

ASSESSMENT OF HEALTH IMPROVEMENT EFFECTIVENESS IN CHILDREN IN SUMMER CAMPS: MODERN APPROACHES AND INDICATORS

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Stationary summer recreation camps provide opportunities for comprehensive health improvement and optimal physical development of children and adolescents. However, the issue of evaluating the effectiveness of health measures during a single session (typically lasting 21 days) remains relevant. The paper is focused on the analysis of modern approaches to physiological and hygienic assessment of the effectiveness of recreation and health improvement in children and adolescents in summer recreation camps, considering the short duration and complex nature of the health interventions. Additionally, it explores prospects for using modern biomedical technologies to enhance the reliability and information value of methods for assessing health-improving effects. Promising methods include those based on bioelectrical impedance and the use of digital health monitoring systems, considering the child's baseline health status and individual characteristics.

Keywords: children's health, summer camps, assessment of health improvement effectiveness, physical development, functional tests, individual approach

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ОЦЕНКА ЭФФЕКТИВНОСТИ ОЗДОРОВЛЕНИЯ ДЕТЕЙ В ЛЕТНИХ ЛАГЕРЯХ: СОВРЕМЕННЫЕ ПОДХОДЫ И ПОКАЗАТЕЛИ

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Летние стационарные оздоровительные лагеря обеспечивают возможность всестороннего укрепления здоровья и оптимального физического развития детей и подростков, однако актуальным остается вопрос оценки эффективности оздоровления за одну смену (как правило, продолжающуюся 21 день). Целью работы было проанализировать современные подходы к физиолого-гигиенической оценке эффективности отдыха и оздоровления детей и подростков в летних стационарных оздоровительных лагерях с учетом небольшой продолжительности и комплексного характера оздоровительного воздействия, а также перспективы использования современных биомедицинских технологий для повышения надежности и информативности методов оценки оздоровительного эффекта. Перспективными представляются методики на основе биоэлектрического импеданса и использование цифровых систем мониторинга здоровья с учетом исходного состояния и индивидуальных особенностей ребенка.

Ключевые слова: здоровье детей, летние лагеря, оценка эффективности оздоровления, физическое развитие, функциональные пробы, индивидуальный подход

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Modern research reports negative trends in children's health: decreased physical activity, deterioration in physical development, and the increased incidence of acute and chronic diseases among school-age children, necessitating effective health measures [1].

To assess and improve the effectiveness of health improvement programs, it is necessary to introduce simple, accessible in the context of summer camps, and at the same time informative methods that allow one to estimate the dynamic changes in children's physical development, functional state and general health during the session [2–5].

In the current context of socio-economic changes against the backdrop of deteriorating health of the younger generation, improving the system of summer recreation camps is becoming an important state task aimed at preserving and improving the health of children [1, 6].

The review is focused on evaluating modern approaches to physiological and hygienic assessment of the effectiveness of children's and adolescents' recreation in summer recreation camp considering the short duration and complex nature of the health-improving effect, as well as prospects for using modern digital and biomedical technologies to enhance

the reliability and information value of methods for assessing health-improving effects.

Role of summer recreation camps in development and health improvement of children

Summer recreation camps for school-age children are characterized by systematic organization of a rational motor regimen, diet improvement, implementation of the participants' social activity considering their personal interests, as well as the exposure to natural health-improving factors, i.e. sun, air, and water, having a beneficial effect on the immunity and psycho-emotional state [5, 7].

All the above has a positive effect on the self-realization and socialization of children and adolescents, that is, it forms the socio-pedagogical aspect of health improvement [8]. Furthermore, the children's psycho-emotional and physical state is improved, largely due to the provision of high physical activity in the format of various sports-oriented events [9]. However, the question of how this improvement can be measured and evaluated is still a matter of debate [4, 5, 10].

In summer recreation practice, such an assessment is carried out by medical professionals on the basis of current guidelines approved in 2019 [2]. According to the guidelines, at the beginning and in the end of the session, the summer camp medical staff records the following child's morphofunctional state indicators, which provide the basis for drawing a conclusion about the health improvement program effectiveness:

- height (body length);
- body weight;
- muscle strength (handheld dynamometry);
- vital capacity (VC).

These indicators are evaluated during follow-up throughout the health improvement session (lasting at least 21 days). To ensure the reliability and comparability of the results of assessing the effectiveness of children's health improvement in summer camps, it is important to adhere to the same timing of measurements and requirements for performers. Baseline measurements are performed at the beginning of the session: on days 1–2 after arrival. Measurements are taken in the camp's medical unit to record baseline data. In the end of the session, 1–2 days before departure, final measurements are carried out to evaluate the dynamic changes. In the camp, these are carried out by a staff physician or nurse, who had been trained and use calibrated equipment. It is important that the measurements are carried out by the same specialists using the same methods and instruments, under the same conditions, to ensure data consistency and high assessment quality.

Along with the above quantitative indicators, the following is also recorded:

- physical development (harmonious, disharmonious — underweight; disharmonious — overweight);
- health group — first, second, third;
- group for physical education classes — basic, preparatory; therapeutic exercise group.

It is recommended to express the total dynamics of the indicators in points in accordance with a specially developed scale [2].

A differentiated approach is used to assess the dynamic changes in body weight, depending on the baseline physical development. In contrast to the standards of 50–60s of the last century, when any weight gain was considered as a positive trend, the current guidelines suggest that the weight gain represents a sign of health improvement in cases of harmonious physical development or disharmonious physical development due to underweight, while in overweight

individuals the decrease in this indicator would be a health improvement manifestation.

Recently, it was proposed to take into account the child's body type when analyzing the dynamic changes in physical development indicators, as this has a great effect on the direction of the body's adaptive changes during health improvement [11, 12].

According to the guidelines [2], the total score for each child expressed in health improvement effectiveness indicators should be assessed. When the child's total score (based on the height, body weight, muscle strength, and respiratory function measurements) for the health improvement session is 12–16 points, the health improvement effectiveness is considered to be high; 6–11 points — the health improvement effectiveness is considered to be low; below 6 points — no health-improving effect.

A sufficiently large number of published reports are focused on scrupulous implementation of the guidelines on assessing the effectiveness of organized summer recreation for children and adolescents in various regions of the Russian Federation [13, 14, etc.]. In most cases, the authors note a fairly high efficiency of health improvement (over 80%), but there always remains a part of the child population in whom health improvement is ineffective (usually within 5%). This may be due to both shortcomings in the organizational and technological procedures in a particular health institution and the specific individual characteristics of some participants.

Thus, classical biomedical criteria are basic in terms of assessing the effectiveness of health improvement: dynamic changes in anthropometric indicators (height, body weight, body mass index — BMI); dynamic changes in physiological indicators (blood pressure, heart rate, vital capacity, handheld dynamometry data, body's adaptive-homeostatic responses); functional tests (exercise tests); immunological indicators (incidence rate, rate of complications of chronic disorders, etc.). The effectiveness of these criteria has been confirmed by numerous studies by domestic and foreign researchers [1, 7].

Along with biomedical indicators, social and hygienic criteria are also distinguished: incidence rate by visits, number of sick days per 100 children, rate of infectious and noncommunicable diseases, dynamics of children's health groups, as well as indicators of adaptation to camp conditions and the social environment [8].

Modern research emphasizes the importance of psychological criteria, including assessment of psycho-emotional state, sleep quality, emotional well-being, subjective satisfaction with the time in the institution (surveys of children and parents), assessment of motivation and communication skills (the use of questionnaires, surveys, and digital tools allow us to track these indicators in real time) [4, 8, 10].

Further development of the system of stationary summer recreation camps meets the interests of the younger generation and the expectations of parents [5]. The inclusion of novel, advanced methods and technologies allowing for the more informative assessment of the health status of participants and facilitating the analysis of individual characteristics in a stream of diverse information represents one important direction of such development [10, 11].

Possible aspects of modernizing the methodology for assessing the effectiveness of summer recreation in health improvement institutions are as follows:

- the use of estimated indices, which are often more sensitive in terms of information value, along with absolute anthropometric and physiometric indicators [11, 15];
- consideration of individual anthropometric characteristics and body type when analyzing shifts in physical development and the results of functional tests [11, 12];

- introduction of new research methods into the practice of medical supervision under the conditions of a summer recreation camp — bioelectrical impedance analysis [4, 16], cardiointervalometry [11]; motor activity measurement [10, 17];

- development of software and application of digital technologies for automated calculation of quantitative indicators of health improvement and its effectiveness under the conditions of summer stationary recreation camps [18, 19].

What fresh ideas and innovative methods are being proposed to improve the health improvement assessment accuracy and comprehensiveness?

First, integration of advanced methods, such as variational cardiointervalometry (determination of the body's adaptive capacity and the balance of the autonomic nervous system branches) [11, 20], bioelectrical impedance analysis (quantitative assessment of body composition and metabolism) [21], infrared thermography (identification of vascular dysfunction in the limbs and skin, assessment of the body's temperature status) [22, 23], and accelerometry (quantitative assessment of the amount and intensity of physical activity) [24], allows one to complement the traditional approach with new possibilities. These methods provide more in-depth and accurate monitoring of children's condition, which is especially important in the context of limited time spent in the camp.

Second, assessment digitalization and automation play a key role in improving the efficiency and convenience of camp staff. The integration of digital platforms and mobile applications allows for the collection, processing, and interpretation of large amounts of data, creating a personalized health pattern for each child [4, 25, 26]. Such software is widely used in practice nowadays [18, 19].

The third important aspect is related to personalization of approaches to the formation of environmental conditions contributing to health improvement. Consideration of the children's

constitutional characteristics, which has become widespread in physical education in recent decades [4, 11, 12], in summer camps can help increase confidence in the results and improve the quality of services provided [3, 12, 14, 27].

In addition, gamification and the involvement of children and parents in the health monitoring process are important areas. The game format increases children's interest and motivation, making the process of monitoring their health a fun and enjoyable activity [28, 29].

Training of qualified personnel and regular professional development of camp staff are necessary for successful implementation of new technologies and methods. Only well-trained specialists can effectively use modern tools and provide an individual approach to each child [30, 31].

CONCLUSION

The shortcomings and limitations of existing methods for assessing the health-improving effects of summer camps are associated with two objective factors: the need to use the simplest and most accessible methods to diagnose the functional state and the short-term effect of camp health factors, since 21 days represent the minimum time for adaptive changes in the human body. These circumstances determine the need for the search, development and implementation of more reliable, informative and sensitive diagnostic procedures and indicators, which is the focus of scientific research at the current stage. Cardiointervalometry, bioelectrical impedance analysis, infrared thermography, accelerometry, and other modern approaches can be promising express methods to assess the body's functional state. The development of appropriate approaches is a pressing issue in the physiology of development and adaptation of a child in order to strengthen his/her health.

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