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Project of Health-Caring Educational School Environment for Children with Diabetes Mellitus

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ABSTRACT
The aim of the study is to design the health-caring educational environment of a modern school for the education of children with diabetes. The leading methods to study this problem are perennial observations and the questionnaires, which revealed the health of children, their success in studying and their psychological state; sociological research, medical research of diabetes mellitus problems, theoretical analysis and generalization of scientific and pedagogical sources on the problem of health caring of students with diabetes mellitus; modeling. The study involved 20 children (aged 10 to 14) with diabetes in comprehensive schools in the Republic of Tatarstan. The main results of the research include identifying the experience of designing school health-caring environment for children with diabetes mellitus in different countries: identifying conceptual basis of the educational environment of the Russian comprehensive school, focused on the health caring of students with diabetes; designing a content-functional model of the health-caring educational school environment for children with diabetes mellitus. The significance of the obtained results consists in the proposed structural and functional model of the educational health-caring school environment as a pedagogical system including the value-objective, content-informational, activity-practical and outcome-evaluative components. The worked out recommendations focus on the individualized and multidisciplinary approaches in the education of children with diabetes that will prevent the development and progression of diabetes mellitus; on the creation of the health-caring environment through the definition and actualization of health-caring functions, modernization of the content and technologies of the educational school process.
Keywords: modernization, educational space, diabetes mellitus disease, teaching process, development, health-caring environment

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INTRODUCTION

Diabetes has long exceeded the limits of an ordinary disease. Today it is called the epidemic of the XXI century. According to the International Diabetes Association, in 2012 371 million people with diabetes were registered in the world. Doctors say that by 2030 their number will reach 555 million people. In Russia, according to the Institute of diabetes of Russian Academy of Medical Sciences at the beginning of 2013 there were registered 3 million 782 thousand patients with diabetes, of whom 325 thousand are children and adolescents with type 1 diabetes and 3 million 457 thousand are patients with type 2 diabetes. Such a large number of patients signals about social aspects of diabetes. In every pre-school institution, in every school, at work, in every house there are people with diabetes. Type I diabetes, or insulin-dependent diabetes is one of the most common endocrine diseases in children with early development of complications leading to subsequent disability in patients. Diabetes is among the diseases that are due to the prevalence and complications impose a real threat to the economy of many countries. This leads to increased costs for health care of these patients [1]. The last decade has seen a clear upward trend in the incidence of diabetes in general, and insulin dependent type of diabetes, in particular. Every year, the world records more than 609,000 cases of newly diagnosed diabetes, of which 3-4% are insulin dependent type [2]. Every 15 years the number of diabetics is increasing. On the whole Russia observes a stable increase in the incidence in the pediatric population, average of 2, 58%.

The analysis of incidence in the age groups showed that the highest figures for the entire period of observation, like in most countries, are marked in the age group of 10-14 years old compared with groups of 0-4 years and 5-9 years [3].

Currently, the planning of health-caring school environment for teaching children with diabetes has become an integral part of organization of special treatment and preventive care.

MATERIALS AND METHODS

2.1. Methods of research

Object of research is educational environment of school. Subject of research is the system of health care of pupils with diabetes in the educational environment of school.

2.2. Trial infrastructure

Experimental basis of the study were 20 secondary schools of the Republic of Tatarstan, which educate children with diabetes.

2.3. Research phases

The studies were conducted from 2014 to 2016. The study included 20 adolescents at the age of 10-14 having type I diabetes for over 4 years, without concomitant diseases of the musculoskeletal system and the peripheral nervous system. The diagnosis was based on the data of medical workers.

In order to study the experience of students' health care a survey was conducted among the students with diabetes. The experience of students' health care was also studied with the help of self-monitoring in accordance with the components of the experience. To achieve the objectives of the study used a range of methods such as observation, survey and

questionnaire; we designed special physical exercises, balanced individual diet, with keeping regular hours and having individual lessons on the development of memory and thinking.

Table 1. Diagnostic matrix of monitoring health and success of students with diabetes

Criteria	Signs	Diagnostic tool
1	Physical health: height, weight, chest circumference, and others.	Technique: "Comprehensive express - assessment of physical health of children" by S.V. Khrushchev, S.D. Polyakov & I.L. Ivanov [4]
2	Psychological health: psychological status, the nature of school anxiety; psychological climate in the family	- Picture test, "I and my school," by Phillips [5] (identifying the nature of anxiety) - Picture test, "I and my family" by A.L. Wenger [6]
3	The spiritual and moral health: attitude towards others; formulation of a motivation for a healthy lifestyle; interpersonal relationships; value orientation	- profile "Incomplete sentences, or my attitude to people" by N.E. Bogouslavskaya & N.A. Kupina [7] - profile "Why are you doing this?" - questionnaire "True friend" by A.S. Prutchenkov [8]
4	Social health: emotional attitude of a child to the adult world; assessment of psychological climate in the classroom, harmony with oneself and the society	-picture test by M. Luscher [9]
5	Academic success: the level of knowledge, the level of anxiety	the card of success, the average score of training -test by A.M. Prichozhan [10] (identifying anxiety as a relatively stable education)
	Social success: personal achievements, energy in various activities, assessment of the psychological climate in the classroom	-student's portfolio -questionnaire "How to determine the state of the psychological climate in the class" by L.G. Fedorenko [11]
	Communicative success	-expert assessment

Correlation of criteria, indicators and means of health and success of children with diabetes are presented in the table (**Table 1**).

On ascertaining stage of the experimental work we carried out (2012) assessment of health and success of the student by the defined criteria (**Table 2**).

Table 2. Assessment results of health and success of students with diabetes

The test parameters	Obtained results
The level of physical health	High-level is not detected; 25% (below average), 15.4 (low), 51.9 (average), 7.7 (above average)
Psychological health status	59% (a sense of fear, mistrust, uncertainty, isolation from others, from adult), 35, 4% (positive state), 54% (negative environment), 9,6-very negative)
	-93.5% (frustration of need to succeed); 62.5% (fear of self-expression); 54.6 (fear of examination situation); 69% (problems and fears in relationship with teachers)
Social health status	36% "ignored", 10% "stars", 15% "favoured", 29% "accepted" 10% "isolated"
Spiritual and moral health status	30% (firmly stand on the path of destruction of their health); 70% (know that health is priceless)
	-44.3 (have a moral compass, but they are not eager to comply to them), 55.7% (justify their choice by the moral attitudes of friendship, kindness, healthy lifestyle, emotional responses are adequate
Academic success	3.9 (academic grade average of training)
	21.15 (explicit angst), 42.3 (very high anxiety)
Social success	42% highly assess the psychological climate in the class, 39% are indifferent, while 19% assess it as very bad
Communicative success	57.6 (low level of communication skills), 34, 62% (average), 7.69 (high level of communication skills)

Thus, the study led to the conclusion that it is characteristic of children with diabetes to have a deviation from the norm in physical, psychological, social, spiritual and moral health. Due to poor health, the majority of them is not successful enough. The results confirmed the need to create favorable conditions for children with diabetes, aimed at preserving and reinforcement of health through the implementation of the model of health-caring educational school environment as a factor of student's success promoting.

The quiz of teachers has allowed us to find out that they have individually oriented approach to children with diabetes mellitus only if their parents informed them. Parents tend to hide the fact that their child is sick. Only a school nurse monitors control and consults

children with diabetes. So, basically in the educational institution children with diabetes are alone with their disease.

RESULTS

The research result led us to the conclusion that we need a new strategy for preserving health, we need to fill the educational environment of school with health caring. The essence of the new approaches is to plan a special educational school environment for children with diabetes. While carrying out the research we have developed a structural-functional model of health-caring educational school environment as a system of health care of students (**Figure 1**).

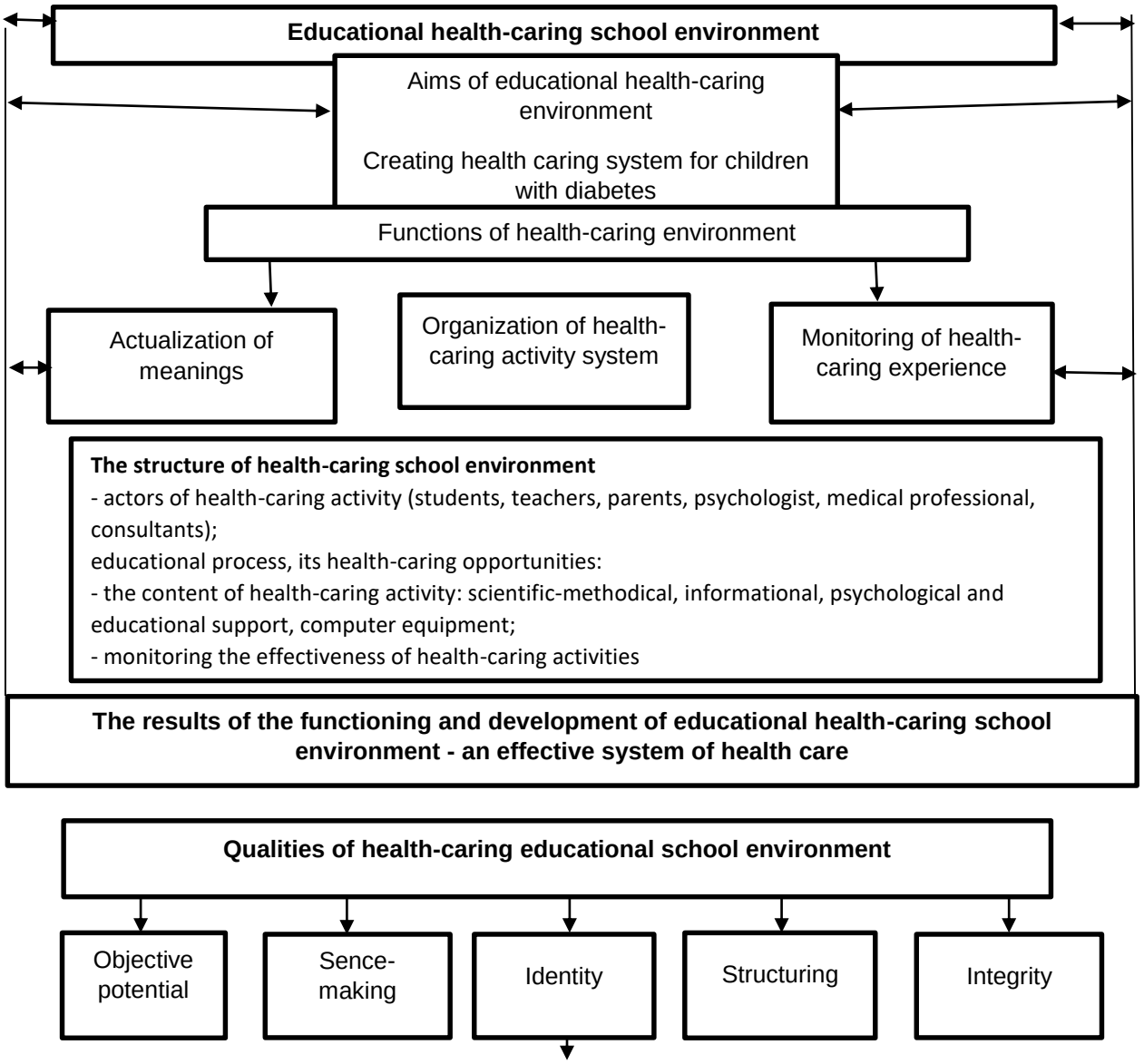

Figure 1. Structural and functional model of health- caring educational school environment

The given model of educational health- caring school environment shows the following conceptual provisions: the purpose and resource of students' health care are presented in the axiological ideas of preserving and strengthening health; in creating health caring system in the educational institution. Health-caring functions in the educational environment consist in the actualization of values and meanings of students' health caring; in developing their personality and ability to health-caring; in the formation of students' experience of health preservation.

An important direction in the implementation of the given model was to train teachers to work in educational health-caring institution. The teachers had training workshops, individual psychological service and health personnel counseling. Workshops included the following issues: age-appropriate characteristic of adolescents in the educational process; the specific nature of the disease of children with diabetes; Specific planning of health-caring lesson environment; creating a comfortable psychological atmosphere in the classroom; creating a situation of student's success in the educational process; tutor support, the development of individual trajectories of development, monitoring of health and educational achievements of children.

Individual counseling was carried out by interaction of a health worker and a psychologist. Experts consulted on a number of issues: nutritional habit for patients with diabetes, physical activity, peculiar progress of the underlying and concomitant diseases; indications and counter-indications in the organization of physical training lessons.

Empowering health-caring educational school environment was carried out by involving teenagers in extracurricular activities: increased staying in the open air, long walks in the fresh air and active games, involvement of children in various activities, attendance of "Culture of Health" lessons, etc.

The implementation of pedagogical conditions, expanding health-caring educational school environment as a factor of promoting student's with diabetes success has identified the positive dynamics of the physical state, mental and moral health of the student with diabetes.

The study of academic success. Average training score has improved by 0.4 points and amounted to 4, 3 points. The dynamics of the anxiety level of children with diabetes can be traced by the obtained explicit anxiety test results (CMAS). The number of children with the level of "very high anxiety" decreased by 20.5%; with "explicit angst" level decreased by 3.4%. The number of children with "somewhat increased anxiety" level increased by 6.7%; at a "normal level" results improved by 15.3% and at the level of "the state of anxiety is not peculiar" the dynamics is seen in 6.7% of children. Thus, health-caring educational environment contributes to the improvement of psychological health of children with diabetes, with probability $p \leq 0,01$.

Students with diabetes showed better academic results in the educational environment designed for them in the educational institution. Humane attitude and attention to their health, training care created a positive motivation to study, anxiety and feeling of isolation decreased; adolescents gained confidence in themselves and their abilities, which had a positive impact on their psychological and social health and academic achievements.

DISCUSSIONS

In recent years, a lot of medical research are dedicated to the problem of diabetes. In their studies, Australian researchers have found that patients with type 2 diabetes are discriminated by society [12]. A. Chisholm et al. [13] indicates the disease dependence on lifestyle and instructs how to prevent it. K. Park et al. [14] study is devoted to the role of nutrition for people with diabetes. G.E. Dafoulas et al. [15] warns of the risk of epilepsy development in patients with diabetes. Type 2 diabetes is a risk factor for Alzheimer's disease development L. Qi et al. [16]. Y.C. Kueh, T. Morris & A.-A.-S. Ismail [17] shows the impact of knowledge about diabetes on self-control and quality of life. S.H. Kim [18] insists that diabetes education programs should be adapted to the needs of the cognitive abilities of the target population. W. Swardfager et al. [19], explains, that even mild symptoms of the disease lead to depression, creating a significant barrier in life. G. Horigan et al. [20] believes that we need a more effective innovative ways of presenting knowledge about diabetes, which will satisfy the needs of people. Scientists also try to solve the problem of health-caring educational institution environment as a condition for promoting pedagogical rehabilitation of children with diabetes [21]; the formation of spiritual basis of the relationship to the "different", the idea of compassion as a basis of interpersonal relations [22]; tutor activities technology [23]; implementation of the principles of health-caring education [24]. However in terms of organization, this problem in educational environment is not solved. Children with diabetes are taught equally with the healthy students.

CONCLUSION

Thus, the diagnostic phase of experimental work suggests that in a secondary school the activities on health caring for students with diabetes are inefficient. Planning health-caring comprehensive school environment with individualized and multidisciplinary approaches in teaching children with diabetes will prevent the development and progression of diabetes.

The formation of students' health-caring experience requires new approaches to the planning of the educational school environment for children with diabetes: humanization of learning process; organization of proper diet; the use of health-caring technologies (specially planned physical education lessons, informational electronic diaries with information on prevention and prophylaxis of diabetes); psychological -pedagogic support; programs and methods, aimed at educating in students a culture of health, personal qualities; education of students, teachers and parents; the formation of ideas about health as a value, the motivation to maintaining a healthy lifestyle. The main task of a patient with diabetes is to accept the idea: "Diabetes is not a disease but a way of life," and in the modern school it is necessary to create conditions for such children and help them learn to live with this idea.

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REFERENCES

1. Titova, N.M., Savchenko, A.A., Titova, N.M. & Subbotina, T.N. (2012). Rol' svobodnoradikal'nyh i metabolicheskih processov v patogeneze saharnogo diabeta I tipa. [Jelektronnyj resurs]: monografija [Tekst]. Krasnojarsk: Sib. feder. University. https://play.google.com/store/books/detailsid=H77GCQAAQBAJ
2. Skyler, J.S. (2011). Immune intervention for tupe I diabetes mellitus. *Journal Clinical Practice, Suppl, 170*, 60-61.
3. Shiryaeva, T.Ju., Andrianova, E.A. & Suntsov, Ju. I. (2010). Dinamika osnovnyh pokazatelej saharnogo diabeta I tipa u detej Rossijskoj Federacii. Nauchno-prakticheskij medicinskij. *Journal Saharnyj diabet, 4*, 11-17.
4. Khrushchev, S.V., Polyakov, S.D. & Ivanov, I.L. (1995). Express assessment of physical health of schoolchildren. Methodical recommendations. Moscow: Academia.
5. The method of diagnosing the level of school anxiety Phillips. http://pedkopilka.ru/psihologija/metodika-diagnostiki-urovnja-shkolnoi-trevozhnosti-filipsa.html.
6. Wenger, A.L. (2003). Psychological drawing tests: Illustrated manual. Moscow: Publishing house VLADOS-PRESS.
7. Bogouslavskaya, N.E. & Kupina, N.A. (2010). Development of the communicative abilities of the child. Moscow: FLINTA.
8. Prutchenkov, A.S. (1997). Alone with myself. Moscow: Publisher: Russian pedagogical agency.
9. Luscher, M. (2009). The color test. St. Petersburg: Publisher: Vector
10. Prichozhan, A.M. (2002). Scale of apparent anxiety CMAS (adaptation of AM Prihozhan) / Diagnosis of emotional and moral development. St. Petersburg, pp. 60-64.
11. Fedorenko, L.G. (2009). Positive (projecting) psychology in school. St. Petersburg: Publishing house KARO.
12. Browne, J.L., Ventura, A., Mosely, K. & Speight, J. (2014). 'I'm not a druggie, I'm just a diabetic': A qualitative study of stigma from the perspective of adults with type 1 diabetes. *Journal BMJ Open, 4*, 7. Article numbere 005625.
13. Chisholm, A., Hart, J., Mann, K., Perry, M., Duthie, H., Rezvani, L. & Peters, S. (2016). Investigating the feasibility and acceptability of health psychology-informed obesity training for medical students. *Journal Psychology, Health and Medicine, 21*, 368-376.
14. Park, K., Ahn, Y., Kang, N. & Sohn, M. (2016). Development of a simulation-based assessment to evaluate the clinical competencies of Korean nursing students. *Journal Nurse education today, 36*, 337-341.
15. Dafoulas, G.E., Toulis, K.A., Mccorry, D., Kumarendran, B., Thomas, G.N., Willis, B.H., Gokhale, K., Gkoutos, G., Narendran, P. & Nirantharakumar, K. (2017). Type 1 diabetes mellitus and risk of incident epilepsy: a population-based, open-cohort study. *Journal Diabetologia, 60*, 258-261.

16. Qi, L., Ke, L., Liu, X., Liao, L., Ke, S., Liu, X., Wang, Y., Lin, X., Zhou, Y., Wu, L., Chen, Z. & Liu, L. (2016). Subcutaneous administration of liraglutide ameliorates learning and memory impairment by modulating tau hyperphosphorylation via the glycogen synthase kinase-3β pathway in an amyloid β protein induced alzheimer disease mouse model. *European Journal of Pharmacology, 783*, 23-32.

17. Kueh, Y.C., Morris, T. & Ismail, A.-A.-S. (2017). The effect of diabetes knowledge and attitudes on self-management and quality of life among people with type 2 diabetes. *Journal Psychology, Health and Medicine, 22*, 138-144.

18. Kim, S.H. (2016). Educational attainment moderates the associations of diabetes education with health outcomes. *International Journal of Nursing Practice, 22*, 444-450.

19. Swardfager, W., Yang, P., Herrmann, N., Lanctôt, K.L., Shah, B.R., Kiss, A. & Oh, P.I. (2016). Depressive symptoms predict non-completion of a structured exercise intervention for people with Type 2 diabetes. *Journal Diabetic Medicine, 33*, 529-536.

20. Horigan, G., Davies, M., Findlay W., Chaney, D. & Coates, V. (2017). Reasons why patients referred to diabetes education programmes choose not to attend: a systematic review. *Journal Diabetic Medicine, 34*, 14-26.

21. Shtreys, O.N. (2011). Sozdanie zdorov'esberegajushhego prostranstva obrazovatel'nogo uchrezhdenija kak uslovie pedagogicheskogo sodejstvija reabilitacii detej, bol'nyh saharnym diabetom. Aktual'nye zadachi pedagogiki: materialy Mezhdunar. nauch. konf. (Chita, dekabr' 2011 g.). Chita: Izdatel'stvo Molodoj uchenyj, 169-171.

22. Yachina, N.P., Kulagina, G.N., Muhutdinova, T.Z. & Hazieva N.N. (2011). Problema formirovanija duhovnyh osnov otnoshenij k «Drugomu», ideja sostradanija kak osnova mezhlichnostnyh otnoshenij. *Vestnik Kazanskogo tehnologicheskogo universiteta, 24*, 142-149.

23. Sergeeva, V.P., Sergeeva I.S., Sorokovyh, G.V., Ziborova, Ju.V. & Podymova L.S. (2011). T'jutor v obrazovatel'nom prostranstve. Moscow: NICINFRA-M.

24. Orekhova, T.F. (2011). Principy zdorov'etvorjashhego obrazovanija i ih realizacija v uslovijah pedagogicheskogo processa shkoly. Metodicheskie ukazanija dlja studentov i uchitelej. Moskow: FLINTA.

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