

**Results:** One in 5 individuals had a handicap VAS greater than 50%, and one in 10 greater than 75%. When placed in rank order, the tinnitus handicap score was the first or second most handicapping area for 37% of individuals. Handicap scores did not depend on implant type and correlated neither with age ( $p=0.59$ ) nor duration since implantation ( $p=0.44$ ).

**Conclusion/Discussion:** Tinnitus has significant impact in the adult CI population.

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### Management of Tinnitus Patients

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**Introduction:** Tinnitus is experienced by about 10–15% of the population, and about 5% of adults experience severe, persistent tinnitus affecting their well-being. Although many adjust, others are disabled by the condition.

**Objective:** A literature review of tinnitus etiology, approaches, evaluation, and current management strategies.

**Results:** Tinnitus is a symptom of many pathologies. It can originate from the outer, middle, or inner ear (e.g. wax in outer ear, otitis media, otosclerosis, presbycusis, acoustic neuroma). It can also be a symptom of hematologic disease (e.g. anemia), endocrinologic disease (e.g. hyperthyroidism), cardiovascular disease (e.g. glomus jugulare or glomus tympanicum, mitral or aortic stenosis), muscular myoclonus (e.g. palatal, tensor tympani, stapedius), pharmacological (e.g. benzodiazepine withdrawal, ototoxic drugs), artrogenous (e.g. dysfunction of the temporo-mandibular joint), or psycho-affective emotional distress (e.g. decompensated anxiety or depression). Severity is graded via questionnaires (e.g. Tinnitus Handicap Inventory) that are also useful for follow-up management. Because of multifactorial etiology it is important to have a detailed clinical history of the tinnitus patient. Is the tinnitus objective or subjective, pulsatile or not, clicking, pure tone or complex, low or high pitched? Is it variable or constant, and is it located in one or both ears or the head, and can the patient modulate their tinnitus with oro-facial or cervical movements. It is also important to record previous ototoxic drug consumption, noise exposure (e.g. at work, leisure, military), previous infectious diseases of the ear or other organs, cranio-cervical trauma, and neurological, muscular, artrogenous, psychiatric, endocrinological, or oncological disease. It is recommended to measure blood pressure, pulse rate, and temperature, and have a complete ear, nose, throat, head, and neck examination (as well as head and neck auscultation in case of pulsatile tinnitus). All tinnitus patients should have the following audiological exams: high frequency tonal audiometry, tinnitus pitch and loudness, loudness discomfort levels, Feldmann masking curves, and residual inhibition. Other specific exams may be relevant according to clinical history.

**Conclusions:** According to the specific etiology, other health professionals besides ENT, audiologist, and psychologist should be involved in tinnitus management

(neurologist, psychiatrist, maxillo-facial specialist, physiotherapist, neurosurgeons). The ENT should focus on identifying tractable causes of tinnitus (specific underlying causes other than SNHL) because pharmacological intervention is not effective in the large majority of patients. Affected patients need support and counselling on healthcare options. According to the severity of the case, a combination of treatments can be applied: counseling, relaxation techniques, cognitive behavioral techniques, instrumentation (hearing aids and/or sound generator), and tinnitus retraining therapy.

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### Emotional and Psychological Aspects of Tinnitus Patients

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**Introduction:** Clinical experience with tinnitus patients, previous research, and the literature show that many tinnitus patients have psychological/psychosocial problems and reduced quality of life (QOL), and many therapies often have a low degree of success.

**Quality of life:** The QOL corresponds to the perception of position in life, cultural context, system of values, and the relation between goals, expectations, standards, and concerns. Tinnitus triggers changes in one's life, a sense of loss of silence, and calling for readjustment. Patients with tinnitus may suffer multiple disturbing states, such as despair, anger, anxiety, and depression. The THI can be used to evaluate the QOL of patients with tinnitus, although the THI was originally used as a way to quantify the severity of tinnitus.

**Emotional aspects:** There are many studies that link tinnitus with emotional problems, highlighting significant psychological disorders. The identification of anxiety and depression in tinnitus patients is important for therapeutic intervention.

**Coping:** Heinecke et al. (2008) found that physiological and psychological aspects were associated with stress responses. Tinnitus patients had a lesser capacity to resolve stressful situations. Intervention programs for tinnitus should consider ways of providing coping mechanisms under stress. A connection exists between maladaptive coping and subjective perception of tinnitus severity, something that does not exist when strategies are effective, which confirms the usefulness of psychological therapy.

**Self-efficacy:** Self-efficacy refers to how individuals perceive their own ability to organize and carry out activities in unfamiliar situations which are usually uncontrolled and unpredictable. Self-efficacy is an indicator of how effective an intervention is likely to be.

**Intervention:** There are examples of collaboration between ENT and psychotherapy, like the University Hospital of Geneva. Patients who do not accept their auditory dysfunction, or are very focused on tinnitus, are sent to a joint appointment with an ENT doctor and a psychologist. This consultation addresses the social and psychological aspects, trying to make the patient understand the relation between tinnitus and some aspects in their daily life which have been disturbed. CBT is a therapeutic strategy used with these patients, and has had positive results. It is therefore important to develop intervention strategies that enhance self-efficacy, optimism, and coping strategies as well as reducing anxiety/depression and promoting their QOL.

**Conclusions:** Motivated by clinical practice and the literature, this work has systematized an approach for implementing a QOL promotion program. It takes a psychological approach and complements standard therapy. Apart from psychotherapy such as CBT, specific strategies can lessen anxiety and depression. The aim is to increase optimism, self-efficacy, and coping strategies, allowing patients to cope more effectively with tinnitus. As the subjective discomfort gradually decreases, a stage may be reached where tinnitus no longer has an aversive connotation.

### Early Identification and Intervention in Audiology

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### Newborn Hearing Screening

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Normal hearing is critical to the development of speech and language. Deafness can be of congenital origin (genetic or extrinsic cause, acquired during pregnancy) or acquired (perinatally or postnatally). Childhood deafness is the most common congenital disability for which there is screening and early intervention. It is estimated that its incidence is 1 to 2 per 1000 newborns, rising to 2 to 4 per 100 newborns from Neonatal Intensive Care Units (NICUs) or with risk indicators. Deafness is a disability with repercussions on the acquisition of speech, language, and intellectual development of the child, making social integration more difficult. The first 3 years of life are crucial for language acquisition and speech.

In 1972 the Joint Committee on Infant Hearing drew up a list of risk indicators for deafness, recommending auditory screening to children that had these indicators. The key risk indicators are: prematurity, low birth weight, hiperbilirubinemia, family history of deafness, congenital infections, ototoxic medication, mechanical ventilation for more than 5 days, low apgar score, craniofacial anomalies, bacterial meningitis, associated syndromes, and NICU for over 48 hours. In 1994 the Joint Committee on Infant Hearing recommended universal neonatal hearing screening (UNHS) using easy and fast screening tests. The aim is to diagnose

deafness before 3 months of age and to rehabilitate before 6 months. However, 50% of cases of infantile deafness are not associated with any known risk indicator.

There are several screening protocols adapted to each country, but otoacoustic emissions and automatic auditory evoked potentials are the most common screening methods. Currently, the average age of detection of hearing loss is about 2 years old, well beyond the age considered ideal for placing a technical aid, either hearing aid or cochlear implant. In 2005, the Screening and Intervention on Children Deafness Group (GRISI) was created. It is an interdisciplinary group consisting of various health professionals (ENT, audiologists, nurses, SPL therapists, and paediatricians). This group's main objective is the implementation of a national program of detection and early intervention, through joint actions with professional associations and several official entities.

### Childhood Hearing Screening

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### Matosinhos Hearing Screening Requirements for School-Aged Children Between October 2012 and May 2014

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**Introduction:** This research is focused on deafness and impaired hearing in children who attend special education, and its main objective is to understand whether the presence of an audiologist is an advantage and if it works as a complement to the linguistic, social, and cognitive development of children attending the 1st year of primary school.

**Objectives:** The research question was: *Is there any need to integrate an educational audiologist in primary schools?*

**Methods:** Exactly 22 schools in a northern region of Portugal were selected and a hearing screening was given to students attending regular classes, which included a brief anamnesis, otoscopy, and an audiogram. The aim was to determine whether there were otologic or hypoacoustic changes that could be detected by the educational audiologists in a school, justifying their presence and above all enabling early intervention and ongoing monitoring of the child.

**Results:** The results revealed the existence of these changes, confirming our work issues (37% with otologic disorders, 6.6% with right ear hearing loss, and 6.7% with left ear hearing loss). We conclude that if there are any students that have already been diagnosed by the family doctor, there are advantages in the inclusion of an audiologist in the multidisciplinary team that operates in schools.