



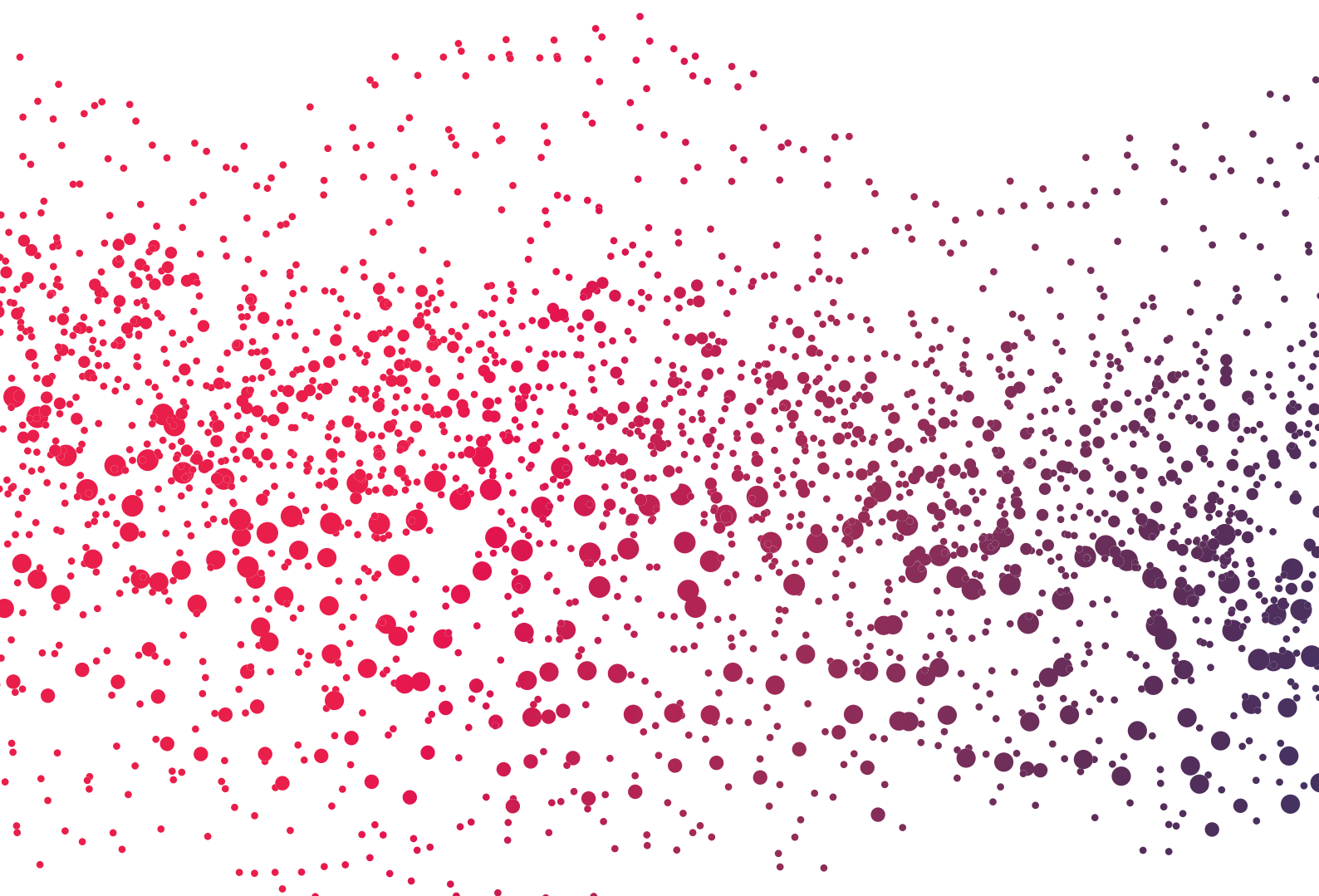
**AMPLIFON CENTRE FOR
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CRS SCIENTIFIC JOURNAL

Otology & Audiology Article Review

Volume 4
December 2021



Teleaudiology and
smartphone technology

Amplification, Balance, Presby-
vestibulopathy and the risk of falls

The WHO Hearing
Screening Handbook

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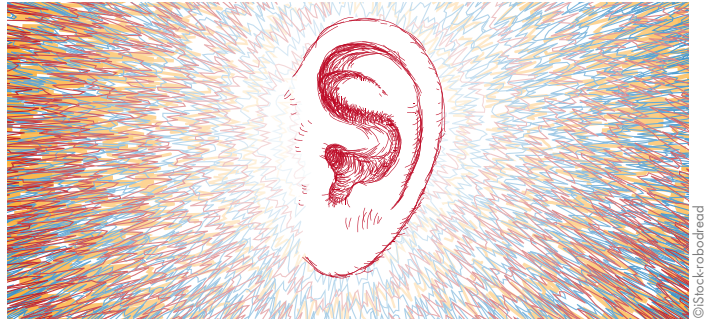
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Chadha S., Cieza A., Mikkelsen B.
Geneva: World Health Organization; 2021.
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EDITORIAL



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Dear Reader,

The Amplifon Centre for Research and Studies [CRS] houses one of the finest private libraries in the field of audiology and otorhinolaryngology, offering the sector's most important international journals. Every three months, a team of Amplifon Audiologists from all around the globe selects the most relevant publications in the field of Otolaryngology and Audiology and make a comprehensive review out of it. The Amplifon Centre for Research and Studies coordinates the development of this quarterly review. We are happy to share these new reviews with you. For this issue, our team reviewed 11 interesting articles published in the third quarter of 2021.

Two articles are related to teleaudiology and smartphone technology used in the follow-up and rehabilitation related to hearing aid fitting. The first article concludes that teleaudiology follow-up consultation may have similar contributions as the standard face-to-face follow-up consultation but cannot replicate the patient's experience of a face-to-face follow-up meeting with an audiologist. In the second article, we see that adults who were confident with smartphones and apps were able to use an app that supports hearing aids management and maintenance. For both topics, it is essential to execute it person-centered and to evaluate the candidacy for these kinds of interventions.

Two literature review articles handle the impact of amplification (hearing aids and cochlear implants) on vestibular function, balance, and the risk for falls. Depending on the specific aspect of balance and the way it is assessed, the authors conclude that many aspects of the vestibular function improve when using amplification.

At the end of this journal, we included a review on the first WHO handbook on "Hearing screening: considerations for implementation." Since the cost of untreated hearing loss is so high, there is a need for more evidence and clear guidelines on how to organize and implement hearing screening programs for neonates, schoolchildren, and adults.

Mark Laureyns

Global International CRS
& Medical Scientific Research Manager





TELEAUDIOLOGY HEARING AID FITTING FOLLOW-UP CONSULTATIONS FOR ADULTS: SINGLE BLINDED CROSSOVER RANDOMISED CONTROL TRIAL AND COHORT STUDIES



Tao KFM., Moreira TDC., Jayakody DMP., et al.

International Journal of Audiology, 2021, 60: Sup1, S49-S60

By Tali Bar-Moshe – Israel

Teleaudiology follow-up consultation may have similar contributions as the standard face-to-face follow-up consultation but cannot replicate the patient's experience of a face-to-face follow-up meeting with an audiologist.

Global population ageing increases the need to find accessibility solutions for hearing rehabilitation services. In the last decade, researchers have started to investigate the use of telehealth approach as a possible delivery model of hearing aid (HA) rehabilitation services. The objective of this article was to examine and compare the effectiveness of teleaudiology, standard face-to-face and blended services of hearing aid fitting follow-up consultations for adults.

28 experienced and 28 new HA users that needed HA fitting were randomly assigned into two groups. There were no significant differences between the groups' variables such as age, gender, hearing loss type and degree, hearing threshold average, etc. Each participant had a face-to-face fitting counseling with audiologists. After this meeting, the participants of the first group got the 1st follow-up consultation face-to-face and the 2nd follow-up consultation remotely, while the participants of the second group got the 1st follow-up consultation remotely and the 2nd face-to-face. The face-to-face follow-up consultation was held by experienced audiologists in the hearing clinic. The remote follow-up consultation was held from the clinic by an experienced audiologist with the assistance of a non-experienced facilitator that was present in the remote location with the participants (home, workplace or another clinic). The facilitators were first year master audiology students with basic audiology knowledge but limited HA knowledge and no practical experience. The facilitator's role was to set up the equipment in the remote location and assist the audiologist with clinical and technical tasks during

CRITICAL NOTE:

Over the years, different technological innovations influence audiologists' practice and increase their need to acquire other skills and abilities in order to give effective and professional rehabilitation services to HA users. Telehealth technology entered many health and rehabilitation services, and it seems that the Covid-19 pandemic accelerated its penetration into other fields and various populations as well. In this atmosphere, audiologists must take part in the process of defining the teleaudiology practice. Teleaudiology in HA rehabilitation may increase accessibility and enable audiologists to "meet" with the patients in their own surroundings, but they have to make sure that it will be suited to each patient's needs and abilities and will have the same professional standards as the traditional consultation model.

the session, such as checking for cerumen in the ear, demonstrating insert and removal of the HA, repeating the audiologist's massage to the participant if the audio/visual connection was not optimal, checking the clarity of the TV or referred ambient noises in the house, and so on. The researchers used various outcome measurements tools in order to evaluate the participants' quality of life (IOI-HA), communication (HAUQ), fitting (COSI, HAll) and service satisfaction (HASS-P).

The results showed that the duration of the remote consultation was approximately 40 minutes, similar to the face-to-face session. Every type of consultation improved

outcomes of participants' quality of life, communication and fitting. Service satisfaction for both remote and face-to-face sessions was high but still significantly greater with face-to-face consultations. There was no influence of the order of consultation's model on the outcomes. One of the limitations of this study was the use of facilitators in the remote sites that deal with the technical equipment and mediation between the audiologist and the participant. There was no assessment of their activities' influence on the outcomes or discussion of the economical and

procedural aspects of training and using facilitators on teleaudiological services.

The researchers concluded that using teleaudiology follow-up consultations may have similar contributions as the standard face-to-face follow-up consultation but cannot replicate the patients' experience of a face-to-face follow-up meeting with an audiologist. Blended services may be useful and increase versatility to patients' needs and preferences. •



USING SMARTPHONE TECHNOLOGY TO SUPPORT THE ADULT AUDIOLOGIC REHABILITATION JOURNEY



Timmer BHB., Launer S., Hickson L.
International Journal of Audiology,
2021, 60: Sup1, S61–S67.
By Tali Bar-Moshe – Israel

It is the audiologist's responsibility to identify the degree of knowledge and the abilities of their patients to use smartphones and apps in order to choose the right complementary training and information tools for each one of them and integrate those tools efficiently in the rehabilitation process.

The adult audiology rehabilitation journey may consist of several stages resembling the behavior change model including: the early phases of awareness to the hearing impairment, contemplation about the possible solutions for it and a decision regarding the preferred intervention; the stage of taking action and trying hearing aids; the ongoing stage of maintenance in the usage of the hearing aids. The article's goal was to review and describe several studies that use smartphone apps to support adults in different stages of their patient journey of audiology rehabilitation.

Supporting contemplation and preparation. The authors presented studies that used Ecological Momentary Assessment methodology (EMA) in smartphone apps that enable participants with mild hearing loss to report in real time their personal experience in different real-world common listening situations. The data collected may shed light on participants' perceptions of their speech understanding and listening efforts in different

CRITICAL NOTE:

The use of smartphones and apps became more and more common in many daily-life aspects including audiology rehabilitation and hearing aids usage. It may be an important tool that will help patients move forward in their hearing rehabilitation journey and use their hearing aid successfully. Nevertheless, there are still many individuals who are not using smartphones and apps for different reasons such as financial, cultural, or personal. It is the audiologist's responsibility to identify the degree of knowledge and their patients' ability to use smartphones and apps in order to choose the right complementary training and information tools for each of them and integrate those tools efficiently in the rehabilitation process.

situations. This data may also have clinical importance in raising awareness of adults to their hearing abilities

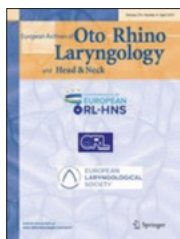
and listening difficulties, indicate if the person is a candidate for hearing aids and encourage them to move on to the action stage and seek rehabilitation solutions.

Supporting the action stage. Researches indicated that due to the complexity and diversity of hearing aids users, it is not easy to measure hearing aids successful outcomes. The use of a patient-centered approach may help define hearing rehabilitation individual goals and outcomes for every patient. The authors described a pilot study that used a smartphone app to collect data on the listening experience of 10 first-time hearing aid users with mild hearing loss, with and without hearing aids. The results indicated that the participants reported significant individual variations of hearing aids benefits. The information collected this way may give the clinician more insights regarding individual challenges, help them setting personal rehabilitation process and goals, defining training and fine-tuning the hearing aids needed for specific patients.

Supporting the maintenance stage. *In order to use hearing aids successfully the wearer must be able to manage and maintain their devices. Recent studies emphasized the importance of hearing aids management and maintenance information given as part of the clinician’s support during the patient journey. The authors used a prototype hearing aid app in order to see if it could support hearing aid management by 30 adult participants, 60 years old and up with no hearing aid experience. The results showed that adults who were confident with smartphones and apps were able to use an app to support hearing aids management and maintenance. It also showed a correlation between a reduced cognitive ability and a difficulty to use the app. The clinical implications of this study suggest that a hearing aid management and maintenance app may be used as a complementary tool to the audiologist’s instructions and guidance throughout the rehabilitation journey.* •



CAN HEARING AMPLIFICATION IMPROVE PRESBYVESTIBULOPATHY AND/OR THE RISK-TO-FALL?



Ernst A., Basta D., Mittmann P., et al.
European Archives of Oto-Rhino-Laryngology (2021) 278:2689-2694.
 By Majda Basheikh – Canada

An analysis of the potential impacts of hearing aid amplification on vestibular function and risk for falls.

Presbyvestibulopathy is the decline of the vestibular sensory system that occurs with increasing age. Previous studies have demonstrated its association with presbycusis, another age-related sensory decline, but this one is related to the auditory system. Although both types of sensory declines occur independently of one another, studies have shown both to be correlated to increased risk of falls in older adults. This study investigates the effect of hearing aid amplification on presbyvestibulopathy and

CRITICAL NOTE:
This literature review suggests that amplification likely induces brain changes to improve balance function. Further research is still needed to evaluate long-term outcomes, but this positive correlation can be encouraging news for older adults that are more prone to falls due to their declining vestibular health.

the risk for falls.

A literature review was conducted on PubMed and the Cochrane Library to identify articles that investigated auditory and vestibular impairments as well as the following factors:

- incidence
- prevalence
- potential correlations between hearing and balance at different stages of life
- influences of amplification (cochlear implants or hearing aids) on balance on its own, also potential impacts on the ageing balance and hearing systems

The studies were further analyzed qualitatively based on intervention types, patient selection, and outcome measurement. The following data was extracted:

- type of study
- subject characteristics (age, disorder type, audiological profile, neurotological diagnostics)
- outcome measures (subjective and/or objective)

A total of ten studies was discovered for this qualitative analysis. Most studies measuring balance performance used a posturography platform system, whereby sensors are used to track force exerted by feet under different test conditions. Four separate studies were found to examine possible impacts of hearing aid use on balance. These studies yielded the following conclusions:

- 4 months after fitting, hearing aid use improved quality of life and reduced fear of falls (in populations without history of prior balance intolerance)
- aided hearing while in the dark yielded more optimal balance results than unaided hearing
- no relationship between hearing aid usage and measures

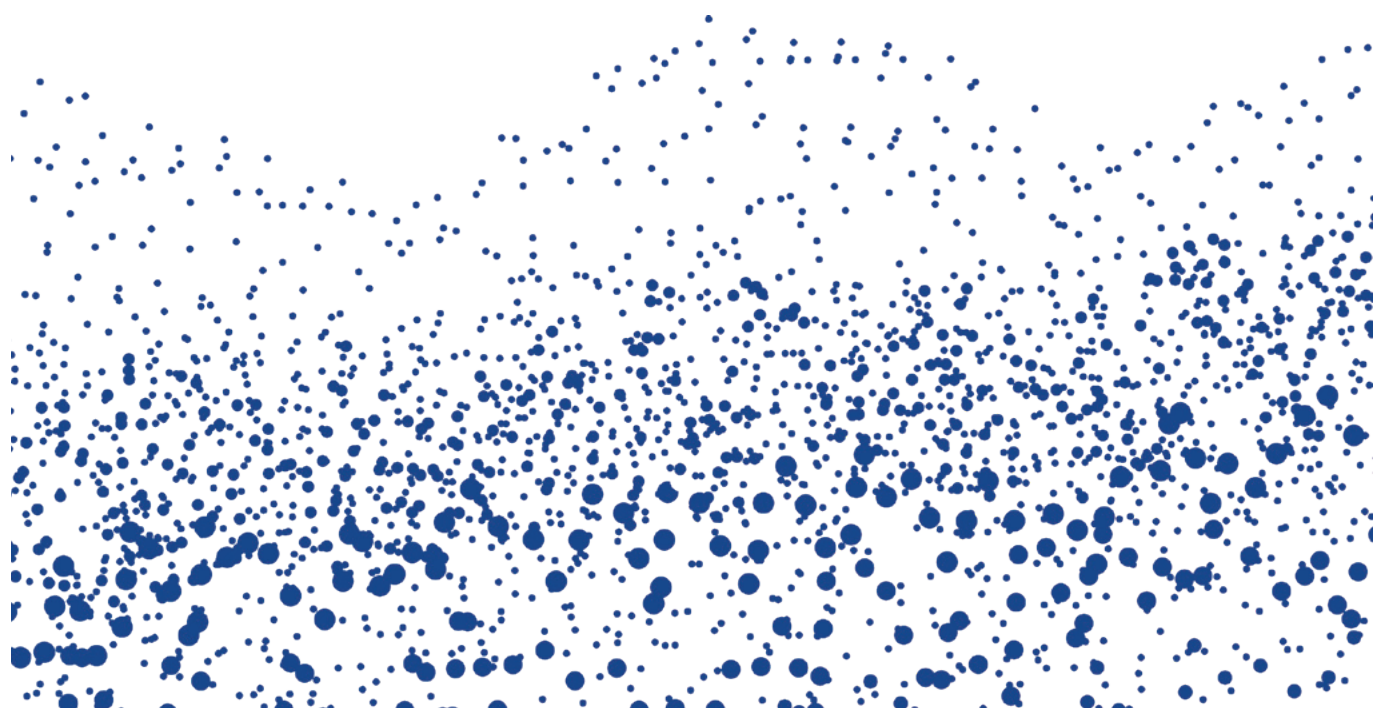
of postural stability

- hearing aid usage has positive effects on static balance by reducing sway velocity

With respect to cochlear implant (CI) and balance, analyzed studies had the following conclusions:

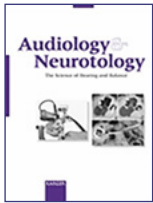
- measures of balance performance in CI users reached near normal values (of healthy controls of similar age)
- evidence of improvements in balance performance in at least 6-12 months post CI implantation
- improved balance performance in bilateral (vs unilateral) CI users, likely due to binaural auditory cues
- CI activation (on position) in unilateral users resulted in improved measures of postural stability

The reviewed literature was consistent in demonstrating that amplification has positive effects on balance function, specifically spatio-temporal orientation. Furthermore, the effects were more notable in CI users due to positive correlations with postural stability. The effects are not necessarily immediate, as indicated by CI users. This suggests possible neuroplasticity considerations, whereby the brain likely learns to process new auditory information to further improve balance function. However, it should be noted that this review as a whole is only an indication of trends between hearing and balance, as the papers reviewed were too diverse to allow for a quantitative analysis. It is also unclear how amplification affects balance in the long term (at least a year). More research is therefore needed using a standardized protocol of tests to further examine the audiological and neurological conditions of subjects before and after amplification. •





THE INFLUENCE OF HEARING AIDS ON BALANCE CONTROL: A SYSTEMATIC REVIEW



Borsetto D., Corazzi V., Franchella S., et al.

Audiology and Neurotology
2021;26:209–217.

By Thomas Zacharia – Australia

The use of hearing aids in individuals with mild to severe sensorineural hearing loss on static, dynamic, subjective balance and quality of life was evaluated in this systematic review.

Hearing loss is known to be associated with multiple comorbidities such as poor physical health, anxiety, depression, dementia, isolation and cognitive decline. Hearing loss is also associated with imbalance, which can be explained using two theories.

Firstly, age-related loss of labyrinthine function in which hearing loss is a surrogate marker for vestibular dysfunction leading to imbalance. Secondly, postural stability is maintained by sensory informations from visual, audio-vestibular and somatosensory inputs and losing hearing cues due to hearing loss can lead to imbalance. It is very important we understand the impact of hearing rehabilitation with hearing aids on improved balanced since the chances of people over the age of 65 years old falling is much higher and the complications from these falls are associated with 17% of all-cause mortalities within 6 months.

The use of hearing aids in individuals with mild to severe sensorineural hearing loss on static balance (quantifying stability while standing still), dynamic balance (stability under dynamic conditions), quality of life, subjective balance and adverse outcomes related to use of hearing aids were studied.

STATIC BALANCE:

Static balance was examined using Romberg test (on foam and/or tandem stance). A significant improvement in Romberg test performance was noted in aided conditions when compared to unaided ones but a direct correlation between hearing aid gain and Romberg performance could not be established.

Computerized posturography was used as an objective test to measure the static balance. 4 studies did not find a significant difference in static balance in aided and unaided conditions but an improvement in static balance was

CRITICAL NOTE:

Hearing aid usage is identified to improve balance in individuals with mild to severe sensorineural hearing loss. Static balance is more improved with hearing aid usage when compared to dynamic balance, in which the localization cues are less consistent during movement due to constant change of auditory information.

observed in aided condition with sound when compared to aided condition without any sound. Most of the other studies have identified significant improvement in static balance in aided conditions in individuals with moderate hearing loss.

DYNAMIC BALANCE:

Dynamic balance was examined using Functional Ambulation Performance (FAP), Timed Up and Go (TUG), and mini-BESTest. In one study, FAP results showed a significant improvement in dynamic balance in aided condition when compared to unaided condition. There was no significant difference between aided and unaided conditions when using TUG test. Mini-BESTest showed a significant improvement in dynamic balance in aided condition when compared to unaided condition. Computerized posturography was used in one study to measure the dynamic balance between aided and unaided conditions and did find an improvement in score, but due to small sample size no statistical analysis was conducted.

QUALITY OF LIFE:

Only one study looked at the improvement in QoL and self-confidence and found a significant improvement in both just after 4 months of using hearing aids.

SUBJECTIVE MEASUREMENT OF BALANCE:

There was a significant reduction in fear of falling noted in 28 patients after wearing hearing aids for 4 months. Sound impulses are considered to be spatial orienting landmarks and the localization process helps the individual to get a 3-dimensional map of the environment to reduce fluctuations in sway velocity and maintain balance in

relation to the sound sources. It is also postulated that sound inputs act as an auditory biofeedback useful to improve postural corrections in order to maintain balance. Auditory spatial cues, auditory biofeedback systems, cross modal stochastic resonances are some of the explanations behind improvement in balance in individuals wearing hearing aids. •



HEARING SCREENING OUTCOMES IN NEONATES OF SARS-COV-2 POSITIVE PREGNANT WOMEN



Alan MA., Alan C.
International journal of pediatric otorhinolaryngology, 146 (2021), 110754.

By Lauren Johnstone – Australia

Authors present a comparison between hearing results of neonates born to SARS-CoV-2 positive mothers and SARS-CoV-2 negative mothers.

To date, global studies of SARS-CoV-2 have identified the high likelihood of vertical transmission of the virus based on several identified patients characteristics; however, data on pregnant patients is limited. Congenital sensorineural hearing loss (CSNHL) is one of the most common abnormalities at birth, with many known intrauterine risk factors associated with this vertical transmission. Viruses contracted *in utero* can directly damage the inner ear structures such as the hair cells and the organ of Corti. A well-known example of this is Cytomegalovirus, which is the leading non-genetic cause of CSNHL. Similarly, SARS-CoV-2 is able to reach the cranial nervous system as a neurotropic virus. This allows transportation via anterograde and retrograde of the virus to SARS-CoV-2 targets found on glial tissues, neurons and brain vasculature, called ACE-2 receptors. Given the similarities of these two viruses in entering the nervous system, it is suggested that intrauterine SARS-CoV-2 infection may have the potential to cause inner ear structure damage.

As of the publication of this review, the association of SARS-CoV-2 and CSNHL has not yet been reported. This study aimed to compare newborn hearing screenings (NHS)

CRITICAL NOTE:

SARS-CoV-2 has the potential to interrupt the nervous system and damage the inner ear structures. However, the authors reported that there is not enough current research to determine if coronavirus does have any definite association with CSNHL. The authors also noted that there are other studies which suggest there is no correlation between coronavirus and CSNHL. This study could act as a solid base for further research into this topic.

in infants born to both SARS-CoV-2 -positive mothers, and SARS-CoV-2 negative mothers.

PARTICIPANTS:

- neonates born to SARS-CoV-2-positive women with the virus all through pregnancy from first menstrual delay between april and december 2020 (test group)
- neonates born to SARS-CoV-2-negative women chosen at random through the participating hospital data base (control group)

The total number of participants was 118 neonates.

EXCLUSIONS:

Neonates with known pre-existing risk factors of CSNHL were excluded. Newborns with any outer ear abnormalities discovered through otoscopy were referred to an otolaryngology center, and were excluded.

CONDITIONS:

All tests on newborns were performed within the first 2 weeks of life via auditory brainstem response (ABR). If a newborn failed the ABR test (“ABR refer”), a second ABR test was performed 2 weeks later.

TEST NEONATES:

The babies born to SARS-CoV-2 -positive women were more likely to be born earlier than the control group (p=0.004), and more likely to be born via caesarian. The test babies were found more likely to have a bilateral refer result than those in the control group (p<0.001). The second ABR test done for the “ABR refer” babies from both the test and control groups were not significantly different to one another (p=0.618).

Refer results:

- bilateral 31.4%
- unilateral right 9.3%
- unilateral left 63.8%

Pass results

- bilateral 55.1%

CONTROL NEONATES:

Refer results:

- bilateral 13.6%
- unilateral right 3.4%
- unilateral left 6.8%

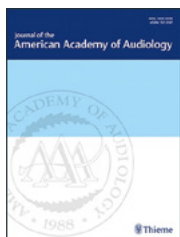
Pass results:

- bilateral 76.2%

This study suggests the likely vertical transmission of SARS-CoV-2, given the test group was shown to be more likely to yield a “Refer” result than the control group. However, the full affect SARS-CoV-2 takes on newborns via vertical transmission is still understudied and requires further investigation. •



LONG-TERM EFFECTS OF HEARING AIDS ON HEARING ABILITY IN PATIENTS WITH SENSORINEURAL HEARING LOSS



Goel AR., Bruce HA., Williams N., et al.
Journal of the American Academy of Audiology
 Vol. 32 2021 June.
 DOI: 10.1055/s-0041-1731592.
 By Thomas Zacharia – Australia

This study tried to investigate the effect of hearing aid use for 5 years on pure tone audiometry and word recognition score when compared to non-hearing aid users.

Hearing aids are the main intervention for hearing loss and it is known to improve long-term quality of life and hearing abilities in individuals with mild to moderate hearing loss. It is important to look at the effect of long-term amplification on an individual’s hearing abilities. Even with prescriptive recommendation by audiologists, hearing aids can expose the hearing aid users to unsafe levels of

sound exposure, causing temporary and/or permanent threshold shifts. Initially, these studies were carried out on children to identify deterioration in hearing in aided and unaided conditions. The trend was no deterioration in hearing due to hearing aid use, but with the settings for severe to profound hearing loss, there was a deterioration in hearing from the use of hearing aids due to the need

to have unsafe sound output levels from the devices. Hearing aids fitted with prescriptive targets are safe levels of sound outputs, but non-prescriptive devices, such as over the counter hearing aids and personal amplifiers, expose individuals to unsafe sound levels and therefore to damaging their hearing.

This study tried to investigate the effect of hearing aid use for 5 years on pure tone audiometry and word recognition score when compared to non-hearing aid users. The study found that there was a decline in pure tone audiometry and word recognition scores in hearing aid users. This decline was not noted in non-hearing aid users. One study also found high frequencies to be more affected with hearing aid usage when compared to low frequencies. The hearing aid use may result in threshold shifts at frequencies know to be affected by human speech and acoustic trauma. Even though in the current

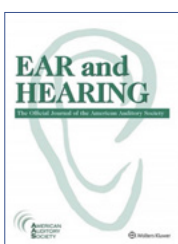
CRITICAL NOTE:

Long-term hearing aid usage can lead to hearing deterioration: the hearing aid exposes the wearer to unsafe sound levels due to manual control of amplification using volume control or no control over MPOs, resulting in a temporary shift in thresholds and later in a permanent shift in thresholds.

study they only noted 5 dB deterioration in 5 years with hearing aid use, they are speculating the deterioration will worsen with a longer period of use, and also in individuals who wear hearing aids that do not have a prescriptive maximum power output settings; or those who control the amplification using volume control for personal preference. •



IDIOPATHIC SUDDEN SENSORINEURAL HEARING LOSS: SPEECH INTELLIGIBILITY DEFICITS FOLLOWING THRESHOLD RECOVERY



Okada M., Parthasarathy A., Welling B., et al.
Ear & Hearing, Vol. 42, N° 3, 782-792.
By Melissa Babbage – New Zealand

This retrospective study addressed the hypothesis that patients who have recovered from SSNHL show greater word recognition deficits than expected based on hearing thresholds, which may be consistent with cochlear synaptopathy.

The presentation of sudden sensorineural hearing loss (SSNHL) varies significantly with respect to audiometric configuration and severity. Partial or complete hearing recovery may occur spontaneously (in around 30–60% of cases) or following medical treatment, most often with corticosteroids. Given the high spontaneous recovery rate treatment, efficacy is unclear. There are several hypotheses for the mechanism of hearing loss, including viral infection, intracochlear membrane rupture, and vascular compromise. The authors suggest that an interruption of the cochlear vascular supply may cause

damage to the dendrites of cochlear afferent neurons. This damage may precede hair cell damage and threshold elevation. Synaptopathy could contribute to difficulties in speech perception, particularly in the presence of noise, without impacting pure tone thresholds.

This retrospective study addressed the hypothesis that patients who have recovered from SSNHL show greater word recognition deficits than expected based on hearing thresholds, which may be consistent with cochlear synaptopathy.

CRITICAL NOTE:

This retrospective review reports data indicating that speech intelligibility in quiet may be impaired following SSNHL, even when pure tone thresholds have recovered to the level of the contralateral ear. This highlights an important issue to be considered by clinicians fitting hearing aids and/or counselling patients who have experienced SSNHL. It is an important next step that the effect of these deficits on real world hearing ability is assessed, particularly with regard to how this varies with degree of contralateral hearing loss. Assessment of speech perception in noise may also provide further information on the speech recognition deficits experienced by patients who have recovered from SSNHL. While synaptopathy provides an attractive explanation for the findings reported in this study, further research is needed to clarify the mechanism of speech recognition impairments following SSNHL.

METHOD:

Audiometric records were reviewed from 166 patients (average age 59.2 years old) who presented with unilateral idiopathic SSNHL. Patients were divided into three groups based on whether mean air-conduction thresholds at low-frequencies (LF; 0.25–1 kHz) were poorer than, better than, or within 15 dB of mean high-frequency thresholds (HF; 2–8 kHz). Classifications were LF dominated SSNHL, HF dominated SSNHL, and flat SSNHL. Speech recognition performance was assessed using the CID W-22 and the Articulation Index (AI) was used to predict the speech intelligibility curve (SIC). Route of treatment and treatment delay were also documented.

RESULTS:

The length between the first and last hearing test ranged from 1 month to around 9 years. Hearing loss severity and the degree of recovery/residual hearing loss were highly variable across patients. An association was made between hearing loss configuration and degree of hearing recovery. The mean PTA recovery was 54% of the initial threshold shift in patients with LF SSNHL, compared to 49% for patients with flat SSNHL and 28% for those with HF SSNHL.

Neither residual hearing loss nor recovery were associated with the choice of treatment or treatment delay.

Mean word recognition scores remained significantly poorer than the contralateral side at the final assessment. In many cases, speech recognition performance was significantly poorer than predicted by the SIC derived from the patient’s audiogram, indicating a deficit in speech intelligibility. Among the 58 patients with no residual hearing loss, 8 of them had a significant asymmetry in word recognition scores consistent

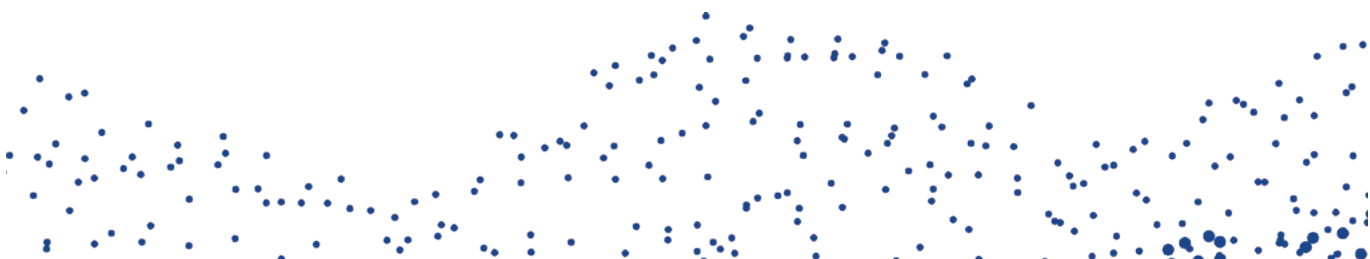
with speech intelligibility deficits unrelated to hearing sensitivity.

DISCUSSION:

The results indicate that the configuration of SSNHL is a strong predictor of hearing recovery, with greater improvement in patients with LF SSNHL than HF SSNHL. The authors suggest that as the LF SSNHL group was older and had more contralateral HF loss, the ability to see an additional shift from SSNHL may be limited. Older patients showed less residual hearing loss, which is interpreted as a likely ceiling effect due to pre-existing hearing loss and less hearing to lose at SSNHL onset.

After recovery from SSNHL, patients were found to have poorer word recognition than predicted based on pure tone thresholds. It is suggested that a loss of speech discrimination ability without significant threshold increase is consistent with loss of inner hair cells or auditory nerve fibres. Whereas the loss of these elements must be greater than 80% to affect thresholds, loss below this level could be expected to significantly impact speech discrimination. Afferent neurons may be permanently damaged by both ischemia and viral infection. The authors also suggest that hair cell damage in the cochlear apex, associated with lower frequencies than those tested in the standard audiometric test battery, could contribute to word recognition deficits. Speech testing was performed only in quiet and real-world handicap may therefore be underestimated.

The authors conclude that SSNHL may result in speech intelligibility deficits that cannot be entirely explained by a change in hearing sensitivity. •





TREATMENT CHOICE IN SINGLE-SIDED DEAFNESS AND ASYMMETRIC HEARING LOSS.

A PROSPECTIVE, MULTICENTRE COHORT STUDY ON 155 PATIENTS



Marx M., Mosnier I., Vincent C., et al.

Clinical Otolaryngology. 2021; 46:736-743.

By Katrien Hoornaert – Belgium

This study follows 155 potential cochlear implant candidates with unilateral, severe-to-profound hearing loss and analyses the treatment of choice selected by the users: CROS, bone anchored bone conduction or cochlear implant.

This study follows 155 potential CI (cochlear implant) candidates with unilateral, severe-to-profound hearing loss. SSD (single-sided deafness) refers to a PTA at the better ear of ≤ 30 dB HL; whereas AHL (asymmetric hearing loss) refers to a PTA at the better ear between 30 and 70 dB HL.

All participants started with an initial trial of 3 weeks with Phonak Cros (or bicros if necessary). After this, the participants had a 3-week trial with Baha BP110 or Ponto on headband. The audiological performance was measured, and QoL (quality of life) was assessed both at baseline and after each trial (using the device).

At the end of the two trials, 75 subjects opted for CROS hearing aids, 18 for BCD, 51 for CI and 11 chose no treatment. There was no significant difference between groups in terms of aetiology, deafness duration, deafness side, hearing thresholds in the better ear or tinnitus severity.

Both the baseline measurements and the audiological measurements with the devices seemed to have no significant influence on the treatment's choice. There was only a significant influence of the scores on QoL: the

CRITICAL NOTE:

It is surprising how most subjects chose the CROS treatment based on QoL and not on audiological performance during trial (because there was no significant difference there), and how fast this subjective benefit decreased!

participants who chose CROS had a better score after the CROS trial than the other groups, the participants who chose BCD had a better score after the BCD trial than the other groups. This suggests that QoL is the most deciding factor in choosing the treatment.

QoL was also measured 6 months after the treatment. This showed that the benefit of CROS was overestimated: QoL was significantly poorer after 6 months (compared to QoL observed just after the CROS trial.)

Long-term (after ± 5 years) usage was also included in this study: 81% of the participants who chose CI still use their CI, whereas only 52% of the participants who chose CROS still uses their CROS hearing aids (in the BCD group: 65% still uses the device daily or occasionally.) •





INFLUENCE OF THREE AUDITORY PROFILES ON AIDED SPEECH PERCEPTION IN DIFFERENT NOISE SCENARIOS



Wu M., Cañete OM., Schmidt JH., et al.
Trends in Hearing, May 2021
 Volume 25: 1–15.
 DOI: 10.1177/23312165211023709.
 By Frederic Debruycker – Belgium

This study uses a battery of tests (BEAR-Better hEaring Rehabilitation) to categorise the hearing impaired’s profile to observe the possibility of predicting comprehension outcomes in noise.

Understanding in noise remains one of the major challenges for people with hearing loss. This study aims to compare the results in noise for hearing aid users, classified based on four hearing aid profiles, but also based on different types of noise.

Many devices are currently set based on pure tone audiometry and the manufacturer’s proposed calculation rule without taking into account supraliminal characteristics and individual differences.

A group of experienced users was selected regarding the pure tone audiometry (sensorineural loss, bilateral, air-bone gap of maximum 10 dB). Supraliminal abilities were also observed:

- loudness perception
- speech perception
- spectro-temporal resolution (interaural phase detection pitch detection)
- binaural processing

Auditory profiles are classified this way (Sanchez-Lopez and al. classification (2020)):

Profile	Low Frequency Audibility	High Frequency Audibility	Binaural processing	Loudness perception	Speech perception	Spectro-temporal resolution
A	+	+/-	+	+	+	+
B	+	-	+/-	+/-	-	-
C	-	-	-	-	-	-
D	-	+/-	+	-	+	+/-

Testing was performed with three different hearing devices, based on the manufacturer’s fitting rule (checked with REM measurement), in three kind of noises:

CRITICAL NOTE:

This study uses a battery of tests created in the BEAR project (Better hEaring Rehabilitation) to categorise the hearing impaired’s profile to observe the possibility of predicting comprehension outcomes in noise. The use of this categorisation is intended to take into account supraliminal elements that are not usually even considered in a fitting. The risk of a user’s categorisation error seems to be a factor in the analysis of the results. The study points out different aspects that predict a more or less positive understanding in noise result.

- speech shaped noise
 - speech shape babble noise
 - speech shape babble with intelligible speech
- Evaluation for speech in noise outcomes used HINT (understanding sentences) and JFC (self-adjustment of S/N ratio to reach minimum speech intelligibility using long dialogue).

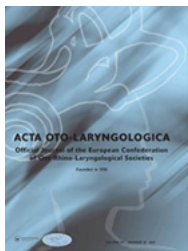
Results of this study result in the following conclusions:

- type of hearing profile, influence the speech perception (HINT) not the self-adjusted SNR (JFC)
- using an intelligible dialogue as competitive noise shows the poorest SIN outcomes, no matter the hearing profile
- manufacturers fitting rules provide generally poorer SPIN outcomes compared to NAL-NL2 but this not always ascertainable

For less favourable profiles the intelligibility results in noise are statistically more dispersed with respect to the median than for profiles more favorable to good results, showing greater inter-personal variability. •



EFFECTIVENESS OF HEARING AIDS IN TREATING PATIENTS WITH CHRONIC TINNITUS WITH AVERAGE HEARING LEVELS OF <30 DBHL AND NO INCONVENIENCE DUE TO HEARING LOSS



Suzuki N., Shinden S., Oishi N., et al.

Acta Oto-Laryngologica, 141:8, 773-779.

By Thomas Zacharia – Australia

Hearing aids could be an effective treatment option for chronic tinnitus in subjects with no hearing loss in the Japanese conversation-comprehension range.

Tinnitus is often associated with hearing loss but around 5-15% of the population with chronic tinnitus has normal hearing or mild hearing loss determined by using pure tone audiometry. For individuals with tinnitus associated with hearing loss, sound masking with the use of hearing aids is very effective but in individuals with normal hearing, hearing aids are not used; rather alternative treatments are followed such as effective counselling and sound generators. This study was conducted in Japan and due to the success of treating tinnitus with hearing aids in hearing loss subjects, those individuals with chronic tinnitus and normal hearing who did not show improvement with alternative treatments showed interest in hearing aids. The study aimed to find the effect of hearing aids on treating chronic tinnitus in individuals with absence of hearing loss in the Japanese conversation-comprehension range, absence of inconvenience in daily communication and absence of improvement in symptoms with general treatments such as educational counselling and sound generators.

Since the subjects had normal hearing, hearing aids were adjusted to reflect the aided thresholds to be 0 dBHL at frequencies between 250 Hz and 4 KHz, with no compression at all frequencies and limited MPO to 100 dB SPL considering acoustic trauma. Subjects were asked to choose whether to be fitted with one hearing aid or two and to wear the hearing aids continuously throughout the day from day one. Subjects visited weekly during the first month and biweekly in the next 2 following months for adjustments and the gain was increased from 1 dB to 3 dB after each

CRITICAL NOTE:
Hearing aids can be used as an effective treatment option for subjects with no hearing deficits but whom report chronic tinnitus and no improvements with the alternative treatment options such as counselling and sound generators.

follow-up visit. After the first 3 months, subjects were asked to purchase the hearing aids if they wanted to and thereafter to wear the hearing aids only when tinnitus is bothering them and to follow up every 3 months and discontinue anytime they wish to.

To quantify the effectiveness of these treatments, subjects were asked to complete 3 surveys: Tinnitus Handicap Inventory (THI), Visual Analogue Scale (VAS) for loudness and annoyance, and questionnaires on subjective symptom improvement for loudness and annoyance.

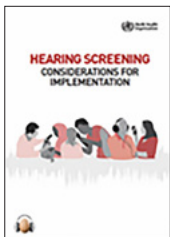
10 out of 103 subjects discontinued using hearing aids after the first 3 months due to various reasons. Among these 10, 5 subjects noticed significant improvement in their tinnitus and did not find a need to wear hearing aids anymore. The remaining 5 discontinued hearing aid usage due to discomfort with the sound from the hearing aid, difficulty understanding speech in noisy environments, cost, purchase of hearing aids from a different hospital, and deterioration of physical health. Further 2 subjects were excluded from the study due to providing incomplete information. The remaining 86 participants were fitted with open fitted behind the ear hearing aids and 1 subject

with completely in the canal hearing aids. There was a significant improvement in THI score after initiating treatment with hearing aids. The mean THI score decreased from 56 to 14 after 3 months of treatment and further down to 9 after 1 year of treatment. Same trend and improvement was noted for VAS score for tinnitus loudness and VAS score for tinnitus annoyance after 3 months and 1 year. 84 subjects had a high frequency threshold of 30 dB or more and 7 had a high frequency

threshold of less than 30 dB. The THI and VAS scores were not statistically significant between these groups entry, 3 months and 1 year. The questionnaires for subjective symptom improvement also noted a significant improvement in tinnitus loudness and annoyance after 3 months and 1 year. The study concluded that hearing aids could be an effective treatment option for chronic tinnitus in subjects with no hearing loss in the Japanese conversation-comprehension range. •



HEARING SCREENING: CONSIDERATIONS FOR IMPLEMENTATION



Chadha S., Cieza A., Mikkelsen B.
Geneva: World Health Organization; 2021.
Licence: CC BY-NC-SA 3.0 IGO. 64p.
By Mark Laureyns – Italy & Belgium

This WHO handbook and guideline, covers
“Hearing screening in newborns and infants,”
“School-based ear and hearing screening” and
“Hearing screening in older people.”

In the world report on hearing created by the World Health Organization (WHO) and launched on the 3rd of March 2021, the authors estimate that 430 million people would benefit from ear and hearing care services. Untreated hearing loss is costly, both from a quality of life and from a financial point of view. Therefore “Hearing Screening across the life course” is seen as the number one action point. This handbook on “Hearing screening: considerations for implementation,” is created to provide practical information to all stakeholders in order to make screening and early intervention for hearing loss and related ear diseases in newborns and infants, pre-school children and school students, elderly people and people at risk, possible and easier to implement.

The first part of “Hearing screening in newborns and infants” starts with the basic 1-3-6 principle (1: screen by the age of 1 month. 2: diagnose by the age of 3 months. 3: intervene by the age of 6 months), the target group is universal so all infants should be screened and as screening tests. The handbook advises to go for physiological screening measures, like automated auditory brainstem response (AABR) or otoacoustic emission (OAE), where AABR is recommended, since it will detect auditory neuropathy better than other procedures and OAE is

CRITICAL NOTE:

We welcome this handbook from WHO on Hearing Screening, since this reference is really needed to help countries and health-care systems to start or in most cases expand their hearing screening programs. Certainly the clear advice to start with adult hearing screening, from the age of 50, at least every 5 years, will be an eye-opening for many and will help to promote and implement adult hearing screening in many countries. The full handbook can be downloaded at this link: <https://bit.ly/3CYojVn>

recommended, since it can detect hearing losses from 30 dBHL onwards. A lot of attention is also spent on the need for follow-up and an effective path to intervention. In the second part of “School-based ear and hearing screening,” ideally hearing loss in one or both ears with thresholds higher than 20 dBHL should be identified, but when starting a screening program it may be wise to start with higher cut-off levels of 30 to 35 dBHL. The age for screening and the frequency should be at the initial entry at school, around the start of kindergarten

and at the school grades, 1, 2, 3, 7 and 11. As screening tests, pure tone audiometry, a digits in noise test (from 9 years of age), ear examination including otoscopy and tympanometry are recommended. The human resources, the referral criteria, diagnostic assessment, intervention and data-management are also discussed.

In the third part of "Hearing screening in older people," it is advised to screen all adults from the age of 50 years old every 5 years and from the age of 65 years old every 1 to 3 years. The handbook mentions that workplace hearing conservation programs for exposure

to noise and chemicals are out of scope and should not be influenced or altered by age based hearing screening. As screening tests, the use of validated questionnaires, combined with pure tone audiometry, a digit triplet in noise test, or only when other tests are not available, a whispered voice test can also be an option. The follow-up for "pass," "refer" and "red flags" results is treated, a clear flowchart is included and as in the earlier part, the human resources, the referral criteria, diagnostic assessment, intervention and data-management are discussed. •

