



ISSUES OF SPEECH TRAINING FOR CHILDREN AFTER COCHLEAR IMPLANTATION

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Article history:	Abstract:
Received: 7 th February 2026 Accepted: 6 th March 2026	The article highlights the issues of creating the necessary conditions for the successful development of speech in deaf children after cochlear implantation. It covers topics such as fine-tuning the speech processor, developing communication skills, improving the ability to perceive ambient sounds and speech using sound-producing devices, enhancing language proficiency, and forming written speech skills based on oral speech.
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Throughout their lives, children acquire social experience, universal human and national ethical norms, receive education, and gradually mature mentally and physically in all aspects. For children with hearing impairments, this process occurs with difficulty, and they become more dependent on the assistance of adults. Following cochlear implantation, the goal is to shape children's auditory perception and speech, teach them to understand and use the speech of others, communicate, and bring their speech to the level of a child with normal hearing. Full mastery of oral speech for a child with hearing loss requires developing the ability to understand a partner's conversational speech freely and to speak clearly and intelligibly for others. The formation of oral speech involves the continuous development of hearing abilities in students with hearing impairments through the use of individual hearing aids. Several surdopedagogues (teachers of the deaf), such as E.L. Goncharova, I.V. Koroleva, O.I. Kukushkina, E.V. Mironova, O.S. Ni-Kola, A.I. Sataeva, and N.D. Shmatko, have proven the necessity of comprehensive psychological and pedagogical rehabilitation for children after cochlear implantation surgery.

The transformation of a child's condition during the process of cochlear implantation and subsequent rehabilitation has led to the emergence of a new phenomenon in surdopedagogy. Educating a child with a cochlear implant alongside healthy peers is a relatively new development for the national education system. To fully utilize the hearing capabilities gained through Cochlear Implantation (CI), children require post-operative rehabilitation. Without this, it is impossible to achieve optimal results in forming and developing natural auditory-speech behavior skills after surgery. The main goal of the post-cochlear implantation rehabilitation course is to teach the child to perceive and understand verbal and non-verbal sound signals, as well

as to use new auditory sensations for speech development. The post-operative rehabilitation process involves a team of specialists: audiologists, psychologists, speech therapists, surdopedagogues, and others. The rehabilitation course for preschool children after cochlear implantation consists of the following components:

- Fitting and tuning the speech processor for the cochlear implant.
- Development of auditory perception and speech.
- General development of the child—memory, attention, motor skills, and non-verbal intelligence.
- Psychological support for the child and their family.

Connection to the Speech Processor

3-4 weeks after the cochlear implantation surgery, the speech processor is connected to the implant and undergoes its initial configuration. An audiologist handles the tuning of the speech processor to achieve optimal effectiveness in forming auditory sensations. From this moment, the child can hear sounds, but long sessions with an audio-tutor are required to perceive and understand them correctly. The first activation and adjustment of the speech processor in young children is a very complex process, as they cannot always account for their sensations, even if they have prior hearing experience. Therefore, special pedagogical exercises are needed to develop a conditioned motor response to a signal (e.g., placing rings on a pyramid upon hearing a sound, dropping cubes into a car body, beating a drum, or putting buttons in a box to the sound of "pa-pa-pa," etc.).

It is crucial that auditory development activities begin in the pre-operative stage and continue after surgery (one week after the removal of sutures) until the speech processor is turned on. The main goal of lessons at this stage is to prepare for the introduction of the cochlear

implant—specifically, to develop a conditioned reflex motor response to sound. During these sessions, the child also becomes accustomed to systematic work, developing perseverance and the ability to listen.

After the initial tuning of the cochlear implant's speech processor, the child may only hear very loud sounds (and may not show any reaction at all), but adaptation to new sensations, further tuning, and learning gradually result in the perception of quiet sounds. At this stage, the teacher's observation is vital to evaluate the child's developing ability to distinguish between low-frequency and high-frequency sounds. Specifically, a useful criterion for the adequacy of the settings is the child's ability to hear low, medium, and high-frequency phonemes or words.

Development of Auditory Perception and Speech

The surdopedagogue trains the child to utilize their newly acquired hearing, develops the correct perception of ambient sounds, and assists in the formation of oral speech. In a child with CI (Cochlear Implant), auditory perception should be developed in the following areas: sound detection, localization of the sound source in space, differentiation between speech and non-speech sounds, distinguishing and identifying various characteristics of sounds, isolating and recognizing non-speech environmental sounds, and differentiating, identifying, and recognizing various speech signals (phonemes, words, phrases).

Pedagogical Rehabilitation of Children after Cochlear Implantation

Unlike conventional hearing aids that simply amplify sound, a cochlear implant bypasses the non-functioning parts of the ear and sends signals directly to the auditory nerve. During surgery, an electrode system is inserted into the patient's inner ear, which provides the perception of sound information through electrical stimulation of the preserved fibers of the auditory nerve. However, on its own, cochlear implantation does not immediately allow deaf children to distinguish sound signals and use speech for communicative purposes after the speech processor is connected. Therefore, after the initial tuning of the cochlear implant processor, the child requires pedagogical support in developing hearing and speech. Research into post-operative pedagogical rehabilitation has shown that results in preschool children can vary significantly depending on several factors, regardless of the child's chronological age:

1. The level of auditory development and the presence of auditory experience prior to cochlear implantation.
2. The developmental level of the child's language ability and speech activity.
3. Individual psychological characteristics.
4. The presence of comorbid conditions (vision, intelligence, etc.).
5. The active involvement of parents (or legal guardians) in the rehabilitation process.
6. The success of the surgical procedure.
7. The adequacy of the speech processor settings.
8. The consistency of wearing the cochlear implant.

9. The emergence of positive experiences in developing hearing and speech skills.

All young children with cochlear implants can be divided into three groups based on their level of auditory development:

1. Children who became deaf in the pre-lingual period (before acquiring speech). This category includes all congenitally deaf children who received a cochlear implant before the age of three.
2. Children who have auditory experience but lost their hearing during the speech acquisition period.
3. Children who were fitted with prosthetics at an early age and worked effectively with speech-language specialists.

When developing auditory perception in children after cochlear implantation, the following must be kept in mind:

- The child's auditory and visual attention must be secured before presenting a signal.
- Until adequate tuning of the CI processor is achieved, children may not hear quiet sounds; therefore, sounds of sufficient volume must be used to elicit a reaction.
- The duration of the latent reaction to sounds is often increased; thus, after providing a sound, a pause is necessary to allow time for a response. If no response occurs, the signal should be repeated.

Children often develop a reaction to the timing of the stimulus delivery rather than the sound itself. Therefore, when developing a motor response to sound, it is necessary to vary the intervals between signals.

With regular work from teachers and parents, auditory skills in young children after cochlear implantation develop much faster than with conventional hearing aids. This is especially true for children who lost their hearing during the speech acquisition period and already have auditory experience. The rapid development of auditory perception stands in stark contrast to the child's gradual ability to form a stable connection between the sound image of a word and the object it represents (a child may repeat words without understanding their meaning at first).

In the first month after the initial activation of the speech processor and the start of lessons, most children can aurally distinguish between "loud-quiet," "long-short," and words with different numbers of syllables. However, for a child to understand speech, it is not enough to simply teach them to detect, differentiate, and recognize speech signals. The child must master the language system—learning the meanings of many words, their phonetic structure, the rules for modifying and combining words in sentences, and using language as a tool for communication. The goal of these lessons is to learn word meanings and build an expressive vocabulary. Once the speech processor is turned on, this work continues with the active involvement of the auditory analyzer. Parents play a leading role in vocabulary building; they must be taught the importance of this work for developing speech comprehension. Unlike typical hearing aids, the rapidly

growing hearing capacity of a child with a cochlear implant allows them to perceive even the smallest segments of speech signals—word elements, prefixes, and prepositions—which serve as formative elements and determine the syntactic structure of an utterance. This allows the child to master morphology and syntax rules in the early stages, especially those with prior auditory experience.

In most cases, the spontaneous speech of young children undergoing cochlear implantation is either non-existent or limited to unconscious babbling. After the processor is turned on, work on forming oral speech is based on developing rapidly improving auditory perception, concepts of the world (objects, phenomena, their properties, and functions), and the child's ability to imitate sounds and articulation. Writing and reading (global and syllabus-based) are utilized in the educational process. While results vary, by the end of the first year—with intensive support from parents—the child begins to actively imitate the speech characteristics of those around them. Many children develop the ability to form phrases from several words within 1.5 years of the operation, and their vocabulary begins to grow significantly. Two years post-surgery, the child forms stable speech, allowing them to communicate in daily life, talk about what they see, recite poems, and sing songs.

A child's speech and hearing development directly depend on their level of psychophysical development. Therefore, sessions to develop non-verbal functions are essential after cochlear implantation. This non-verbal development is based on age-appropriate kindergarten programs and includes:

- a) **Motor activity** (gross and fine motor skills, object-based activity);
- b) **Perception of the world** (ideas about properties and functions of objects, spatial and temporal relationships);
- c) **Attention** (visual, auditory, voluntary attention—improving volume, stability, distribution, and flexibility);
- d) **Memory** (auditory, visual, motor);
- e) **Imagination**;
- f) **Thinking** (visual-effective and visual-figurative thinking, sorting objects by size, color, shape, and quantity, non-verbal classification tasks, and sequencing plot pictures);
- g) **Emotional-volitional sphere** (completing tasks, overcoming difficulties, and considering the interests of others).

The primary rehabilitation process after cochlear implantation is provided at home by parents and relatives. A key condition for success is the development of an individual psychological and pedagogical support program for the child and their family at all stages.

ADVICE FOR PARENTS:

Basic principles for training a child with a cochlear implant:

1. Start with simple tasks and move sequentially to more complex ones.
2. Before presenting a sound or word, capture the child's attention by pointing to the ear.

3. A child needs to hear a sound several times to remember and analyze it; parents should repeat sounds clearly and slowly.
4. The child should repeat the presented sound while listening carefully to their own voice.
5. Every lesson should end with a task the child already performs well.

To date, cochlear implantation is the most effective means of rehabilitating children with total deafness. As a result of the rehabilitation course, children can successfully integrate into society, attend regular kindergartens, and study in mainstream schools. Thus, children who are congenitally deaf or lost hearing during the speech acquisition period (ages 1-5) are the most promising group for auditory-speech recovery if operated on early. Rehabilitation takes 3-5 years, with the ultimate goal for many being preparation for mainstream education. This requires the coordinated efforts of cochlear implant center specialists, experts in the field, and the child's family.

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