

VI International Forum on Teacher Education

Deaf Children after Cochlear Implantation: Transformation of the Speech Therapist Professional Competencies

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Abstract

The purpose of the article is to present the method developed for triggering the natural and spontaneous mastering of communication and speech in a deaf child after cochlear implant (CI) surgery, which is typical for a normally hearing child. The article also aims at demonstrating the need for revision of professional competencies of the present-day teachers of deaf children and speech therapists.

The ideas on the social nature of secondary developmental disorders in children with severe hearing and the ideas on the role of normal child's affective interaction with close adults for triggering the development of child's auditory perception and speech during the first year of life served the theoretical basis of the study. Also, the ideas on the triggering point of the natural development of auditory perception and speech in children after CI surgery and the ideas proposed in the Galperin theory constituted the theoretical ground of the research.

The results of the study: a) method of 3R rehabilitation aimed at transferring a child with CI to the path of the natural development of auditory perception, communication and speech, typical for a normally hearing young child; b) evidence of the effectiveness of the 3R rehabilitation method of a family and a child with CI; c) practical professional skills of a specialist, necessary for implementing a 3R rehabilitation of a family and a child with CI, are identified, their differences from those traditionally taught for the teachers of deaf children and speech therapists are shown.

Keywords: Vygotsky, method, professional training, teacher of the deaf, speech therapist.

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Published by Kazan federal university and peer-reviewed under responsibility of IFTE-2020 (VI International Forum on Teacher Education)

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Introduction

Children with cochlear implants (CI) are children with changing functional status. This is a new category of children with hearing impairments. As a result of the CI surgery, the state of the deaf child's hearing is drastically changing, i.e. the child is able to sense the sounds with the intensity of 26-40 dB at a distance of five meters. This is an outstanding achievement of high-tech medical science in overcoming the deafness. However, the elimination of impairments with the help of digital biomedical technologies is not sufficient to redirect a deaf child to the developmental path of the hearing one.

In practice, experts are faced with a new phenomenon. Many children after the CI surgery are able to hear whispers at a distance of several meters but they continue to behave and communicate as deaf children, relying on their vision, using lip reading, dactylogy, sign language, i.e. the child is indeed no longer deaf, he or she hears but continues to be deaf in behavior. Practice shows that in this status of "no longer deaf but not yet hearing" children after CI surgery may stay for a long time, and even for a lifetime. Medical science cannot help a child change this status. There is a problem of psychological and pedagogical rehabilitation of the child after CI. Its relevance is determined by the ever growing number of children with cochlear implants as well as by the inability to deliver on the potential of high-tech medical science without psychological and pedagogical rehabilitation of a child with CI.

Purpose and objectives of the study

The purpose of the study was to develop the method for triggering in a deaf child after CI surgery the natural development of auditory perception and the spontaneous development of communication and speech, typical for a normal hearing person, and substantiating the need to review the professional competencies of the teacher of deaf children and speech therapist.

Literature review

The history of the implementation of the cochlear implantation method in different countries of the world, as well as in Russia, has shown that without psychological and pedagogical rehabilitation, the high-tech cochlear implantation surgery is not effective enough (Fryauf-Bertschy, Tyler, Kelsay, Gantz, & Woodworth, 1997; Mironova, 2000; Archbold & O'Donoghue, 2002; Clark, 2003; Edwards, 2007; Archbold et al., 2009; Koroleva, 2009; Punch, 2010; Tavartkiladze, 2013; McConkey, 2017). At the present stage, the cochlear implantation surgery is made earlier and it can be carried out in the first or second year of life of a child with severe hearing impairment, however, the problem of post-operative psychological and

pedagogical assistance to the family and the child remains relevant (Ganek, McConkey, & Niparko, 2012; Fagan, Bergeson, & Morris, 2014; McConkey, 2017).

The cultural historical theory of Vygotsky (1995) allows us to explain the need for psychological and pedagogical rehabilitation of the family and the child after a high-tech cochlear implantation surgery. With the help of implantation technologies, it is possible to almost completely eliminate the primary (according to the terminology of Vygotsky) hearing impairment. However, a child who lived a part of his or her life in the conditions of sensory deprivation, namely deafness, has acquired some secondary developmental disorders, and was used to communicating with people not like a hearing child. The family and surrounding people are used to interact with a child in a different way compared to their interaction with a child who hears. Special ways of interacting with the world that have been developed during the period of deafness are rooted in the behavior of the child, and their elimination is in the competence of psychologists and teachers but not in the competence of medicine, no matter how high is its high-tech level. Secondary developmental disorders that have been developed during the period of deafness cannot “disappear” because of the implant is ‘turned on’, that is why a child after the CI surgery needs psychological and pedagogical rehabilitation. However, the question that has to be answered is what should be done in the process of rehabilitation? Should we correct the secondary developmental disorders of the child with CI, based on the traditional competencies of the teacher of the deaf, or should we do something that this teacher has never done before, namely, trying to start the development of auditory perception and the spontaneous mastery of communication and speech, typical for a normally hearing child, on a new sensory basis provided by the implant.

In Russia, the first method used for this purpose was named “auditory-verbal rehabilitation of a child with CI” (Koroleva, 2009). From the name itself it follows that the focus is on the correction of secondary developmental disorders, namely, hearing and speech impairments. A wide range of Western techniques is offered for the implementation of this general approach (Archbold et al., 2000; Edwards, 2007; Estabrooks, 1994), including translated technologies of the Austrian company Med-el, (Allum-Mecklenburg et al., 1996) as well as the Russian methods for the development of auditory perception and speech, previously developed for the deaf and hard of hearing children (Leongard & Samsonova, 1991; Shmatko & Pelymskaya, 2003). In practice, the teachers of the deaf began to work with the deaf children with CI as with hearing impaired children, while speech therapists started working with hearing children with speech impairments, using the traditional professional competencies.

In parallel, Russian specialists began to develop a fundamentally different rehabilitation method based on the idea of “triggering” a natural, typical for a normally hearing child, development of auditory perception and spontaneous development of communication and speech on a new sensory basis (Kukushkina &

Goncharova, 2016). To implement this general idea, the authors began to develop for a teacher of the deaf a new system of work with a family and a child after CI surgery. This system is different from the traditional one and it involves the development of the new professional competencies (Satayeva, 2016).

Methodology

The theoretical framework of the study was based on the following ideas:

- Ideas on the social nature of secondary developmental disorders in children with severe hearing impairment (Vygotsky, 1995);
- Ideas on the role of child's affective interaction with close adults for triggering the development of child's auditory perception and speech at the first year of his life (Nikolskaya, 2008; Bayenskaya, 2015);
- Ideas on the triggering point of the natural development of auditory perception, communication and speech in children after CI surgery (Kukushkina & Goncharova, 2016);
- Ideas on orienting basis of an activity as a system of conditions ensuring its correct implementation (Galperin, 1998).

Phases of the study:

1. Theoretical development of the method of 3R rehabilitation of the family and the child after cochlear implant surgery.
2. Evaluation of the effectiveness of the 3R rehabilitation method.
3. Rationale for the transformation of professional competencies of the teachers of deaf children and speech therapists formed in the process of their professional training and retraining.

Results

The 3R rehabilitation method of the family and the child after CI

The name of the method is an abbreviation of three words indicating its key characteristics:

- Redirecting the child with CI to the path of the natural, typical for the normal hearing child, development of auditory perception and speech;
- Re-experiencing on a new sensory basis those stages of early ontogenesis that were experienced by a child and his family in the conditions of deafness;
- Reordering of the emotional interaction of the child with the family on a new sensory basis.

The basic framework of the method of 3R rehabilitation of the family and the child after CI, distinguishing it from auditory-verbal rehabilitation

The aim of 3R rehabilitation is to transfer the child after CI surgery to the path of development of auditory perception and spontaneous speech development in natural communication with close adults, typical for a normally hearing child.

The fundamental principle of rehabilitation is the creation of conditions for re-experiencing on a new sensory basis the stages of early ontogenesis that were already experienced by a child with CI and his family in the conditions of sensory deprivation – deafness or severe hearing loss.

The basic content of 3R rehabilitation is the restructuring of the emotional interaction of the child with the family on a new sensory basis

The number of the rehabilitation participants is increasing due to the inclusion of relatives of a child with CI. The rehabilitation becomes family matter. The conditions are intentionally created for the family to re-experience on a new sensory basis the early stages of emotional interaction with their child, that have already been experienced by both the family and the child in the conditions of his deafness. The specialist's guideline is the development of the hearing child in the first year of his life when, in the normal development, takes place the triggering of the natural development of auditory perception and of spontaneous speech mastering in a natural and emotionally significant communication of a child with his closed adults.

Rehabilitation begins with the launch of the implanted child's emotional dialogue with his close adults on a fully functional sensory basis, as is takes place in the first year of life of normally developing child. The difference is that a child with CI re-experiences on a new sensory basis the stage of formation of an emotional dialogue with the closed adults during rehabilitation and at another real age.

In accordance with the logic of normal early ontogenesis, triggering the emotional interaction of a child after CI surgery with his close adults on a fully functional sensory basis is a condition for triggering the natural development of auditory perception and spontaneous speech mastering (first, of its understanding, and, then, its generation).

The rehabilitation process is structured in accordance with the logic of the development of the hearing child of the first year of his life. Three main sessions in the work of a specialist are identified and implemented sequentially:

- triggering a child-family emotional interaction on a new sensory basis;
- triggering an understanding of speech in natural communication on a new sensory basis;
- triggering a spontaneous (without training) speech mastering in natural communication on a new sensory basis.

During the 3R rehabilitation, a special technology of restructuring the emotional interaction of the implanted child with the family is used, 8 steps in each session, 24 steps in total. Accordingly, the use of traditional methods for correcting the impairments of auditory perception and speech developed for the deaf and hard of hearing is excluded.

The logic of restructuring the interaction of parents with the child on a new sensory basis is common and is reproduced in each session (8 steps). At the beginning of each session, the teacher takes a leading and decisive position in the emotional interaction with the child and his parents. At the end of each session, the leading role in the interaction is played by the parents and the child, the teacher is not a participant and takes the position of observer.

The teacher's assessment of the intermediate achievements of the child with CI and the parents in the restructuring of interaction on a new sensory basis is carried out in each rehabilitation session and is based on the target indicators of changes in their communicative behavior.

The assessment of the possibility of completing the rehabilitation of a child with CI and his family is based on the selected summary indicators. A child with CI, who completed the 3R rehabilitation, should have a spontaneous speech mastering in natural communication with others that is typical for the hearing child. Parents should interact with their child with CI as with a hearing person, the naturalness of communication and the pleasure generated by such an activity.

Pedagogical tools used to restructure the interaction of the family with the child after CI surgery on a new sensory basis

- Emotionally exciting games, during which the initiatives and emotional responses arise naturally: such games involve the use of toys and objects interesting to the child. These toys and objects are sensory attractive and, as a rule, sounding;
- Emotional and semantic commentary on the child's responses to "exciting" game actions: a satisfactory response is the appearance of smiles, voice reactions, laughter, and, afterwards, the child's speech reactions;

- The teacher's special speech in an emotionally exciting game interaction with a child with CI looks like the parents' speech in the frame of emotional interaction with the hearing child of the first year of life. It is the deliberate exaggeration of the rhythmic and intonational side of speech: melody, chanting, voice modulation, change in voice volume (from whispers to normal conversational volume and above), change in speech rate (from slow to fast), and etc.;
- Formation of the parents' fixation on the child's joyful emotional state in rehabilitation classes, the orientation on the smile and laughter as the most adequate response in the emotional dialogue, and the pleasure of interacting with their child with CI;
- A special presentation to the parents on the possibilities for their child to interact on a new sensory basis during rehabilitation;
- The formation of parents' skills and habits of recognizing and recording in diaries the initiatives that arise in a child in interaction with others on a new sensory basis.

So, we briefly described the 3R rehabilitation method: the purpose, content, methods, means, leading guidelines of a specialist in the process of rehabilitation and assessment of the achievements of a child with CI and his family.

Evaluation of the effectiveness of the 3R rehabilitation method of the family and the child after CI surgery

The effectiveness of the 3R rehabilitation method was tested on the most difficult cases in a pedagogical experimental study (Satayeva, 2016).

The most difficult cases were specially selected, including children with severe hearing impairment who did not master verbal speech as a means of communication before the CI surgery. This study involved 45 children under the age of 2,5 years and 45 children of preschool age from 2,5 to 6,5 years at the moment of start of rehabilitation. Total 90 children were involved in this study.

Based on the clinical-audiological examination (ABR, OAE, audiometry), they were diagnosed with the following: bilateral sensorineural deafness in 29 children (32.2%), bilateral sensorineural profound hearing loss confirmed in 22 children (24.5%) and congenital severe-to-profound sensorineural hearing loss in 39 children (43.3%). These children did not have any additional primary developmental impairments.

All 90 children used hearing aids before CI surgery. After connecting the speech processor, all children used cochlear implants permanently. The range of differences in the timing of implantation was quite large:

from the seven months infant to the 6 and half years old child. The time interval between the operation and the beginning of rehabilitation was minimal.

In accordance with the principles of 3R rehabilitation, in the experiment took part the parents as well as the relatives of children after CI surgery – total number of 90 families. The total number of adult participants is 152, including parents (132), grandparents (16), other relatives and family assistants (4).

The work with each family took place separately and, in accordance with the logic of the method, it included 3 consecutive main rehabilitation sessions. The transition from session to session was carried out in accordance with established indicators of changes in the behavior of a child with CI and his parents in their interaction on a new sensory basis.

3R rehabilitation was considered complete in relation to a child with CI when he was able to take the initiative and adequately respond to the initiative in communication from close adults on a new sensory basis, even without looking at them. He could on a new sensory basis spontaneously (without training) master unfamiliar words and phrases in the course of natural communication, as it happens with a normally hearing child of the first years of life.

3R rehabilitation was considered complete in relation to the family when close adults began to behave like the parents of a hearing young child – they freely initiated emotional interaction with the child and derived clear and visible pleasure from communicating on a new sensory basis.

We present the main results of an experimental identification of the effectiveness of the 3R rehabilitation method of a family and a child with CI.

All adults participating in the experiment (152) switched to interacting with children on a new sensory basis and began to communicate as do it the parents of hearing children. In all 90 children took place triggering the natural development of auditory perception and spontaneous speech mastering on a new sensory basis. All the required by the method indicators of changes in the communicative behavior of children with CI and adults in their interaction were recorded both in rehabilitation classes and in families. The duration of 3R rehabilitation was different in different families, but all they fall into the range from 6 months to 2 years.

Thus, the data obtained in the experiment confirmed the effectiveness of the 3R rehabilitation method in the most difficult childhood cases. Now we have a need in training specialists for the implementation of 3R

rehabilitation and in transforming traditional professional competencies in the context of professional training and retraining of the teachers of deaf children and speech therapists.

The rationale for the transformation of professional competencies of the teachers of deaf children and speech therapists

Just as high-tech digital medicine requires surgeons and audiologists to master new competencies, surdopedagogy and speech therapy of the digital world require the specialists to master new scientific ideas and new practical skills for the rehabilitation of families and children with CI.

A theoretical analysis of the 3R rehabilitation method together with many years of experimental practice of its use allows us to justify the need for mastering professional activities with another, unlike the traditional, orienting basis.

The method of 3R rehabilitation of a child with CI solves a problem that was not previously set in deaf children education. This problem is the triggering of the natural development of auditory perception and spontaneous speech mastering on a new sensory basis, provided by the implant.

The 3R rehabilitation method is based on a new understanding of the subject of professional activity - this is a collective subject, since the child with CI and his or her family are both active participants in the rehabilitation.

The 3R rehabilitation method involves a new content of professional activity – this is not a traditional correctional work aimed to the development of the auditory perception and speech of a child with a hearing impairment, but the restructuring of its interaction with others on a new sensory basis and triggering the development typical for a hearing child.

The 3R rehabilitation method sets the new orienting points in professional activity – this is the normal development of the hearing child of the first year of life, regardless of the age of a child and time when a child had CI surgery.

The method is focused on new, different from traditional, criteria for assessing the achievements of a child with CI and his family – these are the indicators of progress in triggering a child's natural development of auditory perception and spontaneous speech mastering and the indicators of family progress in phased development of ways of emotionally meaningful game interaction with their child as with a hearing child.

Thus, a new understanding of the subject of professional activity, the novel nature of the tasks, content, methods, tools, guidelines and criteria for assessing the achievements of the family and the child with CI during the 3R rehabilitation identify the need to change the orienting basis of professional activity. The performing part of the activity will also be different, that will require some new practical skills of a teacher.

We describe hereafter those new practical skills that a specialist in 3R rehabilitation of a family and a child with cochlear implants should master. A specialist should be able to:

- rearrange the behavior of parents, to ensure their transition from interacting with their child as with a deaf to interacting with him as with a hearing child;
- be able to work simultaneously with a child after CI surgery and with his parents – to set and solve the problems both for the child and for his relatives in the same lesson;
- master the technology of step-by-step reordering of the emotional interaction of the family with their child on a new sensory basis;
- during the rehabilitation of a family with a child of any age after CI surgery, a specialist should be able to use the logic of the formation and complication of the emotional interaction of hearing parents with their hearing young child;
- master the ability to emotional contagion of a child and close adults;
- be able to invent, in accordance with the described principles, the emotionally exciting games that can evoke a natural, vivid emotional response (joy, smile, laughter, surprise, perplexity etc.) in a child, and to encourage initiative in interaction;
- be able to organize an emotionally exciting game interaction;
- be able to give emotional and semantic commentary to any child's response to "exciting" game actions;
- support and develop any initiative in interaction of a child with CI with the help of emotional-semantic commentary;
- be able to use a special speech in interaction with a child with CI, deliberately exaggerating the melody, pace and volume of the voice, as this naturally occurs in the communication of parents with a normally hearing child of the first year of life;
- be able to improvise in the sphere of game emotionally exciting interaction with a child in accordance with the aims of each rehabilitation session;
- be able to focus on the pleasure of interaction participants as the most important criterion for evaluating the effectiveness of a rehabilitation session;

- be able to create a parents' attitude to the child's joyful emotional state in rehabilitation classes, orientate them to smile and laugh as the most appropriate response in an emotional dialogue, support the desire to enjoy interacting with their child;
- be able to provide parents with the ways of organizing emotionally exciting games that can cause an emotional response in a child – joy, smile, laughter, surprise, perplexity, etc.;
- be able to teach parents to adequately respond to their child's initiatives and initiate an emotional interaction. To correct gently the mistakes of parents in interacting with the child, with the help of emotional and semantic commentary and demonstration of the response or initiative necessary for the development of interaction;
- be able to encourage parents to use special speech in interaction with their child with CI, as do it the parents of a hearing child in their first year of life;
- be able to demonstrate to parents the zone of the child's proximal development – the new chances for his interaction on a new sensory basis appearing during rehabilitation;
- be able to teach parents to recognize and record in diaries the new chances for a child (child's responses and initiatives) to interact with others on a new sensory basis;
- be able to apply the new criteria for assessing achievements, including indicators of progress in triggering a child's natural development of auditory perception and spontaneous speech development, indicators of family progress in the phased development of ways to interact with their child as with a hearing one.

Thus, we briefly described the method and showed that for 3R rehabilitation of a family and a child with CI we need a specialist with professional competencies that are different from those traditionally taught for the teachers of deaf children and speech therapist. Correspondingly, the transformation of scientific ideas and practical skills of the teachers of deaf children and speech therapists that were taught these ideas and skills during their professional retraining for working with children with CI is required.

Discussions

The study showed that the use of digital biomedical technologies combined with 3R rehabilitation makes it possible to transfer children with severe hearing impairments of early and preschool age to a developmental path that is typical for a hearing child, to change a development and education path to a more favorable, to open up the opportunity for full integration into society and make changes in the quality of life of the whole family. These opportunities open up new prospects for helping children with severe hearing impairments, determine the general line of development of deaf children education of the 21st century.

An analysis of the results of the study shows the efficiency of the idea and technology of triggering the normal development of auditory perception, communication and speech in children after CI surgery by restructuring the emotional interaction of the family with their child in the early stages of ontogenesis. This leads to the idea of continuing the study to experimentally verify the feasibility and effectiveness of the 3R rehabilitation method for children who use digital hearing aids, not cochlear implants, as well as for hearing non-speaking children of early and early preschool age.

There is no doubt in the further development of implantation technologies and their wider practical application in relation to the paediatric population. It can be assumed that the creators of the bionic eye and the typhlopedagogs will encounter, as well as the teachers of deaf children, a new phenomenon – a child who has received fundamentally new sensory abilities will continue to behave like a blind man. In case of visual implantation, as in case of cochlear implantation, it will be necessary to restructure the interaction of the family with their child on a new sensory basis, refusing to correct secondary developmental disorders in favor of triggering the natural development of visual perception and orientation in the space characteristic of the sighted. The developed 3R rehabilitation method may turn out to be a reference point and a basis for the development of rehabilitation methods for children with visual implants.

The study shows the novel nature of the specialist's tasks and professional competencies in 3R rehabilitation, their significant difference from the traditionally formed in the teachers of deaf teachers and speech therapists, which makes relevant the systematic review of the content of professional training, retraining and advanced training of specialists of psychological and pedagogical profile. An immediate decision of this problem is required, since the number of children with CI is ever growing, and they need effective rehabilitation by the specialists with new professional competencies. In the future, a similar revision may be required for typhlopedagogics.

Conclusion

The method of 3R rehabilitation aimed at restructuring the interaction, on a new sensory basis, of a child with CI with close adults and at triggering the development of auditory perception, communication and speech, typical for a normally hearing young child, was developed. The method is based on modern ideas of the Russian scientific school of special psychology and pedagogy about the development of a young child, the role of affective interaction with close adults to trigger the normal development of the child, the triggering point of the natural development of auditory perception, communication and speech in a child with CI.

For the first time, it was proposed to abandon the traditional work of the teacher of deaf children on the correction of secondary hearing and speech impairments in favor of starting the natural development of auditory perception, communication and speech, typical for a hearing young child.

The purpose, composition of the participants in the rehabilitation process, tasks, principles, content, methods of rehabilitation, intermediate and final indicators of the completion of 3R rehabilitation in relation to a child with CI and his family are proved and presented. The effectiveness of 3R rehabilitation has been proven in an experimental study and by many years of practice. The ability to transfer children with CI of early and preschool age to the developmental path typical for a normally hearing child fundamentally changes the prospects for their development, education, integration into society, and the quality of life of the whole family.

The study presents the practical professional skills of a specialist, necessary for conducting a 3R rehabilitation of a family and a child with CI, and different from those traditionally formed in the teachers of deaf children and speech therapists. It is shown that the novel nature of the tasks, content, methods, criteria for assessing achievements, the composition of the participants in the rehabilitation of children after CI determine the need for restructuring all components of the professional activities of specialists.

The analysis of the study results shows the need for a systemic review of the content of professional training and retraining of the teachers of deaf children and speech therapists for 3R rehabilitation of children with CI. Modern standards for the training of the teachers of deaf children and speech therapists should include the formation of new professional competencies necessary for the psychological and pedagogical rehabilitation of children after the use of implantation technologies. The growing number of implanted deaf children and their need for post-operative psychological and pedagogical rehabilitation emphasize the severity of this problem and the need for its prompt solution.

Acknowledgements

The authors thank the parents of children with CI who participated in the study, and whose enthusiasm helped us testing the effectiveness of the new method of family rehabilitation after cochlear implantation.

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