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Assessing for and Understanding the Impact of Hearing Loss in Children

Prepared by Sally A. Arnold, Ph.D.

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Problem of Hearing Loss in Children

- Hearing loss is one of the most common childhood disabilities.
- The incidence of hearing loss in newborns is 1-6 per 1000.
- Estimates of prevalence rate in school-aged children range from 3-15%, depending upon the criteria used to define hearing loss.
- Hearing loss can negatively impact many areas of development, especially if the loss is inadequately diagnosed and treated.

Identification of Hearing Loss in Children

- All newborns in most states (including New York) are screened for hearing loss before discharge from the hospital.
- **HOWEVER:**
 - Many babies who fail the screening are lost to follow-up.
 - Many cases of hearing loss are not present at birth. An infant may pass the hearing screening as a newborn, but then acquire hearing loss later.

Identification of Hearing Loss in Children (cont'd.)

- Therefore, adults in the child's life (parents or other care givers, teachers, daycare workers, social service workers, etc.) should be alert to signs of possible hearing loss and seek appropriate testing if a loss is suspected.

Types of Hearing Loss

- Conductive
- Sensori-neural
- Mixed

Conductive Hearing Loss

- Problem with sound conduction through the ear canal, ear drum, or middle ear bones (*ossicles*)
- Usually correctable with either medical or surgical treatment

Some Causes of Conductive Hearing Loss in Children

- Otitis media
 - fluid in the middle ear which may or may not be infected
 - some causes are: colds, allergies, poor Eustachian tube function, exposure to second hand smoke
- Perforated eardrum
- Impacted ear wax (*cerumen*)
- Infection in the ear canal (*swimmer's ear*)
- Foreign body in the ear canal
- Malformations of the external ear, the ear canal, or middle ear

Sensori-neural Hearing Loss

- Caused by damage to the inner ear (*cochlea*) or nerve pathway from inner ear to brain
- Typically permanent (cannot be corrected medically or surgically)

Some Causes of Sensori-neural Hearing Loss in Children

- Genetic
- Maternal infections during pregnancy, such as toxoplasmosis, syphilis, cytomegalovirus (CMV), genital herpes, rubella
- Low birth weight (less than 3.3 pounds)
- Conditions at birth requiring prolonged stay in the neonatal intensive care unit (NICU) for two days or more

Some Causes of Sensori-neural Hearing Loss in Children (cont'd.)

- Various bacterial and viral diseases such as meningitis
- Drugs that are toxic to hearing (e.g. certain types of antibiotics and cancer drugs)
- Exposure to loud noise (e.g. from live rock concerts, MP3 players, firecrackers)
- Head trauma requiring hospitalization

Mixed Hearing Loss

- Caused by any combination of conductive and sensori-neural hearing loss
- Problem in the outer or middle ear *and* inner ear or neural pathway

Degree of Hearing Loss

The magnitude of the hearing loss may be classified as either:

- slight
- mild
- moderate
- severe
- profound

Impact of Hearing Loss Upon Children

- Hearing loss can affect many areas of the child's life, including:
 - speech and language development
 - academic achievement
 - psychosocial well-being
- In general, the extent of the impact is directly related to the degree of hearing loss.

Impact Of Hearing Loss Upon Children (cont'd.)

- *However, even children with slight or mild loss, or hearing loss in one ear only, can experience negative consequences.*
- The impact of the hearing loss can be minimized by early identification and intervention.

Potential Effects of Hearing Loss Upon Speech and Language Development

- Vocabulary develops more slowly
- Learn concrete words (e.g. dog, cup) more easily than abstract words (e.g. good, yesterday)
- Have difficulty understanding multiple meanings of words
- Use and understand shorter and simpler sentences than typically-developing children
- Have difficulty understanding complex sentences

Potential Effects of Hearing Loss Upon Speech and Language Development (cont'd.)

- Have trouble with plurals, past tense, and possessives because they can't hear word endings (s, ed)
- Child's speech may be difficult to understand
- May mispronounce or omit certain speech sounds (e.g. s, f, th, sh, k) because they don't hear them
- May speak too loudly or too softly, pitch may be too high or monotone, may use inappropriate inflection

Potential Effects of Hearing Loss Upon Academic Achievement

- Children with hearing loss often have academic difficulty because:
 - they may have language deficits which impact their learning; and
 - they miss out on much of what's being said by the teacher and other students in classroom.
- Academic problems can occur in all subject areas, but especially reading and math.

Potential Effects of Hearing Loss Upon Academic Achievement (cont'd.)

- Without proper management:
 - children with mild-moderate hearing loss typically achieve skills 1 to 4 grades lower than same-age peers
 - children with severe to profound hearing loss typically achieve skills no higher than 3rd or 4th grade level

Potential Psychosocial Effects of Hearing Loss

- May be viewed as socially awkward or immature because they miss subtle conversational cues.
- May have difficulty socializing with peers, especially in noisy settings such as cafeteria or playground or group learning situations.
- If hearing loss is not recognized and understood, others may view child as “hearing when he wants to” or “not paying attention/ daydreaming.”
- Others may view child as less capable because of difficulties understanding in class.

All of the above can lead to reduced self-esteem, social isolation, and a sense of rejection.

Appropriate Services

Services for children with hearing loss include both *assessment* and *rehabilitative measures*.

Components of Assessment

Assessment includes:

- Audiological evaluation by a licensed audiologist to:
 - determine the type and degree of hearing loss
 - determine if child needs an amplification device, and if so, what type
 - refer for other services as appropriate (e.g. medical, speech-language pathology, educational programming)

Components of Assessment (cont'd.)

- Medical evaluation by either a pediatrician or ear-nose-throat physician to:
 - diagnose the cause of the hearing loss if possible
 - provide medical and/or surgical treatment for correctable causes of hearing loss (e.g. otitis media)

Rehabilitative Measures

Rehabilitative measures for hearing impaired children include *amplification, speech / language therapy, and school accommodations.*

Rehabilitative Measures: Amplification

There are a variety of devices to help the child overcome the loss of hearing, including:

- hearing aids
- cochlear implants
- classroom amplification (FM) systems

Hearing Aids

- Hearing aids are selected, fit, and programmed by the audiologist to conform to the child's specific hearing loss.
- Hearing aids can be fit as young as a few weeks of age; in fact, EARLIER IS BETTER!
- Most children wear the behind-the-ear style, which consists of a case that fits behind the ear and a custom-made ear mold that sits in the child's ear.
- The ear mold must be remade one to four times per year as the child's ear grows.

Hearing Aids (cont'd.)

- Function of the hearing aids should be briefly checked daily by either the parent, teacher, or speech-language pathologist.
- Hearing aids should be worn daily during all waking hours for maximum benefit.

Cochlear Implants

- Children with profound hearing loss who receive limited benefit from hearing aids are potential candidates for a cochlear implant.
- The implant provides sensation of sound through direct electrical stimulation of the hearing nerve.
- The cochlear implant consists of:
 - an internal portion which is surgically implanted in the cochlea
 - an external portion which is worn on the head near the ear

Cochlear Implants (cont'd.)

- Children as young as 12 months of age can receive an implant.
- The child's audiologist refers potential candidates to the closest implant center for evaluation and possible implantation.
- Outcome of cochlear implant use is variable, ranging from no benefit (not hearing anything at all) to excellent benefit (being able to hear and understand conversational speech).
- Extensive long-term rehabilitation from audiologists and speech-language pathologists is important to optimize benefit from a cochlear implant.

Classroom Amplification (FM) Systems

- Helps child hear in the noisy classroom environment
- Maintains teacher's voice at consistently strong level regardless of distance between teacher and child
- Teacher wears a microphone and transmitter
- Child wears a receiver which typically attaches to the hearing aid
- Teacher's voice is transmitted via radio waves directly to child

Classroom Amplification (FM) Systems (cont'd.)

- Another type of FM system (*sound field*) transmits the teacher's voice to speakers which are placed around the room.
- Children with lesser degrees of hearing loss are candidates for this type of FM system.

Rehabilitative Measures: Speech-Language Therapy

- Services of a speech-language pathologist are often needed to diagnose and treat any speech and/or language deficits that may occur as the result of the hearing loss.
- Services are typically provided at home (for infants), at preschools, schools, or speech-language clinics.

Rehabilitative Measures: School Accommodations

In addition to classroom amplification systems, a number of accommodations may be implemented at school to enhance learning, including:

- preferential seating near the teacher
- reduction of auditory distractions (e.g. background noise)
- use of visual aids (e.g. overheads, vocabulary lists, lecture outlines)
- allowance of extra time for processing information

Rehabilitative Measures: School Accommodations (cont'd.)

- pre-teaching material and new vocabulary
- providing a note taker for lecture format classes
- monitoring child for fatigue and providing breaks from listening
- tutoring
- using supplemental materials to reinforce concepts
- providing an educational interpreter if child uses sign language

Referring a Child Suspected of Hearing Loss

- Any child showing signs of possible hearing loss (see below) should be referred to a *licensed audiologist* for hearing testing.
- If a hearing loss is confirmed, the audiologist will initiate the rehabilitative process.

Signs of Possible Hearing Loss

Suspect a hearing loss if child is *not* meeting the following developmental milestones:

- birth to 3 months: startles to loud sounds, stirs or wakes up when someone makes noise, recognizes mothers voice, stops playing and listens to new sounds
- 3 to 6 months: shifts eyes towards sound, appears to listen, awakens easily to sounds
- 6 to 12 months: turns head toward sounds, understands “no” and “bye-bye,” begins to imitate speech sounds

Signs of Possible Hearing Loss (cont'd.)

Developmental milestones (cont'd):

- 18 months: imitates environmental sounds, knows names of body parts and familiar objects, uses 10-20 words
- 24 months: responds to sounds at home (e.g. doorbell), begins to use 2-word phrases, uses at least 50 words, speech is 50% intelligible to strangers
- 36 months: hears TV at same loudness as family members, uses at least 500 words, 80% intelligible to strangers

Signs of Possible Hearing Loss (cont'd.)

Additional signs of possible hearing loss include:

- child responds inconsistently to sound
- child frequently turns the sound up on radios, TV, CD's, etc.
- child frequently says “huh” or “what”
- child does not respond when called
- child does not follow directions
- teachers or daycare providers express concern regarding child's hearing

Finding a Qualified Audiologist

Licensed audiologists who work with children are employed at a variety of facilities, including:

- hospitals, especially pediatric hospitals
- free-standing speech and hearing centers
- local colleges and universities that have audiology training programs
- private audiology practices

Websites to Find an Audiologist in a Specific Geographic Location

American Speech-Language-Hearing Association:

www.asha.org

(Under “Quick Links” on the homepage, click on “Find a Professional”)

American Academy of Audiology:

www.audiology.org

(Under “Quick Links” on the homepage, click on “Find an Audiologist”)

Resources for Additional Information about Childhood Hearing Loss

- Alexander Graham Bell Association for the Deaf and Hard of Hearing: www.agbell.org
- American Academy of Audiology: www.audiology.org
- American Speech-Language-Hearing Association: www.asha.org

Resources for Additional Information About Childhood Hearing Loss (cont'd)

- Beginnings for Parents of Children who are Deaf or Hard of Hearing, Inc. www.ncbegin.org
- The Children's Hearing Institute: www.childrenshearing.org
- The Listen-Up Web: www.listen-up.org