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**COGNITIVE TRAINING TECHNOLOGY IN SYSTEM OF  
PSYCHO-CORRECTIVE WORK WITH IHD PATIENTS**

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*Abstract*

This review article presents data concerning methods of neuro-psychological diagnostics and the restoration of the cognitive sphere of patients with ischaemic heart disease (IHD) by means of cognitive training programs. The study of IHD patients' neuro-psychological functions state is especially urgent nowadays due to a high rate of cognitive deteriorations. The existing researches allow us to assert that the cognitive sphere of IHD patients is characterized by certain peculiarities associated with the influence of the disease on the brain work state. The effectiveness of cognitive methods of rehabilitation is the subject of numerous investigations, but up to the present not enough attention has been paid to the practical and theoretical issues of their development and implementation. Main problems arising during the process of making a plan of activities on cognitive sphere restoration are considered. Experimental research data proving the effectiveness of cognitive training activities in the work with patients having cardiological diseases are presented. There is a range of recommendations on employing educational programs in the process of rehabilitation of IHD patients, the choice of the "target" of psycho-corrective impact and the evaluation of the restoration process. This information may be of great use for physicians and psychologists in conducting neuro-psychological diagnostics and developing psycho-corrective activities on the restoration of violated cognitive functions in IHD patients.

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**Keywords:** Cognitive recovery technologies, ischaemic heart disease, cognitive training, rehabilitation training.



## **1. Introduction**

The problem of the human's mental health study of is one of the most significant ones in modern theoretical and applied psychology. The appearance of a disease is one of the most common life situations, which leads to the violation of person's adaptation to a habitual lifestyle. It also concerns patients suffering from cardio-vascular diseases (CVDs). Nowadays CVDs play a considerable role in the increase in general mortality figures in Russia, whereas ischaemic heart disease (IHD) is one of the main causes of population mortality in most economically advanced countries of the world.

## **2. Problem Statement**

For implementing high quality psycho-therapeutic assistance, main fields of the investigation of the psychological state of a person with a CVS were determined. Among them are the following: the study of personality and emotional and behavioral activity in patients with various forms of IHD; psychological adaptation mechanisms of patients who have suffered myocardial infarction; axiological sphere of patients who have suffered myocardial infarction; influence of behavioral peculiarities of IHD patients on clinical-chemical and psychological indicators in the period of an operation stress; mechanisms of psychological adaptation to emotional tension in patients with IHD; individual psychological peculiarities of the internal picture of the disease and the choice of behavior strategies in case of CVD contraction; psychological resistance to psycho-therapy in patients with CVD; psychological diagnostics of IHD risk in the framework of its structure and dynamics of emotional states in patients in the period of hospital treatment; psychological peculiarities of patients susceptible to panic attacks; psycho-corrective work with patients with the consideration of their cognitive state parameters in the clinical dynamics of the disease (Aljohin, Trifonova, & Chernoray, 2012; Lazareva & Nikolaev, 2012, 2013; Solodukhin, Seryy, Trubnikova, Yanitskiy & Barbarash 2016; Reverchuk, 2014; Zinchenko, Pervichko, & Martynov, 2013; Chumakova & Trifonova, 2012).

## **3. Research Questions**

The research issue was the study of cognitive recovery technologies in patients with IHD.

## **4. Purpose of the Study**

There is an analysis of Russian and foreign publications on the problem of restoring cognitive functions in persons suffering from CVDs/

## **5. Research Methods**

The research methodology involves analysis and compilation of academic writings by Russian and foreign researchers, whose authority and scientific reputation have been recognized by medical and psychological scientific community.

## 6. Findings

Nowadays methods of medical care for ICD patients have been considerably improved that has resulted in the increase of life quality and longevity. However, a rise in average age is characterized by a series of changes in the human organism among which gradual development of cognitive sphere deficiency is observed. According to All-Russian epidemiologic research “Prometey”, cognitive deteriorations of various degree of evidence are revealed in approximately 70% of patients over 60 (Yakhno, 2006). The deteriorations of cognitive functioning in IHD patients are connected with the involvement of depth structures of brain in the process of atherosclerotic vascular disease and hemodynamic changes development. It results in the violation of cognitive processes dynamics in the form of attention and memory deteriorations, high rate exhaustion, fluctuations in intellectual capacity and psychological activity decline, which shows disorders in the functioning of cortical and subcortical structures and development of cognitive sphere deficiency over the whole period of disease (Eremina, Demchenko, Shhelkova, Goruleva, & Jakovleva 2015; Tarasova, Trubnikova, Kukhareva, & Barbarash, 2015).

For the compensation of the cognitive deficiency and the adaptation of IHD patients to everyday life, training programs are applied more and more often alongside with pharmaceutical treatment. The search for cognitive deficiency correction ways ensures the necessity of introducing psycho-corrective methods into medical practice. One of such method is cognitive skills training – a special type of psycho-therapeutic work aimed at the correction of cognitive functions impairment or restoration of the lost cognitive functions, such as attention, memory, ideation and others.

One of the main problems arising in the process of cognitive training program development is the absence of a unified approach towards conducting such activities. In the investigations of the assessment of cognitive training influence on the restoration of cognitive functions the activities were conducted with patients who had mild and moderate cognitive impairment. Rarely patients with mild dementia were included into the program of cognitive training activities. The duration of the session was from 20 minutes to 2.5 hours depending on the patient’s age, degree of cognitive impairment and concomitant diseases. The course duration was from 2 weeks to 2 months, 2-5 sessions a week. Cognitive training sessions were conducted both in the form of independent work and in combination with physical exercises. The results of investigations show that significant improvement of cognitive functions were observed in patients with mild cognitive impairment, and insignificant dynamics of cognitive function restoration was observed in the groups of patients with moderate cognitive deficiency. The restoration of the cognitive sphere in patients with mild dementia was either low-grade or not observed, yet, the cognitive training activities made a positive impact on their psycho-emotional state. Thus, currently, there is a significant amount of research which have proved the effectiveness of such activities on restoration of the cognitive domains (Bahar-Fuchs, Clare, & Woods, 2013; Cassilhas, Lee, & Fernandes, 2012; Cyarto & Lautenschlager, 2012; Erickson & Voss, 2011; Nagamatsu, Handy, Hsu, Voss, & Liu-Ambrose, 2012; Liu-Ambrose, Nagamatsu, Voss, Khan, & Handy, 2012; Lindsay et al., 2013).

To assess the level of cognitive function restoration with the help of cognitive training, domestic and foreign researchers used a diagnostic complex consisting of neuro-psychological techniques. They are cognitive functions state assessment scale (Mini-Mental State Examination – MMSE), Frontal Assessment Battery (FAB), MoCA-test, Clock-Drawing Test (CDT), test for assessing mental performance efficiency

and tempo of mental processes (Schulte tables), association test (semantic speech activity), series counting from Mattis scale, the memory technique “Learning 10 words”, Randt Memory Test, Wechsler Memory Scale (WMS), Digit Symbol Substitution Test (DSST, WAIS-III, Wechsler, 1997), Trail Making Test, A. Rey Test, Wisconsin Card Sorting Test (WCST) and Stroop Test (SCW). These techniques were used for assessing changes of main components of cognitive deficiency in IHD patients and patients with other somatic diseases before and after cognitive training sessions domains (Bahar-Fuchs, Clare & Woods, 2013; Cassilhas, Lee & Fernandes, 2012; Cyarto & Lautenschlager, 2012; Erickson & Voss, 2011; Gigler, Blomeke, Shatil, Weintraub, & Reber, 2013; Nagamatsu, Handy, Hsu, Voss & Liu-Ambrose, 2012; Lindsay et al., 2013; Liu-Ambrose, Nagamatsu, Voss, Khan, & Handy, 2012; Nasreddine, Phillips & Bédirian 2005; Rabipour & Raz, 2012).

The effectiveness of cognitive methods of rehabilitation is the subject of numerous investigations, but up to the present not enough attention has been paid to the practical and theoretical issues of their development and implementation.

Nowadays cognitive training sessions are recognized and accepted as an indispensable component of rehabilitative education of patients with various somatic and neurological diseases (Akimova, Zuev, Martynovich, Sokolov & Shvarc, 2011; Eremina, Demchenko, Shhelkova, Goruleva, & Jakovleva 2015; Lazareva & Nikolaev, 2013). Yet, up to now there have been a lot of debates about the effectiveness of cognitive education methods. Clinicians who deny the use of cognitive training argue that the biochemical and morphological changes in the brain cannot result from the use of simple cognitive exercises. Though this argument may be true for those domains of the brain where major damage of tissues can be observed some data show that in case of continual cognitive training molecular changes in undamaged or partially damaged neuron structures occur. Human brain has a potential for reorganization (which is called brain plasticity) that is switched on during the training session and influences the change of links between neurons, their excitability and chemical transmission.

The second argument against the use of cognitive training says that such education provides only narrow focused and specific practical effects which are not related to general functions of the brain and man’s activity on the whole. Though it is true that simpler and functionally closer skills are restored faster than generalized abilities, some data show that general cognitive abilities of the human may be significantly improved as a result of cognitive training (Jean, Bergeron, Thivierge & Simard, 2010; Pogossova et al., 2015; Svendsen, & Teasdale, 2006)].

Nowadays there are no established criteria for designing a cognitive training program. However, some authors have developed recommendations on designing educational programs for restoration of cognitive domains (Koehler, Wilhelm & Shoulson, 2012).

The initial point in developing an educational program of cognitive rehabilitation depends on the severity of the revealed deteriorations, psychosocial and emotional factors and a functional goal of cognitive training. Data obtained with the help of neuropsychological diagnostics may be used in the development of psycho-corrective sessions plan through revealing strong and weak points of the patient’s cognitive domain.

When creating rehabilitation programs, it is necessary to choose a cognitive domain which requires cognitive training. Priority can be given to the domain in which the highest deficiency of cognitive functions

is observed. But, depending on personality features and emotional state of the person neuropsychologist can begin cognitive training with the tasks which are less difficult for the patient. The corresponding level of difficulty is established in order the patient could manage to perform the task without great disappointment and remain motivated to work further. After mastering easy tasks, the level of difficulty is gradually increased. Currently, there are no common rules or standard criteria for making the decision whether the patient has already reached the maximum parameter in the given cognitive domain. Taking into account the absence of basic principles, physicians and psychologists should understand that every cognitive training complex has its own criteria of the beginning and the end of sessions.

The assessment of the progress is carried out in equal time intervals and is implemented in one of the two formats. The first format implies psychometric diagnostics and measures the effectiveness of the task performance by means of an identical cognitive test. This type of measuring in many aspects depends on the availability of equivalent neuropsychological techniques. Neuropsychological tests which are resistant to educational effect are the most useful for the repeated application. In rare cases the evaluation of the training is carried out with the help of commercially available cognitive programs.

The second format suggests the assessment of the use of skills provided by the cognitive training in the patient's everyday activity. This variant is related to the ability to apply a new skill or strategy of behavior in the routine situation. The evaluation of the effectiveness of such training activities may be carried out with the help of questionnaires concerning the patient's everyday activity. The effect of such education should be measured before and after the cognitive rehabilitation.

It should be noted that in conducting rehabilitation activities it is desirable to employ several methods such as psychological counseling, physiotherapy, therapeutic exercise and cognitive training simultaneously for achieving better curative effect.

Although the work with one patient can bring the most significant results group, cognitive education also has some advantages. In general, it is a psychological effect that reduces the patient's feeling of isolation and allows him or her to see oneself as a part of a consolidated group of people participating in a significant project. The mode of group work also gives an opportunity to motivate more people to take part in the activities. The patients should not be left working alone for a long time. It should be emphasized that in spite of the fact of group work the program of cognitive training should be developed for each patient individually, regardless of the number of participants.

Currently, despite the latest accomplishments in the development of technologies for cognitive functions restoration and theoretical and empirical data sphere, the effectiveness of cognitive training activities is still much disputed. A number of medical establishments develop and introduce various services for providing people with slight and moderate cognitive disorders with psycho-corrective aid. The following principles are offered for the evaluation of such services of cognitive rehabilitation (Ladowsky-Brooks, 2010):

1. Was the patient properly taught to use all his/her compensatory opportunities?
2. Was the patient properly taught to use mnemonics (techniques that help to memorize necessary information)?
3. Does the patient understand the reasons for all manipulations conducted with him/her?

4. Did they apply conditioning exercises based on modern theoretical assumptions and empirical data? Did they apply methods based on published researches with promising results?
5. Was diagnostics for cognitive functions change assessment used?
6. Was cognitive training provided under the supervision of a qualified specialist or multi-discipline team of professionals?
7. Were functional and professional goals of the patient taken into consideration?
8. Are the doctors who offer the service of cognitive rehabilitation able to recognize and trace the problems which require additional intervention, for example, depressive disorder?
9. Was psychological counseling in combination with cognitive rehabilitation offered?

Lots of physicians show a great concern that the participation in the program of cognitive rehabilitation may cause patients' false hopes which, in their turn, may lead to disappointment and depression in case the required goals are not achieved. This problem appears to be urgent for all rehabilitation services, regardless of their focusing on physical, psychological or cognitive recovery. However, it could be avoided if rehabilitation services offer qualified specialists who set real goals, are able to trace cognitive and psychological disorders in their patients and take proper measures in order to correct them. Thus, the data informing us about a positive effect of psycho-corrective training sessions with patients of somatic profile provide an opportunity to think that applying cognitive education programs is quite promising for IHD patients.

## 7. Conclusion

The presented review of literature enables us to speak about the expedience of conducting research in the sphere of cognitive rehabilitation. The use of psycho-corrective training sessions aimed at the restoration of cognitive functions in IHD patients is one of the prioritized fields not only of modern psychology, but of correctional pedagogy and clinical medicine as well.

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