Rehabilitation of Sensory disorders

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Sensory disorders

- Blind or visually impaired child
  - Blindness
  - Low vision
- Hearing loss
Blindness and visual impairment
### Global estimate of visual impairment, by WHO region (millions), 2002

<table>
<thead>
<tr>
<th>Region</th>
<th>African Region</th>
<th>Region of the Americas</th>
<th>Eastern Mediterranean Region</th>
<th>European Region</th>
<th>South-East Asia Region</th>
<th>Western Pacific Region</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>672.2</td>
<td>852.6</td>
<td>502.8</td>
<td>877.9</td>
<td>1,590.8</td>
<td>1,717.50</td>
<td>6,213.90</td>
</tr>
<tr>
<td># of blind people</td>
<td>6.8</td>
<td>2.4</td>
<td>4</td>
<td>2.7</td>
<td>11.6</td>
<td>9.3</td>
<td>36.9</td>
</tr>
<tr>
<td>% of total blind</td>
<td>18%</td>
<td>7%</td>
<td>11%</td>
<td>7%</td>
<td>32%</td>
<td>25%</td>
<td>100%</td>
</tr>
<tr>
<td># with low vision</td>
<td>20</td>
<td>13.1</td>
<td>12.4</td>
<td>12.8</td>
<td>33.5</td>
<td>32.5</td>
<td>124.3</td>
</tr>
<tr>
<td># with visual impairment</td>
<td>26.8</td>
<td>15.5</td>
<td>16.5</td>
<td>15.5</td>
<td>45.1</td>
<td>41.8</td>
<td>161.2</td>
</tr>
</tbody>
</table>
Global estimate of visual impairment by WHO region

- SE Asia: 27%
- W Pacific: 26%
- Africa: 17%
- Eastern Med: 10%
- Americas: 10%
- Europe: 10%
Figure reference: WHO 04.138

Global causes of blindness as a proportion of total blindness in 2002

- Cataract: 47.8%
- Others: 13%
- Glaucoma: 12.3%
- AMD: 8.7%
- Corneal opacity: 5.1%
- Diabetic retinopathy: 4.8%
- Ophthiriasis: 0.8%
- Childhood blindness: 3.9%
- Trachoma: 3.6%
Treatment Continuum within Performance Model

Cardiorespiration

Sensorimotor

PERFORMANCE
Cognitive/
cognitive integration

Psychosocial/
Psychological

* ADL: - feeding & eating
  - mobility
  - communication,
  - etc

* Work /productive
  activities

* Play/leisure

Performance
Purposeful activities

Enabling activities
The contributions of **visual** and **acoustic senses** are understandably great both in the:

- Orientation and mobility
- Accessibility
- Communication and correspondence
Blind or visually impaired child

Problems

• Motor
• Sensory
• Cognitive
• Interpersonal
• Interpersonal
• Self care
• Productivity
• Leisure
Perceptual-motor ability

- Doesn’t use hands for exploring environment
- Doesn’t like the prone position since vision doesn’t act as a motivator to raise head
- Delays in elevating to prone, creeping, crawling, rising to sitting, standing and walking
- Fine motor skills requiring manipulation and dexterity may be delayed because of
## Comparison of Developmental Norms between Sighted and Blind Children (mean ages)

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Sighted (in months)</th>
<th>Blind (in months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midline reach in response to sound only</td>
<td>4 to 5</td>
<td>8.0</td>
</tr>
<tr>
<td>Elevates self by arms to prone</td>
<td>2.1</td>
<td>8.75</td>
</tr>
<tr>
<td>Rolls from back to stomach</td>
<td>6.4</td>
<td>7.25</td>
</tr>
<tr>
<td>Crawling on all fours</td>
<td>7.1</td>
<td>13.25</td>
</tr>
<tr>
<td>Raises self to sitting position</td>
<td>8.3</td>
<td>11.00</td>
</tr>
<tr>
<td>Pulls up to stand</td>
<td>8.6</td>
<td>13.00</td>
</tr>
<tr>
<td>Walks with hands held</td>
<td>8.8</td>
<td>10.75</td>
</tr>
<tr>
<td>Walking alone across room</td>
<td>12.1</td>
<td>19.25</td>
</tr>
</tbody>
</table>

Perceptual - motor ability

- Avoid gross motor activities because fear of movement; thus coordination and bilateral integration are poor.
- Development of righting and equilibrium reactions may be delayed positive and balance may be poor.
Sensory

- Tactilely defensive when picked up, bathed or having diapers changed
- Blindism (self-stimulatory mannerism) such as head-rolling; eye-rubbing, pressing-pocking; hand-fingering or rubbing, rocking or swaying the body, flicking or waving the hands in front of the eyes and dropping the chin to the chest
- Difficulty with spatial or temporal tasks and become easily lost
Sensory

- Poor body awareness, lateralization and directionality
- Hyper- or hypo-responsive to vestibular stimulation
- Fearful of unfamiliar voices or noises
- A strong reaction to certain odors or smells
Cognitive

- Poor attending behavior and awareness of the environment
- Tendency to use haptic memory rather than spatial or auditory memory
- No concept of object permanence
Intrapersonal

• Early non verbal language is delayed, such as facial expression and smiling
• Separation anxiety may be more severe and last longer than in other children
• Lacks visual feedback about socially approved behavior and non verbal communication
• Tendency to be passive in the environment
• Withdraw from the environment
Orientation and mobility

• The ability to negative safely, independently and confidently in the environment

• Based on each person’s needs, abilities and environment

• Training programs:
  sensory training
  concept development and motor skills
  long-care skills
  moving with sighted guides
Models of treatment are based on
• sensory integration
• stages of development
• Neuro-developmental therapy
Sensory training

• Learning how to use and sharpen the senses:
  determined landmarks, orient to surroundings maneuver safely within and environment
• Promote tactile sensory sensitivity and discrimination through the use of various textures
• Decrease tactile defensiveness, through the use of pressure
Sensory training

• Promote vestibular sensitivity and discrimination through linear acceleration & deceleration
  Maximize use of tactile perceptual, auditory perceptual, visual perceptual and kinesthetic senses

• Discourage blindism by charging the child’s behavior to some purposeful movement or activity, especially those related to vestibular or proprioceptive stimuli
Concept development and motor skills

Concept development

Learning spatial concept and understanding fundamental structures such as compass direction, building layout

Sardegna & Paul, 1991
Concept development and motor skills

Motor skills

• Encourage physical movement in space, such as rolling, amphibian crawl, creeping, walking using auditory sounds

• Promote reflex maturation through modulation of sensory sensitivities and the opportunity to experience various positions
Concept development and motor skills

Motor skills

- Encourage use of hands for exploration and manipulation
- Decrease fear of movement through a gradual introduction to vestibular and proprioceptive stimuli
Long - cane skills

- After the above listed skills and other fundamental skills are mastered
- Training involves: the correct grip, movement of the cane, and use of the care while walking to identify and maneuver obstacles
- The purpose of the care is to alert the user not only to obstacles but also to changes in the terrain
Communication and Correspondence

• The Braille system, magnification and voice synthesizers

• The Braille system:
  1. A tactile system that consists of raised dots
  2. The dot system is based on a configuration of six dots, when used individually or in combinations, can represent each letter of the alphabet and form punctuation as well as 189 contractions and standard abbreviations
3. An average Braille reader using both hands can achieve a speed of 300 or more words per minute  
    (Sardegna & Paul 1991)

4. Braille writers are available in both manual and electric models  
    (Lowenfeld, 1971)
• Visual aid - magnifier
  magnification aids
  make ordinary - sized
  print readable for
  some visually
  impaired people
  ( low vision )
• Voice synthesizers -
  computer programs
Aural Habilitation / Rehabilitation
Aural Habilitation / Rehabilitation

A collection of services and procedures that are designed to help a person cope with the difficulties presented by hearing loss

(Schow & Nerbonne, 1996)

The goal: to improve communication
Aural Habilitation / Rehabilitation

1. Amplification (Personal hearing aid, Cochlear implant, Assistive listening devices)

2. Auditory training

3. Aural /Oral and manual communication methods
Conventional hearing aids

The most common types of conventional hearing aids:

- In-the-canal (ITC)
- In-the-ear (ITE)
- Behind-the-ear (BTE)
Amplification

Personal hearing aid

• To amplify a speech signal and deliver it at an appropriate level above threshold in the impaired range (Ross, 1994)

• If the degree of the patient’s hearing impairment is sufficient to cause communication disorder
**Behind-the-ear (BTC)**

- Consist of a hard plastic case worn behind the ear and connected to a plastic earmold that fits inside the outer ear.
- The electronic parts are held in the case behind the ear. Sound travels from the hearing aid through the earmold and into the ear.
- BTE aids are used by people of all ages for mild to profound hearing loss.
In-the-canal (ITC)

- For mild to moderately severe hearing loss.
- ITC hearing aids are very small and the casing is individually made.
- The aid has to be set up to individual requirements and there will be no adjustment without a visit to the audiologist.
- These hearing aids are fiddly to take in and out.
In-the-ear (ITE)

- Fit completely inside the outer ear and are used for mild to severe hearing loss. The case holding the electronic components is made of hard plastic.
- Some ITE aids may have certain added features installed, such as a telecoil, a small magnetic coil that makes it easier to hear conversations over the telephone.
- ITE aids usually are not worn by young children because the casings need to be replaced often as the ear grows.
Hearing Aid

Three basic components

• the microphone
• the amplifier
• the receiver
Personal hearing aid

The microphone

Picks up the sounds in the environment and converts the acoustic signal to an electrical signal which is channeled to the amplifier
Personal hearing aid

• The *amplifier*: increases the amplitude of the electrical signal and sends it to the receiver.

• The *receiver*: converts the amplified electrical signal back into acoustic energy and routes it to the ear canal.
Normal Hearing
Amplification

- **Cochlear implant**: an amplifying device that consists of several parts: the microphone, speech processor, external transmitter, internal receiver and wire coil.

- **Assistive listening devices**
Cochlear Implants

- Severe or profound deafness and who cannot benefit from conventional amplification
- Profound deafness result from a loss of hair cell function in the cochlea. As a result, neural impulses are not generated, and electrical activity in the auditory nerve is not initiated.
Cochlear Implants

• Designed to stimulate the auditory directly. An electrode is surgically implanted into the cochlea.

• The electrode is attached to an electronic circuit which is implanted in the temporal bone.
Aural Rehabilitation

Children

• The most important components of a rehabilitation program are early identification and early intervention.

• The sooner a child is identified, the sooner the channels of communication required for language development can be opened.
Aural/Oral and manual communication methods

The aural/oral approach emphasized

• The use of residual hearing to receive language and the spoken word to express language.
• One of the most difficult issues, especially children is how to determine which mode of communication is best for the client.
• Many factors are to be considered, such as the amount of residual hearing, language and cognitive abilities, manual dexterity, and client preference.
Auditory Training

• Once the appropriate amplification device has been obtained, patients may need to be taught (or retaught) how to use residual or remaining hearing.

• Goal: to maximize a person’s use of speech and non-speech cues (Schow & Nerbonne, 1996)
Aural Rehabilitation

Children

• **Oral approach**: to help the child to develop oral skills that will allow for a mainstreamed education and lifestyle.

• **Manual approach**: to help the child develop language through a sensory system that is not impaired. The child learns sign language as the method of communication.

• Combining oral and manual communication in a “total communication approach” emphasizing language development without regard to the sensory system. This approach seeks to maximize both language learning and oral communication.
Carhart approach to auditory training

- Step 1: Develop an awareness of sound.
- Step 2: Gross or general sound discrimination.
- Step 3: Broad discrimination among simple speech patterns.
- Step 4: Development of finer discrimination of speech.

Develop an awareness of sound

The clinician presents various sounds until the child can detect the presence of sound, understand that sound have meaning, and pay attention to sound.
Gross or general sound discrimination

The child is taught that

• Different sources generate different sounds

• To distinguish between very dissimilar sounds (such as a car horn versus a doorbell)

• To discriminate between the suprasegmental aspects of sound, such as loud versus soft intensity, high versus low pitch, long versus short duration.
Broad discrimination among simple speech patterns

The child is now ready to apply knowledge gained from the first two steps to speech sounds. Usually, the clinician begins with vowel discrimination (e.g., /i/ vs /a/) or discrimination of meaningful familiar phrases, such as “good morning” or “how are you?”
Development of finer discrimination of speech

The child practices distinguishing all of the different speech sounds that are available to him or her, depending upon the type and degree of hearing loss.
Hearing aid

**CIC** (Completely-in-the-Canal)
The smallest of all hearing instruments, these are designed to hide more completely in the ear canal and are virtually invisible when worn.

**ITC** (In-the-Canal) and **HS** (Half-Shell)
Still small and discreet, these models are easy to handle and offer the user additional control functions.

**ITE** (In-the-Ear)
This size features the widest selection of user-controlled functions and comfort features.

**BTE** (Behind-the-Ear)
These instruments fit snugly behind the ear and can be connected to external sound sources such as TV's or infrared listening systems.
Thank you...