Assistive Devices

CDS 484/529 AURAL REHABILITATION
Assistive Devices

- There are 2 basic categories
  - Amplification systems
    - Selectively amplify the desired signal without amplifying background noise.
  - Alerting systems
Application of Assistive Devices

- **Amplification Systems**
  - Make sounds audible
  - As a substitute for hearing aids or to enhance the performance of hearing aids
Who Needs an Assistive Device?

- Persons who could benefit from hearing aids, but do not have them
- Persons who have HAs, but want to improve the signal-to-noise (S/N) ratio
  - The S/N ratio is:
    - The difference between the signal level and the noise level in a given environment (e.g., classroom)
    - Signal: teacher’s/speaker’s voice
    - Noise: air conditioners, traffic etc.
Hardwire Connection Devices

- Using a wire to connect a microphone and an amplifier to a headphone or a HA with a direct audio input
  - Mainly for personal use only
  - Advantage: *inexpensive*
  - Disadvantage: *inconvenient*

*Figure 19.9* External microphone connected to hearing aid.
(Courtesy Oticon, Inc.)
Personal Amplifiers
Wireless Devices

- Induction Loop Systems
- Frequency modulation (FM) transmission system
- Infrared (IR) transmission systems
Induction Loop System

Microphone

hardwire or FM

An amplifier

A wire loop

Creating an electromagnetic field

Signal received by hearing aid telecoil

http://www.easternelectronics.co.uk/loop.htm
TecEar-Ear Level Induction Loop

*Ear-level induction loops*

- offer a great alternative to conventional stereo headphones, providing people with hearing loss loud, clear audio without feedback and reduces background noise.
- can also be used with smartphones or any music playing device

http://tecear.com/Music_Link.htm
Induction Loop System

- **Advantages:**
  - Most hearing aids are equipped with telecoil (T-coil)
  - Available in many public places (churches, classes, theaters)

- **Disadvantages:**
  - Sound quality varies because:
  - Dead spots in the magnetic field
  - Susceptible to interference from other electronics (e.g., TV)
  - To receive the signals, HAs must be equipped with T-coil
Induction Loop System

https://www.youtube.com/watch?v=pOHBhKu7pO8
Infrared (IR) System

- PA system microphone picks up sound & converts it to electrical signals
- The signals are sent to an infrared transmitter
- The transmitter sends the signals via infrared light
- Patients wear an infrared receiver
- Many theaters offer this equipment
Infrared System

**Advantages:**
- High quality signals
- No interference from adjacent rooms

**Disadvantage:**
- Some visible light can interfere with the system and create noises
- IR receiver must be in the light pathway
- Can not be used outside due to sunlight
Frequency Modulation (FM) System

From Computer Desktop Encyclopedia
FM System

- Uses a frequency modulated radio wave
- Microphone – transmitter -- Received by HA or other receiver
- Signals can be distributed across a large area
- Different devices use different bandwidths to prevent interference from other FM systems in close proximity
  - (e.g., another teacher in an adjacent classroom)
FM System

- **Advantages:**
  - Extremely portable
  - Can be used with existing HAs that are FM compatible (i.e., *personal* FM system)
  - Can be used in a regular classroom equipped with a speaker (*whole-room* FM system)
  - Can be used for an individual or for an entire group (i.e., classroom)

- **Disadvantage:**
  - High cost
Rehabilitation Act Amendment (1986 & 2000)

- Ensures that electronic and information technology be made accessible to people with disabilities.

- Requires compatibility with hearing aids, cochlear implants, assistive listening devices, etc.

- **Federal Communications Commission: Disability Rights Office**
  - [www.fcc.gov/cib/dro](http://www.fcc.gov/cib/dro)
Telephones for the Hearing Impaired

- Phone can be set with louder output VC
- Compatible with the T-coil of a HA
- Extra speaker can be connected to the handset of a phone
- Video phones and real-time IP video interface services
  - (E.g., Google hangouts, Skype, FaceTime, etc.)
- Short message service (SMS) and multimedia message service (MMS)
TTY (Teletypewriters)

- a.k.a. a TDD (Telecommunications Device for the Deaf)

- Lets people who are deaf, hard of hearing, or speech-impaired use the telephone to communicate, by allowing them to type messages back and forth to one another instead of talking and listening.

- A TTY is required at both ends of the conversation in order to communicate.
The Hamilton CapTel® Phone and App are designed exclusively for individuals who have difficulty hearing over the telephone.

With this phone or app, you may listen to your phone conversations while reading word-for-word captions of what's said to you - similar to captions on TV.
What Telephone Services are Available?

- **Video Relay Service and TTY Relay Service**
  - Relays calls made to or from a deaf individual, translated through an interpreter to or from a normal hearing recipient

- **IM Relay Service**
  - The deaf, hard of hearing, or speech impaired individual uses a service to place phone calls through instant messaging.
  - The communication assistant places their phone call and relays the call as usual.
uControl 2.0 app
Extend the hearing experience
Patients can use their smartphones to adjust hearing instruments and share in-the-moment feedback on performance.

See the uControl 2.0 app in action
Television

- There is always **Closed Caption**

- Other systems used with TV
  - Hardwire
  - Induction loop
  - Infrared
  - FM systems
Other HA accessories

Remote control 2

Customize listening
Perfect for patients who want more control over their listening experience, Remote control 2 lets them discreetly and easily adjust volume and switch programs.

uMic

Hear it from the source
This personal wireless microphone system lets patients hear their companions more easily in challenging listening environments. Attach uMic using the built-in clip or lanyard loop and wirelessly send audio directly to both hearing instruments, through uDirect 2.
Other HA accessories

**uDirect 3**

Enjoy streaming

This sleek, hands-free accessory lets patients enjoy direct connections to communication and entertainment devices, like mobile phones, TVs, FM receivers and MP3 players, with stereo sound and long battery life.

---

**uTV 3**

Be entertained

uTV3 delivers the sound from the TV directly to both hearing instruments, ensuring a more enjoyable experience for patients who like to be entertained by TV.
Alerting Devices...
Alerting Systems

- Let you know something is happening
- You can put an alerting system in your:
  - Telephone
  - Door bell
  - Flashing light indicating a door bell or baby crying
  - Pillow vibrator
  - Wrist vibrator
Why do I Need an Alerting Device if I Already Use Hearing Aids?

- The distance between the listener and sound source
  - Every doubling of distance = decrease of 6 db
- Should not wear hearing aids when sleeping
- Competing noise in the environment
Emergency Alarms

- Fundamental for sake of wellbeing
- A large concern in the deaf population is being notified in the event of emergency or natural disaster
  - Smoke Alarms
  - Automobile Alerting Systems
  - Weather alerting devices
Smoke Alarms

- Different auditory signals:
  - Low frequency is proven to be beneficial for all people, including those with HL
  - Also more beneficial for children who may sleep through traditional fire alarms
- Bed Vibrator
- Pillow Shaker
- Strobe lights
Police and Ambulance Sirens

- Some new sirens can be felt as well as heard:
  - “The Rumbler”
  - Aimed at grabbing people’s attention who may be hard of hearing, or have loud radios or bass in their cars
  - Emits a low, stomach thumping moan
Weather Radio

- National Oceanic & Atmospheric Administration (NOAA)
  - Designed to adapt to the needs of Deaf communities
  - Also useful or those hard of hearing

- Provides 24-hour alerts for:
  - Severe weather watches
  - Severe weather warnings
  - Floods
  - Other hazards and natural disasters
NOAA Weather Radio

- Visual and vibrating alarms
  - Uses pillow vibrator, strobe, bed shaker
- Text readouts
- Three warning lights (weather statement, watch, warning)
- Programmable
- Alert can be sent to individuals via text message
  - WeatherRadios.com, HomeSafe, Inc., noaa.gov, amazon.com, etc.
More About Wake Up Devices

- Vibrations
  - Bed, pillow, wrist
  - Can be set to vibrate differently for different notifications
    - Continuous (steady) vibrations
    - Pulsating – on off on off on off
Wake Up Devices

- Lamp Light Alert:
  - Plug in a previously owned lamp into a special device
  - Flashes when alert is activated, regardless if it is on or off
  - Less expensive but must be put into “flash mode” in order for it to work
Wake Up Devices

- Strobe light:
  - Produce quick sharp white flashes
  - Can be continuous
  - Much brighter than a lamp
  - Better at grabbing attention
Wake Up Devices

- Audible Alerts:
  - Emit a sound that can be constant or pulsed
  - Usually have tone and volume options
  - Can have radio as an option
Wake Up Devices

- **Resources:**
  - [www.ameriphoneinc.com](http://www.ameriphoneinc.com)
  - [www.silentcall.com](http://www.silentcall.com)
  - [www.globalassistive.com](http://www.globalassistive.com)
  - [www.sonicalert.com](http://www.sonicalert.com)
Other Alerting Devices

- Cell Phone:
  - Vibrations, text messages

- Baby Monitor:
  - Vibrations, lights (as baby gets louder, lights get brighter or faster)
Other Services

- Dogs for the Deaf
- Canine Companions for Independence
  - Hearing dogs

www.cci.org  www.dogsforthedeaf.org