Issues in Tinnitus: 2014-2015

A review of contemporary findings, as well as the current status in managing patients with tinnitus

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A look at what the most recent scientific literature says about tinnitus treatment, as well as a review of Cognitive Behavioral Therapy (CBT), Progressive Tinnitus Management (PTM), and Tinnitus Retraining Therapy (TRT).

Newman, Sandridge, and Jacobson[1] estimated 50 million people in the United States experience tinnitus. Fortunately, 95% to 97% of all people who perceive tinnitus are not disabled by their tinnitus.[2] That is, for 95% to 97% of the people who perceive tinnitus, they may notice it now and then, but their tinnitus does not cause stress, anxiety, or depression, or cause them to lose sleep. Instead, they relegate tinnitus to the background, and they habituate to it without very much effort and without discomfort.

However, some people are not able to habituate to their tinnitus. For them, tinnitus is a major problem that may significantly attenuate quality of life and may significantly facilitate and exacerbate behavioral and physiological problems.

Clearly, the majority of hearing care professionals (HCPs, audiologists, otolaryngologists, and hearing aid dispensers) manage patients with tinnitus every day. Therefore, the goal of this article is to review contemporary thoughts and findings, as well as the status quo, with regard to managing the patient with subjective tinnitus.

Introduction

In general, there are two types of tinnitus: subjective and objective. *Subjective tinnitus* is a phantom sound or noise perceived in the ear(s) most often described as buzzing, ringing, crickets, whistling, humming, static, hissing, or a tone (most often high-pitched) which occurs in the absence of a known external stimulus. Subjective tinnitus can only be perceived by the patient, and this type of tinnitus represents 95% to 98% of all tinnitus presentations. Notably, subjective tinnitus often accompanies noise-induced hearing loss and presbycusis. It has been estimated[3] that 80% of all patients with hearing loss have tinnitus, and very likely 80% of all patients with tinnitus have hearing loss—thus indicating a high correlation, but certainly not causation.

Objective tinnitus has a physical sound source. That is, objective tinnitus occurs secondary to a physical anomaly such as a foreign object in the ear canal, a perforated tympanic membrane, a patent eustachian tube and more.

However, tinnitus also may be a sign or symptom consistent with a medical issue or condition such as Meniere's disease, otosclerosis, acoustic neuroma, glomus tympanicum or glomus jugulare (tumors), all of which require medical attention. Objective tinnitus can often be managed medically or surgically, and therefore a differential diagnosis is extremely important.

It almost goes without saying that step one is a differential diagnosis for the patient perceiving tinnitus, and step two is treatment. Unfortunately, in their haste to discover and implement treatment, many consumers skip step one (diagnosis), placing themselves at substantial risk. Therefore, we recommend *all* tinnitus patients be evaluated and diagnosed by a physician or a hearing care professional who has intimate knowledge of the topic area.

Defining the Goal

Noted tinnitus researcher Aage Moller, PhD, asserts curing tinnitus is not likely and arguably should not be the goal for the patient or the HCP.[4] Rather, successful management of tinnitus is likely, and remains a reasonable and pragmatic goal. Moller stated tinnitus is not one thing, it's *many things*. When people say they want to cure tinnitus, it's very much like saying they want to cure cancer or cure pain. The problem is cancer, pain, and tinnitus are not a single thing. Each has many forms, shapes, sizes, manifestations, and perceptions.



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Further, it's important to realize the perception of tinnitus may be different in each person who experiences it. Moller reasoned curing cancer, tinnitus, or pain (with a single solution) remains a noble cause and honorable goal, but is not likely to happen. Nonetheless, we can often successfully manage these problems, and therefore the *successful management* of the tinnitus patient is our goal.

Snake Oil and Mirrors

Unfortunately, people suffering from tinnitus may become victims of scams. Frankly, there is no shortage of "cures, remedies, and magic potions," which allege to solve/cure the tinnitus problem, yet precious few of these marketing claims are substantiated or legitimate. Henry[5] reports the tinnitus patient searching the web may fall prey to the millions of websites that promise to silence, quiet, or cure tinnitus.

Folmer et al[6] reported "effective treatments for tinnitus are generally outnumbered by ineffective strategies, medications, devices and surgeries…" that are marketed and promoted to treat tinnitus. They report "consumers should be wary of medications, devices or procedures" marketed or promoted to "cure" tinnitus. Folmer et al conclude, "Overstatements of a treatment's efficacy, even in light of modest research findings, are common in this field…," and they emphasize "…well designed, placebo-controlled clinical trials should be conducted and analyzed before claims of efficacy are made…."[6]

In a 2014 interview for the American Academy of Audiology,[2] Robert DiSogra, AuD, noted "a wide open and vast quantity of unsubstantiated OTC tinnitus relief products and claims…" across the more than 3 million clickable responses to the Google query "tinnitus." Dr DiSogra reported local grocery stores might have 50 products on the shelf to address tinnitus—none of which involve FDA oversight or approval, and with little science or research regarding their primary ingredient for tinnitus.

Contemporary Findings

Zagolski and Strek[7] report tinnitus pitch and minimum masking level (MML) depend on the etiology of the tinnitus. MML was defined as the level at which tinnitus was rendered inaudible and defined in dB SL. They reported on 195 adult females and 210 adult males with a mean age of 51 years. Just over half the participants reported bilateral tinnitus for a total of 625 ears with tinnitus. Of those 625, tinnitus was described as a pure-tone in 512 and was described as pulsing/popping in 113 ears. For approximately half the group, tinnitus was sudden onset, and for the other half, a gradual onset was reported. The authors state "tinnitus pitch was highest in subjects with acute acoustic trauma and lowest in patients with prolonged estrogen and progesterone pills utilization…." MML values were "lowest in patients with tinnitus caused by acute acoustic trauma and congenital hearing loss…" and MML values were highest in patients with stroke and presbycusis. The authors categorized their patients into groups according to probable tinnitus etiology.

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Henry[5] reports the primary tinnitus management tool (based on peer-reviewed literature) is cognitive behavioral therapy (CBT), and he reports acoustic therapies (ie, sound-based) have the next largest evidence base (after CBT). In his *JAAA* editorial, Henry reports "sound therapy can be effective when combined with education or counseling, and no one form of sound therapy is proven to be superior (to others)." Henry recommends the tinnitus interdisciplinary management team should minimally include an audiologist, otolaryngologist (or neurotologist), and a psychologist.

Fagelson[8] reports no relationship exists between the distress/severity of the perceived tinnitus and auditory sensitivity, and importantly, more than half of tinnitus sufferers have a comorbid psychological injury or illness (eg, post-traumatic stress disorder, depression, anxiety, obsessive compulsive disorder, stress, etc). Fagelson says the management strategy selected should be tailored to the specific patient's needs (such as cognitive behavioral therapy). He notes sound-based interventions help promote the patient's ability to manage their response to their tinnitus. However, sound therapy without counseling is less effective than sound therapy with counseling.

According to Fagelson, the specific sounds selected are most often chosen based on one of three presumptions:

1) Masking to reduce the contrast between tinnitus and the acoustic environment (promoting habituation);
2) Soothing or relaxing sounds to promote relief from stress or anxiety; or
3) Interesting sounds that distract the patient away from their tinnitus.[8]

Further, Fagelson reports hearing aid amplification provides a method through which sound can be delivered therapeutically, because hearing aids amplify environmental sounds (which reduces the contrast between the perceived tinnitus and the acoustic environment), potentially allowing the patient to feel more secure and to relax. Additionally, hearing aids restore audibility in frequency regions associated with "deprivation related changes in (auditory) pathway activity." Fagelson states hearing care professionals should be aware of the benefit availed to the tinnitus patient via well-fitted hearing aids, and they should work with psychologists (for CBT and related therapies) and MDs as needed, to best manage specific patients. He states: "The lack of a cure should not dissuade audiologists from implementing practical programs to improve the reactions of their patients to tinnitus distress."[8]

Folmer et al[6] explored the peer-reviewed literature from the last 70 years related to tinnitus and determined there are effective noninvasive tinnitus treatments that are useful and often help manage the problem. Among the many pragmatic, reasonable, and rational factors, they noted "acoustic therapy" is useful. Specifically, acoustic therapy may be delivered via hearing aid amplification and other products that make background sounds louder, thus reducing the loudness difference between the background noise and the perceived tinnitus. They identified specific counseling techniques shown to help the patient better manage their tinnitus, including cognitive behavioral therapy, psychological counseling and hypnosis, biofeedback, and relaxation training.

Interestingly, Folmer et al[6] reported some over-the-counter and prescription medicines may be of value—not because they directly impact tinnitus (they do not), but because they may be useful to facilitate sleep, and reduce anxiety, stress, depression, or obsessive-compulsiveness, which may help manage tinnitus.

Hoare et al[9] also report there is insufficient evidence to support one particular sound therapy over others. Nonetheless, they

state "sound therapy combined with education and counseling is generally helpful to patients." They note multiple sound sources have been used to help manage tinnitus, such as noise, music, environmental sounds, and hearing aids. In general, sound therapy appears to be beneficial through tinnitus masking as it reduces audibility (of the tinnitus), or may induce "a sense of relief" through habituation via "reversing abnormal cortical reorganization or activity…," which may create or promote the tinnitus sensation. Sound therapy also may promote overall relaxation. They conclude, "Despite the current lack of explanatory evidence, sound therapy should be considered an essential component of any clinical program of tinnitus management."[9]

Cognitive Behavioral Therapy

Henry[5] reports the primary management tool, based on peer-reviewed evidence, is cognitive behavioral therapy. Cima et al[10] report cognitive behavioral therapy is the most evidence-based treatment option with regard to managing the tinnitus patient. The authors note severe tinnitus distress may come from "cognitive misinterpretations, negative emotional reactivity, and dysfunctional attentional processes," which likely facilitate dysfunctional tinnitus habituation. They say researchers and clinicians more or less agree the larger part of tinnitus suffering is associated with negative psychological reactions to tinnitus, and these negative psychological reactions need to be addressed properly to effectively manage tinnitus.

Cima and colleagues[10] report the specific CBT protocol does vary across practitioners, situations, and specifics, but in general "a common ground of therapeutic elements" has been established and was determined to be robust enough to guide clinical practice.They say various CBT approaches "share the premise that psychological distress and resulting problems are based in a malfunctioning information processing mechanism." Therefore, CBT appears to be the most successful and pragmatic treatment approach for modifying dysfunctional behaviors and beliefs in order to reduce symptoms, increase daily life functioning, and ultimately recover from the disorder. Cima et al conclude, "Based on the evidence…we suggest that a CBT-based approach, whether in groups or individually, is the most evidence-based choice for effectively relieving tinnitus complaints so far…."[10]

Fagelson[8] notes multiple studies support the consistent and substantial benefits of CBT with regard to reducing distress while improving quality of life. CBT often fosters an improved patient response to their tinnitus in tandem with their perception of tinnitus becoming less handicapping and more manageable.

Often, CBT programs are offered in tandem with psychologists, and may run 8 to 12 weeks. CBT may include yoga, meditation, relaxation techniques, and more to increase calmness. With regard to the cost-effectiveness of CBT, Maes et al[11] report the cost-effectiveness (ie, economic evaluation) of multidisciplinary tinnitus treatment based on cognitive behavioral therapy is more cost-effective than usual care.

CBT presupposes the individual is an active participant in his/her world, thus interpreting stimuli and using cognitive process to view and/or perceive the world according to the individual's interpretation. Consequently, these thoughts and perceptions can be *changed*. CBT has been used effectively in the treatment of phobias, stress, and depression.[12,13] CBT is most effective when used to treat a specific issue and has been used effectively in tinnitus management.[13]

CBT protocols may include completing "thought" diaries, which allows review and analysis at a later time, and may provide the professional and the patient the opportunity to examine and challenge irrational thought processes. Diaries can be used to chart the progress of therapy and patients, and patients often keep an additional journal recording their thoughts and concerns.

Diaries can be used to identify "automatic negative thoughts" that cause stress and distress. Goal setting can be used to help the patient move forward as they address irrational thoughts and fears. Graded tasks can help with "all or none" thinking. For example, someone afraid of being in noise because it will make their tinnitus worse may find the idea of attending a large social gathering impossible. However, graded exposure to conversation in a variety of settings that gradually become larger and noisier may be manageable with the support of a therapist who addresses concerns and helps build coping strategies at each stage.

To fully benefit from CBT, a commitment from the patient to complete homework between visits is often required. Further, to ensure therapy is effective, a supportive and collaborative partnership is formed between therapist and patient. The goal of therapy is to develop skills to empower the individual to challenge their own irrational thoughts. There is evidence that CBT is the strongest psychological therapy for people with tinnitus, and CBT has been shown to be a highly effective tool with regard to tinnitus management.[15-18]

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CBT management of tinnitus has been occasionally criticized due to the need for focused attention on the tinnitus, and focused attention may indeed prevent habituation. However, the evidence base does show attending to tinnitus via CBT allows the individual to reconstruct their perception of it.[19] The meta-analysis by Hesser et al[17] indicates long-term benefits. Cima and colleagues[10] note that improvements in tinnitus management via CBT have been reported to last up to 15 years.

Importantly, the benefits of CBT are limited in cases where patients are not motivated to change, or are unwilling to participate in homework or self-help techniques.

Progressive Tinnitus Management

Progressive Tinnitus Management (PTM) is an evidence-based and clinically tested approach developed by Department of Veterans Affairs research audiologists. Key to PTM is the inclusion of multiple treatment options to address individual audiologic and psychological needs. PTM involves five levels of treatment: 1) Triage; 2) Audiologic evaluation; 3) Group education; 4) Tinnitus evaluation; and 5) Individualized management.

Patients generally enter PTM at the tri-

age level and progress through each stage as necessary and appropriate for their unique needs. The PTM program includes three supporting resource books including a clinical handbook, a counseling guide for patients with tinnitus, and a self-help workbook for the patient.[20] The five levels of PTM involve:

Level 1: Triage. Triage occurs when a healthcare professional (other than the audiologist or ENT) learns of a patient's tinnitus. Using information provided to them, they provide the appropriate referral for further clinical services to assess and potentially treat the disorder.

Level 2: Audiologic evaluation. Audiologists play a key role in performing audiologic assessment, providing treatment for hearing loss (if appropriate) and determining the impact of the tinnitus on the patient. Educational material is provided to help the patient begin to self-manage their tinnitus.

Level 3: Group education. Group education often includes two parts. The audiologist may administer workshops to introduce sound therapy (ie, acoustic therapy) and to teach patients to incorporate sound therapy to meet their needs. Additionally, a mental health professional (ie, psychologist) may provide workshops implementing CBT principles focused on coping skills to supplement the use of sound therapy.

Level 4: Interdisciplinary evaluation. Should the first three levels (above) not adequately address the patient's perception and coping of their tinnitus, the next step would be a collaborative evaluation with an audiologist and a psychologist (or other mental health professional trained to diagnose and treat mental health disorders).

Level 5. Individualized support. At this level, the patient is provided one-on-one services with their audiologist, psychologist, or both.

The goal of these individualized appointments is to learn skills and techniques that empower patients to self-manage their tinnitus across multiple environments. Of course, for some audiologists in certain clinical settings, it may not be logistically feasible to include mental health professionals on the clinical team assessing and treating patients with tinnitus. Nonetheless, PTM does recommend having appropriate mental health professionals available.

PTM can be considered a framework consisting of multiple evidence-based approaches organized in a "progressive" treatment order. However, the audiologist incorporating PTM is afforded the flexibility to use what makes the most sense based on unique patient needs and available resources.

Tinnitus Retraining Therapy

Tinnitus Retraining Therapy (TRT) is based on a neurophysiological model of tinnitus first introduced by Jasterboff.[21] This model is guided by the hypothesis that bothersome tinnitus has origins within the limbic (emotional) and autonomic (involuntary) nervous system. Therefore, TRT targets habituation of the body's reaction to tinnitus and secondarily habituation of the actual perception of tinnitus. Successful outcomes are achieved when the patient is no longer bothered by the presence of their tinnitus and he/she notices tinnitus less frequently, despite being aware of it.

Taking advantage of the plasticity of the brain, tinnitus habituation retrains "conditioned reflex arcs" that connect the auditory, limbic, and autonomic systems and modifies subconscious levels of the auditory pathway. This is accomplished through two factors: intensive individual counseling and sound therapy.

Counseling sessions incorporate demystifying tinnitus, educating patients about the underlying causes of tinnitus and its effects, and introducing methods that can lead to tinnitus habituation. By reclassifying tinnitus into a neutral signal, adverse reactions to the presence of tinnitus are reduced or eliminated. Treatment options for hyperacusis (oversensitivity to sounds), misophonia (negative reaction to sounds), and phonophobia (fear of sound) are included in the TRT protocol via exposure, desensitization, and reassociation with more pleasant sound images.

TRT entails a detailed approach to sound therapy to desensitize the limbic and autonomic nervous systems via the presentation of constant low-level broadband sounds. According to TRT, the ideal loudness setting for a sound generator is when the perception of tinnitus and external sounds begin to blend together and the tinnitus is still audible. It is important that the sound enrichment from the environment or a device never causes an aversive reaction.

For permanent habituation, sounds should be used 24 hours a day.[22] In addition to structured sound therapy, patients engaged in TRT are encouraged to avoid silence while enhancing ambient background sounds using nature sounds or music. For individuals with hearing loss, background sounds can be increased by the use of hearing aids.

Conclusions

Each person, each brain, each auditory system, and each tinnitus perception is unique. It appears highly unlikely that a specific "universal" solution will be appropriate for each patient who is bothered by the perception of tinnitus. Nonetheless, many factors are important as we develop a solution for the individual tinnitus patient.

As we assess, manage, and treat tinnitus patients, we should keep in mind the vast majority of tinnitus patients have almost certainly searched dozens of websites looking for a cure. It would not be a stretch to assume some of the "snake oil and mirrors" and marketing claims are appealing, and so debunking pseudo-science and marketing claims must be handled with compassion and understanding, while allowing the patient to maintain their dignity and self-respect.

Further, counseling techniques that involve (and perhaps are centered on) cognitive behavioral therapy appear to be the most successful, to date. Indeed, when counseling is combined with sound (or acoustic) therapies, we provide the most successful and reasonable approach to managing the tinnitus patient. Of note, when providing sound therapies, we recommend flexible sound options (as patient preferences clearly change over time) and, of note, while providing acoustic therapy, the HCP must avail sounds that are not aversive and do not create negative associations or feelings for the patient.

Finally, of all the sound generating devices available—literally thousands of options—the advanced modern hearing aid, programmed via personalization (ie, based on the patient's sound preferences and with due consideration for the likely sensorineural hearing loss, recruitment, temporal, loudness, and spectral distortions perceived by the patient) with alternative sound sources, remote microphone connectivity (to maximize the signal-to-noise ratio), extended bandwidth, and vast programming and feature options appears to be the most likely device to successfully help the majority of patients manage their tinnitus.

REFERENCES can be found at www.hearingreview.com or by clicking in the digital edition of this article at: http://hr.alliedmedia360.com

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