WHITEPAPER
2020

Optimal Fitting of Oticon More

INTRODUCTION

This white paper is a continuation of the Oticon Fitting Approach white paper released in 2020. When we develop new hearing aid technology as well as implement changes to how they are fitted using the fitting software, it is important to state why we make the choices we do, as a company. At Oticon, the focus is on providing life-changing technology by providing an optimal fitting with hearing aids that will lead to a quality of life improvement. From a fitting standpoint, there must be a stronger focus on implementing the latest scientific insights on how to help the brain make sense of sound into the hearing rehabilitation process.

With the introduction of Oticon More, we continue on this journey and provide the hearing care professional with more tools to give their clients the best fitting experience possible. This white paper outlines the proposed fitting journey with Oticon More to best meet the needs of your clients, and how we support hearing care professionals from our side in terms of counselling. Two Oticon More fitting use cases are presented to give hands on examples of using the new software tools.

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A better fitting experience with Oticon More

For Oticon, supporting the hearing care professional is as important as developing a high-quality hearing aid for person with hearing loss. Why? Because a poorly fitted hearing aid will not provide optimal audiological performance and, as a result, may not expose the user to the greatest benefit they can receive, both in terms of their quality of life and their brain health. Therefore, it is our responsibility to create a toolbox for the hearing care professional that is expansive when needed, yet simple and fast - all based on a high quality first-fit prescription. For Oticon More, there are a number of important updates to the Genie 2 fitting software. A few are highlighted here because they carry additional value in providing an optimal fitting for all clients.

MoreSound Intelligence™ fitting tool

The new feature replacing OpenSound Navigator™ is called MoreSound Intelligence and the novelty of the audiology behind it warrants a brand-new fitting tool, accessible from the left taskpane in Genie 2. No fitting software feature in the history of Oticon has ever been as thoroughly tested with users as this one and much has been learned from the most successful part of the OpenSound Navigator tool, as well as the part that was not well understood, the Transition bar. The result can be seen in Figure 1. The goal of the tool was to give the hearing care professional a way to engage the client during the fitting and involve them in their own fitting, inspire a positive dialogue about their hearing needs, and help them take ownership of the experience. Although the default settings are a very good starting point for a fitting, it is assumed that the hearing care professional may choose to enter this screen to check that the defaults are appropriate for the person sitting in front of them, and to also look at alternative options for specific user needs. There are five main elements that can be used for this purpose as indicated by the numbers in Figure 1.

1. **Environment Configuration:** This is the next generation of the OpenSound Navigator Transition bar. It is, by far, the single most important handle to set optimally for the individual because changes here determine how much help the user will get in different environments and the activation of automatics. To help the hearing care professional, we have therefore placed a simple question here to ask the client: *"Which situations are Easy or Difficult for your client?"*. In Oticon More, there is a clear distinction between the two. However, one client may find nearly all listening situations to be Difficult and another may find all but the most challenging listening environment to be Easy. This is why we cannot develop a one-size-fits-all approach when it comes to help given. The default setting is that the

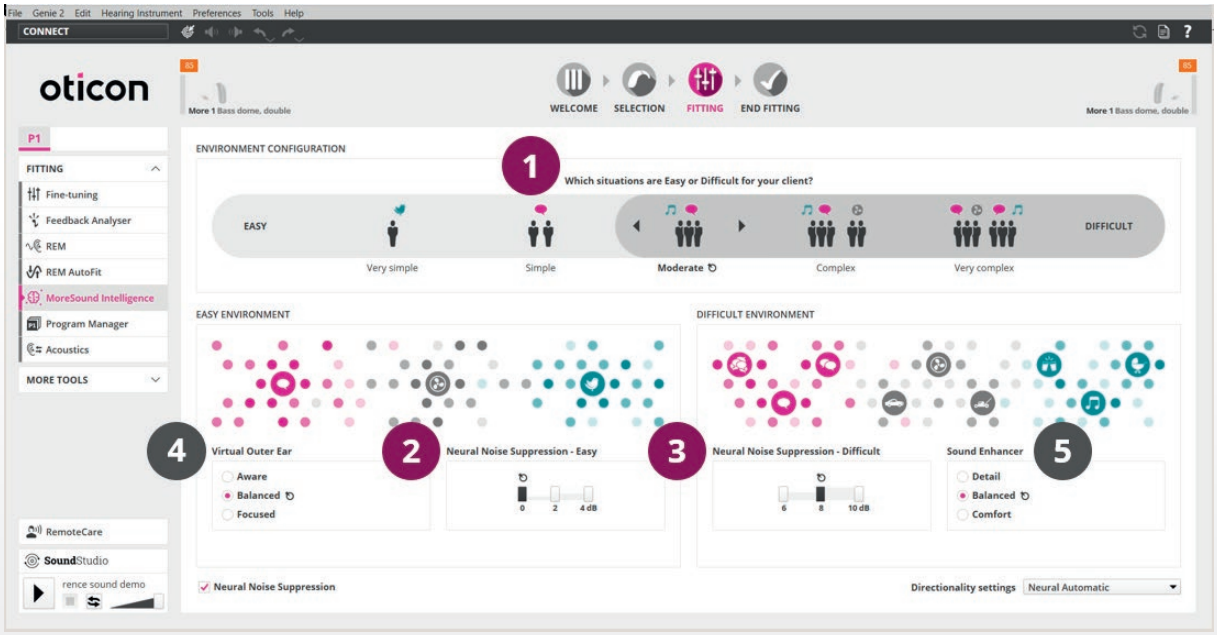


Figure 1. The new MoreSound Intelligence feature screen in the Oticon Genie 2 fitting software.

underlying system classifies situations with moderate complexity (several talkers, some background sound) as Difficult and an estimated 80% of clients will be optimally fitted with this setting. For those requiring help in fewer or more environments, the hearing care professional can simply click right or left to change the configuration.

2 + 3 **Neural Noise Suppression Easy and Difficult:** This part of MoreSound Intelligence represents the Deep Neural Network embedded within the Polaris chip platform in Oticon More hearing aids. The amount of noise suppression provided by the system is configured here for Easy and Difficult listening environments, respectively. Notice that below the Environment Configuration, the screen is split into two parts: handles relevant for Easy environments (2) and handles relevant for Difficult environments (3). As an example, if all environments have been classified as Difficult in the Environment Configuration, then the amount of noise suppression chosen for Difficult environments (3), will apply in all those environments. A simple question that the hearing care professional could ask when considering the (2) and (3) handles, respectively, would be: *"Do you find background sounds to be disturbing sometimes, even in quieter situations?"* and *"Do you find background sounds to be disturbing when there's a lot of sounds around you?"*

4 **Virtual Outer Ear:** This is a fitting handle that is mostly relevant for environments with less background noise, since the pinna configuration is overshadowed by the noise handling processing in more complex situations. Think of Virtual Outer Ear as being your client's opportunity to try out what it would be like to listen with three different sets of outer ears. We all know that the outer ear size and shape matter for how sound is channeled into the ear canal, and in this feature, we introduce three very true-to-life pinna models that correspond to a lower or higher directionality index. The default here is a balanced sound, corresponding to an average adult human ear. The Aware and Focused settings, as well as the Balanced, were developed based on 140 ears and the questions the hearing care professional can ask their client could be: *"Would you like to be able to focus a bit more on someone in front of you, in quieter situations?"* and *"Do you want to be very aware of all sounds around you, in quieter situations?"*. This feature is a preference setting and could be adjusted as needed, typically in a follow-up appointment, based on user feedback.

5 **Sound Enhancer:** This is a fitting handle that is mostly relevant for complex environments with both speech and noise sound sources. This feature is completely new with Oticon More and it is unique because it works dynamically, meaning that it is only active when both noise sources and distinct speech sources are present. In order for the noise suppression to not take away any important speech detail, Sound Enhancer ensures that energy in the key speech region of 1000-4000 Hz is available to the user. Again, some clients will prefer more speech detail in these situations and some tend to prefer a slightly softer, more comfort-focused sound. Three settings are available here and like Virtual Outer Ear, it is recommended to consider this feature a preference setting that can be adjusted as needed, typically in a follow-up appointment, based on user feedback. Simple questions the hearing care professional could ask the user here could be, *"When listening to speech in difficult situations, are you sometimes overwhelmed?"*, or, *"When listening to speech in difficult situations, do you prefer more speech detail?"*.

Order of tools and flow in Genie 2

A change has been made to the left task pane in the Fitting Step of the software, see Figure 2. Although the order of the tools provided here may seem trivial, it makes a difference with Genie 2 as a tool used every day multiple times. The purpose of reordering the tools was to support a fitting flow that adheres more closely to the most impactful aspects of audiology Best Practices that can help increase client satisfaction (Valente et al, 1998, Valente, 2006, Kochkin, 2011).

Feedback Analyser: An accurate measurement of the feedback risk in an individual ear is a very good starting point for a high quality fitting. Therefore, a feedback analysis should be performed if prompted by the software and for many hearing care professionals, it is a standard good practice and part of their normal fitting flow. A feedback analysis ensures a very accurate feedback margin, not based on an estimate, but an actual measurement for the individual hearing aid user. This ensures transparency in the fitting by showing exactly what is possible with all the acoustic choices made for the fitting.

REM & REM Autofit: REM AutoFit and the manual REM tool have moved higher up in the hierarchy for easy access and to visualize Oticon's support of their use, since it has been shown that REM AutoFit saves critical clinic time (Rumley & Crowe 2019) and integrates seamlessly with most REM systems on the market.

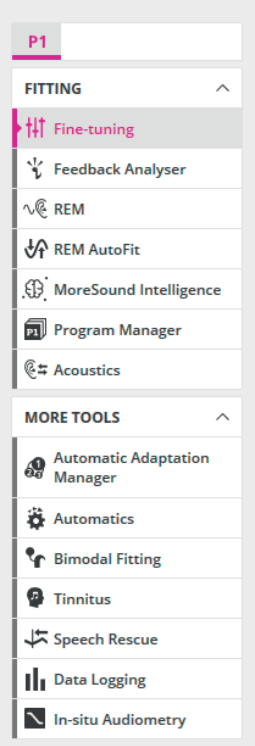


Figure 2.The left taskpane in Genie 2 Fitting screen. The order of tasks has changed.

This includes Audioscan Verifit1 and Verifit2 (using Verifit*LINK*) as well as Interacoustics and MedRx systems amongst others (using IMC 2) where integrated measurements can easily take place right in the fitting software.

Acoustics: Choosing the most appropriate acoustic option is critical for an optimal fitting and although the prescribed acoustics are recommended, based on audiometric thresholds, there may be solid clinical reasons to change them. Changing acoustics has a large impact on targets and gain prescription, as well as being able to prevent audible feedback and inaudible feedback consequences effectively. Therefore, it is a high priority for Oticon to support in the best way possible that hearing care professionals change the acoustics in Genie 2, as well as on the actual hearing aid.

More Tools: These tools certainly have a place in many fittings but are generally not used as a standard step for every hearing aid user. Therefore, tools such as Tinnitus SoundSupport, Speech Rescue and Adaptation manager, are easily accessible, but hidden away when not needed.

24 fitting bands for better target match and fitting accuracy

Oticon's proprietary rationale, VAC+, as well as the generic fitting rationales implemented, can now be adjusted for target accuracy in 24 fitting bands in Oticon More 1. Another good reason for high precision in adjustment of the gain at individual frequencies is adjustment for comfort and being able to precisely handle individual client requests for a change to a specific aspect of the sound picture in follow-up fittings. Most of the new fitting bands are implemented in the high frequencies where they are most needed.

MoreSound Optimizer

In Oticon Opn S, this feature is called OpenSound Optimizer and it was the introduction of an effective feedback prevention system in hearing aids, by use of spectro-temporal modulation technology. In Oticon More, feedback is handled in a similar way, but a gradation of the feature has been added with the option of setting the feature to a Low setting, rather than a simple on/off of the feedback handling system. The Low option is not default because it is not as effective at handling feedback and does not allow for the same degree of fitting flexibility that the full setting does. However, there may be a few persons who are more sensitive to spectro-temporal modulation and can hear slight effects on their own voice or in their music listening experience. For them, there is now an option to set the feature to be active in a more narrow frequency region while still handling feedback risk very effectively. The Low setting can be found under Automatics in the left task pane.

Two use cases

In the later development of Oticon More, many test participants have been fitted with More and have taken part in both lab studies as well as field trials. Use cases such as the two described below are incredibly valuable in testing the entire fitting experience and observing first daily life impressions of a new technology with new audiology that must hold up in realistic real-world day-to-day use. To help the hearing care professional get started with Oticon More, the main learnings from these two test participants are shared with you.

The overall fitting guideline used was a BrainHearing Best Practices approach adapted to Oticon technology and the unique aspects of Oticon More:

- VAC+ rationale
- Personalization questions
- REM AutoFit (Affinity) – used in conjunction with Adaptation level
- Target match within +/- 5 dB margin

Use case 1 (TP1)

TP1 is a 47 year old male. He has a long medical history, due to early diagnosed otosclerosis in both ears and complications resulting in multiple ear surgeries. He was fitted with Oticon Opn S 1 hearing aids once hearing thresholds had stabilized in both ears to an asymmetric mild-to-moderate mixed hearing loss, in the summer of 2019. Before this, he intermittently wore a competitor brand of hearing aid, starting in 2013. He was highly satisfied with Oticon Opn S 1 hearing aids and there have been no follow-up issues. TP1 was chosen as a good use case due to his high level of satisfaction with Oticon Opn S, since we were interested in the subjective audiological benefit in Oticon Opn S versus Oticon More.

TP1 was fitted with Oticon More hearing aids and VAC+ targets were verified using REM Autofit. He was set to Adaptation step 3 and adjusted down 1 dB between 1-6 kHz as this was where he was most comfortable. He was fitted with prescribed acoustics, the new OpenBass dome. Personalization questions placed him in the Complex category of the Environment Configuration in MoreSound Intelligence, meaning that the system considered any environments to the left of this setting Easy and considered Complex and Very Complex situations as Difficult. Virtual Outer Ear was set to Aware and Sound Enhancer remained in Balanced. Neural Noise Suppression was set as prescribed to 0 dB for Easy and 6 dB for Difficult situations. All in all, TP1 was considered a person who needed less help from the system in many situations because he appreciates hearing a lot of sound. He still gets help in the most difficult environments. A short form of the Speech, Spatial and Qualities of Hearing scale (SSQ12) (Noble et al, 2013) completed at his baseline appointment showed a mean score of 7,6 out of 10, meaning that on a scale from 0 to 10,he performed a good step above average on speech, spatial and qualities of sound with Oticon Opn S.

His initial reaction was that he got a boost compared to his own hearing aids. "I hear really well now" and "Feeling a 15-20% improvement".

He completed a two week trial and was able to experience a variety of situations, including work meetings, giving a presentation to 200+ people, and private family/friend events with a larger group of children and adults, as well as music.

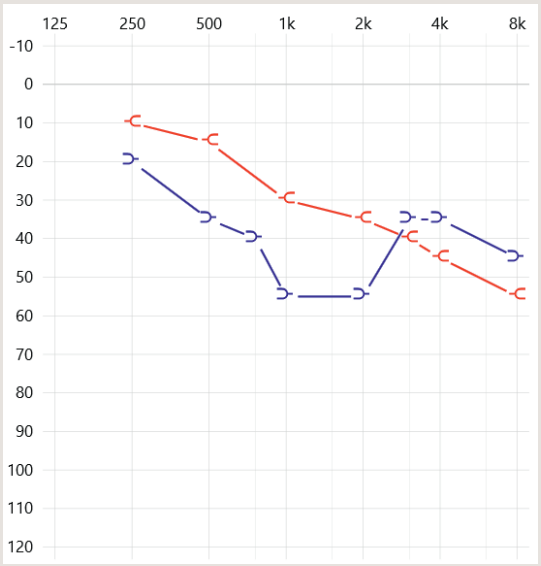


Figure 3.TP1 audiometric thresholds used for Oticon More fitting.

When he returned to the office, the SSQ12-C was administered, which is the same questionnaire, but this time comparing the performance of the new hearing aids (Oticon More) to the previous ones (Oticon Opn S). The scale is from -5 to +5, where a 0 is considered the same performance. TP1 had a mean score of +4,3, meaning that he considered Oticon More to be much better than his Oticon Opn S hearing aids. The interview conducted confirmed that he had a very positive experience. Amongst other things, TP1 commented that he could now hear his young soft-spoken daughter much better, that he could overall hear "15-20%" better and he heard better and more detail in difficult listening environments. Hearing at a distance improved and he remarked hearing "twice as well" in complex situations.

The comfort of the OpenBass dome was very good and it worked its way out far less than his previous open domes, where he always wears a sport lock due to an active ear canal with jaw movement. He also noticed getting more sound with the new dome, which has been confirmed with internal measurements showing 2-5 dB more gain in mid frequencies with the new dome.

Overall, he had a very good experience and his last comment was, "It's a good time to be hearing impaired. There's such a huge evolution in technology".

Use case 2 (TP2)

TP2 is coincidentally also a 47 year old male, but he is a new user. A hearing test showed thresholds within normal limits up to 2 kHz and a precipitous slope in both ears dropping to a moderate to moderately-severe sensorineural hearing loss above 3 kHz with slightly worse thresholds in the left ear. Active on the job market and with lots of coworker and customer interaction every day, he was struggling to hear speech and was bothered by background noise.

TP2 was also fitted with Oticon More hearing aids and VAC+ targets were verified using REM Autofit. He was set to Adaptation step 3 and was quite comfortable with the full setting, despite being a new user. He was fitted with prescribed acoustics, the new OpenBass dome. Personalization questions placed him in the Medium category of the Environment Configuration in MoreSound Intelligence. Virtual Outer Ear and Sound Enhancer remained in prescribed Balanced settings. Neural Noise Suppression was set prescribed to 0 dB for Easy and 8 dB for Difficult situations. The SSQ12 scale completed at the baseline appointment showed a mean score of 5,1 out of 10, meaning that on a scale from 0 to 10, he was having some difficulties in terms of speech, spatial and qualities of sound without amplification.

His initial reaction was an overall positive outlook and acceptance of amplified sound with no remarks on quality of own voice, sharpness or other comments that are often expected at first fitting appointments.

He completed a two week trial and was able to experience a variety of situations, including a lot of driving for work in a small truck, visits to many grocery stores every day with deliveries, and amongst other complex situations, a noisy family brunch.

When he returned to the office, the SSQ12-B was administered, which is the questionnaire given at a follow up for first time users, comparing their experiences with no hearing aids to wearing hearing aids. TP2 had a mean score of +2,5, meaning that he considered wearing hearing aids a substantial improvement to not wearing hearing aids. TP2 described having an eye-opening experience, now

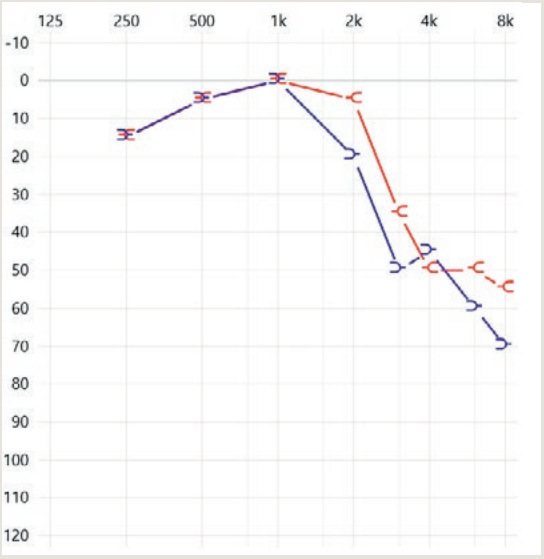


Figure 4. TP2 audiometric thresholds used for fitting Oticon More.

identifying himself as someone who absolutely needed hearing aids and reporting a very positive experience with many small daily epiphanies. TP2 remarked that the hearing aids had already become "part of his body" and that he was hearing so many new sounds, some of them very missed and others that he was adjusting to hearing again as normal every day sounds. His most positive experience was at the noisy brunch where he described being able to focus on one person at a time and having to concentrate less. He was also very comfortable hearing a lot of sound. He was not bothered by background sounds in general and was pleased to be able to hear, for example, a bicycle coming behind him. These are true BrainHearing benefits and they fit well with the purpose of the Oticon More technology which is to provide not just access to more sound, but more high quality sound, so that the brain has to work less hard to navigate a world with many sounds.

All in all, these two use cases showed very positive and promising results. From a fitting perspective, working with the new feature, MoreSound Intelligence, was familiar, yet provided new tools and adjustment handles that give the hearing care professional confidence that they can provide professional care and achieve optimal and successful fittings with Oticon More.

Supporting good and comprehensive counselling throughout the journey

The hearing care professional is expected to wear many hats in the hearing rehabilitation process. Not only must they often help their client overcome the stigma of hearing loss and hearing aids, they also have to educate them on the effect hearing loss has on brain health and overall health. And this is before we even consider all the counselling needed when the hearing aid is fitted and the client has to learn correct insertion, care and maintenance, safety, expectations, wearing time, and so much more.

The hearing care professional usually has a solid and effective routine as well as a specific and personalized way to counsel on many parts of the rehabilitation process. From the Oticon perspective, we can help support the rehabilitation journey from before the client enters the clinic and well after they are fitted with appropriate amplification. We can also contribute to important counselling related to hearing and brain health given our focus on this aspect with our BrainHearing concept. This has been at the heart of Oticon communication and positioning for a number of years now, with the vast ongoing research in this area and the way we substantiate feature benefit using brain objective outcome measures, such as EEG, Pupillometry and SWIR testing for memory recall data (Le Goff et al, 2016, Juul Jensen, 2018, Juul Jensen, 2019, Man & Ng, 2020, Santurette & Behrens, 2020). Figure 5 shows some of the key counselling elements introduced with Oticon More.

Preparation tool

The Preparation tool is a new online tool, which has been designed to support the hearing care professional and the client at the beginning of the rehabilitative journey. The client fills in a short online form that asks simple questions that are very valuable for the professional to know prior to the first office visit. This way, the professional is aware of the client's expectations for the visit and the journey, as well as in which situations they experience hearing difficulty. This can save valuable clinic time and ensure that both parties are on the same page from the beginning. Now, a good dialogue can begin from the moment the client enters the clinic. This tool also encourages the clients to reflect about their current situation/life prior to the meeting. For best preparation, the hope is that clients will talk with their relatives about questions in the tool to get the most comprehensive view on their hearing challenges and how they affect their lives.

Waiting room video about hearing and brain health

In a similar way, this video centering around hearing and brain health is a great educative tool that can help the client to understand that having a hearing loss is not just about damage in your ear and getting help to hearing better. It is a whole body issue and there are many physical, mental, social, and emotional effects of hearing loss. It helps the hearing care professional to add value to the rehabilitative journey and to give the client the information that *caring for their hearing is caring for their health*. With so much new research coming out to show the broader effects of hearing loss, having an educational video such as this can support the professional in their short time with the client, so they do not have to start with the most basic information every time.

One Stop Counselling brochure

This brochure is a valuable all-round tool provided to the hearing care professional as part of a focus on brain and hearing. It centers on how hearing loss can affect

Preparation tool: Client provides information about expectations, reasons for appointment and situations of difficulty, prior to their first clinic visit.

Waiting room video: While clients are waiting for visits, this educational video introduces valuable information about consequences of untreated hearing loss.

One Stop Counselling brochure: As the name implies, this is the number 1 go-to counsellling tool for the hearing care professional to use in the clinic when talking about hearing, brain, and technology.

Oticon More decision tool: When a client needs help making a choice about different technology levels (More 1, 2, 3), this tool uses a different approach to shed light on differences.

The First 30 Days brochure: Important, yet simple, information a new user needs in the first period of time living with hearing aids.

Figure 5. Counselling highlights introduced with Oticon More.

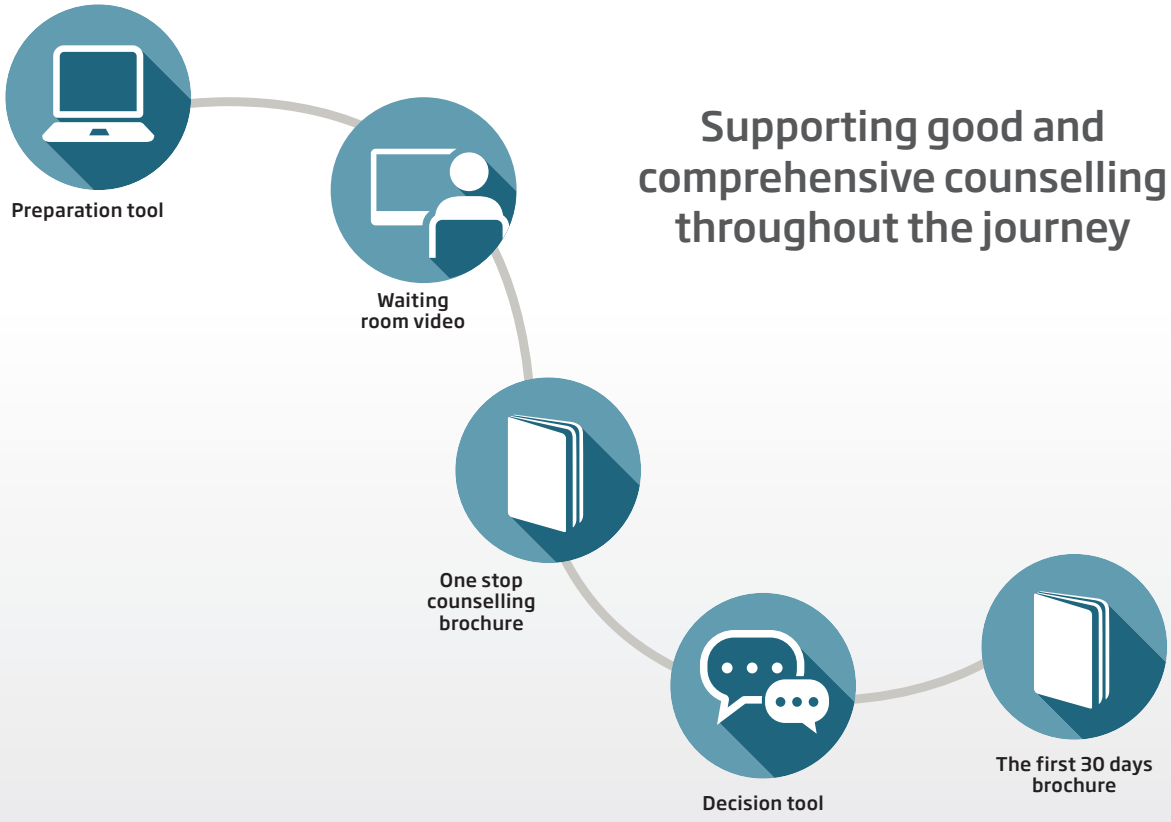
quality of life, mental and physical health, as well as overall well-being. It asks less commonly asked questions directly to the client that relate to how the brain-related effects of hearing loss affect them: *Do social situations exhaust you? Do you get stressed and irritated in noisy situations? Do you find yourself in doubt about what is going on around you?* Then the brochure goes on to explain why your client might feel this way and how a brain-friendly hearing aid can improve their lives. This is all done in a positive tone that leaves the client feeling optimistic, rather than discouraged, and it therefore provides a great starting point for talking about rehabilitation and next steps. This brochure can be an essential part of the counselling situation and as the name implies, it is designed to include all the truly most important points of a counselling session prior to getting hearing aids.

Oticon More decision tool

Oticon More is available in three pricepoints and this tool changes the traditional way of differentiating between pricepoints by referring to how many different noisy situations a given hearing aid can handle. Instead, the decision tool focuses on a few relatable key talking points that are centered on benefits the client can understand and that go beyond "more active lifestyle equals higher pricepoint". One side of the tool has more technical information available to the professional, which can support their dialogue about the difference between the price points with the client. The other side has a simply designed layout that states the differences in easy language for the client.

The First 30 Days brochure

When the client leaves the clinic wearing new hearing aids, hearing care professionals can sometimes wonder if they made sure to give their clients all the information they needed. Perhaps they are sure they gave all the information, but not as sure that the client can retain it all. This brochure is a take-home brochure for the client that gives them simple advice on what to expect within the first 30 days of wearing a hearing aid. This type of information is in line with best practices and has been proven to be helpful to other persons with hearing loss who have been through the process before.



Supporting good and comprehensive counselling throughout the journey

Summary

With Oticon More, we introduce new, strong audiological benefits for both clients and hearing care professionals in the rehabilitative journey. The added features in Genie 2 and the comprehensive package of new counselling materials ensure that the professional has the tools to reliably and comfortably provide optimal fittings and successful hearing rehabilitation journeys for people with hearing loss.

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