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DEVELOPMENT OF METHOD FOR DIAGNOSTICS OF SPEECH DISORDERS IN CHILDREN WITH AUTISM

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Abstract

Introduction. The disorders of speech development in children with autism vary according to its' character and the dynamics of manifestations. The results of current research show that impaired speech in children with autism negatively affects all aspects of the child's personality: hinders the development of cognitive activity, causes disturbances in all forms of interaction and interpersonal communication, which leads to difficulties in social functioning. It was estimated that specific developmental impairment of speech and language was misdiagnosed in 82% of children at pre-school age with autism. The complexity of the issue is associated with a high similarity of speech disturbances and equal clinical manifestations for both nosological diagnoses. At the same time, the specificity of speech disorders in children with autism imposes serious limitations on traditional educative approaches for speech disorders' diagnostics because these methods do not take into consideration the peculiarities of speech disturbance components, which may persist in this category.
The aim was to examine peculiarities of speech development in children with autism and to elaborate the diagnostic approach for evaluation of speech disorders in children with autism aged 4 to 7.
Materials and methods. The study included 157 patients with autism aged 3 till 7 with concomitant speech disorders among other clinical manifestations with the main disease such as iautism (F 84.0) – 66 patients, specific speech disorders (F 80) – 91 patients. The diagnostics of potential speech disorders included testing in accordance with "The table of differential diagnostics of speech disorders" that was developed in the course of the study. Armamentarium consisted of 19 tasks on the principle of two diagnostic approaches: logopaedic – for examining the peculiarities of oral speech and clinical – the presence of speech symptoms according to diagnostic criteria which are typical for the section "F 84 Pervasive Development Disorder" ICD-10. Clinical and psychological diagnostic tools were used: clinical interviews; anamnestic surveys; and follow-up. Statistic analysis included descriptive statistical methods: Pearson's chi-square test was applied to evaluate the incidence of manifestations in different groups; Cronbach's alpha analysis was used for assessment of internal coherence of the method.
Results. The study reveals the peculiarities of speech development in children with autism and specific speech impairments and demonstrates the presence of similar clinical manifestations in both groups in 80% of cases. The new method includes 15 parameters characterized by speech disturbances most commonly manifesting in children with autism and demonstrating statistically significant incidence rate compared to children with specific developmental disorders of speech and language (Pearson's chi-square test).
Conclusion. The analysis of speech development patterns in children with autism was established. The method for assessment of speech disorders in children with autism aged 4 to 7 was developed.

Key words: diagnostics, speech disorders, specific disturbances of speech development, autism, children

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Introduction

The disorders of speech development in children with autism vary according to its' character and dynamics of manifestations. The results of current research show, that impaired speech in children with autism negatively affects all the aspects of the child's personality: hinders the development of cognitive activity, causes disturbances in all forms of interaction and interpersonal communication, which leads to difficulties in social functioning [1, 2]. Despite the quite high interest regarding autism challenges and taking into account the increase of knowledge about disordered speech peculiarities and manifestations, unsolved differential diagnostics' issues in these group of children still exist. According to results of study done in 2016 by Mostiukova E.M., it was estimated that specific developmental impairment of speech and language was misdiagnosed in 82% of children at pre-school age. The complexity of the issue is associated with a high similarity of speech disturbances and equal clinical manifestations for both nosological diagnoses [1,2].

There are methods used in clinical practice, in which different types of speech disturbances are suggested in the scope of communication issues as part of autism classification, developed in accordance with affective and cognitive impairments [3,4].

Current diagnostic approaches do not provide objective data regarding speech development in children with autism. Logopaedic methods for speech assessment are effective to a greater extent for specific developmental speech and language disturbances (F 80); these methods are focused on examining the level of speech development and grammatical system of speech, vocabulary size, derivation skills, speech analysis and the level of coherent speech evaluation [5]. The obtained profile focuses on the most immature and unscathed elements of the child's speech system, which provides an opportunity to select an individual plan for correction. At the same time, the specificity of speech disorders in children with autism imposes serious limitations on traditional educative approaches for speech disorders' diagnostics because these methods do not take into consideration peculiarities of speech disturbances' components, which may persist in this category.

While medical and educational efforts are focused on the development of speech skills, it is crucial to evaluate not only the child's degree of speech maturity, but also the structure and severity of speech disorders. The specification of diagnostic criteria of speech development in children with autism is also essential [5, 6].

Objectives

To examine peculiarities of speech development in children with autism, to elaborate the diagnostic approach for evaluation of speech disorders in children with autism aged 4 to 7.

Materials and methods

The study included 157 patients with autism aged 3 to 7 with concomitant speech disorders among other clinical manifestations with the main disease such as infantile autism (F 84.0) – 38 patients, atypical autism (F 84.1), - 12 patients, childhood disintegrative disorder (F 84.3) – 4 patients, Asperger's syndrome (F 84.5) – 13 patients, expressive language disorder (F 80.1) – 34 patients, receptive language disorder (F 80.2) – 7 patients, developmental organic disability (F 80.9) – 49 patients, who applied to Republican National Centre for Science and Research in Otorhinolaryngology between 2011 and 2014. The diagnostics of potential speech disorders included testing in accordance with "The table of differential diagnostics of speech disorders", that was developed in the course of the study. Armamentarium consisted of 19 tasks on the principle of two diagnostic approaches: logopaedic – for examining the peculiarities of oral speech and clinical – the presence of speech symptoms according to diagnostic criteria which are typical for the section "F 84 Pervasive Development Disorder" ICD-10 (Table 1).

After filling out the table it was analysed, indexes for each diagnosed symptom have been calculated in the group with specific speech disorders (F 80.1; F 80.2; F 80.9) – 91 patients and in the group with different nosologic forms of autism (F 84.0; F 84.1; F 84.3; F 84.5) – 66 patients with the following statistical analysis of obtained results.

In 80% of cases - 125 patients, screening results confirmed general clinical manifestations and a high similarity of speech disorders in children with specific speech disturbances and various nosologic forms of infantile autism (later on - autism) (Table 1).

Nonetheless, among disturbances in oral speech such as expressive speech, grammatical system of the speech, phrasal speech, narration and pronunciation was statistically significantly higher (p¡0.05) in the group of children with specific speech disturbances – 91 patients (100%), only pronunciation was not impaired in one case. In the group with autism clinical manifestations of same speech characteristics were registered partially: capacity for narration – 80.6%; pronunciation – 46.3%; grammatical system of the speech – 28.4%; expressive speech development – 16.4%; syllable structure of the word – 13.4%; phrasal speech formation –10.5%.

Speech symptoms, corresponding diagnostic criteria of F 84 section in ICD-10, were used for the evaluation of statistically significant differences, and they turned out to be common for children with autism: difficulties concerning expression of requests – 100%; impaired ability for dialogue – 85.1%; complications in interaction with adults – 100%; inability to regulate the voice – 98.5%. Monotonous speech as specific manifestation of speech impairment was registered in a relatively small group of patients with autism and was registered in 17.9% of cases. But at the same time this symptom of speech disturbance was missing in the group with specific developmental disorders of speech and language.

Also, in the group with specific speech and language disorders such impairments as echolalia – 41.8% (14.9% in children with autism), alteration of speech fluency – 36.3% (13.4% in children with autism), recurrent speech – 36.3% (14.9% in children with autism) were found more often compared to children from the group with autism.

Tab. 1: Th e and various nosological forms of autism

Speech disorders' evaluation parameters	Specific speech disorders				Different nosologic forms of autism			
	No		There are		No		There are	
	number of tested	percentage, percentage	number of tested	percentage, percentage	number of tested	percentage, percentage	number of tested	percentage, percentage
Loss of speech skill	91	100	0	0	64	96,97	2	3,03
Expressive speech development	0	0	91	100	56	83,58	11	16,42
Understanding of directional speech	69	75,82	22	24,18	0	0	67	100
Adult Interaction	74	81,32	17	18,68	53	80,3	13	19,7
Ability to express requests	75	82,42	16	17,58	0	0	66	100
Spontaneous initiation of speech	76	83,52	15	16,48	57	85,07	10	14,93
Echolalia	53	58,24	38	41,76	57	85,07	10	14,93
Pace of speech	58	63,74	33	36,26	58	86,57	9	13,43
Intonation	76	83,52	15	16,48	62	92,54	5	7,46
Iterated speech	58	63,74	33	36,26	57	85,07	10	14,93
Pronouncing unusual sound	76	83,52	15	16,48	51	76,12	16	23,88
Formation of the grammatical structure of speech	0	0	91	100	48	71,64	19	28,36
Syllabic structure of the word	0	0	91	100	58	86,57	9	13,43
Phrasal speech formation	0	0	91	100	60	89,55	7	10,45
Dialogue ability	68	74,73	23	25,27	10	14,93	57	85,07
Retelling ability	0	0	91	100	13	19.4	54	80.6
Sound pronunciation	1	1,1	90	98,9	36	53,73	31	46,27
Monotonous speech	91	100	0	0	55	82,09	12	17,91
Ability of emotional expressiveness	90	98,9	1	1,1	1	1,49	66	98,51

The results of the study reveal a high similarity of speech disturbances in both diagnostic groups, which required further research concerning streamlined diagnostic tool for evaluation presence and intensity of speech disorders in children with infantile autism (F 84.0).

Clinical and psychological diagnostic tools were used: clinical interviews; anamnestic surveys; and follow-up. Statistic analysis included descriptive statistical methods: Pearson's chi-square test was applied for evaluation the incidence of manifestations in different groups; Cronbach's alpha analysis for assessment of internal coherence of the method.

The verification of the disease was held in accordance with unified standard methods of clinical and pathopsychological, functional and laboratory research with further evaluation the ICD-10 diagnosis.

Results

Based on the results, which were obtained in our study by means of the table for differential diagnostics of speech disorders, the method of speech impairments' assessment for children aged 4 to 7 with infantile autism has been developed. At the core of the method there are speech parameters which incidence in children with specific speech disorders and infantile autism varied significantly; this was established by Pearson's chi-square test and included such speech parameters as: expressive speech level ($\chi2=117.82$, $p=0.0000$), expression of requests ($\chi2=104.15$, $p=0.0000$), grammatical system ($\chi2=93.64$, $p=0.0000$), word formation ($\chi2=124.47$, $p=0.0000$), phrasal speech ($\chi2=131.39$, $p=0.0000$), narration ($\chi2=19.24$, $p=0.00001$), pronunciation ($\chi2=59.61$, $p=0.0000$), interaction with adults ($\chi2=90.19$, $p=0.0000$), speech fluency ($\chi2=10.31$, $p=0.00113$), capacity for dialogue ($\chi2=55.21$, $p=0.0000$), monotonous speech ($\chi2=17.64$, $p=0.00003$), capacity for voice manner control ($\chi2=149.92$, $p=0.0000$), loss of speech skills ($\chi2=2.79$, $p=0.094667$), spontaneous speech initiation (social functioning) ($\chi2=0.07$, $p=0.79084$) (Table 2).

Tab. 2: Speech disturbances incidence rates in groups with specific developmental disorders of speech and language and autism

Speech disorders' evaluation parameters	$\chi2$	p
Loss of speech skill	2.79	0.09467
Expressive speech development	117.82	0.0000
Understanding of directional speech	90.19	0.0000
Adult Interaction	0.03	0.87305
Ability to express requests	104.15	0.0000
Spontaneous initiation of speech	0.07	0.79084
echolalia	13.14	0.00029
Pace of speech	10.31	0.00133

Speech disorders' evaluation parameters	χ^2	**p**
Intonation	2.84	0.09193
Iterated speech	8.87	0.00290
Pronouncing unusual sound	1.34	0.24724
Formation of the grammatical structure of speech	93.64	0.0000
Syllabic structure of the word	124.47	0.0000
Phrasal speech formation	131.39	0.0000
Dialogue ability	55.21	0.0000
Retelling ability	19.24	0.00001
Sound pronunciation	59.61	0.0000
Monotonous speech	17.64	0.00003
Ability of emotional expressiveness	149.92	0.0000

Speech parameters, which did not demonstrate any correlation with the integral estimation results were not included in the method: echolalia, iterated speech, pronouncing unusual sound, intonation. Parameters' correlation rates and the integral score results did not exceed 0.23 (Table 3)

Tab. 3: Inner coherence check testing results of the developed method (19 parameters)

Speech disorders' evaluation parameters	**Parameter and integral rate correlation coefficient**	**Cronbach's alpha in the course of parameter's exclusion from method**
1.1 Loss of speech skill	0.24	0.64
1.2 Expressive speech development	0.52	0.61
1.3 Understanding of directional speech	0.39	0.61
2.1 Adult Interaction	0.35	0.63
2.2 Ability to express requests	0.30	0.63
2.3 Spontaneous initiation of speech	0.25	0.63
3.1 echolalia	0.48	0.61
3.2 Pace of speech	0.43	0.62
3.3 intonation	0.36	0.61
4.1 iterated speech	0.29	0.63
4.2 pronouncing unusual sound	-0.16	0.70
4.3 Formation of the grammatical structure of speech	0.31	0.63
5.1 Syllabic structure of the word	0.28	0.63
5.2 Phrasal speech formation	0.30	0.62
6.1 Dialogue ability	0.06	0.66
6.2 Retelling ability	0.24	0.63
6.3 Sound pronunciation	0.32	0.63
7.1 Monotonous speech	0.16	0.64
7.2 Ability of emotional expressiveness	0.01	0.66

During the preliminary psychometric check (inner coherence estimation by using Cronbach's alpha) no significant correlation was detected between these parameters and other characteristics as correlation rates and integral estimation results turned to be low (from 0.01 till 0.16 in absolute value) (Table 4).

Tab. 4: Parameters' rates of the new method and its' integral estimation results

Research characteristics	**Parameter and integral rate correlation coefficient**
1.1 Loss of speech skill	0.44
1.2 Expressive speech development	0.59
1.3 Understanding of directional speech	0.51
2.1 Adult Interaction	0.43
2.2 Ability to express requests	0.39
2.3 Spontaneous initiation of speech	0.35
3.1 echolalia	0.56
3.2 Pace of speech	0.51
3.3 intonation	0.52
4.1 iterated speech	0.41
4.2 pronouncing unusual sound	0.03
4.3 Formation of the grammatical structure of speech	0.40
5.1 Syllabic structure of the word	0.42
5.2 Phrasal speech formation	0.46
6.1 Dialogue ability	0.22
6.2 Retelling ability	0.39
6.3 Sound pronunciation	0.42
7.1 Monotonous speech	0.23
7.2 Ability of emotional expressiveness	0.17

In addition, it was revealed that Cronbach's alpha increased as these four parameters were excluded from the study.

Therefore, the method included 15 parameters divided into 6 sections (Table 5).

For the purpose of speech disturbances' degree estimation the scoring system was used according to standards designed for methods' management:

0 points – norm;
1 point – light disorders, unobvious speech impairments with occasional alert manifestations;
2 points – moderate disorders, evident speech impairments;
3 points – severe degree of speech disturbance

Tab. 5: The method "Diagnostics of speech disorders in children with autism aged 4 to 7"

Parameter	Research characteristics	Disturbances' intensity degree	Blockage
1. Blockage. Absence or arrested development of expressive, receptive speech	1.1 Loss of speech skill	A no disturbances – no episodes of speech loss	0
		B. mild disturbances – loops of sounds/words/sentences for short periods, which have been pulled through	1
		C. moderate disturbances – stop using some sounds/ words/sentences, which have been pronounced earlier	2
		D. severe disturbances – stop being verbal while various sounds/words/sentences have been used previously	3
	1.2 Expressive speech development	A. no disturbances – phasal and totally comprehensive speech, distorted words/echolalia are absent	0
		B. mild disturbances – to a greater extent comprehensive speech, coherent words/phrases, distorted words are absent, echolalia may persist	1
		C. moderate disturbances – the speech is partially comprehended, a variety of distorted words/phrases, few coherent words/echo reactions may persist	2
		D. severe disturbances – gabble, sounds/scream/noise/ screech in speech	3
	1.3 Understanding of directional speech	A. no disturbances – referred speech is understood to the fullest extent in various situations/circumstances	0
		B. mild disturbances – referred speech is understood to the fullest extent in circumstances tightly connected with the background of the situation; need of interpreting the characteristics of objects/events/actions in unfamiliar situations.	1
		C. moderate disturbances – certain words are understood/ key notions in familiar situations tightly connected with the background of the situation require to be repeatedly prompted by adults.	2
		D. severe disturbances – referred speech is not understood even supported by the background of the situation, the help from an adult is not accepted.	3
2. Blockage. Social functioning and interaction disorder	2.1 Adult Interaction	A. no disturbances – accomplishes 5-10 prescriptions/ tasks without demonstrating unfavourable behaviour, the tasks are easily done after the break.	0
		B. mild disturbances – accomplishes 5-10 prescriptions/ tasks without demonstrating unfavourable behaviour and strong encouragement the tasks are easily done after the break.	1
		C. moderate disturbances – accomplishes around 5 prescriptions/ short tasks, long breaks and strong encouragements from an adult are needed.	2
		D. severe disturbances – no interaction with an adult, avoidance of prescriptions'/tasks' accomplishment, demonstration of aggression, self--aggression	3
	2.2 Spontaneous initiation of speech	A. no disturbances – initiation of interaction with peers and adults without assistance	0
		B. mild disturbances - initiation of interaction with peers and adults with the help of an adult	1
		C. moderate disturbances – self-imposed initiation of interaction only with valued adults, preferred siblings, mimics games	2
		D. severe disturbances – interaction with adults and children is never initiated, individual activities are preferable, demonstrates unfavourable behaviour in cases if the interaction is forced	3
	2.3 Dialogue ability	A. no disturbances – completes 5-10 phrases without assistance in responding to 5-10 questions with words/ expressive gestures/with the help of pictures, displays interest in tasks	0
		B. mild disturbances - completes 5-10 phrases or answers 5-10 questions with words/expressive gestures/with the help of pictures and additional encouragement from an adult	1
		C. moderate disturbances – completes 1-2 simple phrases or answers 1-2 simple questions with words/expressive gestures/with the help of pictures and additional encouragement from an adult	2
		D. moderate disturbances – no phrases are completed, no answers to simple questions with the use of words/expressive gestures/with the help of pictures, does not accept adult's assistance	3
	3.1 Phrasal speech formation	A. no disturbances – independently composes phrases, correct description of storyline by picture or phrasal speech corresponding to age	0
		B. mild disturbances – composes phrases independently when describing the storyline by the picture, occasionally encouragement or confirmation from an adult is needed or uses phrases consisting from 2-3 words in a spontaneous situation	1
		C. moderate disturbances – composes simple phrases consisting from 2-3 words when describing the storyline by the picture with the help of an adult by means of clarification questions, does not use phrases in a spontaneous situation	2
		D. severe disturbances – does not compose phrases when describing the storyline by the picture, does not use phrases in a spontaneous situation, does not accept an adult's assistance	3
	3.2 Retelling ability	A. no disturbances – independently narrates the listened text or builds up logically correct storyline in accordance with pictures, distinguishes the main narrative strand/ characters, answers the questions of an adult.	0
		B. mild disturbances – narrates the listened text or builds up a logically correct plotline in accordance with pictures, distinguishes the main storyline/characters by means of clarification questions from an adult.	1
		C. moderate disturbances – narrates the listened text or builds up a logically correct plotline in accordance with pictures only by means of clarification questions from an adult, does not distinguish the main storyline/characters.	2
		D. severe disturbances – does not narrate the listened text, does not build up a logically correct plotline in accordance with pictures, does not distinguish the main storyline/ characters, does not accept adult's assistance.	3
	3.3 Formation of the grammatical structure of speech	A. no disturbances – correctly repeats after an adult more than 10 words/sentences; all words/sentences pronounced correctly, independently removes mistakes.	0
		B. mild disturbances – from general number 10 correctly repeats after an adult from 3 to 8 words/sentences, independently corrects mistakes in majority of words pronounced in the wrong way, up to two words/sentences – with insignificant assistance from an adult.	1
		C. moderate disturbances – from 10 words/sentences replays correctly 1-2; independently corrects 1-2 words/ sentences pronounced in the wrong way, others – with significant assistance from an adult.	2
		D. severe disturbances – does not repeat after an adult any words/sentences; does not correct any words/sentences pronounced incorrectly; does not accept assistance from an adult.	3

4. Blockage// Social functioning	4.1 Ability to express requests	A. no disturbances – expresses requests with the help of speech/pictures/gestures	0
		B. mild disturbances – expresses requests with the help of speech/pictures/gestures only in familiar situations, in uncommon situations – through third parties.	1
		C. moderate disturbances – expresses requests through third parties or get the desired object independently, does not use speech/gestures/pictures.	2
		D. severe disturbances – does not express any requests or uses negative behaviour for getting the desired object.	3
	4.2 Pace of speech	A. no disturbances – displays 60-100 words/min. or 9-14 sounds/sec.	0
		B. mild disturbances – slow speech tempo, displays 40-50 words/min. or 6-9 sounds/sec.; rapid speech tempo, displays 100-110 words/min. or 15-20 sounds/sec.	1
		C. moderate disturbances – slow speech tempo, displays 50-60 words/min. or 4-6 sounds/sec.; rapid speech tempo, displays 110-120 words/min. or 20-30 sounds/sec.	2
		D. severe disturbances – slow speech tempo, displays less than 60 words/min. or 4 sounds/sec.; rapid speech tempo, displays more than 110-120 words/min. or more than 30 sounds/sec	3
5. Blockage. Phonetic speech disorders	5.1 Sound pronunciation	A. no disturbances – correctly repeats after an adult all of the sounds; vocalizes independently in different situations/ circumstances	0
		B. mild disturbances – correctly repeats after an adult up to 10 sounds; vocalizes independently while interacting, while supporting the game	1
		C. moderate disturbances – correctly repeats after an adult up to 5 sounds/ independently pronounces up to 5 sounds with emotional uplift	2
		D. severe disturbances – does not repeat any sounds after an adult, does not vocalize, does not pronounce any sounds similar to speech besides screaming/crying/yelling	3
	5.2 Syllabic structure of the word	A. no disturbances – pronounces correctly or repeats after an adult all the multisyllabic and monosyllabic words	0
		B. mild disturbances – distorts the syllabic structure of 1-5 multisyllabic words, pronounces correctly monosyllabic words or spells correctly after an adult.	1
		C. moderate disturbances - distorts the syllabic structure of all multisyllabic words and equal to or more than 5 monosyllabic words	2
		D. severe disturbances – distorts the structure of all multisyllabic and monosyllabic words, presence of echoism and amorphous words in lexical resource	3

6. Blockage. Impaired usage of voice tone and expressiveness for inflexion	6.1 Monotonous speech	A. no disturbances – sounds/words are not divided by pauses, the presence of stress marks in words or defined beginning and ending in all the sentences	0
		B. mild disturbances – up to 5 sounds/words are not divided by pauses, no stress marks in words or absence of defined beginning and ending in 1-5 sentences	1
		C. moderate disturbances – more than 5 sounds/words are not divided from each other, no stress marks in words or absence of defined beginning and ending in more than 5 sentences	2
		D. severe disturbances – sounds and words are not divided from each other by pauses, no stress marks in any of the words, absence of defined beginning and/or ending in all sentences	3
	6.2 Ability of emotional expressiveness	A. no disturbances – imitates with emotional expressiveness all the sounds/words or affirmative, interrogatory, exclamatory sentences	0
		B. mild disturbances – among general number 10 imitates with no emotional expressiveness more than 5 sounds/ words/sentences	1
		C. moderate disturbances – among general number 10 imitations with no emotional expressiveness up to 1-5 sounds/words/sentences	2
		D. severe disturbances – imitates without emotional expressiveness all the sounds/words/sentences.	3
	Total score		

Discussion

This study presents data on the characteristics of speech disorders in children with autism and specific speech disorders. Despite quite high interest regarding autism and taking into account the increase of knowledge about disordered speech peculiarities and manifestations, unsolved differential diagnostics' issues in these group of children still exist. In children with autism it was estimated that specific developmental impairment of speech and language was misdiagnosed in 82% of children at pre-school age . The complexity of the issue is associated with a high similarity of speech disturbances and equal clinical manifestations for both nosological diagnoses [1,2]. While medical and educational efforts are focused on development of speech skills, it is crucial to evaluate not only the child's degree of speech maturity, but also the structure and severity of speech disorders. Specification of diagnostic criteria of speech development in children with autism is also essential [6].

The diagnostics of potential speech disorders included testing in accordance with "The table of differential diagnostics of speech disorders", that was developed in the course of the study. Armamentarium consisted of 19 tasks on the principle of two diagnostic approaches: logopaedic – for examining the peculiarities of oral speech and clinical –the presence of speech symptoms according to diagnostic criteria which are typical for the section "F 84 Pervasive Development Disorder" ICD-10.

In 80% of cases - 125 patients, screening results confirmed general clinical manifestations and a high similarity of speech disorders in children with specific speech disturbances and various nosologic forms of infantile autism (later on - autism).

In this way the results of the study reveal a high similarity of speech disturbances in both diagnostic groups, which determined further research should be conducted concerning streamlined diagnostic tool for evaluation presence and intensity of speech disorders in children with infantile autism (F 84.0).

At the core of the method there are speech parameters which incidence in children with specific speech disorders and infantile autism varied significantly; this was established by Pearson's chi-square test and included such speech parameters as: expressive speech level ($\chi2=117.82$, $p=0.0000$), expression of requests ($\chi2=104.15$, $p=0.0000$), grammatical system ($\chi2=93.64$, $p=0.0000$), word formation ($\chi2=124.47$, $p=0.0000$), phrasal speech ($\chi2=131.39$, $p=0.0000$), narration ($\chi2=19.24$, $p=0.00001$), pronunciation ($\chi2=59.61$, $p=0.0000$), interaction with adults ($\chi2=90.19$, $p=0.0000$), speech fluency ($\chi2=10.31$, $p=0.00113$), capacity for dialogue ($\chi2=55.21$, $p=0.0000$), monotonous speech ($\chi2=17.64$, $p=0.00003$), capacity for voice manner control ($\chi2=149.92$, $p=0.0000$), loss of speech skills ($\chi2=2.79$, $p=0.094667$), spontaneous speech initiation (social functioning) ($\chi2=0.07$, $p=0.79084$)

Speech parameters, which did not demonstrate any correlation with the integral estimation results were not included in the method: echolalia, iterated speech, pronouncing unusual sounds, intonation. Parameters' correlation rates and the integral score results did not exceed 0.23

In addition, it was revealed that Cronbach's alpha increased as these four parameters were excluded from the study.

Therefore, the method included 15 parameters divided into 6 sections (Table 5).

For the purpose of speech disturbances' degree estimation the scoring system was used according to standards designed for methods' management:

0 points – norm;
1 point – light disorders, unobvious speech impairments with occasional alert manifestations;
2 points – moderate disorders, evident speech impairments;
3 points – severe degree of speech disturbances.

The main findings of the present study: The study reveals the peculiarities of speech development in children with autism and specific speech impairments and demonstrates the presence of similar clinical manifestations in both groups in 80% of cases.

On the basis of research data analysis the method for diagnostics of speech disorders in children with autism aged 4 to 7 was developed. The method reveals disturbances of speech development on the principle of two diagnostic approaches: educational – study of spoken language peculiarities and clinical – the presence of speech manifestations in accordance with diagnostic criteria from the section "F 84 General Pervasive Disorders" in ICD-10.

The new method includes 15 parameters characterized by speech disturbances most commonly manifesting in children with autism and demonstrating a statistically significant incidence rate comparing to children with specific developmental disorders of speech and language (Pearson's chi-square test).

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