

# Clinical Interventions and Treatment Approaches (2025)

---

## Evolving evidence on what works, for whom, and under what conditions

Across the 446 eligible publications from 2024 to 2025, a total of 132 studies evaluated interventions for tinnitus and related sound intolerance conditions. These papers reflect the widest therapeutic landscape seen in recent years, including psychological therapies, hearing and sound based strategies, neuromodulation, pharmacological and supplement based treatments, surgical and procedural interventions, somatosensory approaches, acupuncture and traditional medicine, digital health solutions and multi component healthcare models. The collective evidence shows that tinnitus distress is modifiable through several pathways. Improvements in quality of life, coping, sleep and emotional wellbeing are common. Complete elimination of tinnitus or large reductions in loudness remain less predictable and vary across patient subgroups.

## Psychological therapies

Psychological interventions formed the largest group of clinical studies. Cognitive behavioural therapy remained the most consistently supported approach. Trials of face to face CBT, internet based CBT and smartphone delivered CBT concluded that these interventions reliably reduce tinnitus distress and often improve anxiety, depression and sleep. Stepped care pathways that integrate CBT elements produced clinically important changes, and many patients moved from severe to moderate or mild questionnaire ranges.

Digital CBT was found to be feasible, scalable and acceptable, with effect sizes approaching those of therapist delivered interventions for users who remained engaged. Other psychological approaches, including acceptance and commitment therapy, hypnosis and brief biofeedback programmes, usually produced short term reductions in tinnitus distress or psychosomatic symptoms, particularly in individuals who had not responded to previous treatments.

# Sound based and hearing related treatments

A large body of work focused on sound therapy and hearing interventions. Conventional hearing aids consistently reduced tinnitus distress and improved speech perception in noise for individuals with hearing loss. Loudness reduction was less consistent, highlighting the difference between perceptual intensity and emotional burden.

Some studies suggested that gain adjustments tailored to tinnitus pitch may enhance benefit, while others found similar improvements across standard fitting strategies. Research on enriched acoustic environments, sound generators and remote sound delivery systems concluded that these approaches can reduce tinnitus handicap, especially when combined with counselling or CBT informed support.

Customised sound therapies, including notched music and tailor made notched sound, produced mixed results. Variability in tinnitus pitch stability, sound tolerance and auditory profile likely contributed to inconsistent findings.



# Counselling based care and tinnitus retraining therapy

Studies evaluating tinnitus retraining therapy concluded that TRT can reduce tinnitus distress when delivered with structured counselling and sound enrichment. Evidence for complete suppression of tinnitus was limited. Comparative research showed that supportive, structured management approaches deliver similar improvements when patient education, reassurance and continuity of care are prioritised. Comprehensive clinic models highlighted that clarity of information and repeated contact may be as important as the specific sound therapy technique.

## Neuromodulation

Neuromodulation remained a major focus of clinical research. Meta analyses and clinical trials of repetitive transcranial magnetic stimulation generally concluded that rTMS can reduce tinnitus severity in the short term for some patients. Long term effects were more variable. Personalised targeting strategies showed potential advantages, although evidence remains preliminary.



Trials of transcranial direct current stimulation and transcranial random noise stimulation produced inconsistent results. Some studies reported small to moderate improvements, while others found no meaningful difference compared to sham.

Bimodal neuromodulation, which combines auditory stimulation with somatosensory input, showed promising outcomes. Several studies concluded that this approach can lead to clinically meaningful reductions in tinnitus distress over several weeks or months. Not all patients respond and long term durability requires further research, but this modality represents an important development.

Experimental invasive neuromodulation, including deep brain stimulation, was limited to case series. These reports suggested benefit in a small number of highly selected individuals with severe and refractory tinnitus.



# Pharmacological and supplement based treatments

Pharmacological studies produced diverse findings. Combinations such as nortriptyline with topiramate and verapamil with paroxetine were associated with reductions in tinnitus severity, particularly in individuals with comorbid depression, anxiety or migraine. These benefits were balanced by side effect concerns and the need for careful patient selection.

Trials of agents including memantine, betahistine and acamprosate produced mixed results. Some studies identified modest improvement, while others found no advantage compared to placebo.

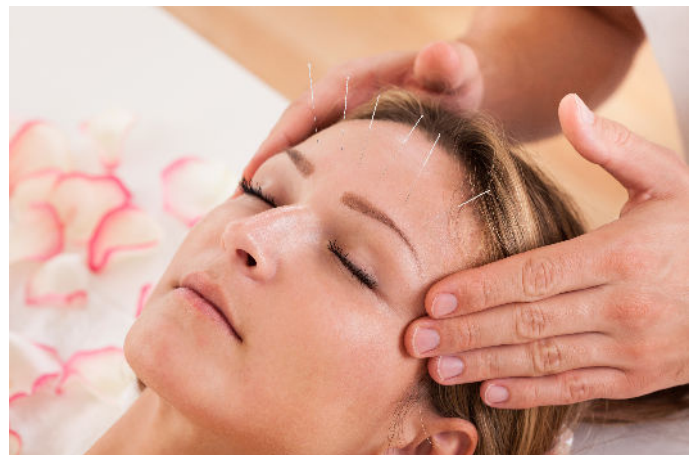
Supplement based interventions, including coenzyme Q10, herbal formulas and commercial products, often reported small to moderate improvements in tinnitus severity or associated symptoms. Many of these studies were small and methodologically limited.

Analyses of pharmacovigilance databases identified drugs associated with tinnitus onset or worsening, although these studies were observational and not designed to evaluate treatment efficacy.



## Acupuncture and traditional medicine

Acupuncture based treatments, including scalp acupuncture, electroacupuncture and auricular acupressure, were often concluded to reduce tinnitus severity and, in some cases, improve sleep and anxiety. Effect sizes varied and evidence quality was frequently moderate or low. Combined protocols involving acupuncture with medications or sound therapy showed potential but require larger controlled studies.



# Procedural and surgical interventions

Surgical and endovascular treatments proved particularly effective for pulsatile tinnitus caused by identifiable structural or vascular abnormalities. Case series and cohort studies reported high rates of substantial or complete resolution following venous sinus stenting, sigmoid sinus wall reconstruction or targeted embolisation. These interventions were generally associated with favourable safety profiles in carefully selected patients.

For individuals with unilateral or asymmetric sensorineural hearing loss, cochlear implants and active bone conduction implants frequently produced major reductions in tinnitus severity. Many patients described near or complete suppression when the device was activated, supporting the role of implantable devices as direct tinnitus treatments.

Otological surgeries, such as tympanoplasty and procedures for superior semicircular canal dehiscence, often improved tinnitus when the underlying pathology was corrected. Complete resolution was not guaranteed.



# Somatosensory and temporomandibular interventions

Evidence for somatosensory approaches continued to expand. Manual therapy, physiotherapy and temporomandibular disorder treatment were frequently effective when tinnitus showed clear somatic modulation or when jaw, neck or masticatory dysfunction was present. Systematic reviews supported TMD directed management in relevant subgroups while noting heterogeneity in treatment protocols.

Somatosensory interventions such as transcutaneous electrical nerve stimulation for somatic tinnitus, stellate ganglion block and botulinum toxin injections for specific myoclonic or spasm related tinnitus produced symptom reduction in narrowly defined patient groups.



## Digital health and online interventions

Digital and online interventions grew substantially during this period. Smartphone based CBT, app delivered sound therapy and online tinnitus courses consistently produced improvements in tinnitus distress with high user satisfaction. Continued improvement at extended follow up was observed in users who maintained engagement.

Internet delivered psychological interventions were described as cost effective and scalable, making them valuable in regions with limited access to specialist services. Adherence, digital literacy and motivation were prominent predictors of treatment benefit.



# Multi component and service level models

Several studies described comprehensive tinnitus clinics, stepped care systems and national or institutional pathways. Integrated models that combined audiological assessment, counselling, CBT elements, sound therapy, hearing interventions and targeted medical or surgical referral consistently achieved meaningful reductions in tinnitus handicap for large proportions of patients. These programmes emphasised that standardisation of assessment, outcome measures and referral criteria improves patient experience and clinical consistency across services.

## Overall interpretation

---

The 132 intervention studies collectively demonstrate that tinnitus distress is highly treatable. Psychological therapies, particularly CBT and digital CBT, have the strongest and most consistent evidence base. Hearing aids, sound therapy and cochlear implants provide substantial benefit for individuals with hearing loss. Neuromodulation, targeted surgical interventions for pulsatile tinnitus and somatosensory treatments all offer clear value for specific subtypes. Pharmacological and supplement-based strategies show more variable and often modest effects. Improvements are most consistent for distress, coping and functional impact rather than complete elimination of the tinnitus percept.

# Key New Clinical Learnings 2025

## DIGITAL CBT SCALES GLOBALLY

Digital programmes now achieve meaningful reductions in tinnitus distress, often approaching outcomes from therapist-delivered CBT.

***“New insight: digital care is becoming central to tinnitus management.”***

## BIMODAL NEUROMODULATION WORKS

Auditory plus somatosensory stimulation produces significant improvements for a substantial subset of patients.

***“New insight: dual-channel stimulation is more effective than single-channel neuromodulation for selected patients.”***



# Key New Clinical Learnings 2025 (continued)

## IMPLANTS TREAT TINNITUS

Cochlear and bone conduction implants reliably suppress tinnitus in unilateral or asymmetric hearing loss.

***“New insight: implantable devices can be considered direct tinnitus treatments when clinically appropriate.”***

## SOMATOSENSORY THERAPY HELPS

TMD management and musculoskeletal therapies reduce tinnitus in patients with clear somatic modulation.

***“New insight: in somatic tinnitus, targeted physical treatment can be the primary mechanism of relief.”***

## STEPPED CARE DELIVERS RESULTS

Integrated care pathways combining education, CBT elements and sound therapy demonstrate strong outcomes in diverse settings.

***“New insight: the structure and coherence of the pathway can be as important as the techniques within it.”***

## PULSATILE TINNITUS IS TREATABLE

When the vascular or structural source is identified, targeted interventional radiology and surgery often result in near-complete symptom resolution.

***“New insight: defined pulsatile tinnitus can achieve curative outcomes through precise anatomical intervention.”***

## ACUPUNCTURE OFFERS MODEST BENEFIT

Traditional medicine approaches reduce tinnitus severity for many individuals, though effects are generally moderate.

***“New insight: these approaches work best as supportive components within multimodal care.”***

