

# 5

## Level 2 Audiologic Evaluation



Tinnitus is a symptom of dysfunction within the auditory system, and usually is associated with some degree of hearing loss (Axelsson & Ringdahl, 1989; A. Davis & Refaie, 2000; J. L. Henry & P. H. Wilson, 2001; Vernon, 1998). As stated in Chapter 3, an audiologic examination should be the clinical starting point for all patients who complain of tinnitus, unless urgent medical services are required. In addition to the audiology testing, it is critical to determine how much of a patient's complaint is due to a hearing problem and how much is due specifically to the tinnitus. A brief assessment should be performed to determine if intervention specific to tinnitus is warranted.

The objectives of the Level 2 Audiologic Evaluation are to determine the potential need for (a) a medical examination (usually from an otologist or otolaryngologist); (b) mental health screening (from a psychologist, psychiatrist, or other mental health provider); and/or (c) audiologic intervention (which can include intervention for hearing loss, tinnitus, and reduced tolerance to sound) (J. A. Henry et al., 2008b). (Appendix C provides an overview of objectives and procedures of the Level 2 Audiologic Evaluation.)

The Level 2 evaluation includes a standard comprehensive hearing evaluation as well as written questionnaires to assess the patient's perception of the relative impact of hearing and tinnitus problems. Patients who require amplification receive hearing aids, which can result in satisfactory management of reactions to tinnitus with minimal education and support. Any patient who experiences problematic tinnitus (even if they will receive hearing aids) is advised to participate in the Level 3 Group Education workshops.

### **Tinnitus and Hearing Survey**

As discussed in Chapter 3, patients who report problems with tinnitus may really be experiencing problems with hearing. The Tinnitus and Hearing Survey (THS; Appendix D) is a brief questionnaire designed specifically to assist patients and clinicians in determining how much of a patient's reported problem is due to tinnitus and how much is due to hearing problems. The survey also contains two items that screen for sound tolerance problems.

The THS contains three sections. Section A includes four statements that address tinnitus-specific problems unrelated to hearing problems. Section B contains four statements that focus on common hearing problems. The Section B statements are phrased to minimize any perceived effects of tinnitus on hearing function. Higher scores for Section A indicate a tinnitus-specific problem, whereas higher scores for Section B indicate a hearing problem. Results of this survey, along with results of the hearing evaluation, provide the clinician with the information needed to differentiate tinnitus-specific problems from hearing problems. Section C asks patients if they have sound tolerance problems. Affirmative responses to Section C should be discussed with patients to determine the potential need to temporarily suspend the PTM protocol to focus on treating the sound tolerance problem.

After completing the THS, patients should understand that the problems listed in Section A are problems that can be addressed with tinnitus management. Section B problems can be addressed with intervention specific to hearing, regardless of the cause of the hearing problem. Section C addresses possible sound tolerance problems.

Patients who have tinnitus-specific problems should be advised to participate in Level 3 Group Education. Attending the Level 3 workshops will include provision of the self-help workbook (*How to Manage Your Tinnitus: A Step-by-Step Workbook*) (J. A. Henry et al., 2010a). Management options for hearing-related problems include amplification, assistive listening devices, and auditory rehabilitation services. Management options for sound tolerance problems include a special sound tolerance handout (What to Do When Everyday Sounds Are Too Loud—Appendix E), sound desensitization procedures, and participation in the sound tolerance evaluation and management (STEM) protocol (for patients who would have difficulty participating in Level 3 Group Education because of reduced sound tolerance).

### **PTM Approach to Managing Sound Tolerance Problems**

Tinnitus clinicians and researchers often report that a relatively high percentage of patients with tinnitus

also suffer from hyperacusis. In reality, many or most patients who are identified as “hyperacusic” do not require intervention specific to sound tolerance. Treatment for reduced sound tolerance usually requires a program of systematic exposure to sound. The PTM sound therapy approach simultaneously addresses reduced sound tolerance. Therefore, sound therapy should be the starting point for PTM patients who have reduced sound tolerance and are able to participate in a program of sound-based tinnitus therapy. The key concern for audiologists is to determine if reduced sound tolerance will interfere with the intervention. Of course, it should be the patient’s decision to focus on addressing sound tolerance rather than tinnitus.

### **Using the Tinnitus and Hearing Survey to Determine Candidacy for Level 3 Group Education**

Section A of the THS is used to assist in determining if a patient should attend Level 3 Group Education. Following the steps below can help to ensure that patients do not attend the Level 3 workshops with the misconception that they will learn to manage a hearing-in-noise problem (which patients often believe is the result of the tinnitus blocking sounds they are trying to hear.)

- Explain that group education focuses on finding ways to manage tinnitus-related problems—the workshops do not focus on hearing-related problems.
- Confirm that the patient is interested in attending workshops that address tinnitus-related problems.
- Ensure that the patient understands that participating in Level 3 Group Education does not preclude receiving concurrent services for managing hearing problems.
- Ensure that the patient does not have a sound tolerance problem to such a degree that it would be difficult to participate in the Level 3 workshops.

If the above requirements are met, then the patient likely is a candidate for Level 3 Group Education.

**Patient Example: Linda**

Using the THS, a patient (Linda) provides a low score for Section A (tinnitus section) and a high score for Section B (hearing section), but reports a severe tinnitus problem. The Level 2 Audiologic Evaluation reveals that Linda has noise induced, high frequency, sensorineural hearing loss. Linda states that the problems listed in Section B are those that she finds most irritating and upsetting, and she believes those problems are caused by the tinnitus. After explaining the objectives of Level 3 Group Education, the audiologist helps her to recognize that she probably would not benefit from a class that focuses on Section A problems. She understands that audiologic management is needed to address the Section B problems. She is happy to receive the self-help workbook (*How to Manage Your Tinnitus: A Step-by-Step Workbook*) to learn more about her tinnitus.

### Using the Tinnitus and Hearing Survey to Determine Need for Intervention for Reduced Sound Tolerance

Section C of the THS is used to assist in determining if a patient needs intervention for reduced sound tolerance. Following the steps below can help to ensure that reduced sound tolerance is addressed when needed.

**Section C, Item 1**

Any patient who reports a sound tolerance problem (of any degree) should receive the sound tolerance handout (What to Do When Everyday Sounds Are Too Loud—Appendix E).

**Section C, Item 2**

If a patient reports that a sound tolerance problem would make it difficult to attend the Level 3 workshops, this should be thoroughly discussed to ascertain that the patient would indeed have difficulty attending a group workshop specifically because of a sound tolerance problem (and not because of some other reason such as social anxiety, transportation problems, severe hearing loss, etc.). If sound

tolerance is such a problem that the patient cannot continue with the normal PTM protocol, then a separate protocol should be undertaken to address the sound tolerance problem. The STEM protocol (Chapter 6) was developed for this purpose. Once the sound tolerance problem is sufficiently resolved, then the patient can re-enter the PTM protocol if necessary to address any tinnitus problems. Normally, reentry into PTM would involve the patient attending the Level 3 workshops (see Appendix A).

### Tinnitus Handicap Inventory

Standardized tinnitus questionnaires are used to obtain a global index score of a patient's perceived tinnitus severity, and many questionnaires are available for this purpose (C. W. Newman & Sandridge, 2004). A tinnitus-severity index score from a tinnitus questionnaire, however, should not be relied on as the sole indicator of the degree to which tinnitus affects a patient's life (as explained in the next section).

A tinnitus questionnaire provides a standardized baseline of the patient's perceived problem due to tinnitus, and it is essential to acquire this baseline prior to any testing or counseling. We recommend using the Tinnitus Handicap Inventory (THI—Appendix F) (C. W. Newman et al., 1996) for this purpose because it is one of the most widely used and best documented of the tinnitus questionnaires that currently are available. For management with PTM, the THI can serve as the primary outcome instrument. Patients should complete the THI to assess outcomes at intervals (e.g., every 3 months) during ongoing intervention, and prior to terminating intervention.

The THI contains 25 statements, and response choices are “no” (0 points), “sometimes” (2 points), and “yes” (4 points). The index score ranges from 0 to 100. Handicap severity can be categorized based on the THI index score as follows (Handscomb, 2006):

- Severe (58–100)
- Moderate (38–56)
- Mild (18–36)
- No handicap (0–16)

A change in the total index score of at least 20 points has been reported to indicate a statistically and clinically significant change in self-perceived tinnitus handicap (C. W. Newman & Sandridge, 2004).

A 10-question screening version of the THI (THI-S—see Appendix F) also can be used (C. W. Newman, Sandridge, & Bolek, 2008). The THI-S includes 10 of the same questions as the full-length THI and usually takes less than two minutes to complete. Comparison of the THI-S to the THI revealed a high correlation ( $r = 0.90$ ). An index score of at least 6 points (out of a possible 40 points) on the THI-S was established as a fence for recommending follow-up. A change of more than 10 points is considered a significant clinical difference.

### How Do the Tinnitus Handicap Inventory and Tinnitus and Hearing Survey Differ?

The THI and THS are used to accomplish different objectives, and each is important for PTM.

The THI is a statistically validated and widely recognized tool for assessing self-perceived tinnitus handicap, making it appropriate for standardized assessment of outcomes of clinical intervention. A patient's index score from any tinnitus questionnaire, including the THI, is vulnerable to influence from hearing problems and cannot be relied on as the sole indicator of candidacy for Level 3 Group Education.

The THS is not a validated outcome instrument, and therefore should not be used as a primary measure of outcome of intervention. The THS was designed to differentiate tinnitus-specific versus hearing-specific problems, which is helpful for determining if a patient should attend Level 3 Group Education. The THS can be used informally to monitor relative progress alleviating tinnitus problems versus hearing problems.

### Hearing Handicap Inventory

The Hearing Handicap Inventory (HHI) is a self-administered questionnaire that assesses self-perceived handicap imposed by hearing loss. Use of the HHI is recommended as a standard assessment

tool for all patients undergoing Level 2 Audiologic Evaluation. Results of the HHI provide additional information to better understand how much of a patient's complaints about tinnitus may be attributable to hearing handicap, which contributes to a more accurate interpretation of patients' responses to the THI and THS.

Four versions of the HHI can be used. The Hearing Handicap Inventory for the Elderly (HHIE) is intended for patients age 65 and older (Ventry & Weinstein, 1982). The Hearing Handicap Inventory for Adults (HHIA) is intended for patients less than 65 years of age (C. W. Newman, Weinstein, Jacobson, & Hug, 1990). Both the HHIE and HHIA are 25-item self-assessment scales that include two subscales (emotional and social/situational). The HHIA differs from the HHIE only in that it includes questions about occupational effects of hearing loss. The screening versions of the HHIE (HHIE-S) and the HHIA (HHIA-S) each include 10 items and can be completed in 5 minutes or less (Lichtenstein, Bess, Logan, & Burger, 1990; Ventry & Weinstein, 1983). The HHIE-S can be used with all patients and is recommended for routine use at the Level 2 Audiologic Evaluation (Appendix G).

### Assessment of Auditory Function

A standard audiologic evaluation provides the information necessary to determine need for referral for medical evaluation and to determine candidacy for audiologic hearing intervention. This is routine practice for audiologists, but some of the procedures warrant special considerations when patients present with tinnitus.

Otосcopy is performed routinely prior to placing earphones for audiometric testing. Even a small amount of cerumen on the tympanic membrane can create a mass effect resulting in a high frequency conductive hearing loss and tinnitus (Schechter & J. A. Henry, 2002). Therefore, it is important to consider this possibility when performing otосcopy.

Pulsed tones often are recommended for use when evaluating pure-tone thresholds in patients with tinnitus (Douek & Reid, 1968; Fulton & Lloyd, 1975; Green, 1972; Yantis, 1994). Investigations, however, have revealed that hearing thresholds

generally are the same whether tones are presented in the pulsed or continuous mode (J. A. Henry & Meikle, 1999; Hochberg & Waltzman, 1972; Mineau & Schlauch, 1997). It is acceptable to use either pulsed or continuous tones for threshold testing, although the use of pulsed tones may assist some patients in distinguishing between the tones and the tinnitus, especially when the tinnitus pitch is close to the test frequency.

Some patients with tinnitus have trouble tolerating louder sounds, and some report that loud sounds make their tinnitus louder. It is important to use caution when conducting suprathreshold audiometric testing. The following guidelines can be helpful:

- Use the softest effective masking sounds during traditional audiometry (the need for masking can be reduced by using insert earphones that increase interaural attenuation).
- Use conservative levels of sound during word recognition testing.
- Approach reflex threshold and decay testing with particular caution as some patients have trouble tolerating the sounds used in these tests. In no instance should pure tones be delivered above 105 dB HL. Speech stimuli should not be delivered above 100 dB HL.

### Assessment of Potential Need for Otolaryngology Exam

As the ideal, every patient complaining of tinnitus would be examined by an otolaryngologist or otologist (Perry & Gantz, 2000). However, this may not be practical or realistic in some settings. Audiologists sometimes are the only health care providers who evaluate patients with tinnitus complaints. Audiologists must be aware of symptoms and conditions that indicate the need for referral to otolaryngology, which include:

- Symptoms consistent with vestibular schwannoma or other retrocochlear pathology

- Symptoms consistent with Ménière's disease
- Symptoms consistent with somatic origin (i.e., vascular, muscular, skeletal, respiratory, or TMJ) of tinnitus (see next section below)
- Ear pain, drainage, or malodor
- Vestibular symptoms
- New-onset tinnitus or hearing loss
- Progressive tinnitus (tinnitus that is perceived as changing in loudness, pitch, and/or timbre over time)
- Significant conductive loss of undetermined etiology
- Unilateral or grossly asymmetric hearing loss.

The most common type of tinnitus is associated with noise-induced hearing loss. These patients usually report that their tinnitus has been fairly stable for years. This common form of tinnitus cannot be corrected surgically, nor is it life threatening. Although a medical exam always is in the patient's best interest, an otologic exam may be eliminated if *all* of the following conditions apply:

- All symptoms and conditions that indicate the need for referral to otolaryngology (listed above) have been ruled out.
- Patient reports a history of noise exposure and concurrent or subsequent onset of tinnitus.
- Tinnitus is symmetric and nonpulsatile.
- Audiogram is consistent with a diagnosis of symmetric sensorineural hearing loss.

### Symptoms of Somatosounds

We briefly described somatic tinnitus (somatosounds) in Chapter 1. It is important for clinicians to realize that many sounds of the head and neck are normal (Hazell, 2003). When we swallow we hear a clicking sound. There is a great deal of blood pulsing through the head and neck at any given time—causing constant loud pulsations (that we normally don't perceive). The carotid artery passes within about 6mm of the cochlea, and we occasionally can hear sounds of the heart through this artery. Additional sounds are caused by joints and muscles, the

eustachian tube, and air passing through the airways. Although all of these sounds are considered normal, they become abnormal when heard on a daily basis or when they cause distress.

Somatosounds generally can be categorized as pulsatile and nonpulsatile (Hazell, 1998b). Pulsatile somatounds include venous hums, vascular loops, and carotid transmissions. Venous hums are caused by turbulent blood flow through the jugular bulb, which is a protrusion into the mastoid cavity (close to the middle ear) of the internal jugular vein. A large amount of blood flows rapidly through the jugular vein, causing vibration of the vein walls that is perceived as a humming noise. This is easily evaluated by an otolaryngologist and is a benign condition. Vascular loops within the internal auditory canal can compress the auditory nerve (Nuttall et al., 2004). This compression can cause auditory nerve activity that may be perceived as sound, which may be pulsatile (Møller, 1995; Nuttall et al., 2004). Surgery can remediate tinnitus caused by vascular compression of the auditory nerve. Carotid transmissions refers to any transmission of sound to the cochlea from the carotid artery. This often is caused by stenosis of the carotid artery, but also can include transmission of heart murmurs (Hazell, 1998b; Lockwood et al., 2004).

There are many other potential causes of pulsatile tinnitus, which have been described (Lockwood et al., 2004; Sismanis, 1998, 2003, 2007). Although rare, life-threatening pathology may be associated with pulsatile tinnitus (Sismanis, 2007). It thus is critical to establish an appropriate diagnosis for these patients. In general, a patient with pulsatile tinnitus should be medically evaluated to rule out potential vascular or neurologic conditions that require medical or surgical treatment. These may include hypertension, hyperthyroidism, carotid blockage, glomus tumor, arteriovenous malformation, aneurisms, and so forth. Glomus tumors are rare, but they are the most common tumor of the middle ear and second most common of the temporal bone (second to vestibular schwannoma) (Moffat & Hardy, 1989). Any mention of tumors to patients can cause alarm and anxiety. It therefore is important to assure patients that these tumors are rare, and if they occur they usually are benign.

Nonpulsatile somatosounds include patulous eustachian tube, palatal myoclonus, and tensor tym-

pani syndrome (Hazell, 1998b). A patulous eustachian tube remains open abnormally. This condition often is misdiagnosed as a blocked eustachian tube (Schuknecht, 1993). Symptoms can include a sense of ear fullness, respiratory noises, and autophony (abnormal loudness of one's own voice). Palatinal myoclonus is caused by rapid contractions of the soft palate musculature (Hazell, 1998b; Lockwood et al., 2004). These contractions may be associated with contractions of other muscles in the head and neck. The contractions can cause the eustachian tube to open and close, giving the perception of an irregular clicking/snapping sound in one or both ears. Tensor tympani syndrome is caused by spasms of the tensor tympani muscle that produces a fluttering low frequency sound (Hazell, 1998b). The sound may be correlated with the sensation of an insect fluttering in the ear canal. This condition generally is benign but may be alleviated by sectioning of the tensor tympani muscle.

### **Somatically Modulated Tinnitus**

Some patients report that movements or manipulations of the eyes, head, neck, jaw, or shoulder can cause changes in the loudness or pitch of their tinnitus. This phenomenon is referred to as "somatically modulated tinnitus." It has been reported by some investigators that the phenomenon is much more prevalent than previously thought—with up to 80% of patients reporting that their tinnitus can be modulated somatically when asked the right questions (Levine, 2004). If a patient does report that movement of the head or neck can change the loudness or pitch of the tinnitus, then the question arises as to how to properly refer these patients. In general, all of these patients should be evaluated by an audiologist. The audiologist then can determine if a referral to otolaryngology or neurology is necessary.

### **Administer Tinnitus Problem Checklist (optional procedure)**

To conclude the Level 2 Audiologic Evaluation, it is important to review results of the Tinnitus and Hearing Survey, Tinnitus Handicap Inventory, Hearing Handicap Inventory, and hearing assessment.

The patient should understand that problems listed in Section A of the Tinnitus and Hearing Survey are specific to tinnitus and are addressed in Level 3 Group Education, and that problems in Section B are addressed by an audiologist and are not covered in Level 3 Group Education.

If the patient has a tinnitus-specific problem, and if time permits, then the Tinnitus Problem Checklist (Appendix H) can be helpful. Use of the checklist is the starting point for teaching a patient how to use sound to manage tinnitus, as described in the self-help workbook (*How to Manage Your Tinnitus: A Step-by-Step Workbook*) (J. A. Henry et al., 2010a). Using the checklist provides structure to talk to patients about any problems they experience that are caused by the tinnitus. The checklist also gives the patient information that is useful to understanding how the workbook can be used, which is an advantage to patients who receive a copy of the workbook.

### **Hearing Aid Evaluation (if warranted)**

Most patients with tinnitus have some degree of hearing loss and hearing aids sometimes can adequately ameliorate both their hearing and tinnitus problems (Surr et al., 1999, 1985). All patients should be advised of the potential for hearing aids to alleviate tinnitus as a secondary benefit. In some instances, hearing aids can be used primarily for managing tinnitus with improved hearing as a secondary benefit (J. A. Henry et al., 2008b; J. A. Henry, Zaugg, et al., 2005a; Searchfield, 2005).

The Flowchart for Assessment and Fitting of Ear-Level Instruments (Appendix I) shows the clinical actions for PTM Levels 2 through 5—with the focus on ear-level instruments. The Level 2 Audiologic Evaluation includes an assessment of candidacy for hearing aids. If the patient is a hearing aid candidate, then hearing aids are fitted as appropriate. The preferred approach to providing patients with ear-level instruments is to dispense only hearing aids at Level 2 and not to provide ear-level combination instruments or noise/sound generators until after patients have completed Level 3 Group Education. Noise generators and combination

instruments should not be an option for patients until they have learned about and implemented different strategies of using sound for tinnitus management as addressed in Level 3 Group Education. The knowledge and experience of using sound to manage tinnitus gained during Level 3 allows patients to make informed decisions about using noise generators and combination instruments. Many patients can learn how to self-manage their tinnitus without having to use special ear-level instruments. If instrument use is warranted, then the proper use of these devices requires multiple appointments with an audiologist who understands their use within the context of PTM.

Although we generally recommend fitting only hearing aids at Level 2, recent developments need to be considered. In the past, combination instruments included amplification features that were limited relative to hearing aids. Patients who were fitted with combination instruments often did not receive amplification that optimally addressed their hearing loss. That situation has changed with the recent introduction of new combination instruments from a number of hearing aid companies. These combination instruments do not sacrifice hearing aid features so patients can be fitted with these devices as high-quality hearing aids. When fitting such combination instruments at Level 2, it might be preferable to not use the noise feature of the devices until the patient has attended a Level 3 workshop—to ensure that the patient fully understands the different uses of therapeutic sound before actually using it with these devices.

### **Patients with Hearing Loss**

At Level 2, patients with hearing loss are provided amplification, assistive listening devices, and education in communication strategies as necessary to maximize their hearing function. Since impaired hearing may be the patient's primary problem (often unknowingly prior to the hearing evaluation), it is essential to optimize hearing function. Furthermore, patients who progress to Level 3 Group Education require adequate hearing in order for them to comprehend the presentation and group discussion. Patients who receive hearing aids and/or assistive listening devices will receive

instruction in how to use these devices (along with many other uses of sound and sound devices) for the management of tinnitus.

### Patients With Normal Hearing

For Level 2 patients who have normal hearing and problematic tinnitus, Level 3 Group Education is recommended. In the group workshop, these patients learn how to use sound (from many sources) to manage their reactions to tinnitus. Some of these patients will acquire the skills needed for satisfactory management and will not need further intervention. Others may require further help after completing Level 3, at which point they should be considered for a Level 4 Interdisciplinary Evaluation that normally includes an evaluation for ear-level noise generators. Because of their personal experience using sound to manage tinnitus at Level 3, these patients should be well prepared to participate fully in any decision about using ear-level noise generators.

### Use of Hearing Aids With PTM

For audiologists, the provision of hearing aids is a routine service with an established skill set. Audiologists are trained and experienced in the selection and fitting of hearing aids for the purpose of improving hearing. If hearing aids are incorporated into management for tinnitus, then the audiologist essentially has the training necessary to perform this service (J. A. Henry, Zaugg, et al., 2005a). The method of PTM makes full use of these existing skills to apply them directly to addressing tinnitus. There are, however, special considerations for the use of hearing aids with these patients (Appendix J).

### Hearing Aids for Managing Reactions to Tinnitus

Special considerations are important with respect to using hearing aids for tinnitus management (these points are summarized briefly in Appendix J):

- The ear canal should be left open as much as possible (or venting should be maximal—as appropriate for slope and

degree of loss) to allow normal entry of environmental sound (especially lowest frequency sounds that are not amplified by the hearing aids) and to reduce the sensation of occlusion. Both factors can contribute to reducing tinnitus perception.

- Hearing aids with feedback reduction circuitry can facilitate the use of open-ear design hearing aids, or larger vent diameters.
- Special noise suppression circuitry actually can be a detriment to patients with tinnitus, as noise suppression could eliminate some background sound that might be helpful for these patients. What may be a goal for optimal hearing aid performance may be at cross-purposes for tinnitus management. If a patient with tinnitus has hearing aids with multiple memories, then a consideration is to program one of the memories to minimize noise reduction (as the “tinnitus” setting) with the microphone set to omnidirectional, and adjusted to minimize the reduction of background sound. Some hearing aids offer “music” settings, or other settings that minimize use of algorithms to eliminate nonspeech sounds.
- Some hearing aids offer sound generator settings that can be activated/reprogrammed after Level 3 Group Education is provided if amplification alone does not ameliorate effects of tinnitus.
- Reduced levels of internal noise also can be detrimental to tinnitus management. In older hearing aids, the floor noise of hearing aids often was helpful for tinnitus patients.

### Benefits of Amplification for Patients With Tinnitus

Beneficial effects on tinnitus from the use of amplification may be due to:

- Amelioration of communicative difficulties caused by hearing loss but attributed to tinnitus

- Alleviation of stress associated with difficult listening situations
- Increase in ambient sound that can reduce the effects of tinnitus (typically, ambient sound makes tinnitus less noticeable)
- Stimulation of impaired portions of the auditory system that often are deprived of sound.

### **Refer for Mental Health Screening (if indicated)**

Certain mental health disorders are known to be associated with the presence and severity of tinnitus. Clinical depression and anxiety often affect patients who experience the most problematic tinnitus (Dobie, 2003; Halford & Anderson, 1991; Kirsch et al., 1989). In addition, some patients suffer from post-traumatic stress disorder (PTSD). PTSD is suspected if the patient reports having been exposed to a trauma and subsequently experienced nightmares, flashbacks, exaggerated startle responses, or excessive anxiety or fear. The traumatic event does not need to be recent for a patient to experience PTSD.

Although depression, anxiety, and PTSD commonly are associated with tinnitus, many other mental health disorders also may present along with tinnitus. These can include substance abuse (opiates, amphetamines, sedatives, cocaine, marijuana, hallucinogens, alcohol, etc.), bipolar disorder, psychotic disorders, attention-deficit/hyperactivity disorder, panic, phobias, and obsessive-compulsive disorder (J. A. Henry et al., 2008b). All of these conditions, and others, present in clinical settings in varying degrees. It is important to not limit screening and referral to only mental health conditions that have known or suspected interactions with tinnitus. Failure to refer patients for possible mental health conditions reduces the likelihood of achieving the desired outcomes from any tinnitus intervention. The concern for so many potential mental health disorders in patients with tinnitus can present a conundrum for audiologists, which speaks to the need for a psychologist to be on the “tinnitus team.”

If indicated by a patient’s comments or behavior during the Level 2 evaluation, screening for

mental health issues should be performed (unless the patient already is diagnosed with a mental health condition[s] and currently is receiving care accordingly). Mental health screening also can be done at any stage of PTM at the clinician’s discretion. If possible, such screening ideally is conducted by a mental health or primary care provider. In most medical centers, primary care offers competent and efficient mental health screening services. Thus, it usually is preferable to refer patients who are suspected of mental health conditions to primary care for screening. However, different facilities may handle mental health screening differently so it is important to determine the procedures used at each facility. If screening is not available elsewhere, it can be useful for an audiologist to use specific questionnaires to screen for the more common comorbid conditions of sleep problems, PTSD, anxiety problems, and symptoms of depression (see Chapter 8).

### **Refer for Assessment of Sleep Disorder (if indicated)**

Sleep disorders are the most common problem reported by patients who are bothered by tinnitus (Axelsson & Ringdahl, 1989; Jakes et al., 1985; Meikle et al., 2004; Tyler & Baker, 1983). Patients with sleep disorders also tend to report the most severe tinnitus (Erlandsson, Hallberg, & Axelsson, 1992; Folmer & Griest, 2000; Meikle, Vernon, & Johnson, 1984; Scott, Lindberg, Melin, & Lyttkens, 1990). These patients may need specialized treatment from a physician, mental health professional, and/or sleep disorders clinician.

It is important to question a patient about details of a reported sleep disorder to determine if referral is needed. In some cases a sleep disorder can be related to a serious medical condition. It also is important to distinguish between insomnia and sleep apnea. Insomnia is a problem with initiating or maintaining sleep, which typically does not have serious medical effects. Sleep apnea is a condition whereby breathing during sleep is disrupted and can have serious health effects such as stroke. Patients who report snoring, morning headaches, gasping or choking upon waking, or those who

have a bed partner who reports the presence of these indications of sleep apnea, should be referred to primary care for assessment.

### Managing Sleep Disorder

If a patient's sleep disorder is a direct consequence of the tinnitus, then effective tinnitus management may resolve the sleep problem. This requires the appropriate use of sound in the sleep environment. In most cases, this should be attempted prior to referring the patient out for insomnia treatment. The use of sound is harmless and inexpensive, whereas insomnia treatment can involve medications, side effects, and significant costs. Strategies for improving sleep when tinnitus is a problem are explained in the Level 3 workshops, and are included in the self-help workbook (J. A. Henry et al., 2010a).

### Prescription Drugs and Tinnitus

No prescription drug has been developed specifically for tinnitus. However, some antidepressant or anxiolytic medications such as amitriptyline or lorazepam may reduce symptoms. These drugs most commonly are used to address coexisting sleep disorders and mental health disorders—primarily depression and anxiety (Dobie, 2004a; J. A. Henry, Zaugg, et al., 2005a; Robinson, Viirre, & Stein, 2004). These studies conclude that medical management of sleep and mental health problems can be a helpful component of an overall approach to managing reactions to tinnitus.

Certain medications can trigger or exacerbate tinnitus, including aspirin, NSAIDs, loop diuretics, and quinine. Normally, fairly high doses are required to cause tinnitus effects, and the effects usually are temporary. Drugs used to treat mental health and sleep conditions also may trigger or exacerbate tinnitus. Patients have reported exacerbation of tinnitus due to alcohol and caffeine. Ototoxicity from aminoglycosides and platinum-containing chemotherapeutic drugs are well-known causes of hearing loss and tinnitus, and these effects often are irreversible (Fausti et al., 1995; Rachel et al., 2002).

The only way to know if a medication alleviates tinnitus is through trial-and-error (e.g., some antidepressants can cause or exacerbate tinnitus as a side effect). This generally is what is done by physicians who attempt to use medications to treat tinnitus. It is better for patients if they can be helped with counseling and the proper use of sound rather than receiving medications that can have harmful side effects or result in dependency/addiction.

### Self-Help Workbook

The self-help workbook (*How to Manage Your Tinnitus: A Step-by-Step Workbook*) (J. A. Henry et al., 2010a) can be given to patients either at the end of the Level 2 Audiologic Evaluation, or at the beginning of Level 3 Group Education. It generally is preferable to withhold provision of the workbook until the patient shows up for the first Level 3 workshop—for a number of reasons: (a) Anticipating receiving the workbook increases the likelihood that patients will participate in Level 3. Attending the workshops increases the likelihood that patients will learn and benefit from the self-help information. Also, increasing the group size can improve the likelihood of meaningful interactions amongst group members. (b) Many patients believe that reducing the loudness of their tinnitus is the only way to feel better and may be disillusioned by the workbook since it does not offer that option. These patients may not even attempt to implement the ideas contained in the workbook and thus may only be able to benefit from the workbook if guided through it by a clinician (and in a group setting sometimes it may be other group members who are best able to influence a patient that the ideas in the workbook can be helpful). (c) Providing the workbook as a patient is leaving the clinic decreases the likelihood that the patient and clinician will discuss the concepts. Discussion fosters interest and learning, and is more likely to lead to the patient making behavioral changes that will reduce reactions to tinnitus and increase quality of life.

We recommend offering to provide patients with their own copy of the workbook when they come to the first Level 3 workshop. Patients also

should be told about the 13-minute tinnitus video that they can view online (<http://www.ncrar.research.va.gov/ForVets/Tinnitus.aspx>). This video was professionally produced by VA Employee Education System and provides basic information that can help to increase interest in learning the concepts that are taught in the workbook and Level 3 workshops. The DVD with the 13-minute video is available from the NCRAR (or from any of the authors of this handbook) and can be used in the clinic to show to patients. Most patients find the video to be entertaining and informative.

### Summary

The great majority of patients who report tinnitus also have some degree of hearing loss. The essential first step in providing clinical services for these patients normally is to assess their hearing function. Using the triage guidelines described in the previous chapter, these patients may require a medical and/or a mental health examination. At a minimum, however, all patients who report

tinnitus should be assessed by an audiologist who can determine what services are needed, including: (a) medical exam; (b) mental health screening; and (c) audiologic intervention for hearing loss, tinnitus, and/or hyperacusis.

The Level 2 Audiologic Evaluation consists mainly of a conventional audiologic assessment. Because the patient reports tinnitus, a brief assessment of tinnitus impact is performed. The primary tool for assessing tinnitus impact is the Tinnitus and Hearing Survey (THS). Results of the THS should be discussed with the patient to determine if tinnitus-specific intervention is appropriate. In addition to the THS, it is recommended to administer the Tinnitus Handicap Inventory (THI) and Hearing Handicap Inventory for the Elderly—screening version (HHIE-S). Results of the THI serve as a statistically validated baseline for assessing outcomes of the tinnitus intervention. Results of the HHIE-S facilitate interpretation of the THS and THI, and serve as a statistically validated baseline for assessing outcomes of clinical services specific to hearing loss. Combined, these three questionnaires provide useful data for documenting a patient's complaints and for determining clinical services that may be needed.

