

Multiflex Tinnitus Technology Handbook

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..... 2ND EDITION

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Introduction

The American Tinnitus Association (ATA) reports that approximately 50 million people in the United States have reported experiencing tinnitus to some degree.¹ Of these, about 16 million report it to be severe enough to seek medical attention and about 2 million are so seriously debilitated by their tinnitus that they cannot function on a “normal,” day-to-day basis.¹ Hearing healthcare providers are the most qualified professionals to provide services to this population, but there are few that do. Starkey Hearing Technologies acknowledges that many professionals may not have much experience or may be apprehensive to work with this patient population, which is why we have created the Multiflex Tinnitus Technology Handbook. This handbook will introduce you to the basics of tinnitus, discuss the tinnitus patient evaluation process, provide treatment recommendations and considerations, and provide references to numerous resources where you can learn more about tinnitus and treating tinnitus patients.

In addition to learning more about tinnitus, we encourage you to try our Multiflex Tinnitus Technology which offers a broadband sound therapy tinnitus stimulus. The Multiflex Tinnitus feature was designed with the professional and tinnitus patient in mind. For professionals, we provide an algorithm that uses the patient’s audiometric data to intelligently set the tinnitus stimulus. We also offer the ability to discretely shape the stimulus and add modulation (a wave-like sound quality effect) to further customize the sound. These flexible features allow for Multiflex Tinnitus to be easily integrated into your choice of treatment philosophy or protocol. To provide the most unique and personalized experience for the patient, we offer SoundPoint Tinnitus, an interactive software tool within the Inspire® software. SoundPoint Tinnitus allows the patient to become an active partner in setting his/her tinnitus stimulus. This feature not only allows the patient to be involved in the hearing healthcare process, but can ensure that the tinnitus stimulus settings are uniquely set to his/her personal preferences. To learn more about our tinnitus solutions, please visit the Tinnitus product page within your professional website.

As you read this handbook you will learn that working with the tinnitus patient is very similar to working with a patient with hearing loss. More importantly, you will see that you can work with this patient population and make a difference by providing information, counseling, and by fitting technology such as Multiflex Tinnitus. Congratulations on taking the first step to helping the millions suffering from tinnitus!

NOTE: Treatment may vary from patient-to-patient and on a case-by-case basis. This handbook is intended to be a resource for professionals. It should not be used as a substitute for medical advice. There are many ways to manage tinnitus; however, no single approach has been found to be beneficial for all tinnitus sufferers. We encourage professionals to go beyond this handbook for additional information (please see recommended resources on page 30).

This section covers the basics of tinnitus. It is extremely important that hearing healthcare professionals are comfortable with this information and are seen as credible tinnitus treatment providers. We highly encourage professionals to learn more than just the basics. There are numerous textbooks, online webinars, conferences, and journal articles that address tinnitus research and treatment. We have provided some recommended resources on page 30 and throughout this handbook to help expand your tinnitus knowledge and expertise.

What is tinnitus?

Tinnitus is the perception of sound occurring in the ear(s) and/or the head when no external sound is present. It is not a disease, rather a symptom of an underlying malfunction that occurs somewhere along the auditory pathway. While tinnitus typically cannot be objectively measured, it is not imagined. There are many descriptions for tinnitus but patients most often describe it as ringing, chirping, hissing or buzzing.

Tinnitus is broken down into two categories:

- **OBJECTIVE:** When a clinician can hear a patient’s tinnitus by standing next to them, using a stethoscope, or a microphone in the ear canal. This form of tinnitus is not as common and is often due to a vascular disturbance or muscular spasm occurring in the head and/or neck. In some literature, this form of tinnitus may also be referred to as Middle Ear Tinnitus.
- **SUBJECTIVE:** Tinnitus that can only be heard by the patient. The source of this type of tinnitus is often complex or difficult to determine as a variety of factors may be involved. This is the most common form of tinnitus. In some literature, this form of tinnitus may also be referred to as Inner Ear Tinnitus.

How many people experience tinnitus?

According to the National Health and Nutrition Examination Survey data from 1999-2004 approximately 50 million people in the United States experience tinnitus to some degree. Of these, it is severe enough for about 16 million to seek medical attention, and about 2 million are so debilitated by their tinnitus they are unable to function on a “normal,” day-to-day basis.¹ A more recent study by Kochkin and colleagues (2011) estimated approximately 30 million people, or roughly 10 percent of Americans, suffer from tinnitus. Further, the prevalence of tinnitus is as high as 26.7 percent for people ages 65-84 years.²

What causes tinnitus?

The exact physiological mechanism or reason for tinnitus is unknown at this time. However, research has consistently shown there are several likely causes or triggers for the onset of tinnitus including:

- **NOISE TRAUMA** - One of the most common causes of tinnitus is noise trauma. Noise trauma can be due to repeated, unprotected exposure to loud sounds over a long period of time (e.g., working in a factory, working in construction, musicians, lawn care) or from a one-time exposure to a close range, very loud sound (e.g., gunshot, firecracker, explosion). The damage that noise inflicts on the auditory system may be permanent and can result in the emergence of tinnitus immediately after exposure or gradually over time.
- **HEARING LOSS** - There are a number of pathologies of the outer and middle ear that can cause hearing loss as well as tinnitus (e.g., ear wax, middle ear infections, otosclerosis). In many cases, after outer or middle ear pathologies have been medically addressed, tinnitus may be alleviated. For inner ear pathologies (e.g., presbycusis, Ménière's Disease, sudden sensorineural hearing loss), few surgical/medical options are available, and thus the hearing loss, and tinnitus, if present, will likely persist.
- **HEAD & NECK INJURY** - Individuals who experience some form of head or neck injury/trauma often report the onset of tinnitus following the incident.³ Common head or neck traumas include skull fractures, whiplash, or a blow to the head. Individuals who experience temporomandibular disorders or other neck/jaw problems are also prone to experiencing tinnitus.³
- **DISEASE OR HEALTH PROBLEMS** - A number of diseases or health problems that are not directly related to the hearing system list tinnitus as a symptom.^{4,5} These include: cardiovascular disease, high blood pressure, underactive or overactive thyroid, fibromyalgia, multiple sclerosis, migraines, and diabetes. In some cases, tinnitus may even be the first sign of the problem.
- **MEDICATIONS** - There are approximately 500 over-the-counter and prescribed medications that cite tinnitus as a possible side effect.⁶ Most people do not experience tinnitus as a result of taking a medication but for those who do, the experience is often temporary and subsides within a few days or weeks once use of the drug is discontinued, though this is not a guarantee. Common medications that cause tinnitus include: anti-inflammatories (e.g., aspirin, ibuprofen), antibiotics (e.g., azithromycin, tetracycline, doxycycline), antidepressants (e.g., Abilify, Celexa, Prozac), antihistamines, and chemotherapy drugs.

What is the relationship between hearing loss and tinnitus?

Although tinnitus does not always co-occur with hearing loss, tinnitus is more prevalent among individuals with impaired hearing than it is among the normal hearing population.⁷ Tinnitus can occur with any degree, cause, or type of hearing loss. Research has shown that the severity of the tinnitus is not related to the severity of the hearing loss.⁸

Also, changes in hearing loss and changes in tinnitus seem to occur independent of each other. Tinnitus can worsen or lessen in severity without any change in hearing and vice versa. We do know that, regardless of age, as hearing loss increases, the likelihood for the presence of tinnitus increases.⁹

Research studies have revealed some interesting relationships between tinnitus and hearing loss that may be helpful for the treatment process. There tends to be a strong association between the pitch of a patient's tinnitus and the frequency range of his/her abnormal hearing thresholds. Further, the tinnitus pitch tends to correspond to the frequency region in which the audiogram exhibits a steep increase in hearing threshold of 40dB or more.¹⁰ When patients have an asymmetrical hearing loss, their tinnitus typically lateralizes to the ear with poorer thresholds; however, for patients with more symmetric hearing losses, tinnitus typically does not lateralize.¹⁰

What is the impact of tinnitus on quality of life?

Anyone who has worked with this patient population will tell you that the impact can be quite profound and vary greatly from patient-to-patient. In general, tinnitus impacts an individual's quality of life (QOL), but there is no way to predict to what extent a person will be affected. The four main QOL categories tinnitus can impact include: emotional well-being, ability to hear, ability to sleep and ability to concentrate.¹¹ If a person is experiencing disturbances in any one or more of these categories, numerous secondary effects or complaints may occur including: stress, anxiety, irritability, fatigue and memory impairments.

In severe cases, tinnitus can interfere with an individual's ability to perform adequately at his/her job and may contribute to psychological disorders like depression, post-traumatic stress disorder, anxiety disorder and anger. For individuals who experience any psychological disorder, it is always recommended that they be referred to their primary care physician or a qualified healthcare provider to address those symptoms. ***It is not within the scope of practice for a hearing healthcare provider to treat patients with psychological disorders.***

Are some people at greater risk for tinnitus?

Tinnitus does not discriminate. However, tinnitus tends to occur more commonly in men, the elderly, individuals in industrial occupations (e.g., construction workers, factory workers, farmers), and people with certain health problems.^{12,13}

With the increase in recreationally noisy activities and the use of personal electronic devices, researchers are more closely monitoring the prevalence of both hearing loss and tinnitus in children and young adults. According to the CDC, an estimated 12.5 percent of children and adolescents aged 6–19 years (approximately 5.2 million) have suffered permanent damage to their hearing as a result of excessive exposure to noise.¹⁴ As hearing loss and noise exposure are both related to the onset of tinnitus, there may be implications on the prevalence of tinnitus for this segment of the population. Very few studies have been conducted regarding tinnitus in children, but initial data suggest that tinnitus may be just as common in children as it is in adults.^{5,15}

A particular segment of the population that is notably impacted by both hearing loss and tinnitus are

military veterans. According to the Department of Veterans Affairs, tinnitus is the number one service-connected disability for veterans from all periods of service with hearing loss ranking second (Figure 1). The 2012 year end fiscal report revealed that nearly 1 million veterans received disability awards and compensation for tinnitus.¹⁶

Most Prevalent Disabilities for Veterans Receiving Compensation at the End of Fiscal Year 2012					
Body System	Disability	Number of Veterans			All Conditions FY 2012 (Percent of Total)
		Male	Female	Total	
Impairment of Auditory Acuity	Tinnitus	917,969	38,204	971,990	6.3%
Impairment of Auditory Acuity	Hearing loss	746,345	11,699	774,384	5.2%
Mental Disorders	Post traumatic stress disorder	532,474	29,975	572,612	3.7%
Skin	Scars, general	436,802	47,220	494,032	3%
Endocrine System	Diabetes mellitus	364,516	4,253	377,946	2.5%
Musculoskeletal System	Lumbosacral or cervical strain	313,525	47,927	364,804	2.2%
Musculoskeletal System	Impairment of the knee, general	303,072	58,953	363,916	2.1%
Cardiovascular System	Hypertensive vascular disease	289,093	20,151	312,000	2%
Neurological	Paralysis of the sciatic nerve	275,229	13,627	294,033	1.9%
Musculoskeletal System	Degenerative Arthritis of the Spine	262,973	25,821	293,419	1.8%

Figure 1
Fiscal year end 2012 most prevalent disabilities for veterans receiving compensation

Are there lifestyle factors that can aggravate tinnitus?

There are a number of lifestyle factors and dietary considerations, often noted in research literature, which may aggravate a patient’s tinnitus experience.^{17,18} Common factors include:

- Stress or fatigue
- Consistent noise exposure
- Use of aspirin in high doses
- Alcohol consumption
- High caffeine consumption
- Tobacco
- High sodium intake

Lifestyle modifications may help minimize the unfavorable effects of tinnitus. It is recommended that patients discuss any dietary, medical, and/or lifestyle changes with their primary care physician before implementing them.

Why are some individuals more bothered by tinnitus than others?

The defining line between those who are bothered by tinnitus versus those who are not is how they react to their tinnitus over time. Many individuals with tinnitus rarely think about it and are able to put it out of their mind. However, those who are significantly bothered by their tinnitus often think negatively about it (e.g., “My tinnitus will never go away”, “I’m never going to sleep well again”). The negative thoughts may in turn lead to conditions such as anxiety, stress or depression. These thoughts and conditions may make the tinnitus worse, elevating it from just an unpleasant experience to an inescapable problem.

The Neurophysiological Model of Tinnitus is often used by many professionals to describe to patients

how tinnitus becomes bothersome. This model or some version of it should be reviewed with most, if not all, tinnitus patients (for more information see page 22).

Is there a cure for tinnitus?

There are many products and treatments on the market that claim to cure tinnitus. However, at the present time, there is NO CURE for tinnitus. It is important that patients are aware of this fact. But it is even more important that they know all hope is not lost! A number of effective treatment options exist that can manage and provide relief from tinnitus.

What treatments have been shown to be effective?

Currently, there are no FDA-approved medical methods for the treatment of tinnitus. No medications or surgical procedures are widely agreed upon nor have they yielded replicable positive results in clinical trials. However, for some patients, the use of certain prescription medications may serve as an indirect solution for providing relief from tinnitus as some drugs can target tinnitus-associated symptoms like depression, stress or sleep disturbance. Research efforts are ongoing worldwide, especially by pharmaceutical companies, to develop a medical treatment that will cure tinnitus or at least provide relief for tinnitus sufferers.

Dietary supplements are also often cited as a potential treatment options for tinnitus. The most common advertised supplements for the treatment of tinnitus include: ginkgo biloba, zinc, melatonin, and lipoflavonoids. None of these supplement demonstrate replicable efficacy and may actually pose potential harm, especially in the elderly.¹⁹

There are also a number of alternative therapy procedures that are referenced to treat tinnitus including acupuncture, cranio-sacral therapy, hypnosis or hyperbaric oxygen treatments. Overall, there is a lack of proven benefit for any alternative therapy. However, treatments that induce relaxation could benefit an agitated person with tinnitus, but this benefit would be indirect.⁵

NOTE: Patients should discuss any medical or alternative treatments with their primary care physician before beginning use.

Proven Treatments

The following treatment options have been shown in numerous research studies to be effective in managing tinnitus.

- **HEARING AIDS** - Numerous studies have shown that amplification alone may provide total or partial relief from tinnitus for patients who present with both hearing loss and tinnitus.^{2, 20-25} Research has suggested that hearing aids may be effective in managing tinnitus for the following reasons.^{26, 27}

- Hearing aids provide stimulation to the auditory system that is deprived of input as a result of hearing loss.
 - Hearing aids may mask tinnitus due to the amplification of background sound.
 - Hearing aids reduce the stress and fatigue associated with straining to hear. Added stress/fatigue for those with tinnitus can have a direct impact on tinnitus severity.
 - Hearing aids result in better hearing and communication. This in turn can lead to less social isolation, and therefore facilitate involvement in enjoyable activities, which may divert attention away from tinnitus.
 - Hearing aids can divert attention away from tinnitus to other sounds. These amplified sounds may demand more of the brain's attention than the tinnitus.
- **SOUND THERAPY** - Sound therapy uses sound to decrease the loudness or prominence of tinnitus by completely or partially covering the tinnitus. The types of sounds that can be incorporated in this approach include music, noise (pink, white, broadband, narrowband), relaxation-type sounds or environmental sounds (e.g., ocean waves, breeze, rain). No one kind of sound is proven to be more effective than another.¹⁹ Sound therapy alone has been shown to help individuals better cope and manage their tinnitus, significantly reducing their perceived tinnitus handicap.^{28, 29} An analogy of the goal of sound therapy is shown in [Figure 2](#).
 - **COUNSELING** - Research studies support that one way to help patients, especially with tinnitus, is to provide them with information! Helping patients understand their symptoms gives them the ability to correct misconceptions and make informed decisions. Often individuals have very inaccurate beliefs about tinnitus and can develop negative thoughts and behaviors, which can make their symptoms and experience even worse. For this reason, education and counseling can be powerful tools when working with this population.^{30, 31} Some tinnitus treatment protocols incorporate a formal counseling technique called cognitive behavioral therapy (CBT). There is strong evidence to support the use of CBT with tinnitus patients.¹⁹ A description and additional resources to learn more about CBT is available on page 23.
 - **COMBINATION TREATMENTS** - The combination of multiple treatment options often provides the greatest relief to the tinnitus patient.^{27-30, 32} There are a number of treatment protocols that incorporate and encourage a combination of treatment options including Tinnitus Activities Treatment (TAT), Tinnitus Retraining Therapy (TRT), and Progressive Tinnitus Management (PTM).



Figure 2
 A candle in a dark room is perceived as very bright. However, if you take that same candle and place it in a brightly-lit room, the candle becomes much less noticeable and bright. In essence, tinnitus is more noticeable when there is very little or no environmental sound. As a result, this may cause difficulty focusing on tasks when in a quiet environment or when trying to fall asleep. Often, when an environment is enriched with sound, tinnitus is less noticeable.

Tinnitus Patient Evaluation & Consultation

Diagnostic Testing

Hearing healthcare professionals who work with tinnitus patients should always perform a comprehensive audiometric evaluation and consultation. Though the tinnitus diagnostic evaluation does not differ greatly from a hearing evaluation, there are additional tools and procedures a professional can include that assist in counseling the patient and creating an individualized treatment plan. In light of these additional measures and the need for counseling and education, the professional should consider scheduling additional time for the initial evaluation.

A comprehensive tinnitus evaluation and consultation includes:

1. Case History
2. Tinnitus Questionnaire
3. Audiologic Evaluation
4. Counseling & Education
5. Recommending a Treatment Plan
6. Referral Recommendations

This section will cover the diagnostic elements of the tinnitus evaluation including case history, tinnitus questionnaire and audiologic evaluation. The remaining elements will be covered in other sections.

Case History

As with the patient with hearing loss, it is important to obtain relevant medical and hearing history from patients with tinnitus. While rare, there are cases when tinnitus may be a symptom of a more serious medical problem. To determine if a patient's tinnitus may be a medical emergency see page 19. Figure 3 is an example of a comprehensive tinnitus case history form. We encourage professionals to provide a similar form to the patient to fill out or make sure to ask the questions listed on this form to obtain a thorough tinnitus case history.

Some of these questions may be covered in a typical case history but it is extremely important to obtain additional information from a patient when they report they experience tinnitus or present with tinnitus as a primary complaint. These questions provide information that assist in making additional referrals, completing the evaluation process, and counseling the patient.

TINNITUS HEALTH HISTORY

1. How long have you had your tinnitus? _____

2. Where do you perceive your tinnitus?
 Right ear Left ear In the head
 Both ears Elsewhere

3. When did you first experience your tinnitus? _____

4. Was there a specific incident linked to the start of your tinnitus?
 Yes, Please explain: _____
 No

5. What does your tinnitus sound like (e.g., ringing, chirping, whistling, humming, clicking)? _____

6. Do you experience your tinnitus (please check one)?
 All the time Fluctuates Unknown

7. Do you have a history or incident of noise exposure (recreational and/or occupational)? If so, please explain: _____

8. Is there a particular time of day when your tinnitus is most bothersome?
 Morning Afternoon Evening

9. Since your tinnitus started, have you experienced any of the following (please check any that apply)?
 Hearing loss Dizziness Ear infection
 Balance disturbances Ear pressure or fullness

10. Do you suffer from any of the following (please check all that apply)?
 Headaches Distress or vertigo Neck pain
 Pain syndrome Temporomandibular Disorder Meniere's Disease
 Any diagnosed health problems, disorder or disease? If so, please list: _____

11. Are there factors that seem to affect your tinnitus (please check any that apply)?
 Stress Medications Sleep
 Time of day Foods Listening environment
 Alcohol Head and/or neck movement (e.g., clenching teeth, moving jaw forward)
 Caffeine Other: _____

12. What activity is most impacted by your tinnitus (please check one)?
 Sleep Hearing Concentration
 Emotional well-being Other, please explain: _____

13. Are you sensitive to loud sounds? Yes No

14. Have you tried any treatments for your tinnitus? If so, what and did it help? _____

TINNITUS EVALUATION SUMMARY

Does the patient have hearing loss? _____

Tinnitus Handicap Inventory Score: _____

Is a referral necessary? _____

Treatment Plan Recommendation: _____

Tinnitus Counseling & Education Checklist:

How many people suffer from tinnitus Treatment options Causes of tinnitus
 Managing tinnitus Aggravators of tinnitus Counseling Programs/Resources
 Impact

Figure 3
Example of a comprehensive tinnitus case history form

Tinnitus Questionnaires

Due to the subjective nature of tinnitus there is no purely objective means for measuring it. However, numerous questionnaires or inventories have been designed specifically to evaluate the patient with tinnitus. These tools provide a means of evaluating the impact tinnitus has on a patient. A tinnitus questionnaire can:

- Help identify individuals who are bothered by their tinnitus and may be helped through treatment.
- Assist in determining if the patient may benefit from minimal counseling or intensive rehabilitation.
- Identify specific problems attributed to tinnitus (e.g., sleep, concentration).
- Evaluate treatment effectiveness (when administered pre- and post-treatment).

We highly encourage professionals to administer a tinnitus questionnaire at the initial evaluation. Three widely used questionnaires are described below.

TINNITUS HANDICAP INVENTORY (THI)

The THI developed by Newman and colleagues (1996) is a 25-item inventory that evaluates the functional and emotional implications of tinnitus and probes the most severe reactions a patient can have to tinnitus (Figure 4).³³ The patient must answer each question with “yes” (4 points), “sometimes” (2 points), or “no” (0 points). Responses are summed to determine the patient's score (ranges from 0 to 100 points). The patient's total score is then compared to the THI grade levels to interpret the level of tinnitus severity (Figure 5).³⁴ Administration and scoring of the THI takes 10-15 minutes. For a full-page pdf copy of the THI visit <https://starkeypro.com/products/hearing-aids/tinnitus>.

QUESTION		4	2	0
1.	Because of your tinnitus, is it difficult for you to concentrate?	YES	SOMETIMES	NO
2.	Does the loudness of your tinnitus make it difficult for you to hear people?	YES	SOMETIMES	NO
3.	Does your tinnitus make you angry?	YES	SOMETIMES	NO
4.	Does your tinnitus make you feel confused?	YES	SOMETIMES	NO
5.	Because of your tinnitus, do you feel desperate?	YES	SOMETIMES	NO
6.	Do you complain a great deal about your tinnitus?	YES	SOMETIMES	NO
7.	Because of your tinnitus, do you have trouble falling to sleep at night?	YES	SOMETIMES	NO
8.	Do you feel as though you cannot escape your tinnitus?	YES	SOMETIMES	NO
9.	Does your tinnitus interfere with your ability to enjoy your social activities (such as going out to dinner, to the movies)?	YES	SOMETIMES	NO
10.	Because of your tinnitus, do you feel frustrated?	YES	SOMETIMES	NO
11.	Because of your tinnitus, do you feel that you have a terrible disease?	YES	SOMETIMES	NO
12.	Does your tinnitus make it difficult for you to enjoy life?	YES	SOMETIMES	NO
13.	Does your tinnitus interfere with your job or household responsibilities?	YES	SOMETIMES	NO
14.	Because of your tinnitus, do you find that you are often irritable?	YES	SOMETIMES	NO
15.	Because of your tinnitus, is it difficult for you to read?	YES	SOMETIMES	NO
16.	Does your tinnitus make you upset?	YES	SOMETIMES	NO
17.	Do you feel that your tinnitus problem has placed stress on your relationships with members of your family and friends?	YES	SOMETIMES	NO
18.	Do you find it difficult to focus your attention away from your tinnitus and on other things?	YES	SOMETIMES	NO
19.	Do you feel that you have no control over your tinnitus?	YES	SOMETIMES	NO
20.	Because of your tinnitus, do you often feel tired?	YES	SOMETIMES	NO
21.	Because of your tinnitus, do you feel depressed?	YES	SOMETIMES	NO
22.	Does your tinnitus make you feel anxious?	YES	SOMETIMES	NO
23.	Do you feel that you can no longer cope with your tinnitus?	YES	SOMETIMES	NO
24.	Does your tinnitus get worse when you are under stress?	YES	SOMETIMES	NO
25.	Does your tinnitus make you feel insecure?	YES	SOMETIMES	NO
TOTAL SCORE PER COLUMN				
TOTAL SCORE				

Figure 4
Tinnitus Handicap Inventory Questionnaire

GRADE	SCORE	DESCRIPTION
1	0-16	Slight: Only heard in quiet environment, very easily masked. No interference with sleep or daily activities.
2	18-36	Mild: Easily masked by environmental sounds and easily forgotten with activities. May occasionally interfere with sleep but not daily activities.
3	38-56	Moderate: May be noticed, even in the presence of background or environmental noise, although daily activities may still be performed.
4	58-76	Severe: Almost always heard, rarely, if ever, masked. Leads to disturbed sleep pattern and can interfere with ability to carry out normal daily activities. Quiet activities affected adversely.
5	78-100	Catastrophic: Always heard, disturbed sleep patterns, difficulty with any activity.

Figure 5
Tinnitus Handicap Inventory Grade Levels

TINNITUS REACTION QUESTIONNAIRE (TRQ)

The TRQ was developed by Wilson and colleagues (1991) as a psychological assessment tool designed to measure the extent to which tinnitus affects an individual (Figure 6). It contains 26 items each rated on a 5-point scale, with anchors at 0 points (not at all) to 4 points (almost all of the time). It is easy to administer and score and provides a global measure of tinnitus distress. To learn more about the development and administration of the TRQ please read Wilson et al., 1991.³⁵

TINNITUS FUNCTIONAL INDEX (TFI)

The TFI was recently introduced by Meikle and colleagues (2013).³⁶ It is a 25-item inventory tool that uses an 11-point scale to measure and classify tinnitus severity. It looks at the functional implications of tinnitus on an individual's life including - concentration, sleeping ability, social activities, overall well-being and hearing. It has been used for pre-and post-therapy assessment to determine the effectiveness of treatment. Oregon Health & Science University (OHSU) owns the copyrights to the TFI, but has given permission to make it available to professionals at <http://www.ohsu.edu/xd/health/services/ent/services/tinnitus-clinic/tinnitus-functional-index.cfm>.

Audiologic Evaluation

The audiologic evaluation of the patient with tinnitus does not differ from that of a patient who only reports hearing loss. However, there are a number of additional test measures that professionals may use when evaluating the patient with tinnitus. We recommend developing a protocol that is appropriate for your clinic but includes the following standard test measures.

STANDARD TEST MEASURES

- Otoscopy
- Acoustic Immittance
- Pure-Tone Audiometry (air and bone conduction thresholds)
 - High Frequency Audiometry- if the audiometer has extended high-frequency testing capabilities, it is advisable to obtain thresholds at these frequencies. High-frequency audiometry is especially helpful for patients who are suffering from tinnitus but demonstrate normal hearing sensitivity at 250-8000Hz.³⁷
- Most Comfortable & Uncomfortable Loudness Levels

For Client

Tinnitus Reaction Questionnaire (TRQ)

Name: _____ Date Completed: _____

This questionnaire is designed to find out what sort of effects tinnitus has had on your lifestyle, general well-being, etc. Some of the effects below may apply to you, some may not. Please answer **all** questions by circling the number that best reflects how your tinnitus has affected you **over the past week**.

	Not at all	A little of the time	Some of the time	A good deal of the time	Almost all of the time
1. My tinnitus has made me unhappy.	0	1	2	3	4
2. My tinnitus has made me feel tense.	0	1	2	3	4
3. My tinnitus has made me feel irritable.	0	1	2	3	4
4. My tinnitus has made me feel angry.	0	1	2	3	4
5. My tinnitus has led me to cry.	0	1	2	3	4
6. My tinnitus has led me to avoid quiet situations.	0	1	2	3	4
7. My tinnitus has made me feel less interested in going out.	0	1	2	3	4
8. My tinnitus has made me feel depressed.	0	1	2	3	4
9. My tinnitus has made me feel annoyed.	0	1	2	3	4
10. My tinnitus has made me feel confused.	0	1	2	3	4
11. My tinnitus has "driven me crazy".	0	1	2	3	4
12. My tinnitus has interfered with my enjoyment of life.	0	1	2	3	4
13. My tinnitus has made it hard for me to concentrate.	0	1	2	3	4
14. My tinnitus has made it hard for me to relax.	0	1	2	3	4
15. My tinnitus has made me feel distressed.	0	1	2	3	4
16. My tinnitus has made me feel helpless.	0	1	2	3	4
17. My tinnitus has made me feel frustrated with things.	0	1	2	3	4
18. My tinnitus has interfered with my ability to work.	0	1	2	3	4
19. My tinnitus has led me to despair.	0	1	2	3	4
20. My tinnitus has led me to avoid noisy situations.	0	1	2	3	4
21. My tinnitus has led me to avoid social situations.	0	1	2	3	4
22. My tinnitus has made me feel hopeless about the future.	0	1	2	3	4
23. My tinnitus has interfered with my sleep.	0	1	2	3	4
24. My tinnitus has led me to think about suicide.	0	1	2	3	4
25. My tinnitus has made me feel panicky.	0	1	2	3	4
26. My tinnitus has made me feel tormented.	0	1	2	3	4
Total					

Wilson et al. 1991

Figure 6
Tinnitus Reaction Questionnaire

- Speech Recognition Threshold
- Speech Discrimination Scores (measured for both quiet and noise)

OPTIONAL TEST MEASURES

- Tinnitus Pitch Matching*
- Tinnitus Loudness Matching*
- Residual Inhibition
- Minimum Masking Level
- Distortion Product Otoacoustic Emissions (DPOAEs)

The more commonly used optional test measures (indicated by*) will be reviewed in this section, the other measures will not.

TINNITUS PITCH & LOUDNESS MATCHING

Tinnitus pitch and loudness matching will be reviewed together as these two measures are often performed consecutively. Collectively, these measures can assist the professional and patient in the following ways:

- Quantification of a patient’s tinnitus
- Validation and acknowledgement of tinnitus symptoms
- Comparison of pitch and intensity of tinnitus to hearing thresholds
- Counseling tool for professionals
- Assistance in programming a tinnitus device (depending on the professional’s fitting philosophy)

A conventional audiometer is sufficient to carry out this additional testing; however, audiometers with inter-octave frequencies, extended high frequencies and the ability to vary output levels in increments of 1-2 dB may provide more accurate measurements. The suggested protocol involves the professional controlling and adjusting the test stimulus based on feedback from the patient.

PITCH MATCHING

- Setup
 - Test Ear
 - Unilateral tinnitus: present stimulus to the non-tinnitus ear
 - Bilateral tinnitus: test the ear with the softest tinnitus; if tinnitus is perceived as the same bilaterally test either ear (or the one with better hearing)

- Stimulus Type
 - Pure tones when tinnitus is reported as tonal (e.g., ringing, chirping)
 - Narrowband noise when tinnitus is reported as broadband (e.g., whooshing, roaring)
- Starting Intensity Level
 - Normal hearing: 10-20dB above the audiometric threshold at the test frequency
 - Impaired hearing: 5-10dB above the audiometric threshold at the test frequency

• Instructions to Patient

- “I want to get a close estimation of the pitch of your tinnitus. I am going to present two sounds for you, and I want you to tell me which one sounds more like your tinnitus. Try to ignore how loud the sound is and focus on the pitch.”

• Testing Protocol

- Uses a two-alternative forced-choice method in which pairs of tones are presented and the patient is asked to identify which one best matches his/her tinnitus. Test frequencies include audiometric octave frequencies that are presented in ascending comparisons starting with 1000Hz vs. 2000Hz until the patient indicates the frequency that is closest in pitch to their tinnitus. Inter-octave frequencies should be used when available for closer approximation of tinnitus.
 1. Present a 1000Hz tone for 3-5 seconds.
 2. Present a 2000Hz tone 3-5 seconds.
 3. Ask the patient which signal is most similar to his/her tinnitus, the first or second.
 4. Based upon his/her response, present next series of comparison tones and repeat until closest approximation is achieved. See [Figure 7](#) for an example of tinnitus pitch matching results.
 5. Record measured level.
 6. Repeat this procedure 1-2 times to ensure reliability of the measure.
- Patients rarely report their tinnitus is below 1kHz; if you suspect it is lower in frequency, follow this same procedure using progressively lower frequencies (750, 500, 250 and 125Hz).

	COMPARISON TONES (HZ)	TONE JUDGED MOST LIKE TINNITUS
Trial 1	1000 vs. 2000	2000
Trial 2	2000 vs. 3000	3000
Trial 3	3000 vs. 4000	4000
Trial 4	4000 vs. 6000	4000

Figure 7
Tinnitus pitch matching comparison results

LOUDNESS MATCHING

- Setup
 - Test Ear
 - Unilateral tinnitus: present stimulus to the non-tinnitus ear
 - Bilateral tinnitus: test the ear with the softest tinnitus; if tinnitus is perceived as the same bilaterally, test either ear (or the one with better hearing)
 - Stimulus Type
 - Use the stimulus that most closely matches the patient's tinnitus, as identified during pitch matching
 - Starting Intensity Level
 - Start the intensity level at the patient's audiometric threshold for the pitch matched stimulus. If a narrowband noise was used for pitch matching, first complete a threshold search using the matched narrowband noise. Once the threshold is obtained using standard audiometric procedures, proceed with loudness matching testing.
- Instructions to Patient
 - "Now that we know what your tinnitus sounds like, I want to get an idea of how loud it is. I'm going to present you with the sound we matched your tinnitus to and gradually increase the loudness. I want you to let me know when my sound equals the loudness of your tinnitus."
- Testing Protocol
 1. Present the signal at the patient's threshold level for the matched frequency.
 2. Gradually increase the loudness of the stimulus by 1, 2 or 5dB steps (depending on the audiometers step-size).
 3. As you near the perceived loudness level of the tinnitus, you may have to toggle up and down to accurately match loudness.
 4. Record measured level.
 5. Repeat this procedure 1-2 times to ensure reliability of the measure.

The measurements obtained from pitch and loudness matching in conjunction with the audiometric data provide reference points during counseling about tinnitus and/or hearing loss. The measurements assist in quantifying the patient's tinnitus and can be marked on the audiogram to provide a visual representation to the patient ([Figure 8](#)).

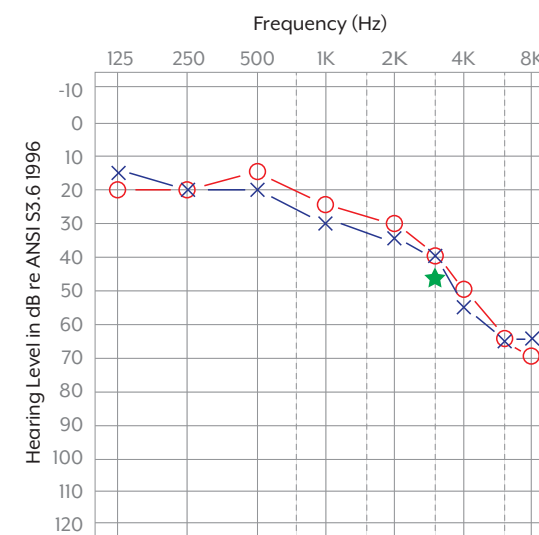


Figure 8
Tinnitus pitch and loudness matched results (green star) relative to audiometric thresholds

Education & Counseling

A critical piece of the tinnitus consultation is allocating time to counsel and educate the patient on the basics of tinnitus and his/her results from the evaluation. For some patients, simply having a better understanding about tinnitus and talking with a professional about their experience is enough to alleviate their concerns. For patients who need more, the information provided during this time reassures them that there is hope and that you are the person who can help. At the first appointment, we encourage you to cover the following information:

- The basics of hearing and tinnitus in layman's terms, including:
 - How the auditory system works
 - What tinnitus is
 - Why hearing loss and tinnitus are often linked
 - What the prevalence of tinnitus is
 - What are the common sources of tinnitus
 - What can aggravate or worsen tinnitus
- Summarize the information obtained from the case history, tinnitus questionnaire, and audiometric evaluation

Effective counseling can be accomplished by listening to the patient, addressing concerns, providing information, and answering his/her questions. The more knowledgeable you are about tinnitus, the better, so it is recommended that you continue to stay current on tinnitus treatment and research. Some patients will require more counseling than can be provided at the first appointment. Therefore, additional appointments may be necessary. For more information on counseling considerations see the [Additional Treatment Considerations](#) section starting on [page 22](#).

Tinnitus Patient Evaluation & Consultation

Treatment Plan

The information obtained through the case history, questionnaire, and audiometric evaluation provide a detailed picture of the impact tinnitus is having on the patient's QOL. Equipped with this information, you can formulate a personalized treatment plan. Remember, for some patients, the evaluation and consultation may provide enough information to manage their tinnitus. For many others, additional counseling and treatment is often necessary. **Figure 9** below can serve as a guide for developing a treatment plan. Please note that these recommendations are secondary to any necessary medical treatment and may vary from patient-to-patient.

PATIENT PROFILE	TREATMENT PLAN RECOMMENDATIONS	NOTES/CONSIDERATIONS
Tinnitus and normal hearing*	<ul style="list-style-type: none"> • Basic tinnitus counseling and education • Additional counseling sessions to discuss any specific areas of difficulty (thoughts/emotions, hearing, sleep and/or concentration) • Sound Therapy • Follow-up care (see page 20) 	Individuals with normal hearing often benefit from counseling and education alone. A wearable device is an option and may provide relief.
Tinnitus and hearing loss-thresholds < 70 at one or more frequency below 4000Hz	<ul style="list-style-type: none"> • Basic tinnitus counseling and education • Hearing aid or combination device (hearing aid + sound therapy) • Additional counseling sessions to discuss any specific areas of difficulty (thoughts/emotions, hearing, sleep and/or concentration) • Follow-up care (see page 20) 	Many patients with tinnitus also have some degree of hearing loss. Hearing aids alone are known to provide tinnitus relief for some patients and when combined with sound therapy may provide even greater relief. Patients with slight/mild hearing loss may experience relief from tinnitus with combination devices.
Tinnitus and hearing loss-thresholds >70dBHL at all frequencies	<ul style="list-style-type: none"> • Basic tinnitus counseling and education • Hearing aid • External noise generator (e.g., tabletop sound generator) • Additional counseling sessions to discuss any specific areas of difficulty (thoughts/emotions, hearing, sleep and/or concentration) • Follow-up care (see page 20) 	The tinnitus stimulus cannot safely be made loud enough for patients with severe-to-profound hearing loss as exposure to loud sounds can further damage hearing and/or worsen tinnitus.
Severe tinnitus with: <ul style="list-style-type: none"> • Suicidal ideation • Suspected mental problem • Concerns about the patient's well-being 	Make an immediate referral to a mental health professional or medical doctor. It is not within the scope of practice for a hearing healthcare professional to treat mental health issues.	Following medical management for any mental health disorder, the hearing healthcare professional may assist in tinnitus management.

Figure 9
Treatment plan guideline

*Normal hearing for adults is defined as thresholds <25dBHL from 250-8000Hz

It should be noted that a number of well-established tinnitus treatment approaches/therapy programs exist. Many professionals use these programs or similar principles to execute the treatment plan for their patients with tinnitus. These programs provide guidelines to follow and offer the flexibility to meet the needs of the patient. The treatment approaches/therapy programs that are commonly used clinically and referenced in the literature include TRT, PTM, and TAT. While these will not be described in this handbook, each program provides a comprehensive protocol and treatment plan for working with patients with tinnitus. In addition, they all incorporate sound therapy, counseling, and hearing aids (when necessary).

- Learn more about TRT at Dr. Pawell Jastreboff's website, the creator of TRT, at <http://www.tinnitus-pjj.com/>
- Learn more about PTM by visiting the National Center for Rehabilitative Auditory Research website at <http://www.ncrar.research.va.gov/education/documents/tinnitusdocuments/index.asp>
- Learn more about TAT, developed by Dr. Richard Tyler at the University of Iowa, at <http://www.medicine.uiowa.edu/oto/research/tinnitus/>

Referral

For most patients, tinnitus is a nonthreatening symptom. However, there are cases when the presence of tinnitus is a sign of a more serious medical condition that may warrant an immediate or additional referral. **Figure 10** provides recommendations to assist in determining the need for a medical referral.^{38,39}

SYMPTOMS	REFERRAL	STATUS/CONSIDERATIONS
Physical trauma, facial palsy, or unexplained sudden hearing loss	Emergency Care or Otolaryngologist	Emergency
Suicidal ideation or manifestation of suspected mental health problems	Emergency Care or Mental Health Professional	Emergency/Urgent; escort patient to Emergency Care or Mental Health Professional, and/or call for assistance
If the patient has ANY of the following: <ul style="list-style-type: none"> • Symptoms suggest somatic origin of tinnitus (e.g., tinnitus that pulses with heartbeat) • Symptoms seem to be caused by movement of head or neck • Ear- pain, drainage, or odor • Unilateral hearing loss and/or tinnitus • Vestibular symptoms (e.g., dizziness/vertigo) 	Otolaryngologist and Hearing Healthcare Professional	Urgent; schedule otolaryngology exam as soon as possible
If the patient meets ALL of the following: <ul style="list-style-type: none"> • Symmetrical hearing loss and tinnitus • Symptoms suggest neural origin of tinnitus (e.g., tinnitus does not pulse with heartbeat) • No symptom from moving head or neck • No ear pain and/or drainage • No vestibular symptoms (e.g., no dizziness) • No unexplained sudden hearing loss or facial palsy 	Hearing Healthcare Professional and Otolaryngologist	Non-urgent; complete hearing exam before patient sees otolaryngologist

Figure 10
Medical referral recommendations

Please keep in mind that the FDA requires medical clearance from a physician before fitting a patient with a hearing aid. If the patient is over 18 years of age, they may waive this medical clearance and instead, complete a medical waiver. The waiver must use language provided by the FDA.

As with any patient fit with amplification, follow-up care is an essential part of the tinnitus patient journey. Numerous follow-up appointments are recommended to ensure that the patient is adhering to the treatment plan and obtaining relief, device settings are appropriate (if a device was fit), and to reassure the patient of your commitment to managing his/her tinnitus.

Recommended Follow-Up Schedule

Every patient has different needs, but follow-up care is especially important with this patient population. Schedule, patients fit with a hearing aid and/or sound therapy device, an appointment 1-2 weeks after the initial fitting. Inform the patient that they may notice a change in the characteristics of his/her tinnitus shortly after initial device use and that it is completely normal and no cause for alarm. At the follow-up appointment, adjustments and further customization of the device may be necessary to ensure the settings programmed provide the greatest amount of relief. Additional appointments are also encouraged to monitor the patient's progress and to address any questions or counseling needs that arise. The recommended follow-up schedule includes appointments at:

- 1-2 weeks
- 1 month
- 3 months
- 6 months
- 1 year (annually thereafter or as needed)

Although not all of the appointments may be necessary for every patient, this schedule should be presented to the patient when the treatment plan is discussed.

At follow-up appointments any of the following may take place:

- Fine-tune adjustments if a hearing aid, sound therapy, or combination device was fit
- Evaluation of treatment effectiveness
- Patient-centered counseling

Evaluating the Treatment Effectiveness

The evaluation of perceived tinnitus distress, disability, and handicap using a questionnaire provides an index for documenting the effectiveness of the treatment plan when administered pre- and post-treatment. The questionnaire that is used prior to treatment should be re-administered six months post-treatment. This six month period allows sufficient time for fine-tuning device settings, additional counseling, and for the patient to acclimate to treatment. A reduction in a patient's self-perceived tinnitus handicap or improvement in QOL may be reflective of the benefit derived from treatment. These results should be shared with the patient to demonstrate that the treatment plan has been effective.

Additional Treatment Considerations

If no change is observed, this may suggest that the treatment is not providing sufficient benefit and additional or alternative options should be considered. If there is an increase in perceived handicap or tinnitus symptoms continue to worsen, refer the patient to an appropriate medical professional and tinnitus specialist for further treatment. For some tinnitus patients, treatment requires a team of allied healthcare professionals who specialize in the treatment of severely impaired tinnitus sufferers. Prior to working with this population, it is recommended that professionals contact a physician and mental health provider, who have experience working with tinnitus patients, to establish a reliable referral team. To find additional professionals in your area who serve severely impaired tinnitus patients, please visit the American Tinnitus Association website at www.ata.org/support.

Every tinnitus patient is different. Therefore, it is essential that you are equipped with a number of resources, information and ways to personalize care. Counseling is one of the most important pieces of working with the tinnitus patient and there are many ways to provide counseling. The following section highlights some commonly used counseling techniques. Some of the techniques discussed are fundamental components of a tinnitus treatment program/therapy while others are supplemental resources. Many of the counseling techniques used with tinnitus patients are rooted in the fundamental principles of CBT but tweaked to meet the needs of this particular patient population. We encourage you to familiarize yourself with these and adopt methods with which you are most comfortable.

Neurophysiological Model of Tinnitus

The Neurophysiological Model of Tinnitus was developed by Dr. Pawell Jatstreboff and is the foundation for TRT.⁴⁰ The model is based on general neurophysiology and behavioral neuroscience and hypothesizes that many systems in the brain are involved in tinnitus, with the auditory system playing a secondary role (Figure 11). Many professionals, even those who do not use TRT in their practice, use the model and/or its fundamental principles to describe why tinnitus becomes bothersome. The following is a quick description of the model written by Sandlin & Olsson (2000).⁴¹

First, there is the perception of the stimulus. At the cortical level, a decision is made as to whether overt action of any kind is mandatory. If the conscious brain deems the stimulus does not demand some purposeful behavior, it can be habituated to (i.e., dismissed) if there are frequent occurrences of the same stimulus. Suppose, however, that tinnitus serves as the stimulus? The conscious brain attempts to make some rational decision. 'Have I heard this before? What causes it? Is it some sort of precursor indicating I am going deaf? Do I have a serious disease? I haven't heard this sound before and I must attend to it until I understand its cause.' The cortex, failing to find an answer for the tinnitus' presence, labels the sound a threat. The limbic system (the brain's emotional control system) is thus alerted and activated to the tinnitus, and the tinnitus becomes a more significant problem for the patient.

Emotional involvement with tinnitus can produce psychological and physiological behaviors. Sleep disturbance, irritability, anger, loss of concentration, and anti-social consequences are often reported. If these negative behaviors produced by the limbic system persist over time, then the autonomic nervous system may also become involved.

A self-perpetuating cycle of events takes place in the brain. The subconscious brain continues to maintain the conscious brain's awareness of the tinnitus. The conscious brain continues to involve the subconscious brain, including the limbic and autonomic nervous systems, as it seeks a resolution that is not forthcoming. This cycle, in turn, serves to increase the subjective loudness and importance of the perceived sound.

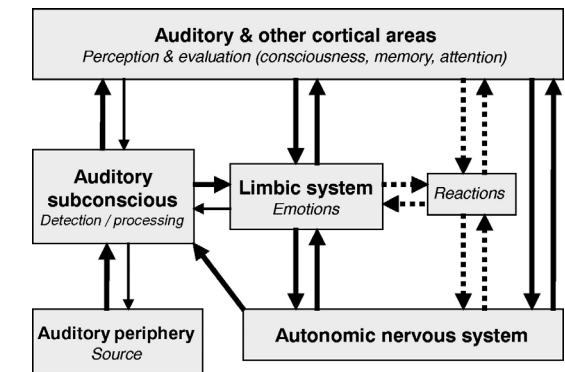


Figure 11
Diagrammatic representation of the Neurophysiological Model of Tinnitus⁴²

Cognitive Behavioral Therapy

Some hearing healthcare professionals are trained in a type of counseling called CBT. CBT was originally developed for the treatment of depression and anxiety, but years of research has shown it to be effective in the treatment of tinnitus-related distress.¹⁹ CBT is based on treating a patient's emotional reaction to tinnitus, rather than the tinnitus itself. The professional helps the patient to identify the negative behaviors and thought patterns they have about his/her tinnitus. Once identified, the professional teaches the patient skills that are designed to reduce the attention placed on his/her tinnitus and improve his/her coping by devising alternative thinking and behavior patterns that help with distraction. Treatment often includes behavior interventions such as learning relaxation techniques, exposure to feared stimuli, instructions on sleep hygiene, and auditory enrichment (sound therapy). Many of the treatment approaches or protocols available for treating tinnitus feature counseling that is based on the principles of CBT. To learn more about CBT for the treatment of tinnitus please review Sweetow (2000)⁴³ and Henry & Wilson (2001).⁴⁴

Quality of Life Focused Counseling

In general, the problems created by tinnitus can be grouped as difficulties with emotional well-being (thoughts and emotions), sleep, hearing, and concentration. Not every patient experiences problems in each area, and the magnitude of impact within each can vary across patients. Described below are some recommendations or counseling suggestions for different tinnitus-related problems. This information was adapted, with permission, from the TAT program developed by Dr. Richard Tyler at the University of Iowa.⁴⁵

NOTE: The entire catalog of TAT counseling materials are available at no charge at www.medicine.uiowa.edu/oto/research/tinnitus/. This comprehensive activities-based counseling program also encourages the use of the Iowa Tinnitus Activities Questionnaire to track the progress of the primary and secondary effects of counseling on the patients QOL. The questionnaire looks specifically at the emotional aspects of tinnitus as well as the problems associated specifically with hearing, sleep, and concentration and can also be downloaded from the provided website.

Thoughts and Emotions

Tinnitus is a very personal experience that often triggers a negative emotional response. How a patient reacts to tinnitus or attends to it may actually make his/her experience worse. Many professionals who specialize in working with the tinnitus patient use methods rooted in CBT to demonstrate and help the patient understand how his/her reaction to tinnitus can exacerbate it. By discussing and demonstrating this relationship to the patient, it may help the patient manage his/her tinnitus. A quick and easy way to counsel the patient is provided on the following page and is adapted from the TAT materials.

INSTRUCTIONS: Use the following illustrations with the suggested scripting, found below each image, to counsel the patient about the relationship between tinnitus and thoughts and emotions. Make sure to discuss each image in the order provided for the most comprehensive explanation.

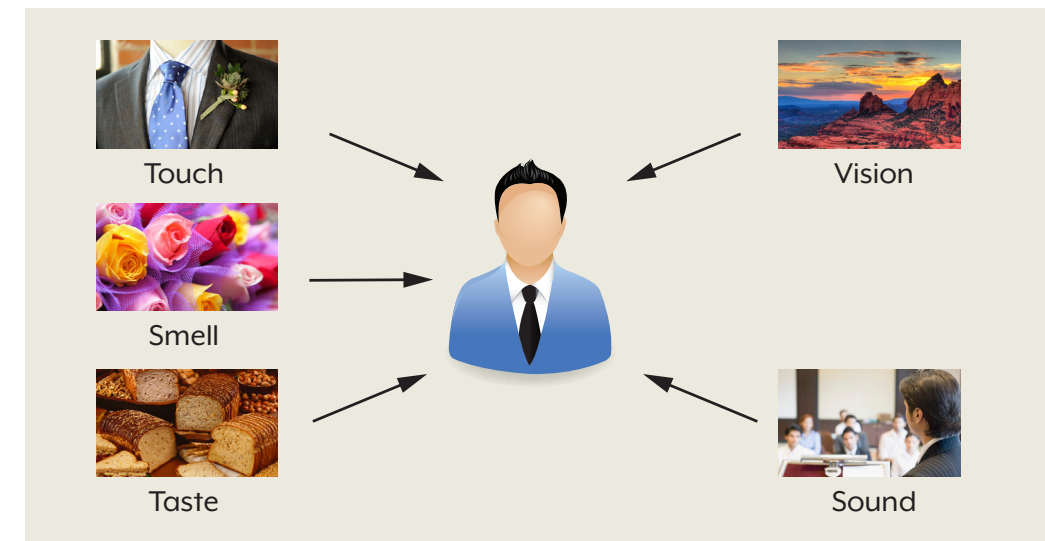


Figure 12
Many stimuli compete for our attention in our environment.

“In our everyday environments, we are bombarded with sensory stimulation that we consciously and unconsciously monitor. Currently, you are actively attending to what I am saying. However, at any given moment you can shift your attention to another stimulus. Right now you are wearing shoes. By simply pointing out that you are wearing shoes, you have likely shifted your attention to how your shoes feel on your feet. However, a few seconds ago you were not consciously aware of or thinking about how your shoes felt. As you can see, we can very quickly redirect our attention.”

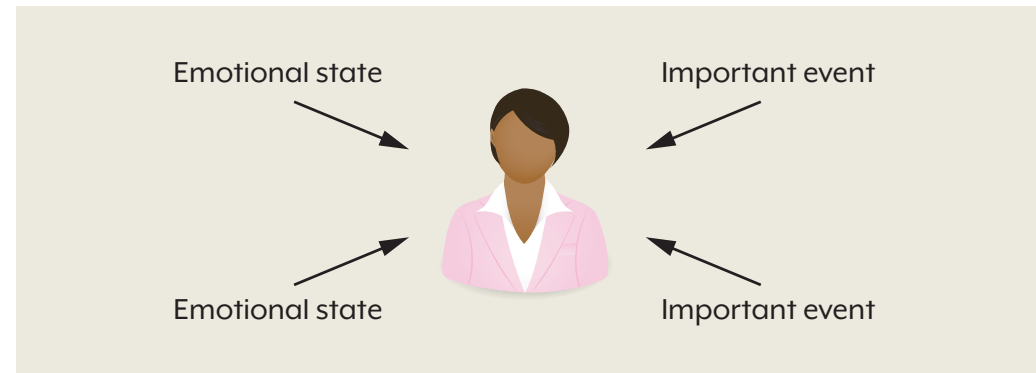


Figure 13
Numerous things can influence our attention.

“Several things can influence our attention including our emotional state, important events, novelty and the unknown. Our thoughts and emotions play a significant role in how we perceive an experience and how our attention is directed.”

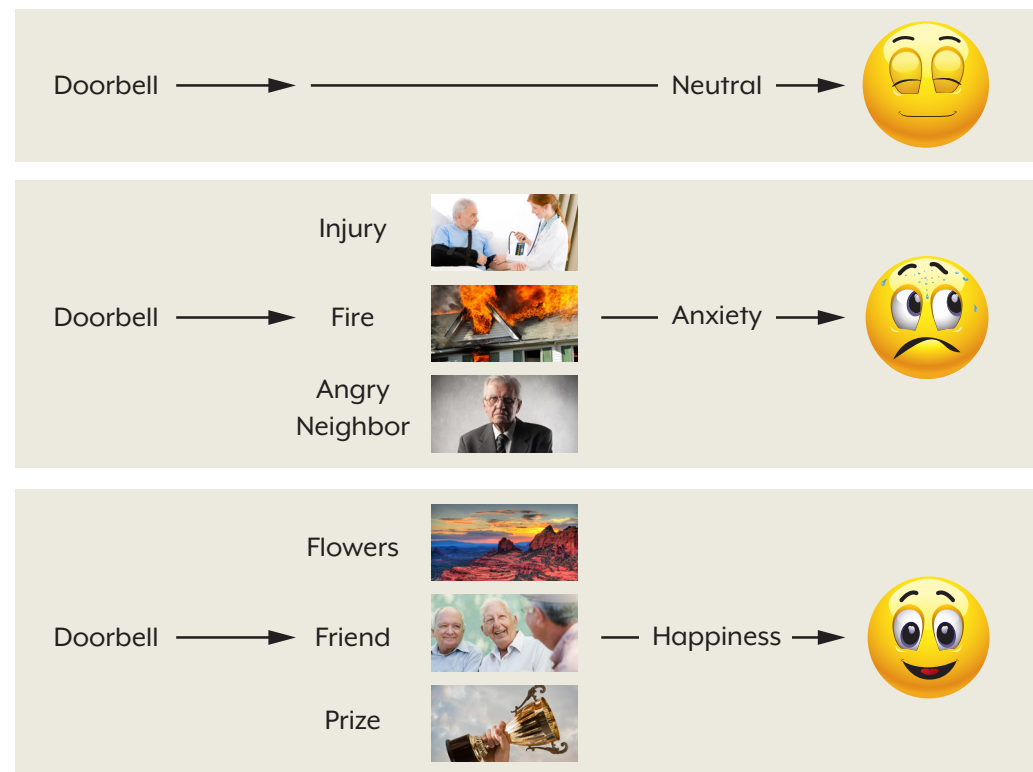


Figure 14
Experiences can shape thoughts and emotions.

“For example, the doorbell ringing for most people is a neutral experience. However, what if the doorbell rings, you answer and an angry neighbor begins to yell at you? A few days later it rings again and it’s someone informing you that your child has been hurt. The next time it rings, you may associate the sound of the doorbell with those past negative experiences, and therefore you may feel anxiety. Or on the flip side, if the doorbell ringing brings positive experiences, like someone bringing you flowers or a friend visiting, you may begin to associate the doorbell ringing with positive experiences, and therefore may feel happy when it rings.”

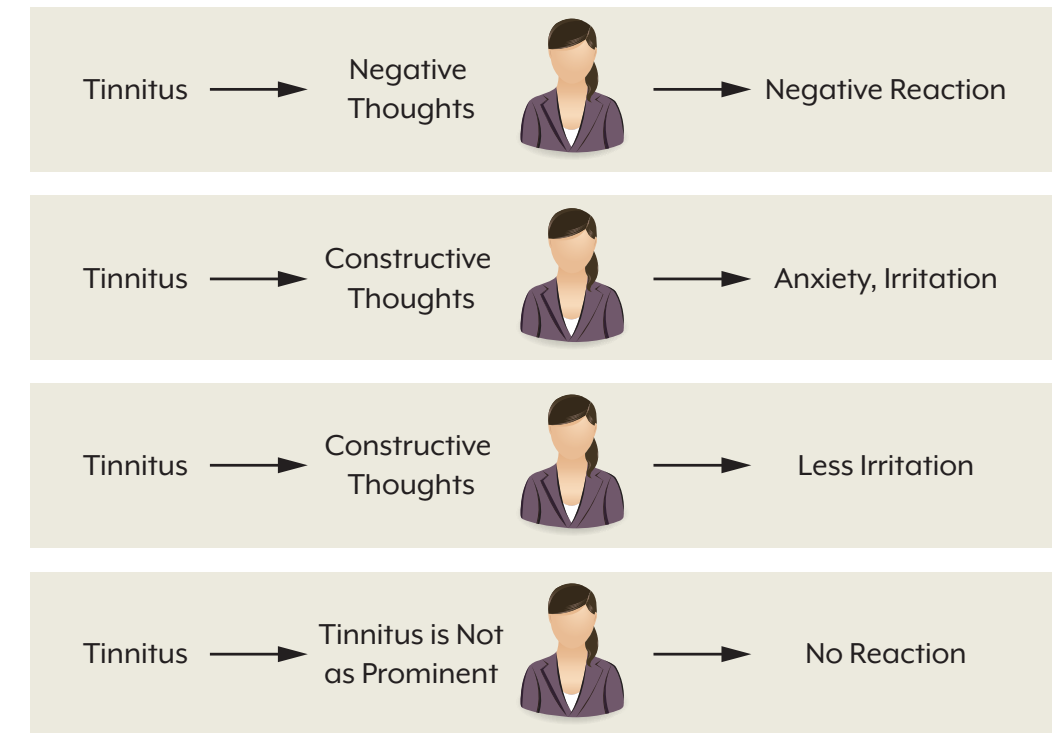


Figure 15
You can change your emotional reactions.

“Now, let’s apply this to how thoughts and emotions can exacerbate your tinnitus experience. If you experience tinnitus and immediately have a negative thought (e.g., “I hate this noise,” “It is never going to go away,” “There is nothing I can do about it”) the result may prompt a negative reaction (e.g., anxiety, irritation, stress). You may become fixated on the experience and the negative feelings and/or reactions that occur. But if you can change your thoughts (e.g., “I know this noise can’t harm me so I don’t need to be afraid or alarmed by it,” “I can ignore it,” or “It’s okay if this noise doesn’t go away because I can learn to put it in the background”) the presence of tinnitus over time may result in a less significant emotional reaction and therefore, less distress. As you can see, your thoughts and emotions may contribute to the level of impact your tinnitus has.”

Hearing

Many tinnitus sufferers who have hearing loss often attribute their communication difficulties to their tinnitus, not the hearing loss. The goal of amplification is to improve communication effectiveness and reduce the stress associated with communicating in general. Many tips that you would provide to the patient with hearing loss are also appropriate for the patient with tinnitus.

The following are tips you can provide the patient to improve hearing and communication:

- When in a noisy environment, remove the noise source if possible
- Move away from noise or reposition yourself so that the noise source is away from the talker

- Optimize visibility of the talker so that you can take advantage of lip-reading, facial cues, and body language
- Clarify the topic of conversation
- Use repair strategies or ask for clarification. For example, “Could you please repeat what you said?”
- Inform the person you are talking to that you have hearing loss

Sleep

Tinnitus does not usually wake people, but rather makes it difficult to fall asleep or get back to sleep.

The following are some suggestions or modifications you can provide to the patient to improve his/her ability to sleep.

- Exercise during the day
- Avoid napping
- Make the following modifications to your bedroom:
 - Eliminate TV, phones, or computer
 - Darken room
 - Set the room to a comfortable, but slightly cool temperature
- Listen to low level background sound (e.g., radio, sound generator, fan)
- Employ relaxation techniques (e.g., imagery, muscle relaxation)

Concentration

Many sufferers find that their tinnitus greatly impacts their ability to concentrate during any activity, but especially for those that require attention. This can make performing tasks at their job or even in their day-to-day life very difficult. There are a number of recommendations that may help improve concentration even when tinnitus is prominent, including:

- Eliminating any additional distractors in the environment
- Adjust work habits; perform tasks that require concentration in environments where tinnitus is not as bothersome or at times of day when tinnitus is less prominent
- Consider task difficulty; if you are having a particularly bad day, complete tasks that require less attention or concentration or decrease the duration of the task by taking incremental breaks

- Decrease prominence of tinnitus with the use of a noise (e.g., music, static, relaxing sounds) especially in quiet environments. Introducing another sound may make your tinnitus less intrusive
- Take active control of your attention; if your tinnitus becomes prominent and you cannot concentrate, starting a new task or activity may help divert attention away from it (e.g., go for a walk, call a friend/family member, run a quick errand)

Stress Reduction Techniques

Many patients experience a great deal of anxiety, tension, and stress as a result of their tinnitus. Techniques that are designed to reduce those side effects may provide an indirect benefit for some patients.⁵ Over the last few years, researchers have started to investigate the use of relaxation techniques like yoga, meditation, or more formal programs like Mindfulness Based Stress Reduction (MBSR) for the treatment of a variety of health-related problems. Of these techniques, MBSR has received considerable attention and investigation.⁴⁶

MBSR is an eight-week intensive training in mindfulness meditation that was pioneered by Dr. Jon Kabat-Zinn in 1979 at the University of Massachusetts Medical Center. The program is designed to assist people with pain and a range of conditions. It uses a combination of mindfulness meditation, body awareness, and yoga to help people become more mindful.⁴⁷ A number of studies have evaluated the effectiveness of MBSR treatment for individuals with a variety of chronic diseases including: chronic pain, fibromyalgia, and rheumatoid arthritis. Data from these studies revealed that MBSR treatment helped patients better cope with their symptoms, improved their overall well-being and QOL, and enhanced their treatment outcomes.⁴⁸⁻⁵⁰

These findings have led to recent investigations into the use of mindfulness-based techniques for the management of tinnitus. Two studies evaluating the effectiveness of mindfulness training concluded that the use of meditation might constitute a useful addition for tinnitus treatment interventions that target the psychological consequences of tinnitus.^{51,52} A recent pilot study evaluated an MBSR-based program, that was designed specifically for patients suffering from chronic tinnitus, called Mindfulness Based Tinnitus Stress Reduction (MBTSR). The study demonstrated preliminary evidence that the eight-week program may be an effective intervention for treating chronic tinnitus and its comorbid symptoms, and may help reduce depression and phobic anxiety while improving social functioning and overall mental health.⁵³ The MBTSR program is available in an online format. To learn more go to <http://mindfultinnitusrelief.com/>.

Hyperacusis

Researchers and clinicians have widely noted a coincidence of tinnitus complaint and of experiences of hyperacusis.⁵⁴ Hyperacusis is a health condition that has been described in a number of ways but can be defined as an abnormal sensitivity to everyday sound levels or noises. Sensitivity to sound often causes hyperacusis sufferers to avoid public or social settings in an attempt to control their sound

environment. It is common, for patients with hyperacusis, to start using hearing protection in situations where they have no control over sound or when noise is unavoidable. This behavior actually exacerbates, rather than improves the hyperacusis, and is not recommended.⁵⁵

Studies have shown that among patients attending tinnitus clinics with a primary complaint of tinnitus the prevalence of hyperacusis is about 40 percent⁵⁶⁻⁵⁸ and in patients with a primary complaint of hyperacusis the prevalence of tinnitus has been reported as 86 percent.⁵⁹

Hyperacusis often complicates the management of tinnitus as it subjects the patient to a second layer of discomfort. Often, these patients cannot tolerate amplified sounds. It is not within the scope of this handbook to specifically address hyperacusis treatment, but we encourage professionals to always ask the patient, while obtaining the case history, if they ever experience any sound sensitivity. If they answer “Yes”, there are a number of recommended diagnostic, counseling, and treatment considerations that can assist in proper diagnosis and care. To learn more we encourage you to go to the Hyperacusis Network website <http://www.hyperacusis.net>.

There are many resources available that provide further detail about working with the tinnitus patient. Several have been discussed throughout this handbook. Additional resources are provided below:

Tinnitus Organizations or Related Groups

- American Tinnitus Association www.ata.org
- Tinnitus Research Initiative www.tinnitusresearch.org/index.php
- The Hyperacusis Network www.hyperacusis.net/

Recommended Books, Articles, and Websites for the Professional

TEXT BOOKS:

- [*Tinnitus: Theory and Management*](#). Snow, J.B. (2004) Hamilton, Ontario: BC Decker.
- [*The Psychological Management of Chronic Tinnitus: A Cognitive-Behavioral Approach*](#) Henry, J.L. & Wilson, P.H. (2001). Boston, MA: Allyn & Bacon.
- [*Tinnitus Treatment: Clinical Protocols*](#). Tyler, R.S. (2006). New York, NY: Thieme Medical Publishers Inc.

ARTICLES:

- [*Clinical Practice Guideline: Tinnitus*](#). Tunkel, D.E., Bauer, C.A., Sun, G.H., Rosenfeld, R.M., Chandrasekhar, S.S., Cunningham, E.R.,...Whamond, E.J. (2014). *Otolaryngol Head Neck Surg*, 151(2S), S1-S140
- [*The Role of the Audiologic Evaluation in Progressive Tinnitus Management*](#). Henry, J.A., Zaugg, T.L., Myers, P.J., Kendall, C.J., Schechter, M.A. (2008). *Trends in Amplification*, 12 (3), 170-87.
- [*A Triage Guide for Tinnitus*](#). Henry, J.A., Zaugg, T.L., Myers, P.J., Kendall, C.J., Michaelides, E.M. (2010). *J Fam Practice*, 59(7), 389-393.

WEBSITES:

- National Center for Rehabilitative Auditory Research (NCRAR) www.ncrar.research.va.gov/Education/Documents/TinnitusDocuments/
- Dr. Richard Tyler’s at the University of Iowa Hospitals and Clinics www.medicine.uiowa.edu/oto/research/tinnitus/
- Mindfulness Based Tinnitus Stress Reduction Online course www.mindfultinnitusrelief.com/

Recommended Resources for the Patient

- [The Consumer Handbook on Tinnitus](#) Tyler, R.S. (2008). Sedona, AZ: Auricle Ink Publishers.
- [How to Manage Your Tinnitus: A Step-by-Step Workbook](#). Henry, J.H., Zaugg, T., Myers, P. & Kendall, C. (2010). San Diego, CA: Plural Publishing.
- [Tinnitus: A Self-Management Guide for the Ringing in Your Ears](#). Henry J, Wilson P. Boston, MA: Allyn & Bacon; 2001.

Multiflex Tinnitus Technology

To learn more about Multiflex Tinnitus Technology and get the most up-to-date product information, fitting recommendations and instructions, and additional resources (e.g., THI form, White Papers, QuickTips) visit the Tinnitus product page within your professional website.

Often professionals ask questions regarding billing codes and reimbursement for audiologic services pertaining to the tinnitus evaluation and intervention. This section lists the Current Procedural Terminology (CPT) codes and the International Classification of Diseases (ICD-9 & ICD-10) codes that are commonly used by professionals. We recommend that you inform the patient prior to his/her first appointment, that insurance may not cover the entirety of tinnitus evaluation and/or treatment.

CPT codes related to the assessment and treatment of tinnitus patients:

92557: Comprehensive audiometry threshold evaluation and speech recognition

92590: Hearing aid examination and selection; monaural

92591: Hearing aid examination and selection; binaural

92625: Tinnitus assessment (includes pitch and loudness matching, masking)

92626: Evaluation of auditory rehabilitation status, 1st hour

92627: Evaluation of auditory rehabilitation status, each additional 15 minutes

92700: Unlisted otorhinolaryngological service or procedure

98960: Education and Training, individual*

98961: Education and Training, 2-4 patients*

98962: Education and Training, 5-8 patients*

NOTE: There are no specific codes for management of tinnitus

ICD-9 & ICD-10 CODES RELATED TO TINNITUS:

DIAGNOSIS	ICD-9	ICD-10
Tinnitus, unspecified	388.30	H93.19
Subjective tinnitus	388.31	H93.19
Objective tinnitus	388.32	H93.19
Tinnitus, right ear	N/A	H93.11
Tinnitus, left ear	N/A	H93.12
Tinnitus, bilateral	N/A	H93.13
Hyperacusis	388.42	H93.23
Hyperacusis, right ear	388.42	H93.231
Hyperacusis, left ear	388.42	H93.232
Hyperacusis, bilateral	388.42	H93.233
Hyperacusis, unspecified	388.42	H93.239
Sensorineural hearing loss, unspecified	389.10	H90.5
Sensorineural hearing loss, unilateral right	389.15	H90.41
Sensorineural hearing loss, unilateral left	389.15	H90.42
Sensorineural hearing loss, asymmetrical	389.16	H90.5
Sensorineural hearing loss, bilateral	389.18	H90.3

* This code is used to report education and training for patient self-management by a qualified, non-physician healthcare professional using a standardized curriculum, face-to-face with the patient which, may be modified to meet individual needs. The focus of training should be to teach the patient how to effectively manage his/her clinical condition.

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