

## ALGORITHM OF PROGRAM OF PHYSICAL REHABILITATION INDIVIDUALIZATION IN CHILDREN 14-17 YEARS WITH VEGETATIVE- VASCULAR DYSFUNCTION

Olena Savchuk<sup>1</sup>

<sup>1</sup> Sumy State University, Sumy, Ukraine, savchukov2017@gmail.com

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### Abstracts

**Novelty of reaserch:** is based on absence of complex estimation of psychological state of special medical groups pupils, suffered by vegetative-vascular dysfunction. The absence of multifaceted approach to this problem provides to incomplete solution of educational recreational tasks in school. **Purpose and methods of research:** Purpose of research is to improve the effectiveness of educational recreational tasks in school conditions for 14–17 years children with vegetative-vascular dysfunction by designing of algorithm program of individualization of physical rehabilitation for defined child group. It was analyzing education software and science & methodical literature touched on approach to physical rehabilitation of 14–17 y children with vegetative-vascular dysfunction at the school. For the purpose of research of defined aim the investigation of physical educational process was performed at school of Sumy city. For algorithm designing the methods of simplification and differentiation were used. **Results of Research and Main Conclusions:** The algorithm and schemes of individual physical rehabilitation program for 14–17 y of children with vegetative-vascular dysfunction was done. It gives possibility to provide individual approach through definition of integrative index of vegetative-vascular dysfunction and individual indexes of vegetative-vascular dysfunction for every child (psychogenic, somatic, risk of vegetative-vascular dysfunction formation under vital activity factors). The proposed algorithm and scheme of individual physical rehabilitation program for 14–17 y children with vegetative-vascular dysfunction allow to make individual approach based on quantitative estimation of prenosological states, improving of health state monitoring, program of motor activity reinforcement.

**Key words:** monitoring, school children, individual approach, prenosological states, motor activity.

**Олена Савчук. Алгоритм програми індивідуалізації фізичної реабілітації дітей 14–17 років із вегето-судинними дисфункціями. Актуальність** теми дослідження зумовлена відсутністю комплексного підходу до оцінювання психофізичного стану учнів спеціальних медичних груп із вегето-судинними дисфункціями, що не виконує повною мірою оздоровчих завдань освіти в умовах навчального процесу закладів загальної середньої освіти. **Мета й методи роботи.** Мета роботи – підвищити ефективність оздоровчих завдань освіти в умовах навчального процесу закладів загальної середньої освіти для дітей 14–17 років із вегето-судинними дисфункціями за допомогою розробки алгоритму програми індивідуалізації фізичної реабілітації дітей цієї групи. Проаналізовано навчальні програми та науково-методичну літературу щодо підходів до фізичної реабілітації дітей 14–17 років із вегето-судинними дисфункціями в умовах навчальних закладів загальної середньої освіти. Із метою вивчення сучасних проблем організації навчального процесу дітей спеціальних медичних груп проведено спостереження за перебігом процесів навчання на уроках фізичної культури для дітей 8–11 класів закладів загальної середньої освіти м. Суми. Використано методи симпліфікації та диференціації до процесу побудови алгоритму індивідуалізації програми фізичної реабілітації. **Результати роботи та висновки.** Розроблено алгоритм та схему програми індивідуалізації фізичної реабілітації дітей 14–17 років із вегето-судинними дисфункціями в умовах закладів загальної середньої освіти, що реалізують індивідуальний підхід через визначення рівня інтегрального показника вегето-судинної дисфункції й індивідуальних для кожної дитини складових частин ризику розвитку вегето-судинної дисфункції (психогенної, соматичної, ризику виникнення вегето-судинної дисфункції під впливом чинників життєдіяльності). Запропоновані алгоритм та схема програми індивідуалізації фізичної реабілітації дітей 14–17 років із вегето-судинними дисфункціями в умовах закладів загальної середньої освіти дадуть змогу здійснювати індивідуальний підхід на основі кількісної оцінки донозологічних станів, покращення моніторингу стану здоров'я школярів, програм закріплення форм рухової активності.

**Ключові слова:** моніторинг, школярі, індивідуальний підхід, донозологічні стани, рухова активність.

**Елена Савчук. Алгоритм программы индивидуализации физической реабилитации детей 14–17 лет с вегето-сосудистой дисфункцией. Актуальность** темы исследования обусловлена отсутствием комплексного подхода к оценке психофизического состояния учащихся специальных медицинских групп с вегето-сосудистыми дисфункциями, что не решает в полной мере оздоровительных задач образования в условиях учебного процесса заведений общего среднего образования. **Цель и методы работы.** Цель работы – повысить эффективность оздоровительных задач образования в условиях учебного процесса заведений общего среднего образования для детей 14–17 лет с вегето-сосудистыми дисфункциями путем разработки алгоритма программы индивидуализации физической реабилитации детей указанной группы. Проанализированы учебные программы и научно-методическая литература согласно подходов к физической реабилитации детей 14–17 лет с вегето-сосудистыми дисфункциями в условиях учебных заведений общего среднего образования. С целью изучения современных проблем организации учебного процесса детей специальных медицинских групп проведено наблюдение за ходом процессов обучения на уроках физической культуры для детей 8–11 классов учреждений общего среднего образования г. Сумы. Использованы методы симплификации и дифференциации для построения алгоритма индивидуализации программы физической реабилитации. **Результаты работы и выводы.** Разработаны алгоритм и схема программы индивидуализации физической реабилитации детей 14–17 лет с вегето-сосудистыми дисфункциями в условиях учреждений общего среднего образования, реализующие индивидуальный подход через определение уровня интегрального показателя вегето-сосудистой дисфункции и индивидуальных для каждого ребенка составляющих риска развития вегето-сосудистой дисфункции (психогенной, соматической, риска возникновения вегето-сосудистой дисфункции под влиянием факторов жизнедеятельности). Предложенные алгоритм и схема программы индивидуализации физической реабилитации детей 14–17 лет с вегето-сосудистыми дисфункциями в условиях учреждений общего среднего образования позволят осуществлять индивидуальный подход на основе количественной оценки донозологических состояний, улучшения мониторинга состояния здоровья школьников, программ закрепления форм двигательной активности.

**Ключевые слова:** мониторинг, школьники, индивидуальный подход, донозологические состояния, двигательная активность.

**Introduction.** The program for special medical groups of 5–9 grade pupils, recommended by the Ukraine Education and Science Ministry of October 15, 2008, determines that the purpose of the work with pupils of a special medical group (SMG) is to provide «individual and sustainable improvement of health state». In the annual report on the Ukraine population health state in 2017 it is stated that children aged 7–14 years in 1,2–3,3 times, and children aged 15–17 years – in 3,0–3,8 times more often than at 0-6 years, are registered with diseases of the nervous system, mental and behavioral disorders, etc. [14].

The main goals of the National Strategy for Motor Rehabilitation in Ukraine until 2025 «Motor activity – a healthy lifestyle – a healthy nation», approved by the Decree of the President of Ukraine of February 9, 2016 No. 42/2016, are the following: development of an indicators set for appreciation the physical health level of different population groups; substantiation of the indicators set for estimation of the physical health level of different population groups and the order of their estimation; introduction of a system for monitoring the main motor activity indicators of various age and social population strata, stimulating and restraining factors.

At present, there is no clear unanimous opinion on the exercises methodology on the physical education of SMG children. Available approaches to the physical education of the SMG children contain an individually oriented component which is solved by scientists in different ways. Thus, according to I. O. Korsak, individual approaches in the physical education of SMG children with cardiovascular diseases during the selection of physical exercise should take into account the pathogenesis of the disease, combine physical activity with other methods of physical rehabilitation (self massage and contrast shower hydrotherapy for limbs and cellular zone three times a week), staged control of the functional condition of schoolchildren at the beginning and end of the school year [6].

The practical experience of O. N. Kamishanova testifies the effectiveness of the individual approach implementation with the distribution of children by the degree of physical fitness [5].

Scientists, in particular, N.S. Polka, S.V. Gozak, O. T. Yelizarov, consider it advisable to take into consideration the level of functional capabilities of schoolchildren with cardiovascular diseases, their physical development harmony, the presence of chronic illnesses and the number of functional disorders and developmental abnormalities [10].

Differentiated psychophysical training of children with vegetative-vascular dystonia syndrome based on the psychophysical portrait of children with baseline vagotonic and sympathicotonic vegetative tone is proposed in the N. N. Nezhkina scientific work [9].

In the valid program «Physical Culture», a differentiated approach to a special medical group for 10–11 grades pupils is implemented according to functional capabilities: on the right flank is the I subgroup – pupils with cardiovascular and the respiratory system diseases, the II subgroup – children with diseases of internal organs and weak sight and then the III – backward in physical development schoolchildren (F. F. Bondarev, V.V. Dubovis, 1997).

The actual program «Physical Culture» for special medical groups of secondary schools of 5-9 classes offers the formation of groups taking into account the age and health status with possible combination of a students group with various diseases (V. I. Mayer, V. V. Derevyanko, 2008).

In contrast to the segregational approaches to the physical education of SMG students, I. Bodnar develops the idea of integrating and inclusive physical education of such children, which contributes to improving the functional capabilities of the organism and the better social adaptation of children with weak health, and an individual approach can be implemented on the basis of common contraindications for children with different diagnoses [1].

In scientific works V.A. Mazur and O. S. Ishchenko describe the approach to students in physical education lessons on the basis of increasing the adolescents motivation to study physical culture, which should contribute to improving the effectiveness of physical education [2; 7].

The reasoning of motor activity regimes for students aged 15-17 with different degrees of health based on indexes of physical activity was carried out in the dissertation of N.V. Semenova [13].

In conclusion, we can assume that the modern models of SMG children physical education do not use a complex approach to assessing the psychophysical state of students. The lack of monitoring of the adolescents psychophysical state and programs for fixing motor activity reduce the health effect of physical education lessons. Thus, an individual-differentiated approach to students at lessons is carried out, first of all, taking into account physiological indicators and does not take into account the psychogenic influence of negative factors and lifestyle of adolescents, which does not fully fulfill the sanative goals of education in the conditions of the educational process at general secondary education institutions.

**The purpose of research** is to increase the efficiency of health education tasks in the conditions of the educational process at general secondary education institutions for children aged 14-17 with vegetative-vascular dysfunctions by developing an algorithm of physical rehabilitation individualization program for children of a such group.

**Objectives of research:**

1. To identify the main structural elements of the physical rehabilitation individualization program for children 14-17 years old.
2. To propose an algorithm of physical rehabilitation individualization program for children aged 14-17 with vegetative-vascular dysfunctions in conditions of general secondary education institutions.

**Material and methods of research.** The analysis of educational programs and scientific and methodical literature on approaches to physical rehabilitation of children aged 14-17 with vegetative-vascular dysfunctions in the conditions of general secondary education institutions was conducted. In order to study the current problems of the educational process organization of the SMG children, observation of the learning process at the physical education classes for children of 8-11 grades of general secondary institutions education in the city Sumy was conducted. In the course of the investigation, the methods of simplification and differentiation to the process of a physical rehabilitation individualization program algorithm constructing were used.

The research was carried out in accordance with the theme of the physical culture medical and biological basis department of A. S. Makarenko Sumy State Pedagogical University «Physiological and hygienic maintenance of health preservation activity of educational institutions» (state registration number - 0113U004662).

**Results of research.** Study and analysis of the programs «Physical Culture» for 5-9 grade special medical groups of general educational institutions (authors Mayer V.I., Derevyanko V.V., 2008) and

«Physical Culture» for 10-11 grade students special medical group (F.F. Bondarev, Dubovis V.V., 1997), as well as observation of the learning processes course at physical education classes, showed that the individual quantitative approach to the dosage of physical activity for children with vegetative-vascular dysfunction is absent, individual factors of child vegetative-vascular dysfunction development risk are not considered. Therefore, in the course of the study, the scheme (Figure 1) and the algorithm (Figure 2) that implement the individual approach by determining the level of the integral index of vegetative-vascular dysfunction (VVD) and individual components for the VVD developing risk (psychogenic, somatic, the VVD emergence risk under the life factors influence) were proposed and methods of their quantitative determination are given in the author's work [3; 4; 11; 12].

Input data of the given program algorithm (Figure 2) include receiving indicators of physical and psycho-emotional state with further data entering in the lines of the psychophysical state elaborated table and the student the living conditions card. The indicators obtaining is carried out by a questionnaire conducted by the class teacher, as well as by anthropometric and physiometric measurements carried out by a school medical officer or a physical rehabilitation therapist.

Diagnosis is performed on the basis of the obtained indicators using the qualimeter calculation of the following four integral indicators:

- 1) the integral index of the VVD ( $II_{VVD}$ );
- 2) integral indicator of the VVD development psychogenic risk of ( $II_{PR}$ );
- 3) integral indicator of the VVD development somatic risk ( $II_{SR}$ );
- 4) integral indicator of the VSD risk under the influence of life factors ( $II_{LF}$ ).

Methods of calculation such integral indicators are presented in the previous articles [3; 4; 11; 12]. There are calculated four integral indicators ( $II_{VVD}$ ,  $II_{SR}$ ,  $II_{gr}$ ,  $II_{pr}$ ) that involving into the card of the psychophysical state of the pupil and the card of living conditions of the pupil.

The «Health» block assumes the pupil that will be given a «yes» response to physical activity with an intensity corresponding to the main group of physical culture.

*Differentiation. Selection a rehab program.* In order to implement an individual approach to pupils according to the data of the integral indicator VVD [3] applied to the following groups:

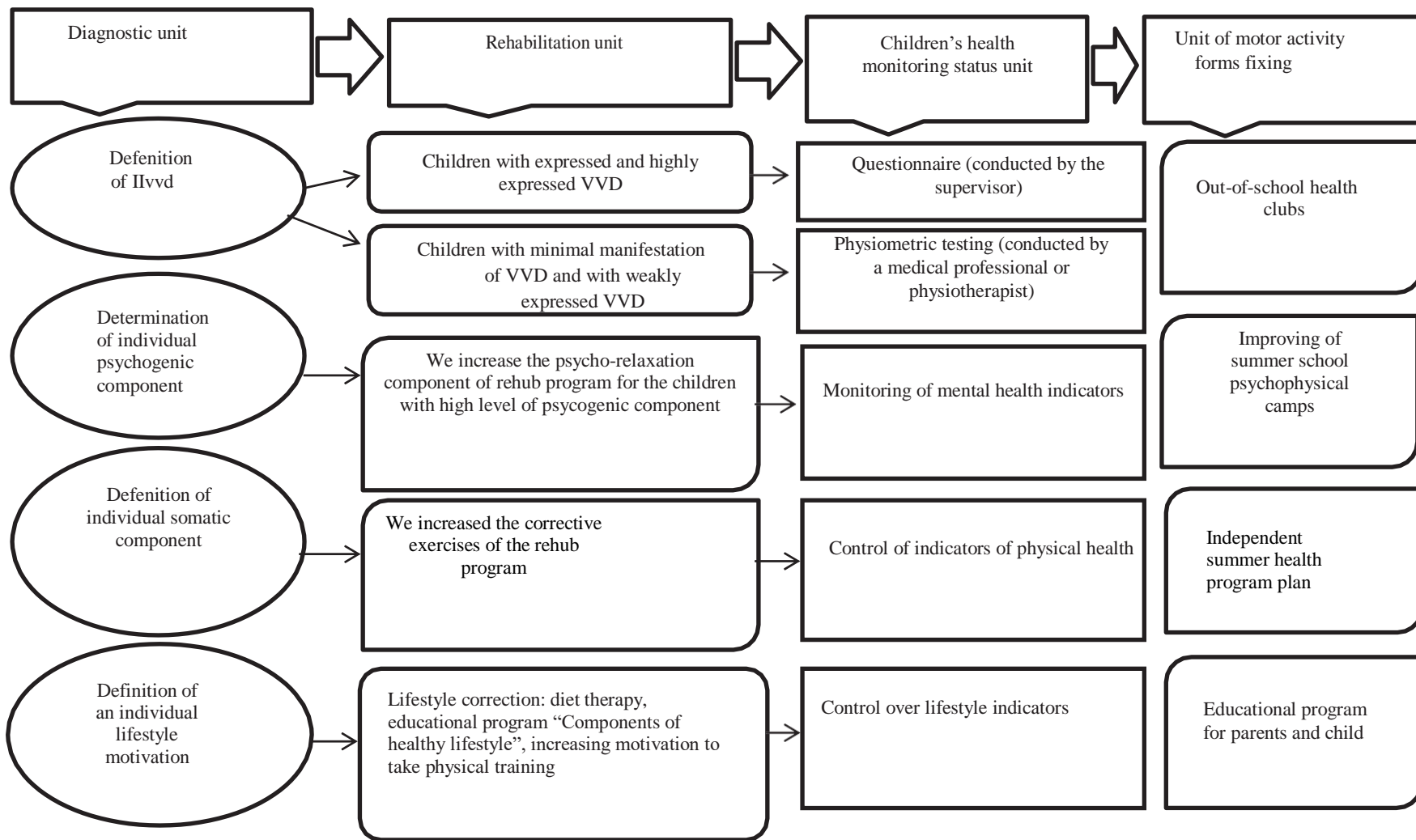
1. Healthy (Group  $D_1$ ).
2. Minimal signs of VVD and weakly expressed VVD (Group  $D_2$ ).
3. Significantly expressed and expressed VVD (Group  $D_3$ ).

For the differentiation of groups into subgroups, the distribution of children according to the probability of occurrence of VVD according to the results of integral indicators of psychogenic, somatic, and life-threatening risks has been applied [4; 11; 12]:

1. General subgroup  $D_1$  (children without signs of VVD).
2. Subgroup  $D_{2,1}$  (children of group 2 with higher than average and high levels of psychogenic risk).
3. Subgroup  $D_{2,2}$  (children of group 2 with higher than average and high levels of somatic risk).
4. Subgroup  $D_{2,3}$  (children of group 2 with higher than average and high levels of risk of lifestyle exposure).
5. Subgroup  $D_{3,1}$  (children of group 3 with higher than average and high levels of psychogenic risk).
6. Subgroup  $D_{3,2}$  (children of group 3 with higher than average and high levels of somatic risk).
7. Subgroup  $D_{3,3}$  (children of group 3 with higher than average and high levels of risk of lifestyle exposure).

*Rehab for the chosen program* in general will involve the implementation of differentiated programs by the pupils in accordance with the proposed division of children into subgroups. A detailed description of these differentiated programs will be presented in the following article

*Monitoring of the functional level.* Monitoring of the state of pupil's health is carried out with the help of the elaborated psychophysical status card and the student's living conditions card and is conducted twice in the academic year (at the beginning and at the end of the school year). The psychophysical card includes the following indicators: the points of the Wein questionnaire, the children's questionnaire for neuroses (adapted for children aged 14-17), the level of heart rate, CAP, DBP, the vegetative index of Kerdo and the Ruffie index, the integral index of the VVD.



**Figure 1.** Scheme of individualization program of physical rehabilitation for children aged 14–17 with vegetative-vascular dysfunctions

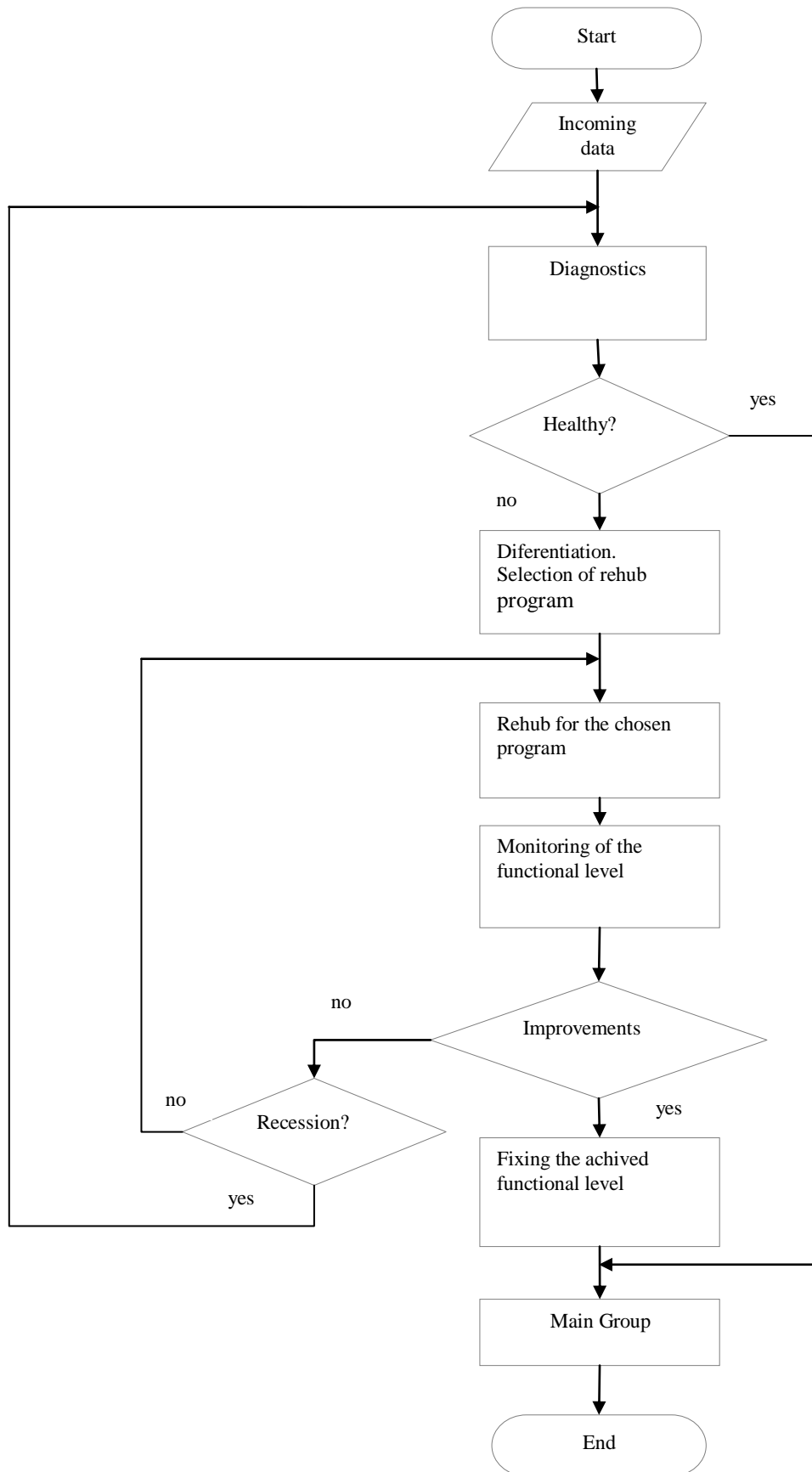


Figure 2. Algorithm of the physical rehabilitation program for children with vegetative-vascular dysfunctions

Body length, body weight, OTK, LJ, muscle strength of the right and left wrist, health group, shoulder index, index of vertebral curvature of the spine, size of subcutaneous fat on the abdomen, level and harmony of physical development, somatotype, adaptive potential, respiratory index, power index, integral index of the somatic risk of development of the VVD.

The card of living conditions of the pupil contains next indicators: domestic motor activity, time during the day and the number of classes during the week of specially organized motor activity, periodicity of eating, frequency of consumption of meat, dairy products, fish and seafood, cereals, potatoes, fruits, juices, vegetables, sweets, the frequency of alcohol use, the frequency of smoking, the duration of sleep, the integral indicator of the risk of VVD under the influence of factors of life: relationship with family, teachers, classmates and friends, load at school, homework time, extracurricular circles, activities in the spare time, feeling of pain in any localization in the last six months, health state for the past six months, self-esteem of health, taking medicine during the last month, an integral indicator of the psychogenic risk of developing VVD, Methods of the points assessment of the proposed indicators included in the psychophysical card condition card and the card of the pupil's living conditions are described in our previous works [3; 4; 11; 12].

*Improvements.* We continue the rehab program.

*Recession.* Conduction new diagnosis and analysis of the causes of recession. Correction of the rehab program, taking into account the risk factors for the occurrence of VVD.

*Fixing the achieved functional level.* The consolidation of the achieved functional level is carried out at the expense of the training period in the health clubs of choice. The teacher according to the state of health of the pupil offers possible health improvement. A compulsory element of the assessment of the acquisition of a physical education curriculum should be developed by a pupil with the help of a physical education teacher to plan an independent health program in the summer that can significantly increase the level of conscious responsible attitude to their health (Figure 1). The important elements of the blocking of motor activity are conducting educational work with children and parents through the creation of an educational school site, as well as the involvement of schoolchildren in psychophysical improvement in older preschool and extracurricular camps (Figure 1).

*Main group.* In the presence of positive changes in the health of the child is transferred to the main group of physical culture.

**Discussion.** The application of algorithms with therapeutic purpose is widely used in the process of patients rehabilitation in the conditions of medical institutions (I.K. Babov, V.P. Torchinsky, I.I. Bila, V. M. Maiko, 2010). Algorithmic approach in school physical education is used, first of all, in methods of teaching physical exercise techniques for schoolchildren (M. Roztorguy, 2013, O. Tovstonog, F. Zagora, 2013, Yu. S. Kostiuk, 2016).

At the same time, numerous scientific researches have proved that in the process of adaptation to physical activity, each organism concludes its «physiological price». Herewith, heredity plays a leading role in determining the rate and degree of the organism adaptation to the training program. Individual differences depend on fluctuations in the intensity of cellular development, metabolism, as well as nerve and endocrine regulation (J.H. Wilmour, D. L. Kostill, 1997). Considering the predominance of unfavorable types of the body non-specific adaptive reactions (stress, overtraining, re-activation) in children with VVD, the physical loads of such children require individual dosage [8]. The foregoing confirms the expediency of using algorithms of individually differentiated dosage of physical activity during school lessons for SMG children with vegetative-vascular dysfunctions.

**Conclusions and perspectives of further research.** Analysis of literary sources and attending school physical classes show that modern models of special medical groups children physical education are aimed at overcoming the practical school difficulties in the absence of training bases, lack of time, high filling of educational groups and do not fully meet the therapeutic needs of education in the educational process at general secondary education institutions.

The proposed algorithm and physical rehabilitation individualization scheme of children aged 14–17 with vegetative-vascular dysfunctions in conditions of general secondary education institutions will make it possible to apply an individual approach on the basis of the quantitative assessment of the dono-

zoological status, improvement of the schoolchildren health status monitoring, programs for the consolidation of motor activity forms.

Prospects for further research in this direction are the specification and experimental testing of the physical rehabilitation individualization program of children aged 14–17 with vegetative-vascular dysfunctions.

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