have been diminished to the simple dispensing of hearing aids. While there are admittedly some patients who will shop relentlessly in quest of the best price, there remains a majority who require a more meaningful approach to rehabilitation. It was certainly an exercise in humility to face some harsh criticism directed towards the profession, but also a reminder that a more regimented effort should be made to appraise the needs of our patients.

Having established my first clinic almost five years ago, I had set out to prove that the provision of quality care would not lead to financial ruin. In fact, this level of care could likely promote the viability and sustainability of an audiology clinic. And so it appeared logical to define what quality care represented to my patients. The solicitation of opinion was extremely rewarding. There are a few groups and associations which represent the hard of hearing, including the CHHA, which are dispersed throughout the country. My query to these groups focused on two important aspects of the business model: services and external communications. The following paragraphs will provide a few examples of the merits of this exercise.

SERVICES

Of primary interest to the consultation was to determine which services were required for patients to recognize a clinic's dedication to quality. Several participants questioned the shift of audiology services within the field from professional to retail facilities and why an increasing focus has been directed towards products rather than services. Many also questioned the lack of multidisciplinary centres, where all ear-related services could be obtained. Overwhelmingly, however, there was staunch criticism toward the lack of resources and expertise allocated towards the counselling of patients with hearing loss and their families. While many of these services were once available when audiology was a hospital-based services, few audiologists have incorporated this facet to their business model during the exodus towards private practice, and consumers have taken note. A unique business model ensued, where otolaryngologists, audiologists, speech-language pathologists, and psychologists worked collaboratively within a single entity. Furthermore, plans were made to train hard-of-hearing consumers to act as mentors to new patients and offer free peer-to-peer counselling services to new patients. Psychology services could also be ordered in urgent cases where psychologists and audiologists could establish appropriate interventions plans for patients with hearing loss and/or tinnitus and their families. The focus and dedication towards the provision of quality services has paid dividends. Our patients have quickly realized that this level of quality cannot be found at retail outlets where hearing aid sales are unapologetically favoured.

EXTERNAL COMMUNICATIONS

Not surprisingly, consumers have noticed the increase in advertizing from clinics which propose hearing aids as the "be all and be all" of solutions. While advertizing has brought awareness to hearing loss, many patients question this sudden increase of ads and why audiological services have been often been diminished to the selection of the most appropriate hearing aid. Our consultation suggested that consumers are interested in comprehensive information on services as well as some transparency into the industry as it relates to understanding the differences between products, services, clinics, and the credentials of professionals who provide hearing health care. One interesting outcome of the consultation process has been that the definition of quality care remains elusive to many consumers. Many consumers are unaware that more comprehensive services exist and, as such, there is exceptional opportunity for clinics to educate consumers and advertize the merits of superior care in the marketplace. As such it was decided that most communication activities would occur internally by providing consumers with knowledge into the hearing health care industry and the importance of adequate service delivery. Furthermore, our consultation with CHHA was a precursor to the current Project 333, where an increase in CHHA membership was targeted as a means for CHHA and consumer-centric clinics to strengthen the group's presence and activities. In so doing, all patients are provided with a complimentary CHHA membership and meaningful communications produced by consumers themselves. The combined outcome from our consultation exercise

has led to a much-appreciated advertizing and educational program which focuses on the importance of services, knowledge and unbiased care.

The consultation exercise has been significantly useful for our clinic to establish its identity and service design. For the past five years, our patients have consistently mentioned their appreciation and trust for the standard of care provided at our clinics. In identifying our patient's needs, our audiologists have also been able to confirm the validity and credibility of their skills and services but also that of their profession. In conclusion, a frequent and carefully constructed consultation with patients is an effective means for hearing healthcare clinics to align their service delivery approach to the needs of their target demographic.

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Why Babies Should Have Specially Designed Hearing Aids

By Majken Roikjer, Pediatric Audiologist at Widex A/S

A hearing aid designed for infants may make an important contribution towards ensuring the best possible rehabilitation of the hearing impaired child. The miniature size of the aid and the soft instant-fit ear-tip mean that the hearing aid will be comfortable for the infant to wear. Therefore, it will more likely be worn through many hours of daily baby life thereby ensuring the best possible conditions for auditory development and language acquisition.

With the introduction of newborn hearing screening, a larger number of infants are being identified with hearing loss at birth. As a result, we are presented with a new group of hearing aid users who receive early intervention partly in form of hearing aid amplification.

Newborns present novel challenges for the hearing care professionals and places new demands on the hearing aid manufacturers for designing hearing aids specifically for small ears. Widex has taken up the challenge and designed a miniature hearing aid that fits well behind the infant ear and meets the specific needs of this group of hearing aid users.

NO DELAYS IN LANGUAGE DEVELOPMENT

Children's ability to hear is critical for their language development. They need to hear what is being said to develop understanding of the world around them. They also need to hear and monitor their own speech production in order for it to develop. This dependence on hearing means that there is a risk that children with an undiscovered hearing loss will not develop language at the same rate as their normal hearing peers.

Language is a critical factor for children's ability to socialise and obtain knowledge, and an undiscovered hearing impairment may affect the child's psychosocial development, cognitive abilities, and academic achievement.[1–4] However, evidence has shown that if the hearing impairment is discovered early and intervention in the form of amplification and aural rehabilitation is initiated early in life, significant delays in language development can be avoided.[5–8]

These findings have led to the acknowledgement that early identification and rehabilitation of hearing impaired children is extremely important. Many countries have as a result implemented newborn hearing screening programs. The objective of these programs are to identify the hearing loss at birth, perform a full diagnostic evaluation before three months of age, and initiate the intervention services as soon as possible after the diagnosis and at no later than when the child is six months of age.[8]

Ideally, this means that newborns with congenital hearing loss will be fitted with hearing aids somewhere between the ages of three to six months. A new group of hearing aid users have come into existence with requirements that are notably different from the ones of adults and older children.

FITTING HEARING AIDS TO INFANTS

One of many challenges when fitting an infant is the practical limitations related to the size of the hearing aid. With a regular size hearing aid the mismatch between the hearing aid and the size and softness of the baby ear is obvious. Even an average-sized hearing aid will seem large and heavy. The hearing aid will be uncomfortable while the baby is taking a nap, is being hugged, or fed, and the weight of the hearing aid may increases the risk of the aid falling off, or being displaced when the child is playing.

Another challenge when fitting infants is the fast growth of the ear canal. Consequently there is a frequent need for new earmoulds to prevent leakage of sound as the infant grows out of their custom mould. Sound leakage as well as displacement of the hearing aid behind the ear often results in unwanted feedback from the hearing aid. This is a particularly critical issue in baby fittings, as experience has shown that parents tend to react negatively to feedback. They stop their interaction with the child in order to stop the whistling which is very unfortunate since nursing and hugging the child is very basic in the relationship between child and parent. The occurrence of feedback often leads to a

negative perception of the hearing aids and the parents may remove them as they might fear that the feedback is hurting their child. This reaction is a very logical, but also very unfortunate since it limits the child's auditory stimulation.

DESIGN FOR BABIES

Considering the limitations of a regular-sized hearing aid in connection with infants, it is clear that ensuring the best possible rehabilitation of the child is not simply a question of fitting the child with a hearing aid as early as possible; the physical fit of the hearing aid is also very important. To ensure the best possible conditions for auditory development and language acquisition, it is of great importance that the hearing aid fits the ear and stays on the ear for as long as possible. A hearing aid where the small and soft ear, as well as the growth of the ear canal, is taken into consideration already in the design is required.

Several aspects must be taken into account in the development of a hearing aid for the infant ear. First of all, the aid should contain all relevant audiological features for an infant fitting and it should also be comfortable for an infant to wear. It must stay in place, and, if possible, the hearing aid should contain an instant-fit ear-tip solution to prevent frequent ear impressions. With an instant fit solution the time spent waiting for new earmoulds is minimized. This means that the period where the earmoulds do not fit properly is avoided and in turn so is the related risk of a period with feedback problems.

There is always the risk that babies will put the hearing aids into their mouths as this is the way that infants naturally explore the world. Therefore another important factor is ensuring that the hearing aid is kept securely in place. Thus, the development of securing features is a high priority issue when developing a hearing aid for infants.

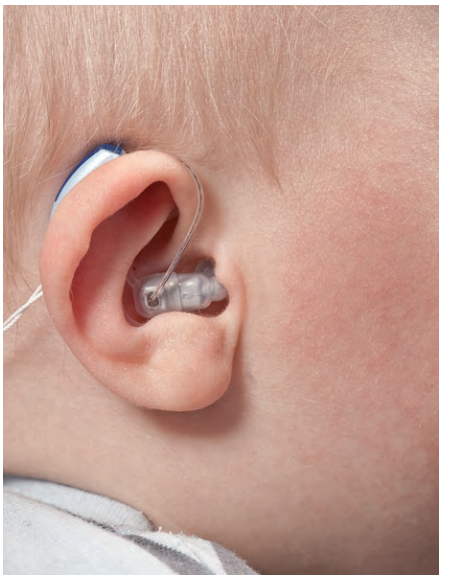
MAKING THE SMALLEST POSSIBLE HEARING AID

There are several ways in which a hearing aid can be reduced in size. The approach taken by Widex involves moving the hearing aid receiver from the housing to the concha of the child's ear (Picture 1).

Moving the receiver not only permits a reduction of the size of the housing, but also has a positive influence on the frequency response of the hearing aid. When the receiver is placed in the concha, the amplified sound is transmitted through a wire instead of through a tube into the child's ear. This is an advantageous design that makes it possible to avoid the resonances and disturbing peaks in the frequency response of the hearing aid which are created when sound is transmitted through a tube.

Transmitting the sound directly into the ear of the child also permits an extended high-frequency response as the creation of a high-frequency roll-off which will limit the high-frequency abilities of the system is avoided. By moving the receiver to the child's concha, in combination with using a broadband receiver, a 10 kHz bandwidth is obtained which is an important prerequisite for the child's speech and language development.[9,10]

All mentioned considerations were taken into account during the design of WIDEX BABY440 (Figure 1). The advanced miniature Receiver-in-the-Ear (RITE) hearing aid offers the best in sound processing – even in the high frequencies. The size and weight of the hearing aid have been reduced remarkably compared to a regular hearing aid (Table 1), which means that the hearing aid fits well behind a small and soft baby ear (Picture 2). Besides the small size, the hearing aid also offers an instant-fit solution with a soft ear-tip as well as the more traditional custom earmould. In both cases the receiver is placed in the concha. Adhesive tape and a retention string have been developed especially to ensure a stable fit behind the ear. Finally there is a built-in Light Emitting Diode (LED), which flashes briefly to indicate that the hearing aid is on.



Picture 1. A Receiver-in-the-Ear (RITE) hearing aid with an instant ear-tip fitted on a 10 month old infant. The receiver is placed in the child's concha.

GREAT RESULTS IN CLINICAL TRIALS

To make sure that the miniature RITE hearing aid designed specifically for infant's also lives up to expectations in the real world, a study was completed with 16 children between the ages of 2–36 months.

All children were identified through newborn hearing screening and had a sensorineural hearing loss ranging from mild to moderate-severe (Figure 2). The children were enrolled from two audiological clinics, one in the USA (1 Hearing and Speech Center, Department of Otolaryngology & Communicative

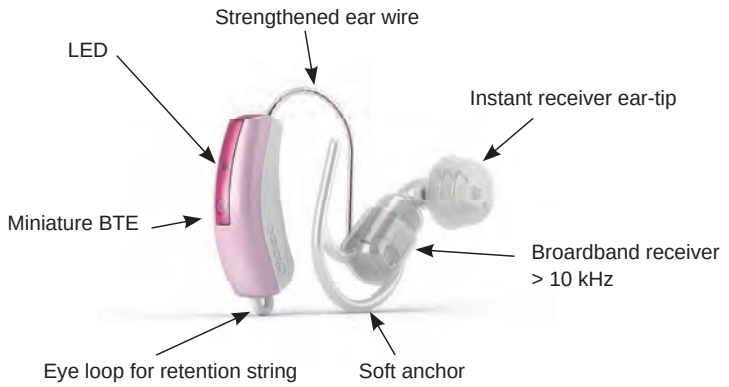


Figure 1. Illustration of the miniature WIDEX BABY440 hearing aid with the instant ear-tip solution.

	Widex mind440 9 BTE	WIDEX BABY440 RITE
Weight	2,7 g	1,0 g
Length	32 mm	24 mm
Width	10 mm	7 mm

Table 1. Comparison of Widex mind440 9 BTE and WIDEX BABY440 in terms of weight, length and width.

Picture 2. WIDEX BABY440 worn by a 3 month old infant.

Disorders, North Shore-LIJ Health System, New York, USA) and one in Sweden (Hörselshabilitering Barn Ungdom, Karolinska University Hospital, Stockholm, Sweden), as part of their normal hearing aid fitting process. Both clinics have vast experience with hearing aid fitting of infants and therefore they receive a considerable number of infants with hearing loss for hearing aid intervention and follow-up services.

During the study, the children were fitted with WIDEX BABY440 hearing aids and monitored closely for a period of 2 to 5 months. The children visited the clinics at regular intervals, and data were collected by means of questionnaires, which were filled out by both parents and hearing care professionals.

All families followed the same procedure for data collection and went through a number of visits in the respective sites. The visits included (1) initial interview with the parents, (2) first hearing aid fitting session (3) several follow-up sessions and (4) final end-session. The audiologist filled out questionnaires and case report forms for each child. Before each follow-up visit, the parents answered a questionnaire regarding their practical experience and satisfaction with their child's hearing aids.

The parent's impression of using a miniature RITE solution for infants was highly positive. The hearing aid was rated as stable and safe in everyday situations and the parents reported that the hearing aid fit well to their infant's ear (Figure 3). Those who reported that the hearing aid did not fit well experienced problems with the retention of the instant ear-tip in the ear canal. In these cases the child was subsequently fitted with a custom earmould solution.

Another interesting result from the parent questionnaire was related to the daily use of the hearing aid. Already at the first follow up session parents reported that their infant was wearing the hearing aid for a good proportion of the infant's waking hours (Figure 4). This illustrates a good immediate acceptance of the hearing aid by parents and infant.

The parent's overall impression of the hearing aids was very high at the end of the study (Figure 5). All the parent's ratings increased with time which is probably related to them gaining experience and confidence with the handling of the hearing aid and security accessories. Instructions and support were provided to the parent's by the hearing care professionals during the study and contributed to the very positive results.

The findings from the parent question-

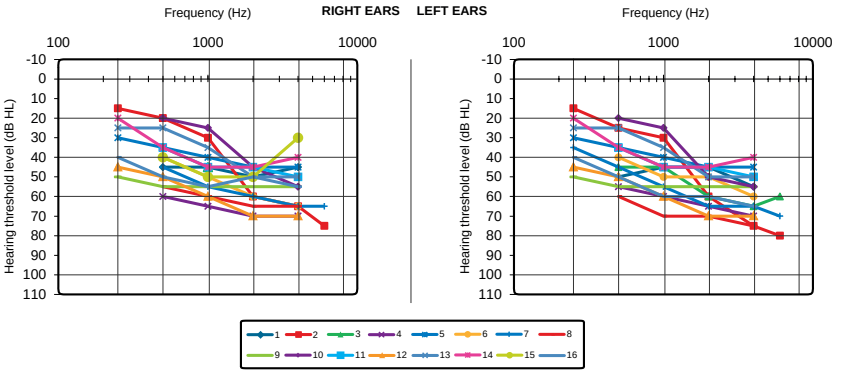


Figure 2. Audiogram configurations for right and left ears for the 16 children who participated in the study.

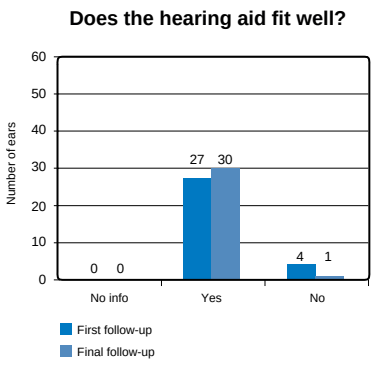


Figure 3. Parent's evaluation of the physical fit of the hearing aid to their child´s ear.

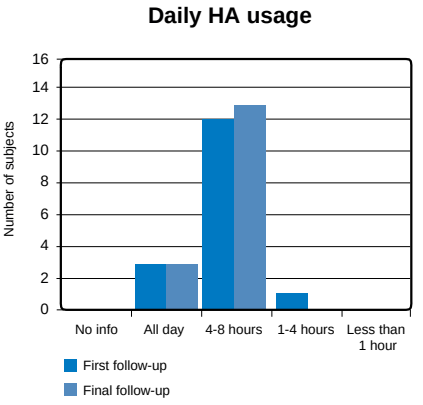


Figure 4. Hours of hearing aid usage during hours of the day when the infant is awake.

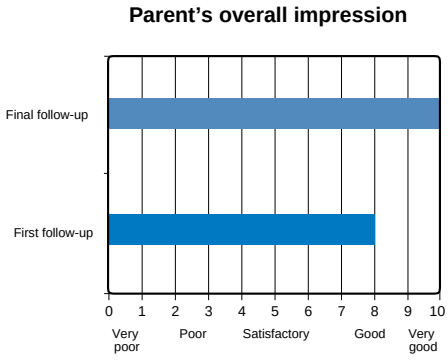


Figure 5. Parent's overall impression of the stability, security and handling of a miniature RITE hearing.

naires as well as the vast experience from the fitting of the WIDEX BABY440 hearing aid support the use of a miniature RITE hearing aid with an instant ear-tip solution for this new and very unique group of hearing aid users. Hearing aids designed for infant ears may result in higher acceptance from both babies and parents leading to an increased early use of hearing amplification supporting auditory and language development.

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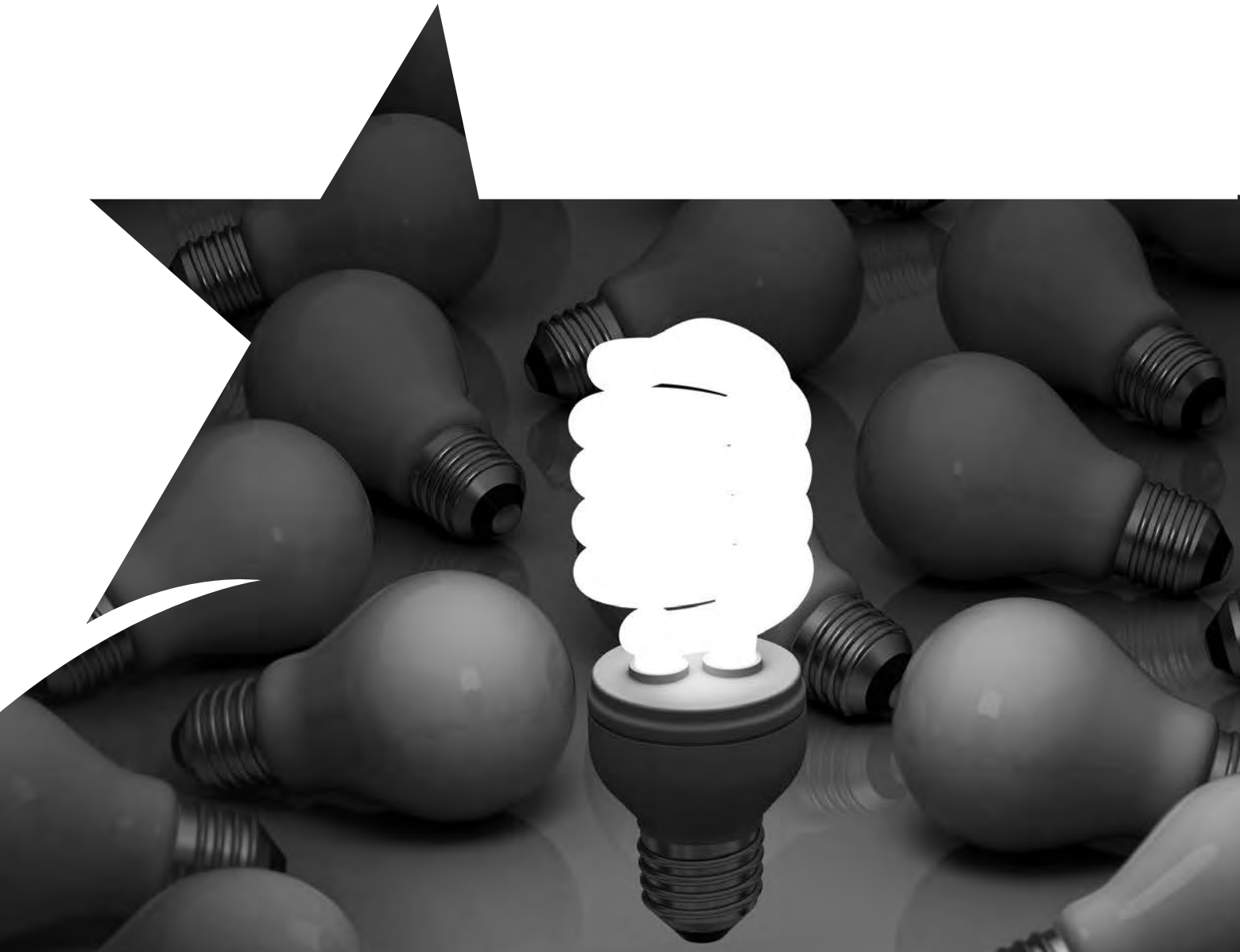

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