

Comprehensive Assessment of Morbidity Risk Factors Among Children and Teenagers

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Abstract: Relying on the statistical data for the Yaroslavl region, the authors identified three groups of diseases that are most common in children and teenagers. These include diseases of the digestive system, respiratory system, and circulatory system. Using Bayes methodology, the authors conducted a comprehensive assessment of the risk of morbidity for each of these three groups. Based on the results obtained, strong, medium, and weak risk factors leading to diseases of the study groups were identified. Among the factors that are of primary importance for the occurrence of diseases, the most common are: lack of well-being in the family, features of pregnancy and childbirth, levels personal anxiety of children and teenagers, degrees of physical activity, as well as the presence of viral and infectious diseases during pregnancy and first years of the newborn baby. Also, the authors described a socio-pedagogical approach for conducting a comprehensive assessment of the influence of factors on the level of morbidity of schoolchildren. The method for determining the “weight” of each factor measured the strength of its influence on the level of morbidity. The specific gravity of each of them in the integrated risk of morbidity is shown. Based on the study, the authors formulated conclusions and recommendations for carrying out preventive measures with children and teenagers.

1. Introduction

According to the data of the chief sanitary doctor in the Yaroslavl region A. M. Zvyagin [1], the first place among diseases of children and teenagers is occupied by respiratory diseases, the second one by diseases of the digestive system, and the third one by diseases of the circulatory system. The statement of this fact does not allow building systemic work aimed at preventing or reducing the risk of these diseases. Most domestic and foreign authors emphasize the need for an integrated approach (Owens, D. K., Sox, H. C., Zaitseva, N. V., Shur, P. Z., May, I. V., Kiryanov, D. A., Yamaletdinov, A. Sh.), but the research of doctors focused on biomedical factors, and teachers and psychologists identify socio-psychological risk factors of diseases [2-4]. There is a need for a comprehensive assessment of the impact of social, psychological and pedagogical factors on the level of morbidity of children and teenagers, the need to determine the specific weight of each identified factor, the force of influence on the level of morbidity in the integrated risk of morbidity. The purpose of the study was to identify and evaluate the impact of risk factors on the emergence of three groups of diseases in schoolchildren: respiratory and digestive organs, as well as the circulatory system.

2. Materials and Methods

One of the effective tools for obtaining information on the above issues is the Bayesian approach to aggregating indicators and assessing the risk of morbidity, based on assessing the probability of a disease in a concrete patient or group of patients. This technique is widely used in the research of L. Lasted, L. E. Polyakov, L. M. Malinsky, and others [5-8]. Over the years, the authors of the article have been monitoring indicators using this technique [9-10].

The practical significance of using this methodology is that it allows calculating risks for an individual educational institution or for a specific municipal district, if necessary, the unit of analysis may be a class (a group of children) or an individual child and his family. This will depend on the goals set during forecasting,

which will determine the degree of probability of occurrence of diseases, increase the effectiveness of dispensary observation and preventive work with children and teenagers, as well as with their families.

3. Results

Since, as noted above, respiratory, digestive, and circulatory diseases are the most common, it is precisely the risks of these diseases that were assessed during a study conducted in the Yaroslavl municipal district among students in secondary schools. All risk factors by force of exposure were divided into three groups: strong, medium, and weak. Summarized results for respiratory diseases are presented in Table 1.

TABLE 1. RISK FACTORS AFFECTING THE OCCURRENCE OF RESPIRATORY DISEASES

Factors		Value of weight coefficient
Strong factors		
1.	Pregnancy and childbirth	3.33
2.	Living conditions	3.26
3.	Eating hot food	3.22
4.	Daily regime	3.09
Factors of medium strength		
5.	Dietary regime	2.82
6.	Serial number of a class	2.76
7.	Satisfaction from relationships with parents and teachers	2.28
8.	Sleep duration	2.0
Weak factors		
9.	Physical activity	1.86
10.	Academic performance, success in learning	1.58
11.	Viral and infectious diseases during pregnancy	1.52
12.	Study session	1.5
13.	Nature of feeding	1.48
14.	Toxicosis	1.38
15.	Personal anxiety	1.3
16.	Family well-being	1.24

Table 2 shows the indicators of the strength of risk factors in the formation of digestive diseases among schoolchildren.

TABLE 2. RISK FACTORS AFFECTING THE OCCURRENCE OF DIGESTIVE DISEASES

Factors		Value of weight coefficient
Strong factors		
1.	Class	21.7
2.	Satisfaction from relationships with parents and teachers	3.0
Factors of medium strength		
3.	Sleep duration	2.76
4.	Living conditions	2.73
5.	Relationships in the peer group	2.17
6.	Nature of feeding	2.03
Weak factors		
7.	Pregnancy and childbirth	1.77
8.	Viral and infectious diseases during pregnancy	1.68
9.	Family well-being	1.49
10.	Daily regime	1.85
11.	Physical activity	1.79
12.	Dietary regime	1.1
13.	Academic performance, success in learning	1.65
14.	Personal anxiety	1.43
15.	Study session	1.2

Among the diseases of children and teenagers in the Yaroslavl region, diseases of the circulatory system occupy the 3rd place. Summarized results for these diseases are presented in Table 3.

TABLE 3. RISK FACTORS AFFECTING THE OCCURRENCE OF CIRCULATORY SYSTEM DISEASES

Factors		Value of weight coefficient
Strong factors		
1.	Academic performance, success in learning	8.4
2.	Family well-being	5.8
3.	Pregnancy and childbirth	5.16
4.	Personal anxiety	5.13
5.	Physical activity	3.53
6.	Viral and infectious diseases during pregnancy	3.35
Factors of medium strength		
7.	Sleep duration	2.7
8.	Quarrels in the family	2.49
9.	Relationships in the peer group	2.12
10.	Complications in childbirth	2.1
11.	Living conditions	2.05
12.	Eating hot food	2.05
13.	Satisfaction from relationships with parents and teachers	2.0
14.	Study session	2.0
Weak factors		
15.	Daily regime	1.14
16.	Dietary regime	1.14

4. Discussion

The study found that the presence of complications in childbirth in the mother more than three times increases the risk of respiratory disease. In contrast, comfortable living conditions, on the contrary, more than three times reduce the risk of organ disease. The research shows that as a child grows up, the risk of respiratory diseases decreases. These data will help to plan health and preventive work both at the level of medical institutions and in educational institutions. Timely identification of families in financial difficulties, social services, and guardianship, organization of additional free hot meals for children from such families, simplification of bureaucratic procedures for receiving material assistance to low-income families – all this, in our opinion, can significantly reduce the risk of diseases respiratory organs.

Analysis of risk factors associated with diseases of the digestive system showed a fundamentally different picture. The socio-psychological characteristics in terms of impact came in the first place, namely, the age of the respondents and the nature of the relationship with parents and teachers. In our studies, we repeatedly emphasized the role of socio-psychological factors in the general well-being of teenagers and, especially concerning their mental and social health [11]. There is a stereotype that diseases of the gastrointestinal tract of teenagers are associated with the nature of nutrition. Our study found that both dietary regimen and taking hot food are among the weak factors.

In contrast, problems in the family and school provoke psychosocial disorders, and since the gastrointestinal system in the period of hormonal changes is maximally susceptible to transformations, including negative. As teenagers grow older, school grades and family relationships provoke the development of digestive diseases. This trend is reinforced by the medium-strength factor associated with peer relationships. For the prevention of diseases of the gastrointestinal tract, it is necessary to actively involve in the work the socio-psychological service of educational organizations: psychologist, social worker, tutor, class teachers. Work on harmonizing family and parent-child relationships, as well as uniting schoolchildren and preventing the appearance of outcasts in classes, should help reduce the risk of gastrointestinal diseases.

In the circulatory system diseases, as well as in the disease of the gastrointestinal tract, the leading role is played not so much by medical, as by socio-psychological factors. We found that the academic performance and success in training proved to be the most influential risk factor for diseases of the circulatory system. The increased load at school, competition, and the negative consequences of poor academic performance with insufficient self-regulation skills, a reduced level of stress resistance lead to overloads in the functioning of the cardiovascular system, “jumps” in blood pressure, headaches, etc. Such a factor as not well-being in the family reinforces these negative trends and increases the risk of cardiovascular disease. Risk factors of

medium strength concerning diseases of the circulatory system are insufficient sleep, quarrels in the family, poor relationships in the peer group.

Among medical indicators, only two factors were assigned to the group of strong, provoking diseases of the circulatory system: the presence of complications in childbirth in the mother (which increases the risk of a child's morbidity by more than five times) and viral and infectious diseases that a woman suffered during pregnancy. Information obtained about the presence of marked risk factors for each concrete child allows a comprehensive construction of preventive work.

To address issues related to the planning of preventive and recreational activities, we have classified risk factors into three groups: (1) unrecoverable (unmanaged), (2) conditionally removable, (3) removable (managed). The first group of factors includes age and gender. To the second group are attributed "living conditions." All other factors are controlled either by medical workers or social workers, teachers, and psychologists.

A large group of risk factors is associated with the organization of the educational process. The following factors can be attributed to school factors: (1) the level of academic performance (an inverse relationship was noted: the better the child learns, (2) the greater the probability of the formation of such a pathology as digestive and circulatory diseases), (3) school anxiety (a risk factor for diseases of the nervous system and sensory organs, organ diseases blood circulation and allergic diseases).

Among the risk factors, lifestyle factors occupy a significant place: physical education, daily regime, sleep duration, frequency of hot food intake, and dietary regime. All these factors are managed at the level of the teacher, the family and even the child himself, so it is necessary to develop in children, starting from pre-school age, the correct attitude to their health, to raise awareness of teachers and parents in the formation, preservation, and promotion of health.

The help of psychologists, teachers, especially social workers, will be required in working with the family. Found that family education is a strong factor in family relationships. It was noted that the lowest integrated risk of morbidity was in the family, where the children are raised by the mother, or both parents together. The highest risk of morbidity was noted if the education in the family is carried out by the grandmother. Quarrels and conflicts in the family lead to the formation of such pathology as diseases of circulatory organs, diseases of the nervous system and senses.

We have found that the structure of the maximum risk of morbidity (1/3) is the share of eliminated factors at the level of the individual and educational institution. The following options are possible to reduce morbidity: minimum and maximum. The first method involves reducing the influence of disposable factors on minimum risk values. The second method involves reducing the influence of disposable and conditionally removable factors to minimum risk values. With the implementation of only the minimum option, it is possible to reduce the morbidity of schoolchildren by 27% compared to the conditions of maximum risk and by 14% compared to the current level of morbidity.

5. Conclusion

Thus, the study allowed to formulate the following conclusions and recommendations:

1. An integrated approach to assessing the risk of morbidity in children and teenagers makes it possible to identify risk factors and determine priorities in managing the incidence of schoolchildren in an educational institution.
2. The methodology used by us made it possible to determine strong, medium, and weak strength factors for such leading diseases as respiratory, digestive, and circulatory systems.
3. The classification of risk factors into groups (such as removable, conditionally removable, and unremovable) allowed us to plan and organize preventive and health-improving work in educational institutions.
4. The proposed methodology for studying the risk of morbidity among schoolchildren and the developed tables for the risk of morbidity allows doctors, teachers, and social workers to interact with each other in resolving the issues of preserving the health of children and teenagers and preventing diseases.

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