Assistive Listening Technologies

What options are available?

An important area to consider in the overall picture of your child's hearing is assistive technology. Many children can greatly benefit from assistive technology in their everyday lives at home, school, and social situations. In recent years, there have been many valuable products developed to assist people with hearing loss to further their independence. Among the many products available to help are amplified telephones, loud telephone ringers, TTY's, personal listening devices, signaling devices, alarm clocks, and television assistance.

One of the key areas to consider in assistive technology is telephone access. No matter what age your child is, being able to use the telephone can be of great value. The simple pleasure of talking to family or friends on the phone can be affected by hearing loss. Additionally, being unable to use the telephone can seriously compromise safety and well-being.

Telephones

Courtesy of HITEC®

Specialized telephones include many features to help with your child's hearing loss. Among these are volume levels well beyond those found in standard telephones, adjustable tone control for maximum clarity, extra loud adjustable ringers, and larger dialing pads. Amplified cordless telephones offer many features of corded phones with the additional benefit of portability.

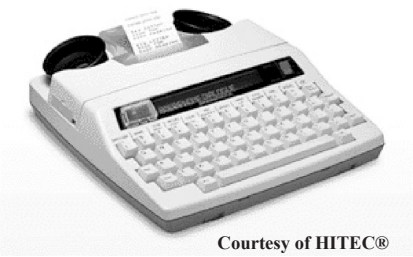
Not every situation requires replacement of existing equipment. Other add-on products such as amplified ringers, portable amplifiers and visual ring flashers can add important features to existing telephones.

Public payphones and telephone consoles of recent manufacture are required by law to have handsets that generate telecoil EMF signals that can be received by children with telecoils in their hearing aids or implants. Recent cell phones are required by a new law to be hearing aid/implant compatible. Such compatibility is an important factor in purchasing a cell phone. With private landline phones, an older child may benefit from connecting a standard "over the ear" headphone to the telephone. Headphones generate good telecoil signals. These devices are widely available as complete microphone/headsets normally used in office settings. They are also available for portable phones and cellular phones.

Bluetooth is also a promising technology to connect the aids/speech processors to telephones. There are manufacturers of FM assistive devices that connect the FM receiver attached to an implant processor or hearing aid to a cell phone through the use of Bluetooth technology.

Modern cell phones have "chat" and "text services" available for short messages. Using these services is a good way to reach a hearing impaired child without the child having to worry about understanding what is orally being said.

Teletypewriters


Courtesy of HITEC®

A TTY (teletypewriter), or Text Telephone, is also another option for children with more profound hearing loss. A TTY is a telecommunication device that has a keyboard and a visual display. Features such as printers, answering machines, memory dialing, and cellular connections can be found on different models. To communicate over the phone, the TTY user can call another individual who has a TTY and have a direct conversation. If calling someone who does not have a TTY, the TTY user will call the Telecommunications Relay Service (TRS). The Relay Service provides a communication link between individuals who use a TTY and those who do not. Specially trained Communication Assistants (CA's) are online to relay a conversation as it takes place. The CA reads the TTY text to the non-TTY user, and types the spoken response to the TTY user. There are other options for using the Relay Service also (please see section on Telecommunications Relay Service).

Television

The ability to watch and enjoy television can be more difficult for a child with hearing loss. If a child needs greater amplification, a simple solution may be a wireless television listening device. TV listening devices come in a variety of lightweight audio headset receivers that can be worn over the head or under the chin. The television volume can be set at a level comfortable for others in the room while the person with hearing loss can adjust the audio receiver as needed. Closed captioning is another very valuable tool. Captioning enables the user to read text on the television for everything that is being spoken in the program. All televisions made after 1993 that are 13" or larger are required to automatically have the closed captioning technology built-into the television. If a television does not have the captioning built-in, there is a device that can be attached to the television to provide captioning. FM systems can also be adapted to broadcast the television signal.

Music Players

Children who enjoy listening to music or recorded speech should use hearing aids and cochlear implants with telecoil capability. A child can connect to MP3, CD players and iPods using ordinary over the ear headphones. Any standard headphone with a large pad (not the in-the-ear type) will normally work. One does not need to purchase headphones advertised as being for the hearing impaired. Cochlear implant manufacturers also sell a cable referred to as a "Walkman" cable for a direct connection to the implant processor. FM systems can also be used to interface wirelessly with music players or with a direct audio input (DAI) cable.

Alerting Systems

Alerting Systems provide alternate notification by flashing a lamp or activating a vibrating device to notify a person of sounds in the home. Examples of this include a doorbell or telephone ringing, a baby crying, the smoke alarm sounding, or any other important sound in

the home. Systems can be basic with just a few points of notification, or they can be more advanced and provide complete notification in the home.

Alarm Clocks

Courtesy of HITEC®

Alarm clocks are always an important thing to consider for your child, especially when he/she is school-age. Alarm clocks can wake up your child by any of the following options: flashing light, vibration (with a bed shaker), audio alarm with adjustable tone and volume, or any combination of these. Some alarm clocks can work as a receiver for an alerting system. Alarm clocks are also available in smaller, more portable designs, that are convenient for traveling.

Assistive Listening Devices (ALDs)

Another key area of assistive technology is Assistive Listening Devices (ALDs). Assistive Listening Devices are designed to help children hear better in a variety of difficult listening situations. Listening in classrooms, groups, restaurants, theaters, or in one-on-one conversations is not only influenced by noise but also by the distance between the speaker and the listener. ALDs can bring the sound directly to the user's ears without increasing background noise and can be used with or without hearing aids. Assistive Listening Devices include Personal, FM, Infrared, Loop, and Television Systems.

Phonak's Inspiro FM system is worn (left) by the speaker which then transmits the sound via a boot (below, encircled) which is plugged into the BTE hearing aid, allowing the sound to be received by the user.


Product photos courtesy of PHONAK®

- **FM Assistive Listening Systems** use a specific radio frequency (generally 216-217 MHz) to carry sound from the transmitter to the receiver. The sound source can be either a microphone or audio input. FM systems are the most versatile since they are portable. Both the user and speaker have complete mobility. These are ideal for classrooms, meetings, television, music players and cell phone interfacing.
- **Infrared Assistive Listening Systems** use invisible infrared light waves to carry sound from the transmitter to the receiver. Infrared systems are considered to be line-of-sight devices often used in theaters, courtrooms, and meetings. The infrared system uses a single transmitter and one or more receivers, which must be on the same channel (95 KHz, 250 KHz and 2.3 MHz). The receiver converts the infrared light waves back into sound, which then can be amplified.
- **Loop Assistive Listening Systems** use a wire antenna "loop" that surrounds a room. A transmitter circulates a signal through the loop wire creating a magnetic field. Hearing aid users and cochlear implant users with a telecoil switched to "t-coil" will pick up the signal when they are within the "looped" area.
- **Personal Assistive Listening Devices** pick up a sound through a microphone, amplify the sound and direct the sound to the ears through earbuds, headphones,

or a neckloop for listeners with “t-coils” in their hearing aids or cochlear processor.

These products represent some of the many advances in technology that are continually developing to help our children lead safer, more enjoyable and more independent lives. For more information about assistive listening technologies, read our newsletter online: **http://www.choicesforparents.org/wp-content/uploads/2010/05/Newsletter-Technology-new.pdf.**

Edited by Michelle Maher of HITEC®, Inc., Paul Lurie of the Foundation for Hearing and Speech Rehabilitation Dawn Violetto of Child's Voice School (2010) and Helen Cartwright, M.S. Advanced Bionics (2014).

Relay Services

There are many available technologies for children who have difficulty with discrimination of speech on the telephone. This difficulty is compounded by the poor voice quality of many users of cell phones and speakerphones. A technology that provides assistance by converting speech to sign/text is the nationwide relay system. It is a 24/7 free service in all states for domestic calls. Long distance calls are charged normally. The essential feature of the relay system is that the child with a hearing loss views a screen on which spoken text is signed/typed. The calls are treated as confidential by the communication assistant (CA).

The relay system works in several modes that all start by contacting a CA employed by one of the services systems operated by the major telecommunication land line carriers. The contact may initially be made by telephone through a free 800 or 7-1-1; or be made by computer through the internet or by a computer or PDA. **The basic relay modes are:**

Video Relay Services (VRS) – This enables individuals who use sign language to make relay calls through the use of CAs who can interpret their calls. The caller signs to the CA with the use of video equipment and the CA voices what is signed to the called party and then signs back to the caller. This type of relay service is not required by the FCC, but is offered on a voluntary basis by certain programs. This option is helpful for people who use American Sign Language (ASL) and for people who cannot type on the TTY easily, such as children who are ASL users.

Voice Carry Over (VCO) – The CA places the call to the hearing person and then transcribes what was being said onto a screen viewed by the child with a hearing loss. If both parties have a hearing loss, the CA could transcribe both ends of the conversation. The disadvantage of this system is that the other caller knows that a CA is involved.

Two Line VCO (2LVCO) – 2LVCO is initiated as described above and again the CA transcribes what is being said to the child with a hearing loss. However, in this mode, the child speaks normally into a standard telephone and his or her speech is not transcribed to the other person, i.e., the recording is one-way to the child. In this mode, the other person does not even have to know that the CA is typing on a screen being viewed by the child. In both cases the speaker needs no special equipment. However, the child needs access to the Internet and a separate phone for the voice connection. If access to the Internet is over a phone line using dial-up or DSL, a separate phone line would be needed for the data connection.

There are several ways that the transcription viewing can occur. The call to the CA can be initiated on any computer connected to the Internet or through the use of "terminal mode" on any computer. It can also be accessed on hand-held Personal Digital Assistants (PDAs) using proprietary devices with the "chat" (SMS) feature available on PDAs that have Internet access to the Website of the relay provider. The older technology, still in use, is called TTY/TTD. These devices have a one or two-line display that is inferior to the capabilities of a computer or PDA screen.

CapTel – A CapTel user dials the phone number of the person they wish to call using their CapTel phone. The CapTel phone automatically routes their call through the CapTel call center and connects them to their called party. At the call center, a specially-trained operator (a captionist) uses a customized voice-recognition computer and re-voices whatever is said by the called party. The technology transcribes the operator's voice into captions that appear on the CapTel screen. The user may also hear the other party's voice to the best of their ability. The CapTel operator does not hear and does not caption what the CapTel user says.

Hearing Carry Over (HCO) – Hearing Cary Over is designed for individuals with a speech disability that can hear on the telephone, but need to type their response on a TTY instead of speaking. The HCO user types his/her conversation for the CA to read and voice to the standard telephone user. When the standard telephone user speaks back, the HCO user will hear the response. Call your relay service provider for more detailed information.

Speech to Speech (STS) – All states offer STS, which enables individuals with speech disabilities to communicate by voice through a CA rather than by typing on a TTY. Individuals call a patient, trained CA who is familiar with many speech patterns and has excellent language recognition skills. The CA makes telephone calls for the individual and repeats what is said. Call your relay service provider for more detailed information.

Spanish Relay Services – While Spanish relay is not required for calls between states, many states with large Spanish speaking populations already offer this service on a voluntary basis.

Skype and video-chatting – Skype and video-chatting are now popular and common modes of communication for individuals. Most computers come equipped with Web cams, or an external Web cam can be purchased for the computer. When both users are sitting in front of the cameras, they can be connected through the Internet and are able to view one another while they talk. Skype is a program that can be downloaded, which enables both users to view one another while they talk. Google Chat, which takes place through a Google Mail (or "G-mail") account is another popular way to video-chat and available on some phones, such as the iPhone.

This mode of communication has been very popular in the Deaf community, as it allows persons who are deaf to contact one another via the Internet and communicate with sign language. This way, both users can view one another while communicating with sign language.

Rear Window Captions – A type of captioning system used in public places, such as theaters, has the advantage of allowing those who desire captions to view them but does not require that all members of the audience view the captions. This rear window captioning system displays reverse captions on a light emitting diode (LED), which is mounted in the rear of the theater. Patrons desiring captions use transparent acrylic panels attached to their seats to reflect the captions so that they appear superimposed on

or beneath the screen. The reflective panels are portable and adjust, enabling the caption user to sit anywhere in the room.

More information about the relay system and CapTel is available in Illinois from the Illinois Telecommunication Access Corporation at **http://www.itactty.org/**, or visit the FCC Website at: **www.fcc.gov/cgb/consumerfacts/trs.html**.

Edited by Michelle Maher of HITEC®, Inc., June Prusak of the Chicago Hearing Society, Paul Lurie of the Foundation for Hearing and Speech Rehabilitation (2010) and and Helen Cartwright, M.S. Advanced Bionics (2014).

The FM Link: Communication in Action

Listening in background noise can be a challenge for everyone but is especially difficult for those with hearing loss. In fact one of the most common complaints of people with hearing loss is that they cannot hear and understand in noisy conditions. Listening in noise or at a distance can also be very tiring because hearing impaired people do not hear certain sounds and what they do hear may be distorted or unclear. For children with hearing loss, it is important that we provide them the clearest, most reliable signal possible because they are using this input to develop speech and language.

Teacher wearing FM Transmitter

Fitting the most appropriate amplification such as hearing aids or a cochlear implant is the first step to success for a child with a hearing loss, but even the best amplification is not always enough. In noisy places and at times when the speaker is more than a few feet away, it will still be difficult for the child to understand what is being said. For these challenges such as listening in a classroom, playing outside, or at a party, a child may need an FM system working along with his/her hearing aids or cochlear implant.

Transmitters

An FM system is like a radio and consists of two parts. One person uses a microphone to send a signal though the air as radio waves. This microphone is also referred to as the transmitter. These radio waves are picked up by small devices called receivers. Modern receivers usually plug directly into the listener's hearing aids or cochlear implant without the use of any cables. An FM system allows the child to hear the speaker (with the microphone) as if that person is standing right next to him/her even if the speaker is standing at the other end of a room and there is a lot of other noise in the room.

Receivers

ESPrit™ 3G behind-the-ear speech processor with an FM receiver attached.

Hearing aid with an FM receiver attached.

Images courtesy of Cochlear Americas and Phonak Hearing Systems

One of the most important features of FM systems for a child is the ability to use FM at the same time as a hearing aid or cochlear implant. In a classroom, for example, it is still crucial that the child hears his/her classmates at the same time that he/she is hearing and understanding the teacher. An FM system routes the teacher's voice directly into

the hearing aid or implant at the same time that the rest of the room is heard normally. This keeps the child in touch with all activity in the room but still gives that extra boost to the teacher who may not be standing nearby while providing important instruction.

When purchasing an FM system, there are several factors to consider. It should first be decided where the child has the hardest time listening and understanding. The user's ability to accept and manage such a device may also be a consideration. After identifying where the FM will primarily be used, it is also important to consider the training needs of the participants, including school staff, other students, family members and even the user him or herself since many people in contact with the child may not be familiar with FM systems. These factors may affect the style and features chosen. All of these issues should be discussed with your audiologist when selecting the best system for your child.

FM should be a consideration for all hearing impaired children from day one. Whether riding in a car, playing on a field, or studying in a classroom, this technology provides the freedom to participate in even the most difficult listening situations. It provides the most reliable access to speech and language regardless of the surroundings. FM is the link for active communication.

Edited by Patrick Henry and Christine Jones of Phonak Hearing Systems (2010) and Helen Cartwright, M.S. Advanced Bionics (2014).

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Technology for Your Child

As your child with a hearing loss grows, you will want to make your home as visual as possible. Regardless of the amount of hearing your child has, or doesn't have, the more he knows about what is happening around him, the better able he will be to understand his environment. This newsletter will review some of the technology that you and your family may be using throughout the years including TTYs, amplified phones, closed captioning, the Relay Service, video relay, alarm clocks and visual emergency alerting devices.

TTYs and Amplified Phones[1]

TTYs and amplified phones can be obtained for free from the Illinois Telecommunications Access Corporation (see below) if eligible, or purchased from HITEC[2], the Chicago Hearing Society[3], or ICODA[4].

TTY: A TTY (teletypewriter or telecommunications device) has a keyboard and a visual display. Features such as printers, answering machines, memory dialing, and cellular connections can be found on different models. To communicate over the phone, the TTY user can call another individual who has a TTY and have a direct conversation. If calling someone who does not have a TTY, the TTY user will call the Telecommunications Relay Service (see below).

CapTel (combination phone with captioning screen): A CapTel user is able to voice for himself but cannot hear well enough even on an amplified phone. CapTel calls are routed through the CapTel call center, where they are connected to the standard telephone user. At the call center, a specially trained operator (a captionist) uses a voice-recognition computer to convert all of the standard telephone user's spoken words to text which is displayed on the CapTel phone user's screen. When the CapTel user speaks, his voice travels directly to the standard telephone user and when the standard telephone user responds, the words appear across the CapTel's screen for the CapTel user to read.

ITAC (Illinois Telecommunications Access Corporation)[5]

The purpose of ITAC is to provide telecommunications access to people who are unable to use the standard telephone. This includes those who are deaf, hard of hearing, late-deafened, speech-disabled or deaf-blind. ITAC accomplishes this goal by providing the Illinois Relay Service and by issuing equipment that enables people with disabilities to communicate with standard telephone users.

ITAC has two main programs. Under the voucher program the user owns and is responsible for the upkeep of the equipment (amplified telephones and TTYs). Under the loan program ITAC owns and provides normal upkeep of the equipment (CapTel, TTY with LVD, and Braille phone).

To find out more information about the equipment issued, application requirements and eligibility, contact ITAC at 800.841.6167 (v/tty) or *www.itactty.org*[6].

Closed Captioning[7]

Closed captioning allows persons with a hearing loss to have access to television programming by displaying the audio portion of a television program as text on the television screen.

Closed captioning provides a critical link to news, entertainment, and information for individuals who are deaf or hard-of-hearing.

1. "Babies and Hearing Loss" by CHOICES for Parents
2. HITEC, 8160 S. Madison St, Burr Ridge, IL 60527, phone: 800.288.8303, tty: 800.536.8890, *www.hitec.com*
3. *www.chicagohearingsociety.org* and click on Product Sales
4. ICODA (International Center on Deafness and the Arts), *www.icodaarts.org* or call 847.509.8260
5. Information taken from *www.itactty.org*
6. Illinois Telecommunications Access Corporation, 3001 Montvale Dr, Suite D, Springfield, IL 62704, 217.698.4170 or 800.841.6167 (v/tty), *www.itactty.org*

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P.O. Box 806045
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Tel: 866.733.8729 (toll-free)
Tel: 312.523.6400 (v/tty)
E-mail: choicesforparents@yahoo.com
Web: www.choicesforparents.org

Professional members of CHOICES for Parents include: Alternatives in Education for the Hearing Impaired, Catholic Office of the Deaf, Chicago Hearing Society a division of Anixter Center, Child's Voice, Children's Memorial Hospital, Cochlear Americas, Deaf Access Program Mt. Sinai, Foundation for Speech and Hearing Rehabilitation, Hearing and Vision Connections, HITEC, Illinois Service Resource Center, International Center on Deafness and the Arts, Low Incidence Cooperative Agreement, MENDAC Institute on Early Childhood, and Sertoma Speech

Beginning in July 1993, the Federal Communications Commission (FCC) required all analog television sets with screens 13 inches or larger sold or manufactured in the United States to contain built-in decoder circuitry to display closed captioning. Beginning July 1, 2002, the FCC also required that digital television (DTV) sets include closed captioning display capability.

In 1997, the FCC set a transition schedule requiring distributors to provide an increasing amount of captioned programming.

For more information on the FCC's closed captioning rules and requirements, as well as Spanish language captioning, exempt programming, and filing a complaint, contact the FCC at *www.fcc.gov/cgb/dro/caption.html*[8].

Illinois Relay Program

ITAC provides telecommunications relay service (TRS) in Illinois, through a contract with Sprint. Illinois Relay is a free service, available 24 hours a day, seven days a week.

TTY users use relay to call people who use standard phones. A person using a standard phone may also call a TTY user through relay.

A person who uses a TTY types his or her end of the conversation to a Sprint Relay operator, who then reads their words aloud to the person at the other end of the line. The operator then types that person's spoken words and relays them to the TTY user as text. Both users can call 711 to reach the relay services or use 10 digit phone numbers based on the type of relay call you wish to make.

To make a relay call from a standard telephone, follow these steps:

- Dial 711 or the traditional 10 digit number for voice users.
- You will hear, "Sprint Relay operator [number]. May I have the number you are calling please?"
- Give the Sprint Relay operator (communication assistant) the area code and telephone number of the TTY user who you wish to call.
- The Sprint Relay operator will process your call, reading aloud what the TTY user types, and will type what you say back to the TTY user.
- Be sure to talk directly to your caller, avoid saying "tell him" or "tell her."
- Say "go ahead" at the end of your responses.

All Sprint Relay calls are strictly confidential. Federal law requires strict confidentiality for the communication assistants. No part of the conversation that takes place between two callers is revealed or stored in written or verbal form.

There are additional phone numbers (10 digit phone numbers) and options when using the relay service, including the person with a hearing loss using his own voice, using Spanish, and more. For more information about the relay service in Illinois, contact ITAC.

Video Relay Service

Several companies operate Video Relay Service (VRS), a free service for the deaf and hard-of-hearing community that enables anyone to conduct video relay calls with family, friends, or business associates through an American Sign Language (ASL) interpreter via a high-speed Internet connection and a video relay solution (or VRS call option).

Video relay calls are placed over a high-speed or broadband Internet connection (i.e., DSL, cable, or T1 line) through a videophone appliance connected to a TV, or through a personal computer equipped with a Web camera and Sorenson EnVision SL (or Microsoft NetMeeting) software. The equipment can be used with any VRS service. The deaf user sees an ASL interpreter on their TV and signs to the interpreter, who then contacts the hearing user via a standard phone line and relays the conversation between the two parties. (Two users with a videophone can talk directly with each other.) Hearing customers can also place video relay calls to any deaf or hard-of-hearing individual by simply dialing a toll free number with a standard telephone.

For more information about video relay, go to *www.csdvrs.com*, *www.sprintvrs.com*, or *www.sorensonvrs.com*.

Alarm Clocks[9]

Alarm clocks are always important to consider for your child; especially when he/she is school-age. Alarm clocks can wake up your child by any of the following options: flashing light, vibration (with a bed shaker), audio alarm with adjustable tone and volume, or any combination of these. Some alarm clocks can work as a receiver for an alerting system. Such systems alert the person with the hearing loss that the phone is ringing or that there is someone at the door. Alarm clocks are also available in smaller more portable designs that are convenient for traveling.

Visual Emergency/ Warning Devices

There are various emergency/warning devices that are visual for your home. Some of these, such as fire alarms can be installed now, and some can be considered when your child is older or living on his own. For more information about emergency/warning devices, contact CHOICES for Parents.

When your child becomes older, or when communicating with an adult who has a hearing loss, you will encounter use of 2-way pagers and various computer technology. For more information, contact CHOICES for Parents.

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8. Federal Communications Commission, Consumer & Governmental Affairs Bureau (CGB), 445 12th St, S.W., Washington, D.C. 20554
9. Re-printed from *www.hitec.com*