Multidisciplinary Clinical Model for Managing Patients with Tinnitus

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Handout Note: This handout is an abbreviated version of the presentation of 246 slides. We transferred information we felt was most important into an outline to serve as a resource for you. If there are any particular slides you would like to have, please email either Craig or Sharon and we will send it out to you. Thank you for understanding of our attempt to go green.

Objectives
1. To present an overview of a clinical pathway for patients seen in a multidisciplinary Tinnitus Management Clinic (TMC)
2. To describe the inclusion of multi-disciplinary specialists in the management of tinnitus Rationale, Evaluation, and Treatment

Why include other specialties?
- Tinnitus is not solely caused by ear dysfunction
- Tinnitus can be generated by:
  - Poor posture and head control
  - Neck musculature
  - Dental problems
  - Ear injury/insults
- Tinnitus is exacerbated by stress levels

General Goals of the TMC
- Return control to the patient
- Promote acceptance of tinnitus
- Ability to manage emotional reactions
- Move patient to a state where tinnitus is a neutral sound
- Realistic expectations about management options
- There is help!

Brief Tinnitus Screening – see last page of handout

Tinnitus Handicap Inventory Screening Version (THI-S)
- Screening version of the 25-item THI
- Assesses the psychosocial consequences of tinnitus
- 10 items
- Score > 6 points suggests need for referral

Tinnitus Case History
- 6-page questionnaire completed prior to TMC designed by entire team
- Email sandridges@ccf.org for a word doc of the case history
Why Group Sessions?
- Group interchanges
- Share and learn from each other
- Encouragement from others to take responsibility
- More cost-effective and time-efficient
- Highly practical for busy practices

Types of Groups
- Mutual sharing or support groups
- Discussion groups
- Task groups
- Encounter groups
- Therapy groups
- Family groups

Education Groups
- Goal is to provide education or informational counseling
- Large number of persons to optimize time and cost-efficiency

General Goals of the TMC Group
- Clarify misconceptions
- Provide reassurance
- Offer practical suggestions and techniques to provide immediate relief
- Empower patient to take control of tinnitus rather than being controlled by tinnitus
- Demystify tinnitus through education
- Establish trust and rapport helping to promote compliance
- Not a “sounding board” for individual problems
- Provide hope for tinnitus relief

MULTIDISCIPLINARY SCREENING
- 15 minute session with neurology, dentistry, physical therapy, psychology and audiology

Neurology – Neil Cherian, MD

Typical Approach
- Brief history
- Examination
  - Vitals, (BP and pulse)
  - Cardiac/Carotid – Bruits – ocular and head
  - General medical/neurologic exam
  - Auditory – Rinne, Weber, TM, recruitment
  - Vestibular – gait/coordination
  - Imaging - head CT and/or MRI
  - Audiometry
  - Lab work up - Blood work, EKG, Carotid ultrasound
  - Medication
What might a neurologist find?

- Pertinent history
- Deficits on exam
- Gross abnormalities on imaging
- Tumors, cysts, cerebral infarcts, MS lesions

If there is no obvious pathology or abnormal exam findings, less specific medications/treatment to be used

Tinnitus – Pitfalls

- No unifying theory on what it is – short of the description
- Many different causes – ear, brain, ear-brain
- Many potential pathomechanisms - ear injury, head trauma
- No consistent audiometric findings or other marker
- No consistent treatment response

Spectrum of Sound Experiences

- Blips/Transients (ear vs pathway)
- Internally transmitted sounds (muscle contraction, blood flow)
- Repetitive, monotonous sounds (Tinnitus)
- Hallucinations
- Psychosis, Delirium
- Well-formed sounds
- Temporal lobe epilepsy
- Imager: Music playing in my head
- Disconnection syndrome (Dementia + hearing loss)
- Conventional Hearing

Subjective Tinnitus

- presbycusis
- labyrinthine concussion
- infections
- stroke
- aspirin
- tumor
- menigioma
- wax buildup

- noise exposure
- barotraumas
- inner/middle ear
- multiple sclerosis
- quinine
- CP angle tumors
- elevated (ICP)

- trauma
- head trauma
- meningitis
- drugs
- cisplatin
- acoustic neuroma
- Meniere’s Disease

Commonly Associated Disorders

- Vestibular Disorders: Neurolabyrinthitis, Vestibular Neuronitis
- Meniere’s Disease: Acoustic Neuroma, TMJ Dysfunction
- Headache Disorders: Passing Out (Pre/Syncope)
- Migraine (part of the diagnosis criteria for basilar migraine)

Medical Approaches

- Testing:
  - head MRI/CT, temporal bone CT, audiogram, blood work
  - Investigate test abnormality
- Treat the underlying disorder
Medication withdrawal
Referrals: Audiology, Otolaryngology, Psychology/Psychiatry

Medical Treatment Modalities
Anesthetics: IV lidocaine
Antidepressants: Amitriptyline (Elavil), Escitalopram (Lexapro), Duloxetine (Cymbalta)
Antiseizure: Carbamazepine (Tegretol), Phenytoin (Dilantin), Valproic acid (Depakote), Gabapentin (Neurontin), Pregabalin (Lyrica), Topiramate (Topamax), Oxcarbazepine (Trileptal)
Benzodiazepines: Clonazepam (Klonopin), Valium (diazepam)
Beta-blockers
Muscle relaxants
NMDA receptor antagonists: Memantine (Namenda), Neramexane
Other: Campral (used for alcohol dependency)
Injections (Not typical indications): Nerve blocks – greater occipital nerve, Cervical Botox
Surgical: Cochlear nerve section for palliation, 30% recovery rate
Vitamins: Vitamin A/C/E, Zinc, B complex, Antioxidants, Glutathione, Herbal preparations, Ginkgo biloba
Supplements:
  - Arches Tinnitus Relief Formula: Ginkgo biloba, chelated Zinc, deodorized Garlic
  - RingStop: proprietary Chinese herbs, and key vitamins and minerals – plus Isoflavone, Vinpocetine, Arginine, Alpha Lipoic Acid, Ginkgo Lipoflavanoids
  - Co-enzyme CoQ10
  - AuraQuell: combination of vitamins A, C and E, plus magnesium currently in clinical trials for NIHL
  - Quietus

Somatic Modulation of Tinnitus
The ability to temporarily change (increase/decrease) the loudness, pitch or character of tinnitus with neck and/or jaw contractions
Patterns
  - Activity/Posture related
  - Temporal patterns of worsening with headaches and/or dizziness
  - Chewing

Is the neck contributing?
Neck pain? Tightness/stiffness
*Pain is not the sole indicator!*
Any arm or hand symptoms? Weakness, Tingling/numbness
Headaches? Location, Frequency/intensity
Dizziness? Related symptoms, nausea, palpitations, blurry vision
Cortical Stimulation
Implantable epidural electrode placement
Chronic Electrical Stimulation: Auditory Cortex, Posterior Superior Temporal gyrus -targeted by MRI

Other Strategies
Electrical stimulation of the cochlea:
Occipital nerve stimulation (ONS)

Neurology Screening Summary
Determines need for full neurologic evaluation through observation and brief screening looking at neurologic symptoms/findings (exam or imaging), cervical symptoms or findings, whether tinnitus can be somatically modulated
Consider need for neck/jaw physical therapy evaluation if there is an abnormal neck exam with modulation
In our experience, the presence of somatic modulation combined with a mechanical problems with the neck/jaw suggests (30 – 50% of the time, estimate), that mechanical interventions may improve the intensity and/or temporal pattern of the tinnitus

Dentistry – Karyn Kahn, DDS

Myriad of TMD Symptoms
Facial/TMJ pain Decreasde range of motion TMJ Clicking/Crepitis
Tooth pain Ear pain Tinnitus
Ear stuffiness Disequilibrium Excessive tearing
Soft tissue puffiness Headache Injected conjunctiva
Nasal congestion Cervicalgia

Tinnitus and Myogenic TMD
Occlusal Discrepancies: Malocclusion, Lack of Anterior Guidance, Interferences to a Stable Joint Position
Parafunctional Bruxism: Diurnal Clenching, Nocturnal Grinding/Clenching
Trismus: Sustained Limited Mandibular Closure, Fibrotic Contracture
TMJ Arthralgia: Protective Co-Contraction of Masticatory Muscles

15 Minute TMD Screening
Past Dental History
Trauma Orthotics
Parafunctional Habits
Oral Habits: Gum Chewing, Cheek Biting, Pencil Holding
Fractured Teeth/Severe Wear
Headaches: Onset, Frequency
Ergonomics: Computer Usage, Musicians, Weight Lifting, Job

Clinical Screening
MROM Normal: 40-55mm
Auscultation: clicking/crepitus
Palpation of masticatory and cervical muscles
Soft tissue examination
Occlusal wear patterns
Load testing of TMJ with elevator muscle contraction
Modulation of tinnitus with masticatory muscle movement restriction

Dental Management of TMD Related Tinnitus
Self Help Therapy: decrease diurnal clenching and other parafunctional habits
Dental Orthotics: reduce muscle hypercontraction during nocturnal bruxism and masticatory function
Occlusal Corrective Procedures: achieve harmonious neuromusculature of the masticatory system
Physical Therapy Modalities: improve posture, resolve myofascial trigger points, improve cervical and masticatory range of motion
Referral: appropriate medical specialists for stress reduction, cognitive behavioral therapy, pain management and pharmacotherapy

Physical Therapy – Kay Cherian, PT, MPT, Cert MDT

The Connection
Levine 1999 found that tinnitus can be modulated somatically with face, head, and neck movements; that tinnitus has been associated with two somatic disorders, temporomandibular joint syndrome and whiplash.
5 out of 6 case study patients had some form of orthopedic diagnosis- neck, jaw or shoulder.
Bjorne 2007 reminded us that Costen in 1934 reported that the jaw was related to tinnitus; and that in 1981 House thought there was a connection between whiplash and tinnitus
Study of 24 patients with Meniere’s disease; had treatment on the neck and jaw that produced improvement in vertigo/tinnitus and aural fullness
3 years later symptom improvement was still statistically significant
Sanchez et al 2007 used repetitive head and neck contractions to assess for modulation and found that the head and neck contractions produced more modulation in tinnitus than any limb maneuver

Neck
“2/3rd of the population will experience neck pain at some point in their lifetime” O’ Grady
Poorer prognosis for those >40 yrs old and for those who also have lower back
Also have high recurrence rate: 22-50%

Referral patterns:
C0-1, C1-2: upper posterolateral cervical region
C2-3: posterolateral and posterior upper cervical region, occipital region
C3-4: upper posterior cervical region
C4-5: posterolateral middle and lower cervical region to the top of the shoulder
Intervertebral disc functions to facilitate motion and provide stability.
In the neck no disc C1-2 - soft tissue has to be lax to permit motion, while tolerating mechanical stresses.
Components:
- Nucleus pulposus
- Annulus fibrosis

Axial Compression
- Water squeezed out of disc
- Rapid creep in first 2-10 min (1.5 mm), slows to 1 mm per hour, plateaus in 90 minutes
- Height of disc is regained when in unweighted position- sleeping
- With age disc drier, stiffer, less able to recover from stresses

Upper Cervical Spine
- OA
  - More extension available vs flexion
  - Stability is minimal
  - No spinous process to limit extension
- AA
  - Lateral AA joints support the weight of atlas and the head to lower structures

Lower Cervical Spine
- C3-4: most SB occurs here
- C4-5: considered midpoint of the curve and the center of gravity
- C5-6: most flexion and extension, but almost as much at C4-5, C6-7

**Physical therapy signs of TMD:**
- Limited opening or excursion movements
- Pain with jaw movements
- Crepitus/clicking
- TMJ tenderness with palpation
- Jaw muscle tenderness with palpation

Muscle disorders were most common disorders of the head and neck- having at least 1 TMJ/TMD symptom
- 56% prevalence of at least 1 symptom
- Carlsson estimated that 93% of population has one symptom of TMD in lifetime
- Females 5 to 9 times more likely
- Ages 15 to 45 years old most common

**Jaw Muscle Referral Patterns:**
- Masseter: Ear, jaw, ipsilateral orbit
- Temporalis: Ipsilateral temporal and zygomatic arch
- Lateral Pterygoid: Ipsilateral ear, and zygomatic arch
- Medial pterygoid: Ipsilateral ear and posterior jaw
- SCM: Ipsilateral ear, sternum, top of head, occiput, orbit of eye
- Trapezius: Lateral neck, posterior jaw, temporal region and retro-orbital region
Neutral posture: All teeth strike simultaneously when tapping together, Symmetry in lateral movements

Forward head posture: Front teeth touch first when tapping teeth together, tightness in one side causes deviations in opening- to R/L

Good posture:
- Sitting up straight will reduce the amount of stress on your joints and muscles.
- Begins at lumbar spine and can effect everything above if poorly positioned

Poor Posture:
- Chronic forward head posture
  - Adaptive shortening of deep cervical fascia and muscles
  - Decreased activation of deep neck flexor (anterior muscles)
  - Increased tension of posterior cervical muscles
  - Aggravates functional malocclusion of jaw

Physical Therapy Screening
- Observations: Mobility of neck, mid back, shoulders and jaw; looking for lack of mobility and pain, or reproduction of symptoms
- Overall posture in sitting, standing, sleeping
- Strength of UE, neck
- Complete testing checking for change in symptoms

Physical Therapy Treatment Options
- Education:
  - Posture
  - Ergonomics- (fix your posture at work)
  - Benefit of exercises
  - How the spine works, and problems that may occur
  - Correct sleeping positions - support for the neck
  - Improve technique of breathing (if needed) to decrease overuse of neck muscles

Physical Therapy Referral for patients who:
- Have neck pain, tightness, abnormalities of movement, tenderness of muscles
- Have jaw deficits of movement, tenderness of muscles, crepitus, clicking
- Have additional symptoms of HA, dizziness
- Have tinnitus related to neck trauma, MVA
- Have history of additional spine, orthopedic problems
- Can modulate tinnitus

What to look for:
- Active PT
  - Patient is involved in their care, progress
  - Home exercises are a must
  - Manual therapy: massage, mobilizations, “hands on approach”
- Passive PT
  - Patient is not as involved in care
  - No home exercises
  - Electric stimulation, hot pack, cold packs, general gym exercises
Physical Therapy Referral Sources
www.apta.org look for OCS certification
www.mckenziemdt.org: Specialized training in cervical mechanics
Find a therapist who is certified or has a diploma

Psychology – Scott Bea, PsyD.

Tinnitus Challenges Emotions
Quality of Life-robbing
Patients respond with intolerance, panic, resistance
Responses produce negative emotional states: Depression, anxiety, frustration

Psychology Helps Manage Distress
Assessing patient’s distress
Instilling hope for a better future
Developing a plan to facilitate adjustment
Cognitive-behavioral psychotherapy
Referrals to local practitioners
Use of self-help guides/workbooks
Collaborating with the team

Educational Session Objectives
Use humor to capture their attention
Instill hope that they can develop personal coping resources
Address the consideration of suicide
And a plan to prevent this occurrence
Distribute relaxation CD’s
With instructions for “letting go”!
Discuss skills to practice and master

Psychological Assessment
Prior to the educational session and screenings:
Depression symptoms
PHQ-9 (minimal to severe depression)
Suicidality
Must be addressed directly
Assist the team in crisis intervention options
Anxiety
GAD-7 (minimal to severe anxiety)
Communicate results during screening interview

Screening Interview
Aided by patient introductions/assessment tools
Communicate the results of the assessment devices and address suicidality.
Assess:
Previous psychiatric history & substance abuse
Coping resources
Social supports
Problematic behaviors (checking, reassurance-seeking)
Premorbid personality factors

Treatment Recommendations
Self-help resources: Relaxation CD’s. Cognitive-behavioral workbooks to promote mindfulness and acceptance
Psychiatry referrals for medications
Cognitive-behavioral therapy (CBT)

The Cognitive-Behavioral Model/Objectives
Skill development & self-sufficiency:
Relaxation
Letting go
Mindfulness
Present-moment awareness
Anxiety management
Mood regulation
Habitation
Acceptance

Finding Psychological Resources
National Register of Health Service Providers in Psychology:
www.findapsychologist.org
Local Psychological Association referral lines (often, in the Yellow Pages)
   Hospital-based health psychologists
   Cognitive-behavioral psychotherapists

Summary
Have a psychological professional on your team
Address the emotional distress of the patient
Assess and address suicidality
Develop referral sources
Cognitive-behavioral therapy
An evidence-based, skill development treatment

Audiology – Craig Newman, PhD and Sharon Sandridge, PhD

Tinnitus Handicap Inventory (Newman, Jacobson, & Spitzer, 1996; Newman, Sandridge, & Jacobson, 1998)
Severity Classification System
No handicap:  0 - 16
Mild handicap  18 - 36
Moderate handicap  38 - 56
Severe handicap  58 - 100
Catastrophic  >76*
20 points is considered a “true” change in performance
Helpful in determining significant change in pre- and post-administration
Email newmanc@ccf.org or sandridges@ccf.org for a copy of the THI or THI-S
Benefits of Sound Therapy
Decreases the perception of tinnitus by increasing the level of background sound, making the tinnitus less noticeable
Provides immediate relief, reducing emotional consequences
Promotes patient control over tinnitus rather than tinnitus control over patient
Promotes habituation to the tinnitus by neutralizing the threatening quality of the tinnitus

Environmental Enrichment Devices
Household devices (e.g., TV/radio, fan)
Tabletop sound machines (e.g., rain, wind, waterfall)
Tabletop fountains
Water purifiers
C-mp3 Tinnitus Therapy System
Sounds of sleep CDs
Sound Pillow

Hearing Aids
Appropriate for patients with hearing loss and tinnitus

Combination Devices

Sound Therapy Philosophies
Tinnitus Masking
Produce a sense of immediate relief
Partial/Complete reduces prominence
Sound presented continuously at lowest level to achieve desired effect
Any sound instrument can be used (HA, maskers, combination units)
Counseling required
Empowering to patient

Tinnitus Habitation (Retraining Therapy)
Decline in tendency to respond to sounds that have repeated exposure and are not a “threat”
Based on neurophysiological model
Tinnitus becomes problem when limbic system and ANS become activated in response to the tinnitus signal
Designed to facilitate long-term habituation through the use of sound therapy and directive counseling
Treatment may take up to 18 months

Music and Tinnitus
Induces relaxation response
Muscle relaxation, slowing HR, decrease BP
Attention shift away from tinnitus
Dynamic nature of music intermittently “masks” perception of tinnitus
Activates auditory pathways across a wide frequency range
More pleasant than white noise for many patients
Music evoking positive feelings
Counseling
Lifestyle changes
Stress management
Sleep
Diet
Engagement in activities/hobbies
Reassurance about lack of serious underlying cause
Realistic expectations about treatment outcome
Promotion of relaxation
Actively listen to patient
Provide patient a sense of hope

Patient Expectation Theory
If patients have confidence in you as a professional and the recommended treatment plan you will see a change in patient behavior.