‘EAR ‘TIS

ANAA Inc.
HEARING HEALTH FOR ALL

Newsletter for Audiometry Nurses
Welcome to the issue of the ANAA Inc. newsletter
2022 Autumn Issue

Autumn 2022

In This Issue

Guess Who? Turn to page 4 for more on the story from some of our girls seconded during COVID to Penrith Panthers Club in Sydney. History in the recording.

President's Report

March 2022

Wishing all our Audiometry Nurses well in these troubled times. I am sure we are all thinking of our fellow beings that have been impacted by the war in Ukraine and the floods here in our own backyard. Sometimes it's hard to know how to help and who to donate too.

Hoping that you are able to get back to seeing clients again in your different area after COVID is slowing down.

On a more positive note Tamworth Hospital has a new ENT, the first in nearly 10 years. Dr Hossein Ghazavi has commenced seeing clients in clinic, and performing surgery at Tamworth Hospital. This will make a huge difference for the New England area clients. Dr Ghazavi has already referred clients for hearing tests to Tamworth Audiometry service at community health.

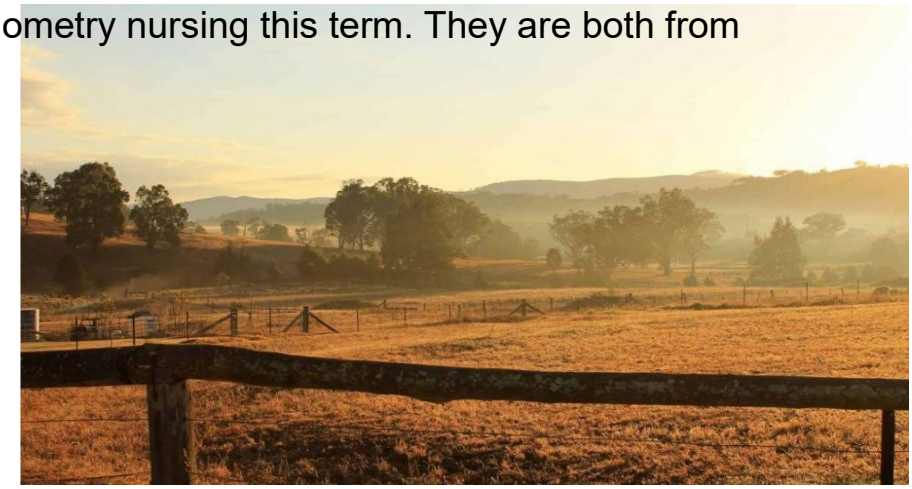
The Annual Audiometry Conference 2022 being held at Tamworth this year on 20th & 21st October. A draft program and further details will be in the next newsletter.

The ANAA Inc. scholarship for 2022 to undertake Audiometry Nursing course has been awarded to Mattia Charters from Quirindi. Mattia will commence her studies with the Australian College of Nursing in July.

We have 2 students studying audiometry nursing this term. They are both from the Northern Rivers area of NSW.

Best Wishes

Purna Sweetman



Save the date

ANAA Inc

Tammworth Conference

2022

October 20th –21st

The Pavillion

FUNCTION CENTRE & GARDENS

What deployment looks and feels like in a Covid pandemic world

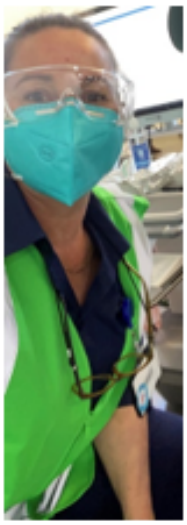
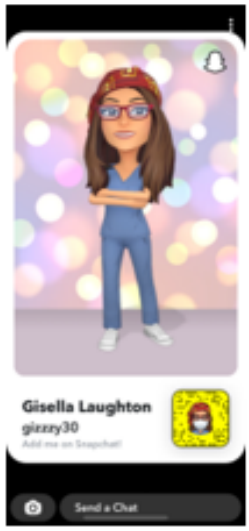
So when Covid raised its ugly head, the world was most definitely in a panic! Yes we thought here is Australia we were dodging some bullets, which we did nicely thanks very much, however delta had a different plan for us all.
Our numbers of infections grew....then it grew some more.

We went from green to red alert in a heartbeat, from busy clinics to working from home as ordered with public health orders.
No I didn't bring the Audiometry booth home with me! ....We got creative and did as much telehealth as possible, which was at least taking Audiometry histories and triaging
In order of priority for when clinics would open again. Several weeks had passed when I got "the phone call" "You are being deployed!"

As also a Nurse Immuniser, I never knew I would be that much of a hot property!!
Well the LHD had other ideas.

I have been working at the Penrith Vaccination clinic since July on Saturdays
Then since Early August deployed full time, many days spent as the team leader as well.
End of August sent us to 2 other locations, now currently as I write this at Panthers RSL Club, which is now my 3rd location.

It has been a stiff learning curve, with rushes of craziness, back to shift work as well as weekends, wearing scrubs and a good variety of N95 and P2 masks, googles and high vis vests, not sure if I am a tradie or feeling like I am in space!

We even vaccinated one day until 0100 in the morning, yes you read that right!!! With some 2000+ people being vaccinated some days.

So here I still am in November still jabbing away, I have seen all walks of life, put out lots of spot fires, held lots of hands, consoled children as well as adults, and feel I have done some good for the betterment of society!!
I have done my bit as a frontline worker to beat this damn virus! As I am sure you all have too.

"So when can I go back to the world of Audiometry???" our wait list must be huge by now.
No idea they said.....we have made a repatriation plan for those deployed!!! .....whatever the hell that means.

Next.....we are now onto the booster doses!

Hahahahahah
"BE A NURSE THEY SAID, IT WILL BE FUN THEY SAID!!

Heather Gillies, Gisella Laughton and some co-workers doing our thing!

Apologies for the belated print run -story should have been included in our previous edition of ‘Ear’Tis

Training, Webinars and Education

Check out updates to the ANAA Website.

Kate has placed new additions into the Members section

- *Peer Review*
- *Professional Competencies*
- *Updated Clinical Practice Standards*

Other resources for those who have not checked out the website

- *Audiometry Nursing Handouts available for hard printing or emailing out to clients.*
- *Information on the Audiometry Nursing Course and our scholarship.*
- *Previous editions of 'Ear'Tis newsletters*

Next Sense

Audiology Masterclass Series 2022

This series of lectures will be expanded as new episodes are scheduled.

https://hearinghub.edu.au/about-us/events/audiology-masterclass-series-2022/

Training, Webinars and Education

Australasian Newborn Hearing Screening Workshop

has been postponed to

July 22nd 2022.

9.30am to 5.30pm.

Cost $65.

https://www.nextsense.org.au/professional-development/australasian-newborn-hearing-screening-workshop-2022

NAL New Website

Cytomegalovirus: the silent virus

By Emma Webb, Valerie Sung and Cheryl Jones.

Congenital cytomegalovirus (cCMV) infection is the most common, and potentially preventable, infectious cause of permanent hearing loss and child neurodevelopmental disabilities such as cerebral palsy. Approximately 400 infants are either born with or develop cCMV-related issues in Australia each year.

The most common sequelae of cCMV are sensorineural (permanent) hearing loss affecting around 13% of infants, vision loss, cerebral palsy, intellectual impairment and neurodevelopmental disability. Despite this, the public, and even health professionals, have little awareness of cCMV.

There is no effective vaccine for the prevention of cCMV infection. While there has been a shift in the understanding of viruses and infection prevention and control, adequate infection prevention of CMV for expecting mothers is low.

CMV is a virus in the herpesvirus family. Once a person is infected, the virus remains viable but usually inactive (dormant/latent) in the body. The infection is common but silent, affecting around 83% of adults, with most remaining asymptomatic. CMV is generally spread by direct contact through bodily fluids such as saliva, nasal mucous, or urine, for example, through kissing children on the lips, sharing food, handling children's toys or changing nappies without washing hands.

CMV can be problematic for pregnant women if caught for the first time (primary infection) or reactivated from its latent state. The most risk of transmission to an unborn baby is when CMV primary infection occurs in the first trimester of pregnancy of a non-immune mother. A minority of babies born with cCMV infection can be unwell at birth, but most (about 90%) are born without any symptoms - of these, 14% go on to develop hearing loss or neurodevelopmental disabilities.

Targeted cCMV screening in Australia

Currently, there is no routine nationwide newborn screening for cCMV in Australia. Targeted cCMV screening was piloted in Queensland, and was feasible and cost-effective when completed by hearing screeners before newborns were discharged from hospital. Another pilot study to evaluate targeted cCMV screening is underway in Western Australia and results are expected to be available in the next few years. However, with the trend towards early discharge of postpartum mothers from hospital, especially during the COVID-19 pandemic, there is a need to test other ways of targeted cCMV screening to avoid missing cCMV infection in newborns who are rapidly discharged home.

Our study, published in the Journal of Paediatrics and Child Health, aimed to test the feasibility and acceptability of targeted cCMV PCR screening by parents themselves taking saliva swabs from their newborns through the Victorian Infant Hearing Screening Program (VIHSP) at the four largest maternity hospitals in Victoria. Parents completed the saliva swab at the time their newborn did not pass VIHSP's hearing screen, either in hospital or at home, and sent the saliva samples to a central pathology laboratory through the post or through hospital services, depending on where the swab was completed.

Our work demonstrated the parent-conducted targeted cCMV screening program to be feasible, with 76% of families agreeing to participate and 100% of the 96 swabs completed within the required time frame of 21 days from birth. One infant was confirmed to have cCMV infection and was able to immediately see an infectious disease clinician to discuss the option of antiviral therapy. We also captured the parents' perspectives of the program. The majority of families (over 90%) found the screen was easy to do, thought it was a good idea, and were glad their baby was screened.

We have therefore demonstrated a new way of targeted cCMV saliva PCR screening to detect cases of cCMV infection that might be otherwise missed by early hospital discharge, especially during the COVID-19 pandemic. We hypothesise this targeted cCMV screening approach can be successfully implemented state-wide with the addition of training of hearing screeners, midwives and nurses to complete saliva swabs in hospital before discharge, to increase uptake and reduce the potential for false positive results.

How about universal cCMV screening?

Before thinking about universal cCMV screening in Australia, we need to understand how common cCMV infection is in newborns in Australia, and we also need to develop cheaper, more convenient and more rapid ways to screen for cCMV to enable implementation at a population level. We also need more data on whether antiviral treatment is beneficial for newborns with cCMV infection who are asymptomatic or have isolated hearing loss.

A recent grant from the National Health and Medical Research Council (NHMRC) will allow our research team to use data from the Generation Victoria research project to determine how common cCMV is in a 2-year birth cohort of more than 110 000 newborns in Victoria. We will partner with the Walter and Eliza Hall Institute of Medical Research to develop a rapid bedside screening test.

About the authors

Emma Webb is completing her PhD at the University of Melbourne, looking at understanding factors facilitating early screening for congenital cytomegalovirus in infants. Emma is a clinical audiologist by background working in the diagnostic space.

Valerie Sung is a paediatrician at the Royal Children's Hospital, Clinician Scientist Fellow and Team Leader at the Murdoch Children's Research Institute, and Honorary Clinical Associate Professor at the University of Melbourne.

Professor Cheryl Jones is a staff specialist in infectious diseases, Dean/ Head of School of Sydney Medical School and a world authority on congenital infections.

From Insight+

WORLD REPORT ON HEARING

World Health Organization

2021

The cover image is an artistic representation of a sound wave entering the cochlea. The sound wave in this image represents the musical notes of the 'Sound of Life', a song specially created for the WHO Make Listening Safe initiative by Ricky Kej. Download the song here https://youtu.be/EmXwAnP9puQ

Sound of Life | WHO | Song for "Make Listening Safe" | Ricky Kej | Lonnie Park

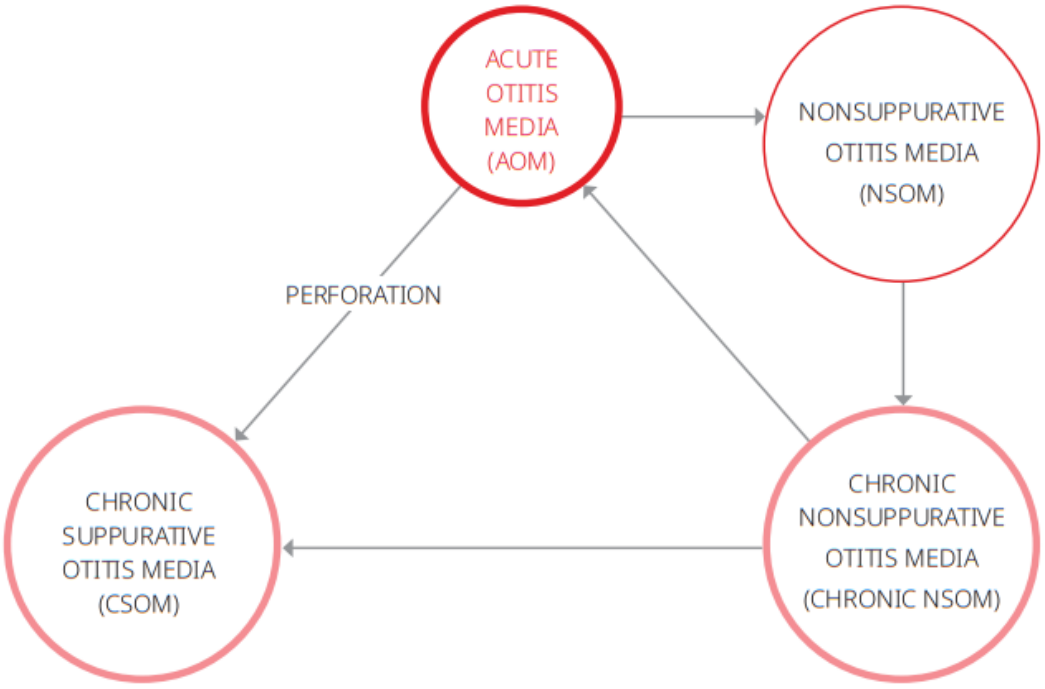
CAUSATIVE FACTORS:
Otitis media *(34–40)*

The term "otitis media" (OM) reflects a range of conditions, all characterized by inflammation of the middle ear. Although anyone of any age can develop otitis media, children are most commonly affected. The different forms of OM include:

- Suppurative otitis media (infective conditions):
  - Acute suppurative otitis media (AOM), including recurrent acute otitis media
  - Chronic suppurative otitis media (CSOM)
- Nonsuppurative otitis media (NSOM) including acute and chronic NSOM. NSOM is synonymous with otitis media with effusion (OME)

Acute otitis media (AOM) is a middle ear effusion accompanied by acute infection. Such an infection can result in a perforation of the tympanic membrane, with the possible development of chronic suppurative otitis media (CSOM). Incomplete resolution of AOM is often followed by a period with nonsuppurative otitis media (NSOM). At the same time, chronic NSOM may itself be a risk factor for AOM. Hence all conditions are interrelated and an individual with otitis media may experience its different forms at different times based on a variety of influences (Figure 1.3).

Figure 1.3 Types of otitis media and their interrelationship



Otitis media poses a major concern due to its:

Annually, acute middle ear infection affects over 700 million people, mostly children below the age of five years *(40)*.

- **High incidence and prevalence**: Although infection can occur at any time throughout the life course, the highest incidence is encountered in children below the age of five years. Available data indicate an incidence rate of 10.85% of AOM *(40)* – i.e. more than 700 million cases each year, the majority of these being children in this age range. The incidence rate varies across regions and countries – from 3.64% in central Europe to more than 43% in parts of sub-Saharan Africa. The variation across countries and regions can be attributed to genetic predispositions as well as to modifiable risk factors such as allergy, upper respiratory tract infections, exposure to second-hand smoke, lack of sanitation, undernutrition, and low socioeconomic status *(36, 38, 100)*. The incidence rate of CSOM is 4.76% – i.e. more than 30 million cases each year, and an estimated point prevalence above 200 million cases globally *(40)*. Some 22.6% of the burden of CSOM occurs in children below five years of age. In terms of prevalence of NSOM, it is well documented that up to 80% children have experienced at least one episode by the age of four years *(35)*.

  In addition, certain Indigenous populations are predisposed towards otitis media *(38, 101–103)*. These include native Americans, Aboriginal populations in Australia and Indigenous populations in circumpolar regions such as Canada, Alaska, and Greenland. For example, the Government of Australia has documented that in Indigenous Australian children aged 0–5 years, the prevalence rate of otitis media is over 90%; and that over half of all Indigenous children experienced some degree of hearing loss *(104)*.

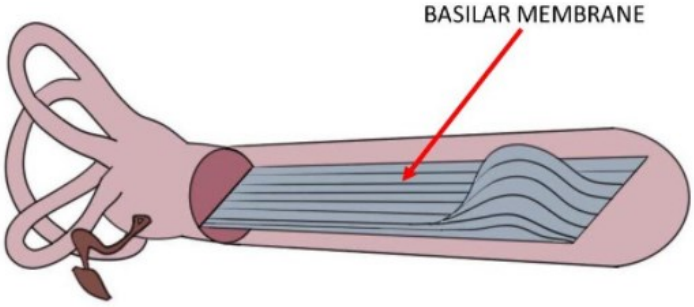
- **Association with hearing loss:** ear infections are one of the common causes of hearing loss in childhood *(20)*. Even though the prevalence of otitis media reduces with age, its impact on hearing is evident across the life course and hearing loss associated with otitis media persists into old age across all world regions *(40)*. It is estimated that globally, more than 3 in 1000 people have hearing loss due to otitis media *(40)* of varying severity.

  Cases of NSOM are usually associated with mild hearing loss, which is often the only symptom and may well go undetected. Despite the "mild" grade of hearing loss, the impact of NSOM on speech perception is significant, often leading to adverse educational outcomes *(105)*.

- **Potential to cause life threatening complications:** it is estimated that each year 21 000 people die as a result of otitis media complications, such as mastoiditis, meningitis and brain abscess *(40)*. Mortality is shown to be highest at the extremes of life – i.e. in the first five years of life and in those aged over 75 years. Geographically, mortality rates are lowest in high-income regions of the world; the highest rates are seen in Oceanic countries and in parts of sub-Saharan Africa.

BASILAR MEMBRANE - DEFINITION

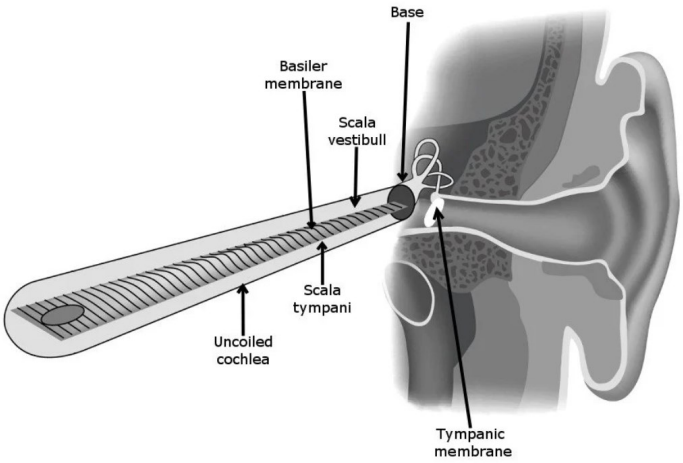
the basilar membrane is found in the cochlea; it forms the base of the organ of Corti, which contains sensory receptors for hearing. Movement of the basilar membrane in response to sound waves causes the depolarization of hair cells in the organ of Corti. The hair cells transduce auditory signals into electrical impulses.



The image above shows the cochlea unrolled to make the basilar membrane easier to see. The basilar membrane is the entire blue/grey structure.

Basilar membrane - definition (neuroscientificallychallenged.com)

The basilar membrane is a structural element that divides the cochlea – which is essentially a long tube – down the middle into two liquid-filled tubes: the scala media and the scala tympani.



The basilar membrane in an uncoiled cochlea. (Photo Credit : Kern A, Heid C, Steeb W-H, Stoop N, Stoop R / Wikimedia Commons)

Basilar Membrane: What Is It? What Are Its Functions? » Science ABC

A big Thankyou to Kate Norton for completing the review of ANAA Inc Clinical Practice Standards.

You will find the updated version on the ANAA Inc website.

For those wanting to learn more about the inclusion of Otoacoustic emissions ,and interested in including them in their test battery-I have published extracts from an interesting article outlining why they are a important measurement in audiological assessment. Here in the ACT we have moved into including them into our test battery and no longer perform acoustic reflex measurement. . If you are in the enviable position of obtaining new tympanometry I highly recommend getting one that also performs OAE's .

For the full article-

https://www.audiologyonline.com/articles/evidence-based-clinical-

Otoacoustic emissions (OAEs) are sounds which arise in the ear canal when (paradoxically) the tympanum receives vibrations transmitted **backwards** through the middle ear **from** the cochlea.

These vibrations occur as a by-product of a unique and vulnerable cochlear mechanism which has become known as the 'cochlear amplifier' and which contributes greatly to the sensitivity and discrimination of hearing.

Otoacoustic emissions, their origin in cochlear function, and use
David T Kemp
British Medical Bulletin, Volume 63, Issue 1, October 2002, Pages 223–241, https://doi.org/10.1093/bmb/63.1.223

James W. Hall III, PhD

October 19, 2015

OAE Advantages

Evaluate Outer Hair Cell Function

What are the clinical advantages for OAEs? They are diverse and they are powerful. First, we know that there is no better way to evaluate outer hair cell function than to record OAEs. The audiogram provides us with very little information about hair cell function. Studies show that only a couple of working hair cells are required in a critical band of the cochlea to obtain a normal threshold. However, for OAE amplitude to be entirely normal, virtually every outer hair cell has to be functioning. Almost everything that can go wrong in the cochlea initially involves the outer hair cells, such as noise exposure, ototoxic medications, or presbycusis. They are like "canaries in a coal mine" for hearing. If the OAEs are normal, you can be assured that outer hair cells are still functioning well, but as soon as there is a problem with the OAEs, you know there is dysfunction in the cochlea.

Every time you have a powerful advantage, there will be a downside to the technique. In this case, site specificity is a big advantage. When OAEs are abnormal and we have ruled out a middle ear problem, we can be certain there is an outer hair cell problem. An abnormal audiogram does not tell you anything about the outer hair cells. But with OAEs, we can be confident that the outer hair cells are not functioning normally if the OAEs are abnormal, assuming we have ruled out technical problems and middle ear dysfunction.

Objective

OAEs do not require a behavioral response. That is a huge advantage for infants and young children. It is good for patients who cannot participate in traditional testing due to factors such as language, cognitive function, motivation, and attention. It is the lack of a requirement for behavioral response that OAEs were so quickly adapted for newborn hearing screening.

Ear Specificity

They are ear specific. Imagine you have a two-month-old infant where hearing loss is suspected. Most likely, attempting behavioral audiometry will yield non-ear-specific sound field findings. However, if you have normal sound field responses to speech and some tones and perfectly normal OAEs for each ear, the likelihood of that child having hearing loss is now very slim. Sound field responses to speech alone without the OAEs would not rule out hearing loss of some kind in both ears. The ear specificity can be used to your clinical advantage.

Frequency Specific

They are highly frequency specific. With an audiogram, you test information at octave frequencies. From 1000 to 2000 Hz, there are a thousand Hz in between. But with OAEs, you can start exploring inter-octave regions, and with transient OAEs, you can go about every 40 Hz to get another data point. With distortion products, using 10 frequencies per octave gives you a data point every 100 Hz. Take advantage of the frequency specificity. You will see that it comes in handy with a lot of different patient populations.

No Sound-treated Room Required, Portable

Another advantage is that you do not need a sound-treated room, but you do need a quiet patient. They are portable, so you can take them to the patient in most cases. There is an averaging process involved which reduces background noise, but also the ear is being sealed up tightly with a probe. There is a lot of ambient noise, but it will not interfere with responses. You can record OAEs with some modification of the protocol in a nursery or in a Head Start program.

Time Efficient

OAEs can be quick. If you are doing OAE screening in preschools, kindergartens or on infants, thirty to forty-five seconds per ear is not uncommon.

OAE Disadvantages

Noise

OAEs are susceptible to noise. The more sound there is in the ear canal, the harder it is to detect what we are trying to record.

Middle Ear Dysfunction

Middle ear status is a big factor. Because we are putting sound through the middle ear and recording small sounds that have to come back through the middle ear, any middle ear dysfunction can stifle that response.

Site Specificity

The specificity of OAEs to outer hair cells has a downside. We only get information about the outer hair cells. That is not a problem if we use OAEs with other procedures that do give us information on inner hair cells, the auditory nerve, and other structures.

Predicting Degree of Hearing Loss

The disadvantage associated with high sensitivity to cochlear to dysfunction is that the OAEs may be abnormal or absent in someone who does not have bad hearing. You cannot predict degree of hearing loss with OAEs. Some of the best and the brightest hearing scientists and audiologists have used all kinds of statistical attempts to predict hearing loss with OAEs, but you just cannot do it. In fact, anyone with a sensory hearing loss due to outer hair cell dysfunction more than 40 dB will not have OAEs. That does not mean they cannot hear.

In fact, sometimes you will not see OAEs in patients with a 20 dB hearing loss. We cannot use OAEs to estimate hearing loss, but that is okay, because we have other ways to do that. We are not measuring hearing with OAEs. That is the important point. We are measuring outer hair cell integrity or function. You can have a profound hearing loss and normal OAEs. We see this with auditory neuropathy. You can have abnormal OAEs and good hearing sensitivity. OAEs are not a test of hearing, nor do we ever want to imply that they are.

Pediatric Applications of OAEs

One of the most valuable applications of OAEs is infant hearing screening, although we are not going to talk about that today. We are going to talk about the diagnosis of children and use of OAEs in other applications. If you would like to know more on OAEs and automated ABR entirely for infant hearing screening, register for the course here. I am confident in the screening outcomes of all three grandchildren because OAEs have been studied since the early 1980s as a screening technique.

The Joint Committee on Infant Hearing (2007) includes numerous references to OAEs in the document. OAEs are a critical part of the screening program. They are in the test battery for infants zero to six months, but they are also in the test battery for six-month-old to two years old. They do not have quite the same role, because these behavioral tests that are minimally important in the infant, perhaps not even feasible, become more important in children older than six months. That does not mean that OAEs are no longer important, however.

Diagnosis of Auditory Dysfunction

Diagnosis of auditory dysfunction is essential and depends on the use of OAEs. Newer hand-held screening devices are very reliable and durable, and you can use them diagnostically. I no longer say that someone should have to make a decision between a screening device and a diagnostic device as now you can get the best of both worlds in a single device.

If you are evaluating a young child for the first time, always suspect auditory neuropathy and you will never miss it. I never say this to the parents, but in the back of my mind, I am saying that I want to prove that this child does *not* have auditory neuropathy. By the end of the test battery, I want to be confident that we are not dealing with auditory neuropathy or a false hearing loss in older children. One easy way to do that is to record OAEs in every patient. The clinical guidelines for diagnosis of auditory neuropathy spectrum disorder (ANSD) always include OAEs.

Ototoxicity

There is almost no better way to monitor ototoxicity, particularly with young children, than with OAEs. Many audiograms of patients who receive ototoxic medications on a frequent basis (e.g., cystic fibrosis, chemotherapy) will have a ski slope hearing loss after about 1000 Hz, where not only do you have poor sensitivity, but also distortion in the cochlea and very poor word recognition. It is a problem in terms of management, because a hearing aid may not help, yet there is such good hearing in the low frequencies that a cochlear implant might not be immediately considered. This kind of hearing loss can be prevented, and OAEs can be a big part of that prevention.

The AAA guidelines for ototoxicity monitoring (2009) were written by a task force of well-recognized audiologists. In these guidelines, you will see a reference to distortion product OAEs. This type of OAE is well-suited for ototoxicity monitoring because it provides information to the highest frequencies, sometimes up to 16,000 Hz. With transient OAEs, because of the nature of the stimulus and recording OAE activity from the basal part of the cochlea, there is still stimulus in the ear canal, and we cannot detect OAEs for the highest frequencies, which are coming back from the cochlea so quickly that they are mixed in with the stimulus. You must use distortion product OAEs.

The rationale for OAEs as a technique for monitoring for ototoxicity and assessment for ototoxicity are as follows:

- Highly sensitive to cochlear (outer hair cell) dysfunction
- Most ototoxic drugs first damage outer hair cells
    - Aminoglycosides (e.g., gentamicin)
    - Loop diuretics (Lasix or furosemide)
    - Cisplatin
- Objective (can be performed on sick patients)
- Brief test time (one or two minutes)
- High degree of frequency detail (selectivity)
- High-frequency limit up to 10,000 Hz (DPOAEs only; TEOAE limit is about 5000 Hz)
- Earlier detection of cochlear auditory dysfunction compared to audiogram

I do not know of a single drug that selectively damages the inner hair cells. They are all going to affect the outer hair cells. OAEs are quick. If you have a child that is very sick, they can be sleeping and do not have to be motivated or paying attention. You can take OAEs anywhere. If there is a pediatric clinic seeing a lot of children getting ototoxic drugs, have them put an OAE device into their budget. Give them an in-service and they can do all the screening. The nurse can do this every time the child comes into the clinic.

Any audiologist in any pediatric setting should be monitoring for ototoxicity. Very often, the physicians who are giving the patient potentially ototoxic drugs come to the audiologist and ask if they can do the monitoring for the patient.

Adult Applications for OAEs

OAEs are not just of value in children. There are evidence-based applications of OAEs in adults. Research articles that support these applications. These applications include:

- Diagnosis of cochlear versus retrocochlear auditory dysfunction
- Identification of false and exaggerated hearing loss, including malingering
- Monitoring ototoxicity
- Hearing screening
    - Industrial settings
    - Military personnel
- Early detection of cochlear dysfunction in noise/music exposure
- Diagnosis and management of tinnitus & hyperacusis

If in an adult OAEs are normal and there is a hearing loss, one of the first things you want to think about is a retrocochlear pathology. False and exaggerated hearing loss can certainly happen in an adult, as well, sometimes in worker's compensation cases. OAEs are not quite as useful in monitoring for ototoxicity in adults because some adults may not have had OAEs at the beginning of treatment because of presbycusis or noise exposure. If the patient has normal hearing and OAEs at baseline, then they can be used in adults to monitor ototoxicity.

Summary

There are many valuable and evidence-based applications of OAEs. I hope each of you review your test protocol in your clinical setting and begin to use OAEs. Take advantage of them. They can help you to more accurately identify, diagnose, and manage patients with hearing loss.

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