Hearing Impairment

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FACTS ABOUT HEARING IMPAIRMENT AND DEAFNESS

- 278 million - moderate to profound bilateral hearing loss. (WHO 2005)
- ↑ population and longer life expectancies.
- 80% of deaf and hearing-impaired - low- and middle-income countries.
- Leading cause of mild to moderate impairment in children - Chronic middle ear infection.

FACTS ABOUT HEARING IMPAIRMENT AND DEAFNESS

- 50% of deafness and hearing impairment is avoidable through prevention, early diagnosis, and management.
• **Congenital**: congenitally deaf; born with impairment.
• **Acquired or adventitious**: born normal; suffer diminished hearing later.
  ◦ Prelingual deafness
  ◦ Postlingual deafness
  ◦ Presbycusis

Evidence suggest that normal language patterns are maintained if deafness occurs after age 3

**Classification by age of onset**

• Deafness can be inherited.
  • Pre-natal and peri-natal causes
    ◦ Premature birth
    ◦ Anoxia during birth
    ◦ Infections of the mother: e.g. rubella, syphilis
    ◦ Ototoxic drugs
    ◦ Jaundice of newborn

**CAUSES OF HEARING IMPAIRMENT AND DEAFNESS**

• Post Natal
  ◦ Infectious diseases such as meningitis, measles, mumps and chronic ear infections.
  ◦ Ototoxic drugs at any age.
  ◦ Head injury or injury to the ear can cause hearing impairment.
  ◦ Aging
  ◦ Smoking
  ◦ Excessive noise

• Current annual production of hearing aids is estimated to meet less than 10% of global need.

**FACTS ABOUT HEARING IMPAIRMENT AND DEAFNESS**
Hearing impairment impacts development in:
- Speech
- Language
- Education
- Social integration

Severity of impact related to:
- Level and type of hearing impairment,
- Age of onset, especially if it begins before the age of speech development.

FACTS ABOUT HEARING IMPAIRMENT AND DEAFNESS

Facts about hearing:
- Presbycusis is a common problem among older individuals.
- Hearing loss is the 3rd most common chronic health condition among older Americans.

Refers to complete or partial loss of the ability to hear from one or both ears.

There are different levels of hearing impairment: mild, moderate, severe or profound.

HEARING IMPAIRMENT AND DEAFNESS

CAUSES OF HEARING IMPAIRMENT AND DEAFNESS

Blockage by wax or foreign bodies
- Excessive noise – environmental, work-related, recreational
- Accumulated exposure to noise will result in hearing impairment or deafness.
Types:
- Conductive
- Sensorineural
- Neural
- Mixed

Hearing Impairments

Conductive:
- Problem - outer or middle ear
  - childhood middle ear infection
  - punctured eardrum
  - presence of fluid in the middle ear
  - accumulation of ear wax in the external ear canal

Hearing Impairments

Conductive Hearing Loss

- Involves a reduction in sound level
- inability to hear faint sounds
- can often be corrected through medicine or surgery

Hearing Impairments

Sensorineural
- Problem: inner ear or nerve going to the brain
  - usually permanent
  - requires rehabilitation, w/ limited success
- Common causes
  - aging
  - excessive noise
  - smoking
  - genetic disorders
  - infectious disease

Hearing Impairments
Sensorineural hearing loss may result from lesions in the inner ear or 8th CN.
  - Cochlear: there is damage to the inner ear (cochlea).

Sensorineural hearing loss results in:
  - A reduction in sound level
  - Less ability to hear faint sounds
  - Affects speech understanding or ability to hear clearly.

As a result of exposure to:
  - Abrupt dangerous levels of sound
  - Loud sound over extended periods of time

Noise Induced Hearing Loss (NIHL)
Extended exposure to sounds >85 decibels can cause hearing damage.

iPods can produce sounds >105 decibels!

Avoiding Noise Induced Hearing Loss (NIHL)

Go To: www.generationdeaf.com/whatisnihil.html to calibrate your iPod setting.

Avoiding Noise Induced Hearing Loss (NIHL)

Neural:

- Problem – auditory nerve damage
  - Profound and permanent
  - Auditory brainstem implant (ABI) is only possible help

Hearing Impairments

- Conductive and sensory hearing loss
  - Middle and inner ear affected simultaneously.

Causes

- otosclerosis involving the ossicles and the cochlea
- transverse and longitudinal temporal bone fracture
- head trauma
- chronic otitis media
- cholesteatoma and middle ear tumors
- some inner ear malformations

Mixed Hearing Loss

Etiology of Sensorineural Hearing Loss

<table>
<thead>
<tr>
<th>Category</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developmental and hereditary</td>
<td>Alport syndrome, Usher syndrome</td>
</tr>
<tr>
<td>Syndromic</td>
<td>Large vestibular aqueduct syndrome</td>
</tr>
<tr>
<td>Nonsyndromic</td>
<td>Otitis media, viral, syphilis</td>
</tr>
<tr>
<td>Infectious</td>
<td>Aminoglycosides, loop diuretics</td>
</tr>
<tr>
<td>Pharmacologic toxicity</td>
<td>Head injury, noise-induced, barotrauma</td>
</tr>
<tr>
<td>Trauma</td>
<td>Multiple sclerosis</td>
</tr>
<tr>
<td>Neurologic disorders</td>
<td>Migraine, cryoglobulinemia, sickle cell</td>
</tr>
<tr>
<td>Vascular and hematologic disorders</td>
<td>Polyarteritis nodosa, HEV</td>
</tr>
<tr>
<td>Immune disorders</td>
<td>Paget disease</td>
</tr>
<tr>
<td>Bone disorders</td>
<td>Vestibular schwannoma</td>
</tr>
<tr>
<td>Neoplasms</td>
<td>Presbycusis, Meniere disease</td>
</tr>
</tbody>
</table>
• Implies hearing is defective, but functional

**Hard of Hearing**

• Deafness refers to the complete loss of ability to hear from one or both ears.

**Deafness**

- **Congenital**: congenitally deaf; born with impairment.
- **Acquired or adventitious**: born normal; suffer diminished hearing later.
  - Presbycusis
  - Prelingual deafness
  - Postlingual deafness

  ❖ Evidence suggest that normal language patterns are maintained if deafness occurs after age 5

**Classification by age of onset**

- **Prelingually deaf** individual
  - born with insufficient hearing to acquire speech normally, or
  - lost hearing prior to the age at which speech is acquired.
- Delayed language acquisition
- Delayed social development
  - Inability to pick up auditory social cues
- Often results in irritability

**Prelingual Deafness**
• Occurs after the age at which spoken language normally acquired (~age 3)
• Effects on speaking, reading, writing, and speech
• Depends on the individual and duration of hearing loss

**Postlingual Deafness**

• Is the onset of deafness in older life.
• Hearing loss with aging
  ◦ Genetic (deafness often runs in families)
  ◦ Adventitious (from insult to the hearing system by environmental sound)
  ◦ Smoking
  ◦ Other factors

**Presbycusis**

• Sounds often seem less clear and lower in volume.
• Difficulty hearing and understanding speech.
• The speech of others seems mumbled or slurred.
• High-pitched sounds difficult to distinguish
  ◦ e.g. “s” and “th”
  ◦ women’s voices
• Conversations difficult to understand, especially when background noise present.
• Certain sounds seem annoying or overly loud.
• Tinnitus (a ringing, roaring, or hissing sound in one or both ears) may also occur.

**Presbycusis**

• Auditory centers of the brain are affected by
  ◦ injury, disease, tumor, heredity or unknown causes.
• CAPD may have hearing loss.
• CAPD involves multiple components of sound
  ◦ E.g. localization and lateralization, auditory discrimination, auditory pattern recognition

**Central Auditory Processing Disorders**
Oral Health Needs of Children with Hearing Impairments

- Significantly higher rates of caries than a comparison general population
- Parental ignorance about oral health care

Communication tips
- Only speak to the patient when he/she can see your face.
- Always be at eye level.
- Turn off all extraneous sounds e.g. music, HVAC, etc.
- No back lighting or shadows on your face.
- Light face so that facial expressions, lips can be read.
- Speak to patient before putting on mask and beginning treatment.

Communication tips
- Modulate voice - speak slightly louder than normal, but don't shout.
- Speak at your normal rate - do not exaggerate sounds.
- Clue the person with the hearing loss about the topic of the conversation if possible.
- When not understood - rephrase your statement into shorter, simpler sentences.
- In restaurants and social gatherings, choose seats or conversation areas away from crowded or noisy areas.
- Don’t talk with food or non-food items in mouth.

Communication tips
- Eliminate extraneous noise in the operatory
- Conclude all discussion with patient before beginning Tx
- Hearing devices may emit feedback due to dental devices or even the caregiver’s body.
- Have the patient turn off the hearing device and place it in a pocket or purse.
- Do not place on bracket table.

Dental Management
Patients may exhibit fear, hostility or paranoia in the dental chair.

Use visual aids to augment or replace verbal communication (models, drawings, disclosing)

May need to arrange for a sign language interpreter.

Dental Management

References

- Hearing Loss (Mayo Foundation for Medical Education and Research)
- Hearing, Ear Infections, and Deafness (National Institute on Deafness and Other Communication Disorders)
- www.cdc.gov