

PREVENTION OF DENTAL CARIES: TRENDS AND TREATMENT

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Summary: Creation of modern programs for dental disease prevention, based on the risk theory, is an integral part of the minimally invasive dental caries treatment concept, implementation of which in the daily practice of a dentist will not only improve dental health, but it can also increase benefits of prevention as a dental service.

Keywords: caries, prevention program, risk factors, minimally invasive therapy, dental health

Dental caries is the most common dental disease in adolescents. Prevalence rate of caries in 12 year pediatric patients in Ukraine varies 72.7 to 91.4% and 81.3 to 94.3% in patients aged 15, respectively. However, the amount of affected teeth based on Filling Caries (FC) + Filling Caries and Removal (FCR) parameters in 12 year pediatric patients varies 2.23 ± 0.21 to 3.71 ± 0.37 , and during three years it was demonstrated to increase up to 3.91 ± 0.39 to 6.18 ± 1.01 in patients aged 15, respectively [8].

Modern approaches to creating preventive programs, including programs for dental caries prevention, are based on risk theory. Risk management: risk management is a procedure for adoption and implementation of managerial decisions aimed to decrease probability of occurrence of an adverse outcome and minimize possible

losses due to the procedure implementation [11]. Selection of methods and risk management tools is considered the key phase of the risk management. The primary risk management tool in the medical practice is prevention or diversification (method of reducing) of risks. Risk analysis of development and progression of dental diseases that employs evidence-based

medicine sources allows to highlight groups of the most significant factors.

Environmental risk factors characterize the human living environment and include geochemical and agroclimatic region features, chemical composition of water, soil, air, and food that impacts the caries morbidity level in people [1,4,5,9,12,13].

Social risk factors are stipulated by economic development of a country and welfare level of an individual.

General somatic risk factors increase its influence on development of a dental pathology year after year, and first of all, on caries, since the prevalence rate of chronic non-infectious diseases in pediatric patients in Ukraine increases on average by 5.4% [14].

Behavioral risk factors (diet culture, such as frequent snacks and consumption of easily digested carbohydrates), absence or low level of culture of individual hygienic skills, appear due to insufficient adequate control of habits and behavior in a family.

Dental risk factors include the following: saliva and oral liquid properties; amount of cariogenic microorganisms in the oral cavity and in the dental biofilm; amount of enzymes, macro- and microelements in the oral liquid; enamel resistance and maturity; features of odontoglyphics.

Summarizing the above, it should be noted that the risk factor management and removal or reducing their impact is the primary task of a dentist. While discussing possibilities of the dentist to impact the managed risk factors, specifically, behavioral and general somatic ones, it should be emphasized to perform the curation in pediatric patients since the age of teething.

The first Friendly Dental Visit conducted at the first birthday (12 months) helps resolve many issues, and is the basis to implement prevention methods on a personal level. Close communication with the pediatric patient and his/her parents allows to highlight risk factors which further may lead to development of dental diseases and assign the regimen of subsequent visits, taking into account the detected risk factors for control and further recommendations.

During the Friendly Visit mothers are trained to care for oral cavity of their children, to select and use items and products for oral cavity hygiene in adolescents. Mothers also learn how to train their children

individual oral hygiene and monitor the status of oral cavity hygiene. In addition, such visits help develop confidence, collaboration and understanding by parents the necessity to follow all recommendations.

Therefore, during the new phase of development of dental science and practice, the need to implement a system of individual prevention of dental diseases as part of dental and preventive service and dynamic observation system, is obvious.

The algorithm of preventive dental service should include methods of objective assessment of risk factor status using modern test systems to determine saliva parameters, indicate dental plaque, detect *Streptococcus mutans* in saliva as well as utilizing software for composite prognosis and evaluation of dental caries development, such as Risk Profile (Axellson, 2000) and Cariogramma (Bratthall, 1997; L.P. Kiselnikova, E.N. Tabolova, M.V. Miroshkina, E.V. Krikova, A.V. Schukin, 2008) [3, 7, 15,16].

First of all these tests are good indicators for dentists and excellent tools to motivate patients. Patients can see their findings and, generally, are willing to accept a treatment plan, and that is fine motivation for further collaboration.

Subsequently, the objective assessment of risk factors for dental caries development should be the keystone of preventive measures protocol, i.e., to create modern standards for dental caries treatment.

In Ukraine, possibilities of dental service that works extensively, are exhausted; brain drain is observed from the primary dental branch that deals with prevention, specifically, in pediatric dentistry; and today we need a brand new approach towards prevention as well as change the paradigm of minimum intervention concept [17].

This method represents the dynamic observation system and is efficient only if the

integration of all components during a patient treatment are met.

The suggested approach is patient-oriented and includes 4 primary treatment components below:

Step 1. Detection: stratification of risks of development and progression of dental diseases:

- diagnostic tests to immediately check level of cariogenic bacteria, pH, and buffer capacity of saliva and its rheological properties;

- detection of carious cavities (X-ray, DIAGNOdent laser fluorescence spectroscopy).

Step 2. Removal or prevention.

Having established the risks, it is possible to provide recommendations and take optimal preventive measures. They may include the standard measures depending on diagnosis: oral cavity hygiene, diet correction, maintenance therapy, patient motivation. In case of high risks, decontamination, remineralization, and fissure sealing should be additionally performed.

Step 3. Recovery. This step is performed using non-invasive or invasive methods, as appropriate. Non-invasive recovery methods include remineralizing products (Tooth Mouss, MI Paste Plus, F-gels, varnishes), infiltration methods (Icon DMG), non-invasive fissure sealing, prescription of drug products that provide comfort (Dry Mouth Gel).

Invasive recovery methods are the following: sparing preparation with precision drills, erbium laser, ultrasound, air-abrasive method. Minimally invasive preparation methods are enough diversified and should be selected based on equipment available at the dentist's office. The main requirement is to prepare with minimum damage for adjoining normal tissues and perform definitive

restorations using glass ionomer cement (GIC), invasive fissure sealing.

Step 4. Dynamic observation consists in development of the dynamic observation system schedule, specifically, repeated examinations, that will allow to efficiently perform preventive treatment. At this stage general and dental health is evaluated, medical history is updated, current status of oral cavity is assessed (using diagnostic tests), efficacy of preventive measures is evaluated, patient is informed about comparative findings, and minimally invasive restorations are corrected. During the examination, patient status is re-assessed taking into account quality indicators of prevention and treatment, and the treatment regimen is corrected according to the current status.

The benefits of the minimally invasive caries treatment are obvious. It offers minimum weakening of tooth structure and minimum time consumption for the treatment, longer lifetime of restorations, preventive effect due to elimination of microorganism retention into fissures as well as high aesthetic qualities in adequate control of risk factors. The disadvantages of this method are mainly human-related: the dentist should be highly qualified and have professional equipment, this method is complex for perception and contradicts to the general Black's concept.

It should be mentioned that minimally invasive method of caries treatment is used selectively in Ukraine only as part of recovery and, significantly less frequently, fissure sealing. Only those methods, that can be immediately implemented and paid, have been used. This approach is shortsighted and is completely inefficient for future conditions when caries prevention in Ukraine (like in other countries with low caries rate) will be the main source of income of the dentist and the subject for funding.

Creation of efficient approaches to municipal prevention, such as regional programs for prevention of dental diseases, based on risk diversification methods, is the actual issue for the dental service in Ukraine. To be able to create such programs it is necessary to perform a systemic analysis of risk factors of development and progression of dental diseases, range their significance (i.e., to highlight factors, markers and indicators), create prognostic models, quality indicator system, and synthesize an efficacy assessment procedure. Significant exploratory works in this regard had been conducted by academician V.K. Leontiev, corresponding member of the Academy of

Medical Sciences K.N. Kosenko, professors P.A. Leus, A.V. Udovitsky, L.A. Khomenko, N.I. Smolyar, A.V. Denga, and others [2,3,4,5,6,10]. The issue of creation of new, highly efficient, economically reasonable and realistic for the large-scale implementation of preventive programs for the most common dental diseases, still remains extremely actual at the current stage and requires focused attention of the dental science and practice. The actual issue for the dental service in Ukraine is to create efficient approaches to municipal prevention, such as regional programs for prevention of dental diseases, based on risk diversification methods.

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