

## **Dynamics of the Main Classes of Diseases According to (ICD 10) in a Single Cohort of Schoolchildren Over a 10-Year Observation Period**

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### **Abstract**

The publication presents the results of a study of the health status of 437 schoolchildren at different stages of school education (before entering school, at the end of the first grade, during the transition to subject education and at the end of school education).

Dynamic assessment of established (diagnosed) pathological conditions in their compliance with a certain class of ICD-10 over a 10-year observation period established an increase in the proportion of schoolchildren suffering from diseases of the musculoskeletal system, the organ of vision, cardio- and endocrinopathies. The data obtained update the importance of early diagnosis in risk groups, as well as preventive measures aimed at developing a healthy lifestyle and skills among students and their parents within the framework of Priority National Projects in Russia.

**Keywords:** *ICD 10; Schoolchildren; Healthy Lifestyle and Skills*

### **Introduction**

The state of health of students is characterized by a significant prevalence of morbidity and an increase in this indicator in the process of school education [1-4]. In modern society, the general education system makes high demands on the health of students, which necessitates the joint work of doctors, teachers, psychologists and parents to control morbidity, methods of recovery and rehabilitation of not only patients, but also students from risk groups [5-9].

The basis of preventive activities in pediatrics is medical examination, based on active dynamic monitoring of not only sick, but also healthy children. Preventive examinations are an important link in medical examinations, which are carried out in order to timely identify deviations in the state of children's health and organize the necessary treatment, preventive and recreational activities.

There are a number of reasons that actualize the importance of preventive medicine and especially pediatrics (a significant contribution and a wide list of risk factors and triggers in the development of various pathologies; the growth of chronic diseases that limit the

duration and quality of life; a significant contribution of social causes that cause various diseases; the need for timely correction somatic pathology, but also the psychological state of the patient (including the child), etc.).

The most important periods of observation include the age before entering school and after the end of the first year of study, as well as the transition to subject education, puberty (14 - 15 years) and graduation from school 10 - 11<sup>th</sup> grade (16 - 17 years) [10,11].

### Purpose of the Study

Based on the results of a dynamic 10-year observation, to present data on the health status of a single cohort of schoolchildren in order to update the main preventive directions for children's practice in the learning process.

### Materials and Methods of Research

The examination of schoolchildren was carried out in standard schools in different districts of Krasnoyarsk. The school process (learning in the first shift, daily and total weekly load, lesson duration, break duration, number of school days per week) in all schools was organized in the same way and did not have significant differences in learning conditions (light, heat and air conditions, selection of furniture according to body length).

A survey of 437 schoolchildren was conducted annually at the end of the academic year (April-May); throughout the 10-year study period. The following main stages of observation were identified in the work:

- I. Before entering school;
- II. After the end of the first year of study;
- III. After graduating from elementary school;
- IV. Completion of schooling.

The data obtained were recorded in the individual card of the child and the journals of the study protocols. The system of medical support for children was studied in terms of indicators: primary and general morbidity, according to the results of medical examinations, and assessment of pathological damage.

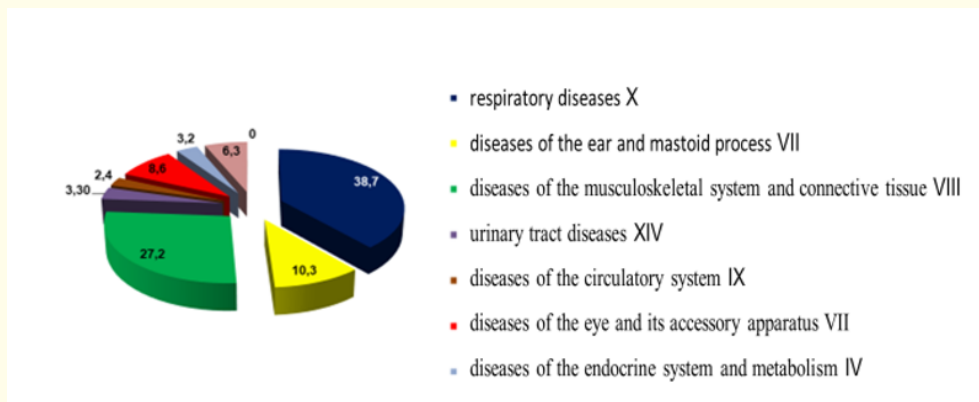
The performed studies complied with the ethical standard of the bioethical committee, which is part of the KSMU. prof. V.F. Voyno-Yasenetsky, developed in accordance with the Declaration of Helsinki of the World Association "Ethical principles for conducting scientific medical research involving humans" as amended in 2000 and "Rules of clinical practice in the Russian Federation", approved by order No. 266 of the Ministry of Health of the Russian Federation of 06/19/2003.

Statistical processing of the results of the study was carried out using the STATISTICA v. 6.0. To assess the reliability of differences in incidence rates, we used the calculation and evaluation of the value of the "t" criterion and confidence limits (confidence intervals) of incidence rates using the "method of confidence limits" (I.P. Paltyshev, N.N. Filatov, 2013).

### Results and Discussion

For a more detailed study of the characteristics of somatic ill-being in the observed schoolchildren, we considered the established (diagnosed) pathological conditions in their accordance with a certain class of ICD-10. According to this classifier, a grouped list of diseases with common features is considered a class (Figure 1).

According to our data, the features of the considered structure of the main classes of diseases at the beginning of schooling should include a significant frequency of respiratory pathology of the class "Respiratory diseases" (38.7%) with an unconditional predominance

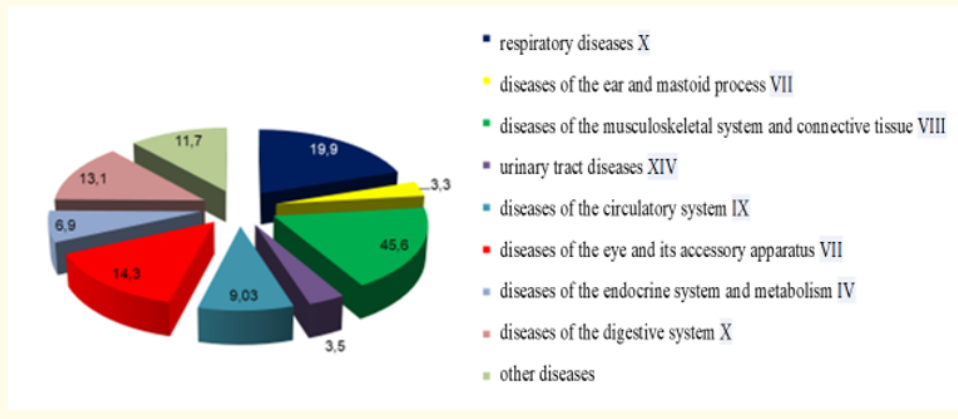


**Figure 1:** The structure of the main classes of diseases (ICD10) in children at the beginning of school education.

of acute respiratory infections, which has well-known explanations (vulnerability of the local immunity system of mucous membranes, insufficient maturity of the immune system in childhood, a large number of contacts with potential pathogens, etc). The second place in the structure of the main classes belongs to “Diseases of the musculoskeletal system and connective tissue” (27.2%), which included congenital and acquired bone deformities, posture disorders, post-traumatic deformities and other disorders of the musculoskeletal system and others. The third place was taken by the class “Diseases of the ear and mastoid process” (10.3%) with a significant frequency of various otitis media. The presented data demonstrate the nature of the most significant medical problems in primary school children, as well as determine the importance and nature of monitoring (with the involvement of relevant specialists) of children with the above deviations, which in the first years of schooling are predominantly functional in nature, but in the future can form the basis for the formation of chronic pathology with impaired compensation of the corresponding functions and significant limitation of life.

The above approach from the standpoint of the main ICD-10 classes (a grouped list of nosologies with common features) was also used in this study at the stage of completion of schooling (Figure 2). The data obtained showed a significant (twofold) reduction in the proportion of children with respiratory disorders (class “Respiratory diseases”) - 19.9% at the end of school, against 38.7% at the beginning of education. The increase in the proportion of children in the class “Diseases of the musculoskeletal system and connective tissue” to 45.6% looks very sad, against 27.2% when entering school. The causes of disorders of the musculoskeletal system in childhood and adolescence can be nutritional deficiency, hypovitaminosis (especially low supply of vitamin D), endocrinopathies, concomitant diseases of the gastrointestinal tract, and taking medications. The most common reason is the low physical activity of schoolchildren, leading to a decrease in bone mineral density. Particular attention at the stage of completion of school education deserves the third most important group of nosologies from the class “Diseases of the eye and its adnexa”. The predominant pathology is myopia (myopia), which is mainly associated with high visual load in educational institutions, improper seating of students during long-term schoolwork, increased load on the visual analyzer when working with computer equipment at school and at home. In this regard, systematic work on the prevention of organ pathology vision becomes paramount. In recent years, an important place in the structure of the main classes of ICD-10 is occupied by “Diseases of the circulatory system” and “Diseases of the endocrine system and metabolism”. According to our data, at the stage of completion of schooling, diseases from these classes are noted in 9.0% and 6.9%, which is 3 - 4 times more than before entering school. In the

structure of endocrinopathies, the leading positions are occupied by thyroid diseases and childhood obesity, which has reached epidemic levels in both developed and developing countries. Adverse effects are obvious (negative impact on physical and sexual development, psychological health), the transition from childhood to adulthood with a large burden of somatic, metabolic and psychological problems.



**Figure 2:** The structure of the main classes of diseases (ICD10) in adolescents at the end of school.

## Conclusion

With an increase in school experience, various pathologies significantly progress, which in later life provokes the development of chronic diseases, often with a progressive and disabling course and a significant decrease in the quality of life.

The distribution of children into groups and the assessment of health indicators with the specification of the most significant classes of diseases on the basis of ICD-10 allows us to present the most relevant statistical indicators for subsequent comparative analyzes in various territories, to evaluate the effectiveness of preventive and curative work in children's medical institutions and organized children's groups, and also determine the need for specialized services and personnel.

The solution of preventive tasks in school groups to prevent the most significant pathology (myopathy, pathology of the musculoskeletal systems, endocrinopathy, gastrointestinal diseases, etc.) is an interdisciplinary work of various healthcare professionals, school medical service, as well as teaching staff (educators) and the child's family.

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