ABSTRACT

of the dissertation work by Delmira Bakytbekovna Abdukalikova on the topic "Improving the Organization of Dental Care for Children with Autism Spectrum Disorders (ASD)," submitted for the degree of Doctor of Philosophy (PhD) in the educational program 8D10101 – "Public Health"

Relevance:

Autism Spectrum Disorders (ASD) represent a group of neurodevelopmental disorders characterized by incomplete and uneven formation of higher mental functions, impaired social interaction and communication, as well as restricted and repetitive patterns of behavior. Recent studies confirm a steady increase in the registered prevalence of ASD worldwide, linked both to the improvement of diagnostic criteria and observation techniques and to an objective increase in the number of children and adults requiring specialized assistance. According to an updated systematic review, the median prevalence of ASD reaches 1% of the pediatric population; however, rates vary significantly across regions and depend on the development level of healthcare systems, service accessibility, and social awareness. Meta-analytical data confirm that the global prevalence of ASD is approximately 0.7%, with higher rates observed in high-income countries with developed registry surveillance systems. Additional international estimates show an increase in DALYs related to ASD, especially in countries with a high socio-demographic index, reflecting the growing impact of ASD on public health. Since 2014, high variability in prevalence rates has persisted, caused by differences in case detection, diagnostic approaches, and methodological features of research.

At the same time, ASD is characterized by marked heterogeneity of manifestations and significant gender differences: most epidemiological reviews record a male-to-female ratio of about 4:1, yet there is growing evidence of underdiagnosis of ASD in girls, particularly those with preserved intelligence and compensatory behavioral strategies. It has been established that certain criteria of widely used diagnostic tools, such as the ADI-R, have gender bias and are less effective at detecting the "female phenotype" of autism. Furthermore, epidemiological studies of the adult population indicate that ASD prevalence remains comparable across all age groups, and women with autism may be underestimated when using standard diagnostic algorithms.

Of particular importance are data on the frequency of the co-occurrence of ASD with intellectual disabilities and comorbid chronic conditions. Numerous studies confirm that individuals with ASD, especially when combined with intellectual disabilities, are significantly more likely to have mental disorders, vision and hearing impairments, and physical limitations. These conditions not only complicate the clinical picture and increase the risk of disability but also create additional difficulties in assessment, multidisciplinary management, and prevention, as cognitive and sensory deficits can reduce treatment adherence, hinder communication, and lead to delays in identifying comorbid pathology.

Collectively, this emphasizes that the burden of ASD is significantly broader than neurodevelopmental symptoms alone and requires a multidisciplinary, coordinated approach at the intersection of medicine, mental health, social services, and education.

In the Republic of Kazakhstan, similar trends are confirmed by official data: the number of registered ASD cases among children is steadily growing, requiring a comprehensive response from the healthcare and education systems. One of the most vulnerable areas is the dental health of children with ASD. According to World Health Organization data, diseases of the hard tissues of teeth and the oral cavity remain the most common pathology among the pediatric population. In children with disabilities, including ASD, the frequency of dental system lesions significantly exceeds average figures. They are characterized by multiple carious lesions, inflammatory periodontal diseases, and dental anomalies, which often remain without timely treatment due to behavioral characteristics, communication difficulties, and limited access to specialized dental services.

The prevention of dental diseases in children with ASD is complicated by sensory hypersensitivity, impaired motor skills, and difficulties adapting to dental procedures. The existing organization of dental care does not fully account for these features, and the training of specialists to work with this category of patients remains insufficient. The relevance of this study is determined by the need to develop a scientifically grounded model of dental care for children with ASD, including elements of multidisciplinary interaction, preventive technologies, and adapted educational approaches for parents and specialists. Implementation of such a model will increase the accessibility and quality of dental care, reduce the prevalence of caries and its associated complications, improve the dental health of children with ASD, and enhance the well-being of their families.

Purpose of the dissertation research:

To scientifically substantiate the improvement of the organization of dental care for children with ASD by analyzing medical-social and organizational factors and developing a comprehensive preventive model.

Research Objectives:

1. To study the organization of dental care for children with autism spectrum disorders and analyze the dynamics of the incidence of mental and behavioral disorders for 2019–2023.

2. To analyze the results of a comparative assessment of the dental status of children with ASD and their neurotypical peers, identifying significant features for the organization of specialized dental care.

3. To evaluate the role of socio-behavioral and organizational factors: compliance and awareness of parents, dietary behavior characteristics, accessibility of dental care, and professional readiness of doctors in forming the dental status of children with ASD.

4. To develop a comprehensive model for organizing dental care for children with ASD and evaluate its effectiveness based on clinical-hygienic and organizational indicators.

Materials and Methods: The study involved 56 children with ASD and 42 neurotypical children (average age — 69.6 months). An analysis of official statistical yearbooks of the Ministry of Health of the Republic of Kazakhstan for 2019–2023, a clinical-instrumental assessment of dental status (DMFT/dmft, hygiene index (Qscan Plus), salivary pH), and surveys of parents and dentists were conducted. Comparative and statistical analysis methods were applied.

Research Program:

Research Stages	Research Methods	Research Materials	Results
To study the organizational structure of dental care for children with autism spectrum disorders (ASD).	Information-analytical, bibliographic methods.	Scientific publications, including foreign and domestic sources, covering a 10-year depth.	Based on the literature review results, the article "Dental health problems of children with autism spectrum disorders (literature review)" was published in the journal *Pharmacy of Kazakhstan. Clinical Medicine and Pharmacology* 1 (240) 2022, pp. 36-41.
To analyze the dynamics of the incidence of mental and behavioral disorders among the pediatric population of the Republic of Kazakhstan for the period 2019–2023.	Retrospective epidemiological study; medical statistics methods.	Data from the National Scientific Center for Health Development (NSCHD). Statistical yearbooks "Health of the Population of the Republic of Kazakhstan and Activities of Healthcare Organizations."	Retrospective analysis of the primary incidence of mental and behavioral disorders in the Republic of Kazakhstan for 2019–2023 revealed an increase from 52.8 per 100,000 population in 2019 to 65.6 in 2023, with a minimum level in 2020 (45.1 per 100,000). The average annual rate was 54.88 ± 7.69 per 100,000 population. The most pronounced growth was registered among the pediatric population aged 0–14 years, justifying the need for expanding preventive measures.
Comparative assessment of the dental	Instrumental-diagnostic study; medical	Basic examination (extraoral/intraoral), DMFT/dmft indices;	Based on the results, the article "Risk Factors for Early Dental Caries in

status of children with ASD and their neurotypical peers.	statistics methods; descriptive-comparative prospective study.	hygiene index (including Qscan plus); registration of treatment needs.	Children with Autism Spectrum Disorders in the Republic of Kazakhstan and Ukraine" was published in the *Journal of International Society of Preventive and Community Dentistry*, June 30, 2025.
Assessment of the level of dental awareness among parents of children with ASD.	Cross-sectional study based on a sociological survey (questionnaire); medical statistics methods (nominal data analysis).	Survey of parents of children with ASD. Author's questionnaire, copyright certificate №26472 dated May 25, 2022. The parental questionnaire was developed in accordance with the research objectives and included blocks aimed at assessing awareness of dental issues. Content validity of the tool was confirmed through expert evaluation by specialists in pediatric dentistry and public health.	Based on the results, the article "Multidisciplinary approach in the rehabilitation of children with autism spectrum disorders in dental practice" was published in the journal *Pharmacy of Kazakhstan, Clinical Medicine and Pharmacology* 6 (251) 2023, pp. 25-34; The "BOTAQAN" rational nutrition lunch box was developed and implemented.

Object of study:

56 children with autism spectrum disorders and 42 neurotypical children aged 5–6 years. Patient recruitment was carried out at the "Rostok" and "Autism Pobidim" rehabilitation centers in Almaty.

Subject of study:

Organizational and preventive approaches to providing dental care to children with ASD.

Scientific novelty:

1. For the first time in the Republic of Kazakhstan, an interdisciplinary approach to dental care for children with ASD was implemented, including

assessment of organizational, epidemiological, behavioral, and professional aspects of dental service delivery.

2. The need for structural adaptation of the preventive dentistry system under the conditions of increasing population demand has been substantiated.

3. It was established that the low level of parents' dental awareness and the pronounced features of feeding behavior in children with ASD are the main determinants of the formation of an unfavorable dental status.

4. For the first time, an innovative model for organizing dental care for children with ASD was developed and tested, including a child preparation algorithm, adapted sensory reception conditions, a dental risk scale, and a comprehensive set of measures to improve the qualifications of specialists.

Practical significance:

The obtained results have practical significance for the healthcare system and dental services, as they allow improving the effectiveness of prevention and treatment of dental diseases in children with autism spectrum disorders (ASD).

The developed and implemented organizational-preventive model of dental care takes into account patients' sensory, behavioral, and nutritional characteristics, which contributes to better adaptation of children to dental visits and enhances the quality of care provided.

The proposed tools, including the dental risk scale, adapted reception algorithm, and educational programs for specialists and parents, can be applied in the practical activities of dental organizations, as well as in the training and professional development of healthcare personnel.

The research results can be implemented in the work of rehabilitation centers and primary healthcare institutions, which will improve access to dental care for children with ASD and reduce the prevalence of dental diseases.

Key points for the defense:

1. Analysis of official statistical data (2019–2023) showed a general increase in mental and behavioral disorders (growth rate 6.34%), with the highest rates in the 0–14 age group, justifying the priority of specialized dental care for children with ASD.

2. Children with ASD have statistically significantly more unfavorable dental status indicators compared to neurotypical peers (lower pH, worse hygiene, higher caries intensity and activity; $p < 0.05$).

3. A comprehensive model for organizing dental care for children with ASD was developed and tested, featuring an adapted appointment algorithm, the use of the SHIGKA scale, nutritional support, oral hygiene lessons for children and parents, and a "Workshop" intensive for doctors. Hygiene lessons led to significant status improvement in 5–6-year-olds ($p < 0.05$), and the "Workshop" facilitated adaptive methods in clinical practice.

Description of the Main Research Findings

The structure of the study was determined by its objectives. To accomplish the first objective, an analytical review of domestic and international scientific publications on the organization of dental care for children with autism spectrum

disorders over the past 10 years was conducted. Official statistical data from the S. Kairbekova National Scientific Center for Health Development of the Ministry of Health of the Republic of Kazakhstan for 2019–2023 were used as sources of epidemiological information, reflecting the dynamics of mental and behavioral disorder indicators among the pediatric population.

To address the second objective, a comparative assessment of the dental status of children with autism spectrum disorders and their neurotypical peers was carried out. All participants underwent a basic clinical examination, including both extraoral and intraoral stages. The intensity of dental caries was assessed using the DMFT/dmft indices, while oral hygiene status was evaluated using clinical indices and fluorescence control (Qscan Plus). Additionally, the need for dental treatment was recorded. The analysis was conducted with age stratification, with a particular analytical focus on the cohort of children aged 5–6 years as a key group for the development of early preventive strategies.

To accomplish the third objective, aimed at assessing the influence of socio-behavioral factors on the dental health of children with autism spectrum disorders, a sociological survey of parents and dentists was conducted. The purpose was to evaluate the level of compliance, the degree of the child's socialization, and the professional competencies of specialists. Educational interventions were implemented to develop oral hygiene skills in children using visual supports (PECS system, step-by-step checklists, and educational materials such as "I am learning to brush my teeth" and "I am at the dentist"), along with a parent training program. The effectiveness was assessed by analyzing intergroup differences and the dynamics of indicators using a "before/after" approach with appropriate statistical methods.

Within the framework of the fourth objective — the scientific substantiation, development, and validation of a comprehensive model for organizing dental care for children with autism spectrum disorders — an integrative model of prevention and education was developed and implemented. The model included a patient management algorithm, a dental risk assessment scale, nutritional support, and a system of professional training for specialists.

Conclusions

1. A study of the organizational structure of dental care for children with autism spectrum disorders (ASD) based on an analysis of domestic and international experience showed that specialized care for patients with ASD is characterized by the absence of a systematized organizational model, insufficient integration of multidisciplinary interaction, limited implementation of behavioral and sensory-adapted protocols, and a deficit in targeted training for specialists in managing patients with ASD. Analysis of the scientific literature and the regulatory and organizational framework of the Republic of Kazakhstan confirmed the existence of systemic gaps, including the lack of unified preventive approaches and insufficient coordination between relevant services. Analysis of the dynamics of the incidence of mental and behavioral disorders among the pediatric population of the Republic of Kazakhstan, according to annual official statistical yearbooks of the Ministry of Health for 2019–2023, revealed an

increase in registered primary incidence from 52.8 to 65.6 per 100,000 population (average annual growth rate — 6.34%), with the most pronounced dynamics in the 0–14 age group, which reinforces the urgency of improving the organization of dental care for children with ASD.

2.   A comparative assessment of the dental status of children aged 5–6 years with autism spectrum disorders and their neurotypical peers revealed statistically significant differences in key clinical and hygienic indicators. Children with ASD registered lower salivary pH values (Me 5.57 vs. 6.92; $p=0.001$), a higher oral hygiene index (Me 2.10 vs. 1.60; $p=0.001$), higher rates of caries intensity DMFT/dmft (Me 6.0 vs. 2.0; $p=0.001$), and a higher degree of carious process activity (Me 4.0 vs. 2.0; $p=0.001$), reflecting an increased cariogenic load and unfavorable hygienic status in this group. Gender analysis showed no significant differences in most indicators within the group of children with ASD, except for the oral hygiene index ($p=0.001$), whereas in neurotypical children, statistically significant differences were found in the DMFT/dmft indicator ($p=0.001$). The identified features have organizational significance and justify the need to develop specialized preventive programs emphasizing hygiene status control, early detection of active caries forms, and individualization of preventive measures for children with ASD.

3.   The complex influence of socio-behavioral and organizational factors on the formation of unfavorable dental health in children with ASD has been established, dictating the need for systemic professional training of specialists and increasing parental awareness: a) a comparative analysis of dietary behavior established statistically significant differences between children with ASD and neurotypical peers: children with ASD follow a dietary regime less frequently (67.86% vs. 80.9%; $p=0.045$), more often demonstrate slow eating behavior ($p<0.001$), and prefer soft and sticky foods (44.6% vs. 7.1%; $p<0.001$; V=0.33), which forms a pronounced cariogenic profile. b) parental survey results revealed: an insufficient level of dental awareness and the absence of sustainable hygienic and dietary habits, which increases dental risks; an assessment of dental care accessibility showed organizational and behavioral barriers, including insufficient adaptation of appointment conditions and a lack of specialized information for parents. c) survey results of dentists revealed a high frequency of contact with children with ASD despite insufficient professional readiness, as evidenced by differences in experience (30% vs. 70%), higher levels of psycho-emotional stress (91.7% of young specialists and 64.7% with over 5 years of experience), low self-assessment of knowledge (88.9% of specialists with less than 5 years of experience and 62.4% for more experienced ones), limited use of adaptive techniques (86.1% of young doctors and 52.9% of experienced doctors), and insufficient preventive counseling for parents.

4.   As part of the research, a structured comprehensive model for organizing dental care for children with autism spectrum disorders was developed, including a five-stage patient management algorithm, sensory-adapted dental appointment organization, the dental risk assessment scale with threshold values, the "BOTAQAN" nutritional module for correcting cariogenic factors, and an

educational component for parents and specialists. An evaluation of the model's effectiveness demonstrated statistically significant improvement in clinical and hygienic indicators (a decrease in the proportion of unsatisfactory hygiene index values according to the McNemar test, $p<0.05$), increased parental adherence to preventive recommendations, and growth in doctors' professional readiness to work with children with ASD. The implementation of the model into the practical activities of dental organizations and the system of additional professional education is confirmed by implementation acts, indicating its organizational viability and reproducibility in dental clinic settings.

Approbation of dissertation results.

The main provisions and results of the dissertation research were tested at scientific and practical conferences of various levels, including international and republican forums on the issues of dental health and inclusive education. The model for organizing dental care for children with ASD has been tested in several dental clinics in Almaty, as well as in rehabilitation centers providing assistance to children with disabilities.

The research results were discussed at meetings of the Department of Public Health and Social Sciences of the Kazakhstan Medical University "KSPH," which allowed for expert evaluations and recommendations for the implementation of the developed approaches into practical healthcare. The scientific community positively evaluated the obtained data, which were taken into account in the formation of thematic recommendations and expert opinions.

Publications.

Based on the dissertation materials, eight scientific works have been published, including five articles in journals recommended by the Committee for Quality Assurance in the Field of Science and Higher Education of the Republic of Kazakhstan, and three articles in international peer-reviewed journals indexed in the Scopus database (Journal of International Society of Preventive and Community Dentistry, Georgian Medical News, European Archives of Paediatric Dentistry). Methodological recommendations titled "Foundations of Organizing the Prevention of Dental Caries in Children with Autism Spectrum Disorders (ASD)" have been prepared and published in three languages (Kazakh, Russian, and English) by "Daryn" Publishing House, 2024 (ISBN 978-601-305-581-7).

The author has obtained the following copyright certificates:

– No. 26472 dated May 25, 2022 - "Questionnaire adapted for the population of Kazakhstan: 'Influence of dietary patterns on the level of dental health of children with ASD'";

– No. 29506 dated October 18, 2022 - "Modified method for determining the oral hygiene index in children with autism";

– No. 31077 dated December 14, 2022 - "Healthy nutrition box for children with autism 'BOTAQAN'";

– No. 47571 dated June 17, 2024 - "Algorithm for providing dental care to children with ASD";

– No. 58704 dated May 24, 2025 - "Model for organizing dental care for children with ASD";

– No. 58705 dated May 27, 2025 - "Intensive seminar 'Workshop'";

– No. 58706 dated May 27, 2025 - "Dental risk assessment scale.

Personal contribution of the doctoral student

The author independently performed all research volumes, including literature analysis, data collection, clinical studies, and statistical interpretation. The student developed and implemented the scale, "BOTAQAN" nutritional module, and "Workshop" program.

Scope and structure of the dissertation.

The structure of the dissertation includes an introduction, four sections, a conclusion, findings, practical recommendations, and a list of references (249 sources). The volume of the work is 141 pages of printed text and contains 23 tables, 8 figures, and 15 appendices.