CONSUMER FACTS

Hearing Loss and Hearing Aids for Adults

SPEECH-LANGUAGE PATHOLOGY AND AUDIOLOGY AND HEARING AID DISPENSERS BOARD

Speech-Language Pathology and Audiology and Hearing Aid Dispensers Board

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STATE OF CALIFORNIA
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DEPARTMENT OF CONSUMER AFFAIRS

About the Board

The Speech-Language Pathology and Audiology and Hearing Aid Dispensers Board (Board) licenses and regulates speech-language pathologists, audiologists, and hearing aid dispensers, along with other providers registered to assist in the delivery of speech-language pathology, audiology, and hearing aid dispensing services. The Board protects consumers by requiring adherence to laws designed to ensure the qualifications and competency of licensed providers, and further protects Californians with hearing loss by informing them of their legal rights and obligations when purchasing or returning hearing aids. The Board is also responsible for protecting consumers from unlicensed, incompetent, and unethical practitioners by investigating complaints regarding possible violations of its laws, suspending or revoking licenses, and imposing disciplinary sanctions, when necessary.

Introduction

This consumer guide provides information on the types and degrees of hearing loss and today's hearing aids, and features a glossary of common terms related to hearing testing, hearing aid technology, and hearing professionals.

We hope you find our guide helpful!

Three Types of Hearing Loss

There are three general types of hearing loss, which are distinguished by underlying causes, symptoms, and possible treatments.

Sensorineural

Sensorineural hearing loss (SNHL) is permanent and typically progressive, and occurs when there is damage to the inner ear (cochlea) or to the nerve pathway from the inner ear to the brain. Both loudness and clarity of sounds are affected. This is the most common type of permanent hearing loss, and typically cannot be medically or surgically corrected. There are a number of causes for SNHL, including aging, genetics, excessive noise exposure, and chemotherapy/pharmaceuticals.

Conductive

Conductive hearing loss occurs when sound is not conducted efficiently through the outer and/or middle ear. In some cases, medical or surgical intervention can be undertaken. The outer ear consists of the pinna, ear lobe, conchal bowl, ear canal, and many other small structures. The middle ear consists of the eardrum, three small bones (ossicles), muscles, and tendons. Conductive loss reduces the loudness of sounds; however, if sounds are loud enough, they are usually clear because the cochlea is not involved. Some causes of conductive hearing loss are:

- Middle ear infection (otitis media)
- Poor eustachian tube function

- Perforated eardrum
- Impacted earwax (cerumen)
- Presence of a foreign body
- Absence or malformation of the outer ear, ear canal, or middle ear
- Disease or damage to middle ear structures

Mixed

Mixed hearing loss occurs from a combination of sensorineural and conductive causes.

Degrees of Hearing Loss and Associated Speech Recognition		
Mild	25–39 dB*	Difficulty only with faint speech
Moderate	40–69 dB*	Frequent difficulty with loud speech
Severe	70–89 dB*	Can only understand amplified speech
Profound	90+ dB*	Usually cannot understand even amplified speech

* dB stands for decibel and is a unit for expressing the relative intensity of sounds. Higher dB values indicate poorer hearing.

Hearing Aids: The Basics

Assistive Listening Devices

There are a number of devices that provide alerting signals to those with hearing loss such as alarms, doorbells, smoke detectors, etc. In addition, there are devices that can send a television signal from a transmitter attached to the television to a receiver worn by the individual with hearing loss. The wearer can control the volume. There are a number of no-cost, speech-to-text phone systems available for those who have difficulty understanding speech on the phone, even with a telecoil.

Digital and Programmable Hearing Aids

Today's hearing aids operate with the use of a computer chip that primarily amplifies speech and has background noise-reduction capabilities for a comfortable listening experience. Digital hearing aids can be fully automated or can have multiple listening programs for different environments. Many hearing aids can be programmed to meet the hearing and communicative needs of the wearer. Analog hearing aids are no longer available from the major manufacturers.

Feedback Suppression

Hearing aid circuits can reduce feedback—unwanted sound or squeals that come from a hearing aid. Feedback suppression circuitry is available in most hearing aids.

FM Systems

FM systems are wireless sound transmission systems that transmit sound or speech on a radio frequency. They require a transmitter microphone worn by a speaker or at a sound source and a receiver worn by the listener that is coupled to a hearing aid or a cochlear implant. FM systems can dramatically improve the signal-to-noise ratio in a noisy environment or when listening at a distance from the source.

Hearing Aid Gain

Hearing aids can have different levels of power—or gain—for different degrees of hearing loss, with power levels ranging from mild to super power. In addition, hearing aids today provide different amounts of gain depending on the incoming sound; i.e., more gain for soft sounds, less for loud sounds.

Hearing Aid Styles

Hearing aids can be custom in the ear, receiver in canal (RIC) with hearing aid behind the ear, or conventional behind the ear (BTE) with a custom earmold. BTEs require a type of coupling earmold that can come in various styles. Contralateral routing of signal (CROS) aids can transmit sound from the poorer to the better ear.

Low Battery Warning System

When the battery in a hearing aid nears the end of its life, the aid will emit a warning sound to tell the wearer that it is time to change the battery. Most aids have this warning system.

Omni Versus Directional Microphones (DMs)

There can be one or two microphones on hearing aids. Omni, or single microphones, pick up sound from all directions around the head. DMs consist of a microphone pick-up pattern that typically emphasizes sound coming from the front versus unwanted sound coming from behind. In quiet, typically both microphones are working. In a noisy environment, the back microphone typically shuts off so that sound is louder in front of the listener and softer from behind, which assists with hearing speech in noise. DMs are not available in every hearing aid, but they are a common feature.

Over-the-Counter (OTC) Devices

OTC devices—which will be made available to the public once federal regulations are approved—are hearing devices that will likely be sold in retail or electronics outlets. They are intended only for those more than 18 years old with perceived mild-to-moderate hearing loss. Consumers should still seek a hearing test and counseling by an audiologist or hearing aid dispenser prior to a purchase of this type.

Personal Sound Amplification Products (PSAPs)

These are over-the-counter devices with fewer features than those found in hearing aids. They are primarily designed for those without hearing loss and are less sophisticated and less costly. There are pros and cons for all styles.

Telecoils (T-coils)

Telecoils, or T-coils, are induction coils of wire inside a hearing aid. T-coils allow hearing aids to pick up electromagnetic spillage from a phone so it can be amplified, thereby improving the signal-to-noise ratio in a noisy environment. It can also pick up electromagnetic emissions from an induction loop, which can also be amplified. Loops are typically found in public venues such as theaters, churches, and auditoriums. T-coils are not available in every hearing aid style. The advantages and disadvantages of T-coils should be discussed with your dispensing professional and ordered at the time of a hearing aid evaluation.

Wireless (Bluetooth) Hearing Aids

Some hearing aids can be "paired" with electronic devices that can create a Bluetooth or wireless data-transfer process; for example, hearing aids can be paired to smartphones, televisions, computers, and other electronic devices. Using this process and similar wireless technologies, acoustic information can be streamed directly from the electronic device to the hearing aid. To accomplish streaming, some hearing instruments may require an intermediate instrument called a "streamer."

Glossary of Hearing, Hearing Loss, and Hearing Aid Terms

Acoustic Gain: Difference between the input to the microphone of a hearing aid and the output of the receiver in the aid.

Aided Threshold: Lowest level at which a signal is audible to an individual wearing a hearing aid.

Air-Bone Gap: Difference in dB between air-conducted (earphone) and bone-conducted (bone oscillator) hearing thresholds for a given frequency in the same ear.

Analog: In hearing aids, amplification that uses traditional, continually varying signal processing.

Audiogram: Graphic representation of threshold of hearing sensitivity as a function of frequency.

Audiologist: A professional with a graduate degree, typically a doctorate degree, licensed to provide diagnostic hearing evaluations and can be licensed to dispense hearing aids. An audiologist can also provide rehabilitation of hearing loss and evaluate balance disorders.

Audiometer: Calibrated electronic equipment designed for the measurement of hearing sensitivity.

Aural Rehabilitation: A program of treatment designed to help restore communicative function that can result from hearing loss.

Aures Unitas (AU): Both ears together.

Auris Dextrae (AD): Right ear.

Auris Sinistrum (AS): Left ear.

Cerumen: Ear wax; ceruminous gland secretion in the ear canal.

Cochlear Implant: Surgically implanted device that enables primarily profoundly deaf individuals to perceive sound. A cochlear implant produces an electrical signal that is detected by the auditory nerve.

Compression: Nonlinear amplifier gain in hearing aids used to regulate uncomfortably loud sound.

Decibel (dB): Unit of sound intensity used in hearing testing.

Digital: Sound is converted to a digital signal for processing by the hearing aid and then converted back to a meaningful acoustic signal.

Direct Audio Input (DAI): Direct input of sound into a hearing aid by means of a hardwire connection between the hearing aid and an assistive listening device or other sound source.

Earhook: An aspect of a behind-the-ear hearing aid that connects the aid to the earmold tubing.

Ear Impression: Cast made of the outer ear (concha) and ear canal for creating a customized hearing aid or earmold.

Frequency (Pitch): Number of times a repetitive event occurs in a specified amount of time; e.g., the number of times cycles of a sound wave occurs in one second, expressed in hertz (Hz). Hearing is typically measured at 250–8000 Hz.

Hair Cells: Sensory cells of the organ of Corti in the cochlea or inner ear.

Hearing Aid Dispenser: An individual licensed to fit and sell hearing aids.

Hearing Aid Evaluation: A process of choosing suitable hearing aid amplification for a given individual.

Hearing Threshold: An absolute threshold of hearing sensitivity or the lowest intensity level at which a sound is perceived.

Immittance Audiometry: Battery of tests that measures the function of the middle ear, including tympanometry.

Listening Check: Informal assessment of the output of a hearing aid to ensure proper functioning.

Masking: In audiometry, to introduce sound to one ear while testing the other to eliminate any influence of crossover of sound from the test ear to the nontest ear.

Microphone: Device found in hearing aids that transduces sound waves into electrical signals.

Most Comfortable Loudness (MCL): Intensity level at which sound is perceived to be the most comfortable.

Multichannel Hearing Aid: Hearing aid in which each of two or more frequency bands can be controlled independently.

Neckloop: Necklace-size loop of wire that can be plugged into an assistive listening device or receiver, a radio, TV, and some computer speakers and phones. It generates a magnetic signal that can be received by the hearing aid telecoil and amplified.

Occlusion Effect: Low-frequency enhancement in the loudness level of bone-conducted signals due to the occlusion of the ear canal.

Pressure Vent: Small vent in an earmold or hearing aid to provide pressure equalization in the ear canal.

Pure Tone Average (PTA): The average pure tone threshold at 500 Hz, 1000 Hz, and 2000 Hz.

Receiver: Device that converts electrical energy into acoustic energy in a hearing aid.

Recruitment: Increase in the loudness growth rate found in sensorineural hearing loss.

Speech Audiometry: Speech measurements performed during a standard audiometric evaluation, including speech recognition threshold (SRT) and word recognition testing.

Streamer: Device that allows for wireless Bluetooth transmission of sound from external devices to hearing aids.

Uncomfortable Loudness Level (UCL): Intensity level at which sound is perceived to be uncomfortable.

Vent: A bore made in an earmold or hearing aid that permits the passage of sound and air into the otherwise blocked ear canal.

Vestibular: Pertaining to the balance mechanism (vestibular system).

Volume Control: Manual or automatic control designed to adjust the output of a hearing instrument.

Additional Resources

National Institute on Deafness and Other Communication Disorders: **www.nidcd.nih.gov**

Hearing Loss Association of America: **www.hearingloss.org**

Edmund G. Brown Jr., Governor

Alexis Podesta, Secretary
Business Consumer Services and Housing Agency

Dean R. Grafilo, Director
Department of Consumer Affairs

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