Chapter 1: Overview of Audiologic Rehabilitation

Learning Outcomes

Upon completion of this chapter, readers should be able to:

- recognize and understand common vocabulary used in habilitation and rehabilitation;
- synthesize the components of an audiometric evaluation;
- analyze audiometric test findings and predict the secondary communication difficulties;
- diagram and apply a model for audiologic rehabilitation;
- describe a variety of audiologic rehabilitation settings for children, adults, and elderly adults.

Relevant Knowledge and Skills Acquisition (KASA) Standards

B1, B17, D2, D7, D10, D12, E12

Outline

Introduction
- Definitions and Synonyms
- Providers of Audiologic Rehabilitation
- Education Needs of Providers

Hearing Loss Characteristics
- Degree of Hearing Loss and Configuration
- Time of Onset
- Type of Loss
- Auditory Speech Recognition Ability

Consequences of Hearing Loss: Primary and Secondary
- Communication Difficulties
- Variable Hearing Disorder/Disability

Rehabilitative Alternatives
- Historical Background
- Contemporary Issues
- Professional Issues
- Evidence-Based Practice
- Multicultural Issues
- Current Status

Procedures in Audiologic Rehabilitation: An AR Model-CORE and CARE
- Rehabilitation Assessment Procedures
- Management Procedures

Settings for Audiologic Rehabilitation
- Children
- Adults
- Elderly Adults

Summary

Audiologic habilitation and rehabilitation involve a variety of assessment and management efforts for the person who is deaf or hard of hearing, coordinated by a

professional with audiologic training. Audiologists are the professionals at the center of these efforts even though other professionals can and do play a significant supportive role. Recent developments in the past decade have been fostered by technological advances like open fit hearing aids and cochlear implants along with improved methods of out-come measurement and internet software innovations. However, these new devices and methods must be used consistently if those with hearing loss are to be well served.

A model of rehabilitation has been presented here to provide a framework for assessment and management procedures in audiologic rehabilitation as described in the remaining chapters of this book. Professionals who intend to engage in AR must be familiar with the characteristics of hearing loss reviewed in this chapter if they are to perform effective rehabilitation.

Summary Points

- Audiologic rehabilitation (AR) is defined as those professional processes per- formed in collaboration with a client who has hearing loss to achieve better communication and minimize the resulting difficulties. It does not include closely related medical intervention or the teaching of academics to the deaf.
- Audiologists are the chief providers of AR, but speech pathologists and teachers of the deaf also do a great deal of this work. In addition, other professionals such as social workers and rehabilitation counselors may provide key rehabilitative assistance to those with hearing loss.
- AR providers need some background in diagnostic audiology, and they need an understanding of hearing loss and its effect on both children and adults.
- Hearing loss can be defined in terms of degree of loss, time of onset, type of loss, and word recognition ability. Those with milder forms of hearing loss are called hard of hearing; those with extensive hearing loss who cannot use hearing for the ordinary purposes of life are considered deaf.
- The deaf may be divided into four groups: the prelingually deaf, who are born deaf or acquire it in the first five years of life; the perilingually deaf who ac- quire deafness while acquiring a first language, the postlingually deaf, who acquire hearing loss after age 5 through the school years; and the deafened, who acquire hearing loss after their education is completed.
- The most serious and primary consequence of hearing loss is the effect on verbal (oral) communication, referred to as disability. The secondary consequences of hearing loss may be referred to as a handicap and includes social, emotional, educational, and vocational issues. The World Health Organization (WHO) now suggests that communication activity limitation be used instead of disability and that we speak of participation restriction instead of handicap. In connection with these new terms, WHO also suggests that personal factors and environmental factors are key issues in the provision of AR hearing ser- vices. These terms and factors help us properly understand the consequences of hearing loss and provide the basis for a model of AR.
- Both children and adults are underserved, and many more should receive AR help. Only 25 percent of those who could be using hearing aids obtain them. Even those who have hearing aids can often be shown how to get more effective help from amplification and can benefit from other services to assist them in their communication breakdowns.
- The early history of AR is essentially the history of efforts to help the deaf, beginning in the 1500s. Audiology came into being as a profession in the mid-1940s in

connection with World War II, and both audiologic diagnosis and audiologic rehabilitation (AR) are considered key elements within this profession.

- Beginning in the 1970s, audiologists became more involved in hearing aid fitting, and in the following decades until 2000 new developments such as cochlear implants and assistive listening devices emerged to revolutionize audiologic rehabilitation. In the past decade, the increased use of open fit hearing aids, software and Internet technology, along with improved outcome measures have led to even more exciting advances in AR.
- The model for AR includes assessment and management; rehabilitation assessment includes four elements defined by the acronym CORE. These elements include an assessment of Communication activity limitations and hearing loss through audiometry and self-report; Overall participation variables, including psychological, social, educational, and vocational factors; Related personal factors; and Environmental factors.
- Management includes four elements also, and these are summarized by the acronym CARE. These elements include Counseling, which includes an effort to help clients accept the hearing loss and set reasonable goals; Audibility improvement by using hearing aids and other devices; Remediation of communication; and Environmental coordination and participation goals.
- Children receive AR services in a variety of settings, including early intervention and school programs. Adults and elderly adults are usually served in settings that dispense hearing aids; these include private practice, medical or ENT offices, hearing aid specialists, military or VA service centers, and community hearing clinics.
- The first eight chapters in this book are organized to provide an overview of the fundamentals in AR, including hearing aids (Chapter 2), cochlear implants and vestibular/tinnitus rehabilitation (Chapter 3), auditory and visual stimuli (Chapters 4 and 5), speech and language issues (Chapter 6), psychosocial is- sues (Chapter 7), and school AR services (Chapter 8). Two chapters provide comprehensive explanations to illuminate AR for children (Chapter 9) and for adults (Chapter 10). Finally, two case study chapters illustrate how this work is done with children (Chapter 11) and with adults (Chapter 12).

Supplementary learning activities

See http://www.isu.edu/csed/audiology/rehab to carry out these activities. We encourage you to use these to supplement your learning. Your instructor may give specific assignments that involve a particular activity.

- Hearing Loss Simulations: Three digital audio samples are filtered to simulate normal hearing, a high-frequency hearing loss, and a low-frequency hearing loss and presented in this activity. Audiograms representing each hearing pattern are also displayed.
- Hearing Loss Classification: To help understand the process of categorizing hearing loss in terms of type, degree, and configuration, this activity provides the learner with sample audiograms and asks you to categorize the loss in all three ways.
- More Hearing Loss Classification: This activity is similar to the one above but in a different form.
- Hearing Loss Configuration Profile: In this activity you can enter dB levels at 1000, 2000, and 4000 Hz in the better ear and the software will convert these into one of eight audiometric patterns considered hard of hearing. Deaf levels would be 80 or 90 dB or higher at these same frequencies. This activity allows the learner to see what

type of communication difficulties would be experienced by hard of hearing persons with these different configurations.

- In fitting hearing aids and measuring outcomes from amplification, it is important to understand the difference between dB SPL, dB HL, and dB SL. This activity on the website will help you learn how these dB levels relate to each other.
- Review of studies to understand why children and adults need audiologic rehabilitation.

Chapter 1 Test Question Bank

Multiple Choice (Select the best, most complete answer.)

Which of the following statements is <u>not</u> accurate?

a. About 1 in 10 individuals in the U.S. has a hearing loss.
b. Persons with mixed hearing loss will have bone conduction pure tone thresholds which are better than the corresponding air conduction thresholds.
*c. Gallaudet's successful school for the deaf helped to promote the oral approach to educating the deaf here in the U.S.
d. Most hard of hearing youngsters are thought to have hearing loss beginning at birth .

The principle consequence imposed by a hearing loss is the effect on:

a. educational progress
*b. verbal communication
c. psychological adjustment
d. social adjustment

The degree of loss corresponding to a 91 to 110 dB loss is:

a. Moderate
b. Mild
*c. Profound
d. Severe

True / False

A.G.Bell was a key figure in the early efforts to educate the deaf here in the U.S.. (True)

Most pure sensorineural hearing losses have a number of air-bone gaps (15 dB or more). (False)

The profound hearing loss a child obtains at three years of age could accurately be described by the terms prelingual and congenital. (False)

Most hard of hearing children receive rehabilitation in the schools. (False)

Those with hearing loss tend to have comparable intelligence to normal hearing persons. (True)

The first ever known teacher of the deaf was de l'Epee in France. (False)

The amount of loss is referred to as the disability (or activity limitation) that a person may have while impairment is the consequence of that loss. (False)

The vast majority of children with hearing problems in school are deaf. (False)

A. G. Bell is associated with the oral approach for teaching the deaf. (True)

Thomas Gallaudet went to England to learn the oral approach at the Braidwood school. (True)

Speech and language are nearly always affected in a deafened individual. (False)

Decisions about placement in a deaf or hard of hearing program are based only on the child's degree of hearing loss . (False)

CARE and CORE provide a framework for doing AR. This model is based on the USA Health Organization recommendation. (False)

Most settings for doing AR with adults are not the same ones as found for elderly adults. (False)

Individuals with hearing sensitivity which is poorer than 90 dB should always be classified automatically as deaf. (False)

Short Answer / Essay

Distinguish between the audiometric and functional definitions of the term "deaf".

Briefly describe the term "phonemic regression".

Briefly discuss the historical significance for each of the following as they pertain to AR

a. Ponce de Leon
b. Clarke School for the Deaf
c. ASHA
d. World War II

Distinguish between the terms hearing loss and hearing disability.

Distinguish between prelingual and postlingual hearing loss.

List and explain two of the main factors that can alter the disability resulting from a hearing loss: (2 points each)

Describe two studies discussed in class that justify the need for doing AR with children

Bonus: Review Test Bank

Often a prerequisite to a course that would use this text is a basic audiometry course. Below are questions that would be used as part of a review of audiometric testing and diagnosis review. These questions don't necessarily relate to specific information presented in this text.

Assume O dB HL is equal to 20 dB SPL; If a persons threshold is 35 dB HL what is this threshold in SPL?

a. 10 dB SPL
b. 15 dB SPL
c. 35 dB SPL
*d. 55 dB SPL

This symbol O is used on an audiogram for recording: (ignore color)

a. Left ear air conduction
*b. Right ear air conduction
c. Left ear bone conduction
d. Right ear bone conduction

This symbol > is used on an audiogram for recording: (ignore color)

a. Left ear air conduction
b. Right ear air conduction
*c. Left ear bone conduction
d. Right ear bone conduction

Excellent word recognition (discrimination) is expected in the following type (s) of loss:

a. Conductive
b. Mixed with large sensorineural component
c. Sensorineural
*d. Conductive and mixed with small sensorineural component
e. All of the above

Medical treatment or surgery to restore all or part of the hearing is usually possible in the following type (s) of loss:

a. Conductive
*b. Conductive and mixed
c. Conductive and sensorineural
d. Sensorineural
e. Conductive, mixed, and sensorineural

There is usually a problem with clarity of hearing in the following type(s) of loss (es):

a. Conductive
b. Mixed with large sensorineural component
*c. Sensorineural and mixed with large sensorineural component
d. Conductive and mixed with small sensorineural component

There may be a problem in the cochlea in the following type (s) of loss:

a. Conductive
b. Mixed
c. Sensorineural

*d. Sensorineural and mixed
e. All of the above

There is a problem in the outer or middle ear in the following type (s) of loss (es):
*a. Conductive and mixed
b. Mixed
c. Mixed and sensorineural
d. Sensorineural and conductive
e. Conductive, mixed, and sensorineural

Word recognition (discrimination) scores are used to measure the:
*a. Clarity of hearing
b. Tolerance of hearing
c. Sensitivity of hearing
d. Threshold of hearing

The range of human hearing for intensity is: (just detectable to pain)
a. O dB SPL to 120 dB SPL
b. O dB SPL to 100 dB SPL
c. O dB HL to 100 dB HL
*d. O dB SPL to 140 dB SPL

The following reference level is used on audiograms and audiometers:
a. SPL
*b. HL
c. SL
d. dB

The configuration of a hearing loss is determined by:
a. the type of loss
b. the degree of loss
c. the discrimination ability
*d. the shape of the audiogram

The traditional speech frequencies are:

a. 500, 1000 Hz
b. 500, 2000 Hz
c. 1000, 2000, 4000 Hz
*d. 500, 1000, 2000 Hz

The degree of loss corresponding to a 91 to 110 dB loss is:

a. Moderate
b. Mild
*c. Profound
d. Severe

The prelingually deaf refer to the group:

a. Who were born without hearing
b. Who lost their hearing before the age of 5 years
c. Who became profoundly deaf after 5 years but before their late teens
*d. Both a and b
e. Both a and c

The deaf were first taught during the

*a. 1500s
b. 1600s
c. 1700s
d. 1800s
e. None of the above

In the case of hard of hearing children, the hearing aid provisions for these youngsters

a. are inadequate because they need stronger hearing aids
*b. are inadequate because when the aids are checked only about ½ are in good condition
c. are inadequate because when the aids are checked only about ¼ are in good condition
d. all of the above.
e. are adequate. Most of them wear hearing aids.
d. Severe

True / False:

Pure tone air conduction and bone conduction thresholds can reveal whether a hearing loss is conductive, mixed, or sensorineural (True)

SRT stands for speech repetition threshold. (False)

Decibel is the unit used in audiology for measuring the intensity of a sound. (True)

Zero dB sound pressure level is the average normal threshold for the human ear. (False)

The frequency range of human hearing goes from 125 Hz to 8000 Hz. (False)

Chapter 2: Hearing Aids and Hearing Assistive Technologies

Learning Outcomes

Upon completion of this chapter, readers should be able to:

- identify the main components, controls, and features of a hearing aid;
- describe several different hearing aid styles;
- recognize specialized forms of hearing aids;
- evaluate the influence of the combined acoustic effects of earmolds and earshells;
- discuss the need for and process of taking and ear impression;
- outline the process of selection and fitting of a hearing aid;
- compare and contrast the fitting of hearing aids on the adult vs pediatric populations;
- differentiate "assistive devices" from "hearing aids" and suggest appropriate uses for each.

Relevant Knowledge and Skills Acquisition (KASA) Standards
B2, B11, E2, E3, E7, E8, E9, E10, E12, E15, E17, E18

Outline

Introduction
    History of Amplification
Hearing Aid Components
    Microphone
    Amplifier (Digital Processor)
    Receiver
    Batteries
Hearing Aid Styles
    Behind-the-Ear
    In-the-Ear/Completely-in-the-Canal
    Receiver-in-the-Canal
The Earmold
Who Is a Hearing Aid Candidate?
    Degree of Hearing Loss
    Degree of Communication Disability
    Motivation to Use Amplification
Hearing Aid Fitting Protocol
    Selection
    Quality Control
    Fitting
    Hearing Aid Orientation
    Validation/Outcome Measures
Pediatric Fittings
Special Fittings
    Contralateral Routing of the Signal (CROS) Fittings
    Bone-Conduction Hearing Aids

Bone-Anchored Devices
Middle Ear Implantable Hearing Aids
Cochlear Implants

Hearing Assistive Technology or When a Hearing Aid May Not Be Enough

Types of Assistive Devices
The Role of the Audiologist in Hearing Assistive
Technology Systems

Summary

Hopefully, after reading about the above amplification options that are available to those individuals with hearing impairments, it should be apparent that there is not a shortage of choices in amplification devices. In fact, due to advancements in electronics and computer technology, most of these amplification devices are capable of reproducing amplified sounds and speech for individuals with hearing impairments with considerably higher fidelity and output levels than ever before. However according to the MarkeTrak VI survey (Kochkin, 2001), only 22 percent of those individuals with a hearing loss that could receive benefit from amplification devices actually seek out and receive professional services. Thus, audiologists have the formidable task of informing the general population about amplification products and services and dispelling many of the misconceptions regarding amplification that currently exist today.

Hearing aids and hearing assistive technology are great rehabilitative tools for persons with hearing loss, but they will not restore hearing to normal. Modern technology has greatly enhanced the benefits our patients can receive from
amplification. Audiologists need to remain abreast of new advances in both technology and fitting procedures to provide their patients with the best care. Dispensing of hearing aids and other amplification devices can be some of the most rewarding work in the field of audiology. Providing amplification can truly change the quality of life of persons with hearing loss, allowing them to be part of their family in society and, in the case of children, providing them with the needed auditory information for both speech and language development and educational advancement.

Summary Points

- The basic components of a hearing aid are the microphone, amplifier, and speaker (receiver). Using algorithms designed to improve speech perception, modern digital instruments are programmed to individualize the fitting.
- Hearing aids come in a variety of styles, including behind-the-ear, in-the- ear, and completely-in-the-canal models.
- Earmolds and all in-the-ear hearing aid shells are often molded to fit the cli- ent’s ear and couple the hearing aid to the ear. The audiologist can use the earmold’s style, tubing, venting, and damping to change the sound going into the ear.
- Hearing aids are appropriate for individuals with hearing loss that cannot be medically or surgically remediated. The fitting process must include a full hearing evaluation and an evaluation of the client’s communication difficulties and motivation.
- Most individuals with hearing loss benefit from wearing two hearing aids, a binaural fitting. A hearing aid in both ears improves listening in background noise and helps in sound localization.
- Hearing aid fitting protocols must include selection of the device, quality control, orientation/fitting, and validation with outcome measures. All aspects of the protocol are vital to a successful hearing aid fitting.

- Individuals with unilateral hearing loss can benefit from CROS hearing aids or implantable bone-anchored hearing aids.
- Successful pediatric fittings require a team approach with members including the audiologist, speech pathologist, teachers of the hearing impaired, and the parents. The audiologist must ensure the wearer, or in the case of the pediatric fitting, the caregivers, know how to remove and work the controls, troubleshoot the instrument, do a listening check, care for, and clean the instruments.
- Assistive listening devices are designed for specific listening situations like television, telephone, or auditorium listening. ALDs can be helpful for people with hearing loss and also helpful to all us when in difficult listening environments, e.g., watching the television in the airport and using the captions.

Chapter 2 Question Test Bank

Multiple Choice (Select the best, most complete answer.)

Which of the following could <u>not</u> cause a BTE hearing aid to cease functioning properly?

*a. Broken cord to external receiver
b. Bad battery
c. Earmold plugged with cerumen
d. Malfunctioning microphone

Which of the following assistive devices is especially suited for use by the deaf for telephone communication?

a. Telephone amplifier
*b. TDD or Relay
c. Infrared transmitter/receiver system
d. Closed captioning device

Which of the following is/are true concerning hearing aids?

a. In-the-canal hearing aids generally are not appropriate for clients with profound hearing loss.
b. CROS hearing aids are a good option for cases with bilateral conductive hearing loss.
c. The shell of an ITE hearing aid is custom made for each person to be fit.
*d. Two of the above

Which device designed to assist in telephone use by those with hearing loss is found inside a hearing aid?

a. TDD
b. CROS
*c. Telecoil
d. Call waiting

Which set of frequencies is used in computing a hearing aid's HF Average Full-On Gain and OSPL-90 values?

a. 1000, 1500, and 2000 Hz
b. 500, 1000, and 2000 Hz
c. 1000, 1600, and 2000 Hz
*d. None of the above

Of the components of a hearing aid fitting discussed, which contributes most to the success of the patient adapting to amplification?

a. The most advanced hearing aid technology available
*b. A motivated patient with realistic expectations
c. An experienced professional
d. A good quality hearing aid

A patient with realistic expectations regarding his/her hearing aids understands that:

a. With advances in technology, little or no maintenance is required in the upkeep of today's hearing aids.
b. Hearing aids need never be noticed by other people.
*c. Hearing aids may not help in every communication setting
d. Most insurance policies cover at least some of the cost of hearing aids.

The main difference between analog and digital hearing aids is:

a. digital hearing aids are smaller because fewer components are needed
*b. how the sound is processed
c. digital hearing aids are programmable, analog aids are not
d. digital hearing aids always result in greater patient satisfaction

The main components of all electronic hearing aids include:

a. microphone, amplifier, power supply, frequency rectifier
b. power supply, volume control, A/D converter, acoustic coupler
c. receiver, integrated circuit, acoustic coupler, microphone
*d. microphone, receiver, power supply, acoustic coupler

Which hearing aid component transduces acoustic energy to electrical energy?

*a. microphone
b. A/D converter
c. receiver
d. rectifier

Hearing aids may be turned on and off using all but which of the following methods?

a. MTO switch
b. detent in the volume control wheel
c. remote control

*d. disconnecting the receiver

Telecoils:

a. are included on all hearing aids except CICs
b. are only helpful when using telephones (as the name implies)
*c. work on the principle of electromagnetic induction
d. are only available with digital hearing aids

Two methods of limiting output are:

a. peak clipping, distortion reduction
b. compression amplification, transducer control
c. ethereal transduction, peak clipping
*d. peak clipping and compression amplification

The term "Dynamic Range" refers to:

a. the range of frequencies that an individual can hear
*b. the range of usable hearing, defined by the softest sounds an individual can hear and the loudest sounds he/she can tolerate.
c. the range of sounds a hearing aid can process
d. a 5,400 acre ranch located outside of San Antonio, Texas

A rule of thumb when choosing the style of hearing aid for a patient is:

a. An increase in size results in an increase in cost
*b. An increase in size results in an increase in fitting range
c. A decrease in size results in a decrease in cost across all technologies
d. A decrease in size results in an increase in available options

All of the following are true regarding the OSPL of a hearing aid except:

a. should be set according to the patient's LDL
b. it is the most critical setting for a successful fitting
*c. describes the On-going Sound Pressure Level of a hearing aid
d. it is the highest level of sound the hearing aid can produce

According to ANSI S 3.22 (2003), the basic test parameters for an electroacoustic check of a hearing aid include all but which one of the following:

a. gain
*b. volume control taper
c. compression characteristics
d. maximum power output

When the input signal is 45 dB and the output from the hearing aid is 95 dB, the gain value is:

a. dependent on the compression ratio
*b. 50 dB
c. 2.1 dB
d. 95 dB
5. 140 dB

Gain is defined by the formula:

*a. output – input = gain
b. input – output = gain
c. input + output = gain
d. output / input = gain

Which of the following is not a purpose for earmolds?

a. couple hearing aid to ear
*b. dampen wind noise in the ear canal
c. prevent feedback
d. alter the frequency response of the sound reaching the ear canal

A CROS hearing aid:

*a. puts a microphone on the bad ear, the receiver on the good ear
b. puts a microphone on the good ear, the receiver on the bad ear
c. puts a microphone on the bad ear, a receiver on each ear
d. puts a microphone on either ear, does not need a receiver

The following are common types of earmolds:

a. integrated, tube type, skeleton
b. resonator, custom molded, tube type
*c. shell, skeleton, canal
d. diotic, tube type, custom molded

BAHA stands for:

a. Better Acoustic Hearing Aid
b. Bone Advanced Hearing Accessory
c. Bilaterally Available Hearing Amplification
*d. Bone Anchored Hearing Aid

An earmold can be used to do all but which one of the following:

*a. improve the signal to noise ratio
b. allow low frequency amplification to escape from the ear canal
c. reduce the occlusion effect
d. allow normal input of unamplified sound

The right hearing aid style for an individual can be determined by considering all but which of the following:

a. cosmetic concerns
b. physical limitations
c. financial concerns
*d. whether a digital or analog hearing aid is needed

According to your text regarding Hearing Assistive Technology, all of the following are examples of the different categories of Assistive Devices except:

a. Hardwire devices
b. Infrared systems
*c. Hearing Aids
d. Audio loop systems
e. Telephone Listening Devices

Binaural amplification for a person with a bilateral hearing loss is a more desirable option than a monaural fit because:

a. Speech perception is optimized when in difficult listening settings.
b. Sound localization is enhanced.
c. Hearing is more natural and balanced.
*d. All of the above.

Which set of frequencies is used in computing a hearing aid's HF Average Gain and OSPL-90 values?

*a. 1000, 1600, and 2500 Hz
c. 500, 1000, and 2000 Hz
c. 1000, 1800, and 2000 Hz
d. None of the above

The speaker component in a hearing aid is also referred to as a(n):

a. amplifier
*b. receiver
c. gain control
d. coupler

Gain is described by all but one of the following:

*a. The level of internal noise generated by the hearing aid
b. Describes how much the input signal is amplified
c. The difference between the output SPL and the input SPL
d. is different as the volume control on an amplifier is adjusted

Which auditory system has a transmitting system which will generally keep the signal from being transmitted outside of the space where it is contained?

a. FM
b. ILA
*c. Infrared
d. FM/ILA

All of the following types of hearing aids have internal receivers:

a. Body aid, BTE, ITE
*b. BTE, ITE, CIC
c. Body aid, ITC
d. ITE, eyeglass aid, body aid

When the input signal is 30 dB and the output from the hearing aid is 75 dB, the gain value is:

*a. 45
b. 50
c. 60
d. 75
e. 140

Which of the following is not a purpose for earmolds?

a. couple hearing aid to ear
*b. prevent damage of hearing aid receiver
c. prevent feedback
d. alter frequency response of hearing aid

All amplification systems include three basic components:

a. microphone, speaker, receiver
b. microphone, receiver, output limiter
c. tone control, output limiter, volume control
*d. receiver, amplifier, microphone

Distortion:

*a. is present when the output signal is changed unfavorably from the original signal
b. is when sound is made louder than it was originally
c. is when sound is amplified
d. always improves the clarity of sound

The Count the Dot audiogram is used:

a. to estimate the 0SPL90
b. to estimate the aided SRT
*c. to estimate the percent of speech that is audible
d. to estimate the degree of hearing loss

Dynamic range refers to the area between:

*a. SRT and discomfort level
b. 125 Hz and 8000 Hz

c. no gain and full on gain
d. pure tone average and SRT

True / False

A hearing aid fitter can use real ear measures to see if the gain is adequate. (True)

Individuals with losses of 26-30 dB who also experience communicative difficulty will not benefit from amplification because they are so close to normal limits. (False)

Most candidates for hearing aids are people with sensorineural hearing loss. (True)

Feedback happens because signals or acoustic energy from the output goes from the receiver to the microphone over and over. (True)

The uncomfortable level for a person gives us a guide in setting the tone control on the hearing aid. (False)

One purpose of the ear mold is to transmit sound from the receiver to the ear canal without bothersome feedback. (True)

A cochlear implant costs between $4000 and $6000 (False)

Zinc air cell batteries generally are not affected by “shelf life” problems observed with other types of batteries. (True)

BTE, eyeglass and ITE hearing aids all use tube type molds. (False)

0SPL 90 is the average sound pressure level when volume is 1/2 on and input is at 90 dB. (False)

Acclimatization makes it harder to fit hearing aids and know what they will do two months later. (True)

Equivalent input noise is the prescribed way to measure environmental noise. (False)

It is very important that the earmold provide a very tight seal when used in a slight/mild hearing loss case in order to prevent bothersome feedback. (False)

The microphone is an example of a transducer. (True)

Cases with conductive hearing loss should never be fit with a hearing aid. (False)

Internal noise is the relationship between acoustic signal and electrical background sounds arising from the amplifying device. (True)

Frequency response characteristics of an amplification system are determined entirely by the response of the microphone. (False)

Although digital amplification is becoming increasingly common, ITC and CIC hearing aids cannot utilize digital circuitry at the present time due to size issues. (False)

CROS hearing aids are designed for use with persons having a profound loss in one ear and normal hearing in the other ear. (True)

The new bone-anchored hearing aid was designed to be used with cases having bilateral sensorineural hearing loss. (True)

If a BTE hearing aid squeals while in the person's ear, the earmold may be too small or may not fit well. (True)

Hardwire assistive listening devices utilize FM radio wave technology to provide improved signal –to-noise listening ratios for users. (False)

Assistive Listening Devices can only be used by those with telecoils in their hearing aids. (False)

The purpose of directional microphones is to increase the signal to noise ratio for the wearer. (True)

Real Ear Measurement is one method of determining whether or not hearing aids are properly adjusted for the patient's hearing loss. (True)

Behind-the-ear hearing aids can fit any degree of loss except slight to mild. (False)

In attempting to determine which hearing aid to fit on an individual, obtaining optimum acoustic results is most important, and cost should not be considered. (False)

With an Inductive Loop system the amplified signal is fed to the user through an electromagnetic field. (True)

One major advantage of group amplification systems is that they can improve signal to noise ratio for multiple listeners. (True)

The frequency response of a hearing aid describes the amount of gain at each frequency. (True)

ALDs using FM technology are only available for group systems. (False)

The "C" in HIO-BASICS stands for "Compression" (False)

FM systems will often produce a better signal-to-noise ratio for the listener than conventional hearing aids in a classroom setting. (True)

Short Answer /Essay

List two major ways in which using binaural hearing aids is significantly better when compared with using a single hearing aid for a person with significant hearing loss in both ears.

Identify three different specialized devices which a hearing impaired person might find helpful in using the telephone.

List the elements and briefly describe the HIO BASICS.

List and briefly describe the elements of the CLEAR handout.

List five hearing aid styles and briefly describe an advantage and disadvantage of each.

Explain why each of the following hearing aid characteristics is important to consider when selecting the correct hearing aid for an individual (6 pts.).

a. gain
b. frequency response
c. maximum output

Briefly define/describe each of the following as they pertain to hearing aids or cochlear implants:

a. Telecoil
b. Venting
c. Electroacoustic analysis
d. Audibility Index (AI) (Count-the-dots)
e. CIC
f. Acclimatization