PRACTICAL ASPECTS OF TINNITUS ASSESSMENT AND MANAGEMENT

SPEECH AND HEARING ASSOCIATION OF ALABAMA

Gail M. Whitelaw, Ph.D.
The Ohio State University
whitelaw.1@osu.edu

LEARNING OBJECTIVES

◆ List tools and approaches that can easily be incorporated into audiologic evaluation
◆ Describe management tools and techniques that can be incorporated into standard practice
◆ Develop a tinnitus team for referral
◆ Address unique aspects of tinnitus including pediatrics and those present in patients with hyperacusis

OPPORTUNITIES

◆ 50 million Americans have tinnitus
◆ 31 million Americans have hearing loss
◆ Overlap in these groups: many people with tinnitus also have hearing loss
◆ Can be part of standard audiology practice or provide opportunities for expanding practice (pediatric, patients with traumatic brain injury, etc.)
◆ Grateful patients; can be a lucrative source of patients to a practice
**Tinnitus Defined**

- The perception of sound in the ears or head where no external source is present
- Subjective noise: Only the person who has it can hear it
- Described as many types of sound: ringing, buzzing, roaring, crickets, rushing, frying, songs
- Where does this fit into the patient appointment? Rank ordering the issue

**“Why Do I Have This”**

- Assume there's a correlation between why they have it and how it's going to be “cured”
- The “Holy grail” may not be an appropriate goal for the patient
- “I know I have a brain tumor”...even though no evidence...much about what surrounds tinnitus is NOT rational
- Simple issues: Excessive wax in the ear canal, hypertension, etc.
- More complex issues: Vestibular schwannoma
- Tinnitus should be medically evaluated (catch-22)?
  - The “sinister” issues: Unilateral, sudden onset, etc.

**“How Do I Cure This”**

- Goal for many patients
- Run from pillar to post to find solutions
- The question of “when did you first notice your tinnitus” vs. “when were you first bothered by your tinnitus.”
- Goal is to make tinnitus a “non-issue” in the person's life
- What is the role of audiology services in this quest?
THE IMPACT OF TINNITUS

- Interferes with sleep (getting to sleep/staying asleep)
  - David Baguley: “sleep hygiene”
- Interferes with concentration
- Inability to relax
- Negative impact on work, social life, family interactions
- Depression/anxiety/suicidal ideation
  - Another vicious cycle
- “I have a brain tumor”: Seeing the tinnitus as something “benign” or neutral
- Much depends on how the person perceives this
  - “My little friend”

WHAT WE DO ABOUT AN ISSUE IS RELATED TO WHAT WE UNDERSTAND ABOUT THE ISSUE

- Must believe in what we choose to do
- Must be authentic in what we recommend
- Difficult patients: Call in reinforcements when needed
  - Hyperacusis for example

BEGIN WITH THE END IN MIND (STEPHEN COVEY)...DISCUSSING MANAGEMENT FIRST

- What does the patient expect?
  - Understand why are they there...the issue of having them “tell their story”
  - Attorney patient from Wisconsin that say Dr. Dodson and me
    - His focus and concerns differed from our assumptions—the Opera "trombone"
  - A “cure”?
- Need to have a clear understanding of what the person is looking for...
- We have to know what we think...clear understanding of what we can do...
- “No cure”...does not invalidate all we have to offer...Just I looked, hearing aids do not cure hearing loss, we still prescribe them!
BEGIN WITH THE END IN MIND (STEPHEN COVEY)...DISCUSSING MANAGEMENT FIRST

- Work together as a team to build a program...
- “Tools in the tool box”
- I don’t “fix” the patient, they fix themselves...
- The “personal trainer scenario”
- The case of John, former drummer turned personal trainer, and his success with tinnitus treatment
  - “Don’t you think I should wait”
  - Gave it 4 days

POSITIVE PSYCHOLOGY

- Research from the University of Pennsylvania
- Research by Martin Seligman, Ph.D.
- Three central premises: positive emotions, positive individual traits, and positive institutions. Understanding positive emotions entails the study of contentment with the past, happiness in the present, and hope for the future
- The issue of tinnitus: “There’s nothing you can do about this”
  - We have such a significant number of things that people can do...we hold the key to these
  - Easily within the scope of audiology

DO PEOPLE “SUFFER” FROM TINNITUS...

- How do you classify tinnitus?
- Antics with semantics or addressing how you and others perceive their tinnitus?
- I don’t use the word “suffer” or “tinnitus sufferer”
  - The person’s perception of themselves
  - The audiologist’s perception—we need empathy and not sympathy
- People who have tinnitus perceive it, have it, experience it...etc., etc.
POSITIVE PSYCHOLOGY

- Many patients differentiate the two questions:
  - When did you first notice your tinnitus?
  - When were you first disturbed by your tinnitus?
    - Often described as the first time that someone (often a physician) told them that there was nothing they could do about their tinnitus
    - Patients who state that the quality of their day is based on their perception of their tinnitus when they awake on a given day

POSITIVE PSYCHOLOGY

- Authentic Happiness
  - [http://www.authentichappiness.sas.upenn.edu](http://www.authentichappiness.sas.upenn.edu)
  - Tinnitus patient who teaches health promotion at OSU...what we say and how we “behave” as professionals has a direct influence on what the patient believes will work
  - Flourish: A Visionary New Understanding of Happiness and Well-being (2011)

TINNITUS AND DEPRESSION

- Separating the person with a reaction to tinnitus and the person with tinnitus who has more global issues in the area of mental health
- The aspect of tinnitus patients that result in audiologists not wanting to work with this population
  - Perception that they are “crazy”
  - Similar to every other patient population: knowing your skills and limitations
BRAIN PLASTICITY

- Ties into the Neurophysiologic model of tinnitus proposed by Jastreboff
- *The Brain that Changes Itself* (2007) by Norman Doidge
- Plastic is fantastic …for your brain
  - [http://www.psychologytoday.com/blog/prime-your-gray-cells/201108/plastic-is-fantastic-your-brain](http://www.psychologytoday.com/blog/prime-your-gray-cells/201108/plastic-is-fantastic-your-brain)

TALKING ABOUT TINNITUS

- Talking about tinnitus puts emphasis on it…draws attention to it (Sweetow)
- How does one address/manage/treat tinnitus without talking about it?
- Being aware of this issue…
- However, asking “What is your goal in pursuing treatment”
  - Starting the appointment with two questions
  - Why are you here today
  - What can I do to facilitate your goals for today?

TINNITUS AS A NATURAL PHENOMENON

- Heller and Bergman (1953): Subjects asked to enter a “soundproof booth” and report all the sounds that they heard
  - 94% reported some form of tinnitus-like perception
  - Study was not well replicated, unfortunately
- Levine (2001): 55% of subjects reported tinnitus when they were placed in a “low noise” room
  - This aspect also addresses one of the tenets of management: Masking
  - A “mantra”…quiet is the enemy of the person with tinnitus
  - The example of a candle in a lit room vs. a candle in a dark room

One might describe tinnitus as “universal”

- This would suggest that because people have had this experience, they might be sensitive to it
- Has not often been the case
  - “Pull yourself up by your bootstraps”
  - “I know that and I can ignore it; why can’t you?”
  - “It’s not so bad”
The issue is not the tinnitus but the perception...

- Of the 10-15% of the population report being “troubled” by tinnitus
- Ranges from 1 in 5 to 1 in 10 people
- Onset of tinnitus likely to be sudden and insidious
- Addressing the severity of the tinnitus

Prevalence issues

- Many studies:
  - All use different definitions, ask different questions, use different time frames (do you currently have tinnitus, have you had tinnitus in the past few years, etc.)
  - The true issue is the impact of tinnitus on the life of the person who has it
  - Did not test hearing prior to study...does that matter?
- Ranges include
  - 5% of prevalence of constant tinnitus (study in Poland, 1999) to 40% in a US study in 1981

Probably nearly impossible to look at prevalence

- Does prevalence data help us?
  - We know a lot of people have tinnitus
  - We know a lot of people looking for help
  - We know that it’s an auditory phenomenon for many people, or perceived that way
### WHERE DOES AUDIOLOGY FIT IN?

- Many people with tinnitus have hearing loss
- Well fit hearing aids significantly reduce tinnitus PERCEPTION in 60-70% of patients (will read several articles on this)
  - Well fit...appropriate high frequency gain, etc.
  - Janet's case study
- Can rule in/out auditory issues; make appropriate referrals—multidisciplinary team

### WHERE DOES AUDIOLOGY FIT IN?

- If we don't "own" this, others will
- "Sufferers" are seeking answers, spending money on things that don't work or in some cases might make tinnitus worse
- We have skill, knowledge to address this
- COUNSELING SKILLS

### TINNITUS AS A BRAIN ISSUE

- Tinnitus perception is “hard wired” in the brain
- “Cure” in the past was VIII nerve resection
  - Didn’t work 😞
  - Provides insight into how significantly hard wired this is
- “Phantom pain”
**UNDERLYING MODEL OF TINNITUS**

**NEUROPHYSIOLOGIC MODEL**

- Jastreboff (1990)
- In addition to the classic auditory system pathways (somewhat described by Hallam’s model), other central neural pathways are involved in the emergence and maintenance of tinnitus
- Specifically, the limbic system, sympathetic autonomic nervous system, and reticular formation are key in this hypothesis

Diagrammatic representation of the Jastreboff neurophysiological model (with permission).
**NEUROPHYSIOLOGIC MODEL**

- After a short period of awareness of tinnitus “activity”, habituation should occur (the activity is no longer consciously perceived).
- However, once negative emotional reinforcement occurs (fear, anxiety, tension) then the limbic system and the ANS kick in.
- The activity is enhanced and the perception persists.
- So, habituation is the NORM and tinnitus becomes a problem when it’s associated with a negative experience.

**DIAGNOSTIC TOOLS AND APPROACHES FOR TINNITUS**

**CASE HISTORY**

- The “verbal vomit”: Patients with tinnitus must be able to tell their story.
- Specific questions: Don’t assume they’ve been asked previously or addressed.
- Recent experience with patients who cut sodium from their diet.
- Questions:
  - Medications
  - Dietary
  - Otologic (Eustachian tube, etc.)
  - Barometric pressure
  - Dental
  - Traumatic brain injury.
LETTING THE PATIENT TELL THEIR STORY

- For many tinnitus patients, this appears to be key
  - Articulate fears, concerns, etc.
  - Beneficial but can be time consuming...how in depth to go?
- Case of Edward; retired hospital attorney from Wisconsin, referred to Ohio State for otologic/audiologic work-up of tinnitus
  - His concerns: Listening to opera "albums";

GUILT/SHAME/SIGN OF WEAKNESS

- Tinnitus is invisible
- Analogous to pain
- Well meaning friends, family, coworkers weigh in on the process
  - Geesh, I have that, too...I just ignore it
  - You should just get over it
  - “Pull yourself up by your big girl panties”
- Need to establish that this is not a character flaw, that the perception of this sound is their reality

USE OF QUESTIONNAIRES TO HELP IN DIFFERENTIATING ASSESSMENT/TREATMENT NEEDS

- Tinnitus Handicap Index (THI)
- Tinnitus Reaction Questionnaire (TRQ)
- Tinnitus Function Questionnaire
- “Grading severity”—does rating tinnitus provide any benefit?
- Chasing a phantom perception: Too much “talking time” or “thinking time” about tinnitus?
AMERICAN TINNITUS ASSOCIATION

• ata.org
• Recommend that this be the ONLY source of tinnitus information that they follow
• “Dangers” of searching online
• Counterintuitive to treatment goals

DIAGNOSTIC PROCESS

• What audiology contributes to the process?
  • Careful case history
  • In typical audio, ask about tinnitus
    • Ringing, buzzing, sounds in the ears
    • Describe—one ear more prominent than the other?
      • Central, etc.
  • Neuromonics questionnaire
  • “Favorite questions”?

DIAGNOSTIC PROCESS

• What audiology contributes to the process?
  • Focus on listening, having patient tell their story
  • Cases from OSU Speech-Language-Hearing Clinic
    • Mary
      • Music Teacher
      • Music educator conference—“protect your hearing”
      • Audiologic evaluation: Felt eye jump to certain pitches
      • Tinnitus
      • Normal hearing
    • Referred to otology
      • Had Superior Semicircular canal dehiscence (SSCD)
        • Daughter, also
DIAGNOSTIC PROCESS

- What audiology contributes to the process?
  - Nancy
    - 57 year old nurse
    - Marathon runner
    - Flu shot
    - SSCD dx.
    - Actually, had autoimmune disease

TWO QUESTIONS

- When did you first notice the tinnitus?
- When did it first become bothersome to you?
  - Interesting responses regarding this
    - When my physician told me that I’d have this for the rest of my life.
    - When I was told there was nothing I could do about it

DESCRIBING MY GOAL FOR THE SESSION

- Putting some parameters on the tinnitus and putting tools in the tool box to help in addressing the tinnitus
- May help suggest an etiology but the goal is not to find the cause since the goal is to make this manageable, not necessarily to cure
**SPECIFIC QUESTIONS**

- Reactive tinnitus
- Sound tolerance
  - Ask the question or listen for cues?
  - Questions that bias a response
  - Trying to see if this is an “issue”

**SIMPLE MANTRA AT THE START**

- Silence is the enemy of the tinnitus patient
- Putting a person in a booth with headphones
- To mention or not to mention...that is the question
  - Tinnitus perception may be worse
  - If patient comments on this, I let them know this is common, expected, etc.

**HABITUATION**

- Goal is to make tinnitus a “non issue” in the person's life
- In some cases, this goal is a challenge due to the fact that the perception of tinnitus changes (e.g. stress, change in health condition, etc.)
DIAGNOSTIC PROCESS

- Complete audiologic
- High frequency phones
- Use Neuromonics suggested assessment as a guide
  - Pitch match
  - Loudness match
  - NBN masking
  - BBN masking
  - Loudness discomfort level

AUDIO...

- Ultra high frequencies (at least to 12,500 Hz)
- Noise exposure
- Early indicator of cochlear damage?
- Are high frequencies more important than we have previously thought?

LOUDNESS DISCOMFORT LEVELS: A PARADOX

- We “measure” these
- However, instructions are the key
  - In the Neuromonics model, can’t tolerate for “more than a minute”
- NO NORMATIVE DATA on LDL’s in adults...Neurmonics makes recommendations for “hyperacusis”, “reduced sound tolerance” and “normal sound tolerance”
- Use in conjunction with other measures...can they tolerate voice/speech (autophony) (indication of Semicircular canal dehiscence OR tensor tympani syndrome)
EDUCATING THE PATIENT AND OTHERS

- Case of Pete
  - Lives an hour from our clinic, his wife lives in California
  - When they sleep together, disaster
    - She loves silence, he loves sound
    - Stress around this; increases his tinnitus
  - Set up parameters that he reported on tinnitus and had her listen
    - Enlightening for her
- Neurmonics patient...he uses it for sleep; preferred masking device

MANAGEMENT/TREATMENT

“CARE” PROJECT

- The person is going to tell you what you need to know to work with them...our job is to listen to that
INTERVENTION METHODS FOR PATIENTS WITH TINNITUS (DOBIE, 2002)

- Medical management
- Drug treatment: sleep disorders, depression, anxiety
- Acoustic therapy: Masking, Neuromonics, TRT, hearing aids
- Counseling: Audiology counseling as educational and supportive, Psychological counseling performed by a licensed and educated psychologist usually focusing on CBT
- Tinnitus retraining therapy (TRT)
- Electrical stimulation
- Tinnitus inhibitor
- Complimentary and Alternative Medicine approaches

SLEEP

- Foundation for tinnitus treatment
- First aspect that needs to be addressed
- Baguley’s approach
- Partner with physician who is willing to address this
  - Melatonin: OSU study demonstrates success for patients who have not used Melatonin previously
  - Sleep aid such as Ambien (short term)

MEDICATIONS TO ADDRESS DEPRESSION AND ANXIETY, IF PRESENT

- Effective in working with tinnitus patients, has been documented in numerous studies
- Physician of choice may not be an otolaryngologist
ACOUSTIC THERAPIES

• Hearing aids
• Neuromonics
• “Traditional” maskers and combo devices
• All based on the approach that silence is the enemy to the person with tinnitus

HEARING AIDS AND THE PATIENT WITH TINNITUS

• Kochkin and Tyler: 2007…60% of patients with tinnitus who had concomitant hearing loss found significant reduction in their tinnitus
• Trotter and Donaldson (2008): Approximately 70% of patient noted an improvement (reduction) in tinnitus perception while wearing appropriately fit hearing aids

HEARING AIDS AND THE PATIENT WITH TINNITUS

• The concept of appropriately fit
  • Kochkin data: At least 50% of patients report benefit on tinnitus from hearing aid wear, but the number goes up as verification and validation of amplification are addressed
  • Critical feature is to assure that the hearing aid is appropriately fit
  • Tinnitus referrals of patients who have worn hearing aids previously yet have been “under fit”
HEARING AIDS AND THE PATIENT WITH TINNITUS

- The concept of appropriately fit
- Explaining this to tinnitus patients
- Case study
  - Linda
    - 50 year old woman, tinnitus since 9 years of age (dad and brother, also)
    - Fit with CICs
    - Under fit, did not wear all the time
    - Boosted aids…noticeable decrease in tinnitus
    - Her “happy hour” story

HEARING AID BENEFITS

- Del Bo and Ambrosetti (2007) Progress in Brain Research
- Hearing aids in patients with tinnitus have two specific benefits: 1) the hearing aid makes the patient less aware of the their tinnitus and 2) provides improved communication by reducing the sensation of annoyance perceived and the perception that the tinnitus masks voices

HEARING AID BENEFITS

- Del Bo and Ambrosetti (2007) Progress in Brain Research
- Amplification appears to provide sufficient activation of the auditory nervous system to reduce the tinnitus perception and it MAY elicit expression of neural plasticity that can reprogram the auditory nervous system and have a long term benefit on tinnitus by restoring neural function

- Best results were obtained in binaural fittings, open fit is best with widest “band amplification possible”, suggest disabling noise reduction controls
EXTENDED BANDWIDTH

- Extended bandwidth amplification seems to have more impact on tinnitus perception (reduction of tinnitus) than products that are more “standard”
- Even if fitting an aid without a “masking option”, extended high frequency is a benefit
- Correlates to concept of evaluating high frequencies…the neurophysiologic model approach

HEARING AIDS IN PATIENTS WITH TINNITUS

- “Sell themselves” by the fact that demonstration aids available
- When we start to tell patients that using a hearing aid may address their tinnitus, somewhat skeptical
- Our clinic’s experience: Widex products with Zen440’s…probably overkill for many patients (we have used this product on patients with very mild losses or essentially normal hearing also)
- Ability to shape sound on one Zen Toggle (can have up to 5 programs) 440 only
- Can fit to wide ranges of hearing loss; report extended high frequency benefit

BROADER PERSPECTIVE

- Nearly every manufacturer has a tinnitus management technology available, often imbedded in a product that will be dispensed as a hearing aid (Oticon Ti, Phonak, etc.)
- Become comfortable with philosophies, research behind the device, etc.
- Comfort with fitting normal hearing with amplification
- Product like Zen2Go
OTHER APPROACHES: MORE SPECIALIZED

- Neuromonics
  - Sleeping with the device
  - Similar to a sound pillow
- SoundCure
- More traditional masking approaches
  - General Hearing Instruments
    - Tranquil
    - Triad
    - Non-custom
    - Soft tip for sleeping/comfort

CASE STUDY

- Curly
  - TBI
  - "Charlatan" treatment previously
  - Hyperacusis main complaint, however tinnitus close second
  - Wanted to get back to his life
  - 12 months of treatment with Neuromonics
  - Very successful
  - Has moved on to hearing aids

COUNSELING
SUPPORTIVE COUNSELING

• American version of Australian “tinnitus coach”
• Our tinnitus coach is a neuropsychologist with background in pain management
• Generally a standard referral for a number of reasons
  • Skill and scope of practice
  • Time (and reimbursable time?)

COGNITIVE BEHAVIORAL THERAPY (CBT)

• Very effective for tinnitus management
• Anxiety disorders, phobias
• “OCD personality”…what separates those who learn to ignore tinnitus from those who can’t
• Minimize impact of tinnitus on one’s life—making tinnitus a “non-issue”
• Idea of replacing non-helpful, irrational thoughts with “functional” thoughts

COGNITIVE BEHAVIORAL THERAPY (CBT)

• For tinnitus:
  • Short term
  • Replacing non-functional approaches (e.g. my day is determined by the loudness of my tinnitus) with functional approaches (e.g. I determine how I react to what happens to me today)
COGNITIVE BEHAVIORAL THERAPY (CBT)

- Case
  - 63 year old patient; Dean of a college
  - Tinnitus due to misfiring of nerve in sinus area
  - “Constantly hearing frying of bacon without the benefit of the smell”
  - Desperation…nothing audiologic helped (not surprising, based on the etiology of his tinnitus)
  - CBT very effective

ALTERNATIVE AND COMPLEMENTARY MEDICINE APPROACHES (CAM)

- Establish a relationship with providers
  - Acupuncture
  - Massage
  - Concept that many etiologies of tinnitus come from neck and spinal misalignment
  - Must have experience with tinnitus patients
  - Our “best” accupuncturists (MD trained in Eastern medicine) suggests that tinnitus patients try a few sessions

CENTER FOR INTEGRATIVE MEDICINE/OHIO STATE

- Physicians there believe in use of supplements, etc.
- Effective for some patients
- Controlled method vs. patient pursuing over the counter
HYPERACUSIS

• Sound tolerance issues
• Moves against conventional wisdom
  • No use of hearing protection
• Use Hyperacusis questionnaire
  • Many patients have other issues such as reaction to strong smell, light, or migraine headaches
• Assessment is easy, relatively
  • No specific protocol but need some measure of loudness discomfort
  • Issues with this measurement

HYPERACUSIS

• Treatment options
  • CBT
  • Habituation devices and techniques used with tinnitus
    • Concept that sound should be consistent

SUMMARY

• Can add tinnitus services to patients in any practice settings
• Does not need to be part of a specialized tinnitus treatment program, although this can be offered
• Grateful population
  • “Satellite dish on my head if it would help…”
RESOURCES

- Progressive tinnitus management