

**Pediatric Dental Medicine****Individual program for health education and motivation for oral hygiene and nutrition in children aged 7 to 10 years**Marianna Dimitrova<sup>1</sup>, Hristina Tankova<sup>2</sup>, Maya Rashkova<sup>3</sup>**Индивидуална програма за здравно обучение и мотивация за орална хигиена и хранене при деца от 7 до 10 г. Възраст**Мариана Димитрова<sup>1</sup>, Христина Танкова<sup>2</sup>, Мая Рашкова<sup>3</sup>**Summary**

Motivation is the leading force for change in the behavior of each individual. Knowledge must be upgraded, analyzed and synthesized in order to achieve the desired effect, and the motivation must be done through interesting and interactive methods for the child, so that it does not lose interest.

This publication presents an individual preventive program for motivation and health education in oral health of children from 7 to 10 years of age, developed by the author team. The purpose of the program is to influence the child's value system and build behavioral habits in the direction of maintaining and improving its oral health in the long term, which will be implemented in two of the main preventive areas – oral hygiene and eating habits. The program contains 3 levels, spread over time with intervals between them of 7-10 days.

For the purpose of the program, a motivational interview was developed for the initial assessment of the child's knowledge and psycho-cognitive characteristics, also educational presentations and demonstration methods for illustrating the structure of the teeth, dental plaque and harmful foods. Thematic experiments are included, which present dental caries, the influence of acids on the teeth and others, in a way interesting for the child. As children learn most easily through games, some are also included in the current program – with competitive nature for oral hygiene, role-playing games and an interactive smartphone game on oral health.

This program provides a variety of methods to motivate and educate the child, which maintain interest and create habits for good oral health in the long term.

**Key words:** motivational program, health education, behavior, motivation

**Резюме**

Мотивацията е движещата сила за промяна на поведението на всеки индивид. Знанията трябва да бъдат надграждани, анализирани и синтезирани, за да постигнат желаня ефект, а мотивирането да става чрез интересни и интерактивни за детето методи, за да не губи то интерес.

Представена е разработена от авторския колектив индивидуална профилактична програма за мотивация и здравно обучение за орално здраве на деца от 7-10 годишна възраст. Целта на програмата е въздействие върху ценностната система на детето и изграждане на поведенчески навици в посока поддържане и подобряване на оралното му здраве в дългосрочен план, което ще бъде осъществено в две

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от основните профилактични направления – орална хигиена и хранителни навици. Програмата съдържа 3 нива, разпределени във времето с интервали между тях от 7-10 дни.

За целта на програмата е разработено мотивационно интервю за първоначална оценка на познанията и психо-когнитивната характеристика на детето, презентации за обучение и демонстрационни методики за онагледяване на устройството на зъбите, зъбната плака и вредните храни. Включени са тематични експерименти, които по интересен за детето начин представят зъбният кариес, влиянието на киселините върху зъбите и др. Тъй като децата учат най-лесно чрез игри, то такива са включени и в настоящата програма – със състезателен характер за орална хигиена, ролеви игри и интерактивна игра за телефон на тема орално здраве.

Настоящата програма осигурява разнообразни методи за мотивиране и обучение на детето, които поддържат интереса и създават навици за добро орално здраве в дългосрочен план.

**Ключови думи:** мотивационна програма, здравно обучение, поведение, мотивация

## Introduction

In the social aspect, motivation and training for maintaining oral health in children is part of the promotion of oral health, which includes a set of educational, organizational, political, regulatory, economic measures to change the behavior in order to achieve better oral health [1]. Health education is part of health promotion, which uses personal experience and the influence of the environment in which knowledge, skills, values, attitudes and behavior are acquired or modified [2]. There are many theories describing the learning process – behaviorism, cognitive psychology, theory of social learning, experiential learning and others. The application of any of these theories in the context of acquiring health knowledge is directly related to the age of the patient, the level of needs according to Maslow's pyramid and his motivational personality [3].

According to Albert Bandura, there is a relationship between a child's behavior, his personal qualities and knowledge, and the changing environment. Much of human learning involves modeling, observation and imitation [4]. Since the age of 7 to 10 years includes an active period of adaptation and socialization associated with the transition from preschool to school age, learning through observation or modeling shows high efficiency [5, 6]. Through health education, the patient is informed and upgrades his previous knowledge, which enables him to make decisions about his health, based on his awareness and ultimately

to be health literate. According to Bloom, learning is a process that goes through 6 levels: Knowledge -> Understanding -> Application -> Analysis -> Synthesis -> Assessment [1].

The objective of each motivational program is related to modeling such behavior in children, which will allow a gradual transition from lower to higher levels of education and thus naturally transform new concepts of oral health, which will grow into significant personal values of the child [1, 7, 8].

The motivation is based on the needs and interests of the individual and in order to achieve good results it is necessary to make learning a desirable process for the child. Another important aspect of the motivational sphere of educational activity is the interest in learning. The main aspect of interest is emotional coloring, which means that the child actively/emotionally participates in each part of the learning process [9, 10].

We present an individual program for training and motivation of children (7-10 years) for proper oral hygiene and nutrition, specially developed motivational interview for initial assessment of knowledge and psycho-cognitive characteristics of the child, author's methods for cognitive and motivational experiments, games, etc., tests to control the results obtained. Motivation is the engine of any preventive activity and it is an interaction between the individual, his behavioral factors and his environment (the family) [11]. It is a complex

process that combines observation, ideas, feelings, desires, hopes and behavior.

### Objective of the program

The goal of the program is to change or build behavioral habits in the direction of maintaining and improving the oral health of a child aged 7-10 years in the long term. This will be achieved by influencing its value system through motivation and health education.

The program will be implemented in two of the main preventive areas:

1. Health education and creating a stable and conscious oral hygiene habit;
2. Health education and building proper and conscious eating habits.

In order to turn the health education program into a part of a motivational program, in which we must ensure the change of the child's behavior, we will use demonstration, experimental and game methods. The program consists of the following parts:

- Motivational interview;
- Essence of the program;
- Control and monitoring through the program;

### Motivational interview

#### *Determining the individual motivation of the patient*

In its essence, the motivational interview is a consultative conversation, the main purpose of which is to strengthen a person's own motivation and personal commitment to the process of change. During the interview, an important point is to determine the individual motivation of the patient, which is a set of needs, ideas, desires and individual goals [12, 13, 14].

At the first stage we determine the needs of the child according to Maslow's pyramid in order to adjust the motivational program with the characteristics of the mental development of the child. They must be complied with its age and individuality.

This individual motivational program is for children 7-10 years old, the so-called "age of specific actions" – the independent thinking develops and the logical reasons for the phenomena are realized. The child complies with the opinion of others but the abstract thinking is not yet well developed, so we must use specific examples in our communication with it. Adolescents love active games, competitions and role-playing games [5]. All this determines the inclusion of demonstration, game and experimental methods through which the child to perceive and realize the information offered to him.

#### *Determining the level of knowledge*

With the initial assessment of the child, it is necessary to check the child's knowledge about his oral health in order to know what is the starting position and what foundation we will build on the new information. For this purpose we ask questions in several areas: dentition, oral hygiene and caries, nutrition (fig. 1).

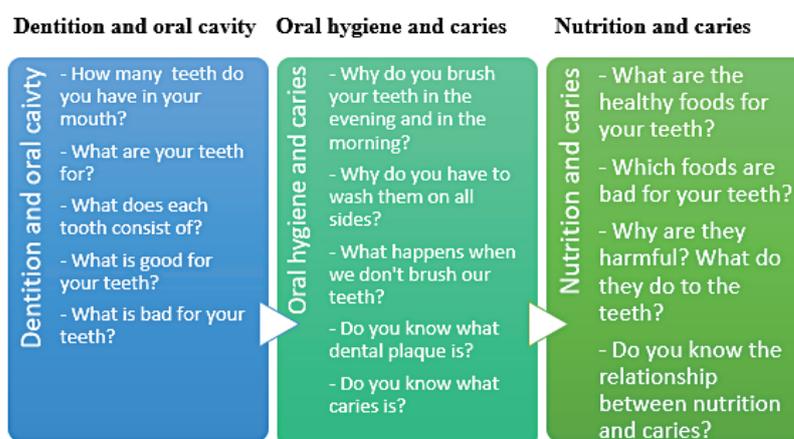


Fig. 1. Questionnaire for knowledge assessment of the child

### Essence of the program

The program includes several methods for individual education – by presentation, demonstration, and experimental [14, 15, 16, 17, 18].

**Presentation method** – new information is presented to the child with a Powerpoint presentation in plain language on the following specific topics:

- 1) oral cavity and teeth (Fig. 1) – number of teeth, dentitions, groups of teeth, structure; 2) den-

tal plaque and caries (Fig. 2) – genesis, composition, relation to caries; 3) nutrition – cariogenic and caries-protective foods, nutrition and caries; 4) oral hygiene – basic rules, methods and tools; 5) eating habits – basic guidelines for proper nutrition.

Demonstration methods – by interesting demonstration of the submitted information

we increase the interest of the child and the degree of understanding. We demonstrate the following:

1) *Oral cavity and teeth* (Fig. 4, 5, 6) – plastic dental models are used, which demonstrate the groups of teeth, the structure of the tooth and what is dental caries;



Fig. 2. Teeth and dentitions



Fig. 3. Dental plaque and caries



Fig. 4. Dentition



Fig. 5. Teeth germs



Fig. 6. Structure of the tooth

2) *Dental plaque and oral diseases* – they are demonstrated by visualization of dental plaque with a coloring tablet. The child can see the “invisible” dental plaque on the tooth surfaces, which helps to understand the previously obtained information. The connection of the plaque with caries and periodontal diseases (gingivitis) is commented. The method aims to educate and motivate the child to improve oral hygiene, emphasizing the relationship between

the location of the plaque and carious lesions and/or periodontal disease.

3) *Nutrition and caries* – on a gypsum model we demonstrate the long-lasting retention of sticky foods and saliva that is not able to wash them away, compared to solid foods such as carrots and apples. This helps the child to understand the knowledge given to him with the presentation and to motivate him to avoid these foods. For this purpose we use: gypsum dental model, water container, toothbrush, biscuit, carrot (Fig. 7).



**Fig. 7a** The biscuit is crushed in water, imitating the bite inside the mouth, and is placed on the teeth. The model is then immersed in water, which imitates the saliva and once we get it out, we can see that the pieces remain on the teeth and we need a toothbrush to clean them



**Fig. 7b** The carrot is chopped into tiny pieces, imitating the bite. Then we put it on the teeth, immerse the model in water and when we get it out we can see that the model is clean without the need of additional cleaning

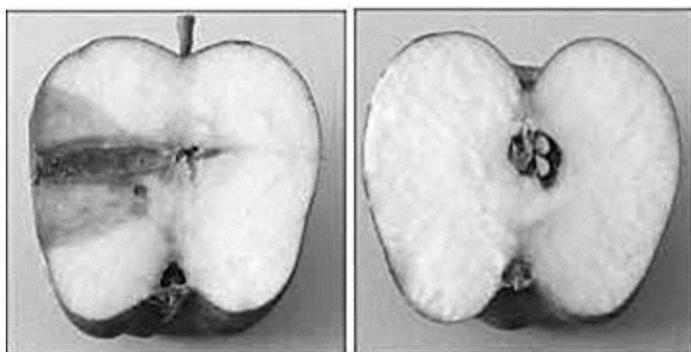
**Fig. 7.** Demonstration method “Adhesive Dental foods” (original method)

**Experimental methods** – we include these methods at the next level (second visit) of the motivational process, which is related to upgrading new information and maintaining the interest in the training topics. This is most easily done by involving the child in practical experiments using new information. Experiments are conducted in the following areas:

1) *Caries – way of development and visualization* – through the experiment “Apple with caries” [15] the child gets a visual idea of how caries progresses and makes an analogy between the structure of the tooth and the structure of the apple. The experiment begins in the office, but ends at home. The purpose of this demonstration has two directions. The first is education on the nature of dental caries and its development, and the second – motivation for the need to prevent the carious process through the active participation of the child.

Before starting the experiment, we discuss with the patient why the apple may look like a tooth – they both have an outer shell – teeth have enamel and apples have a peel that protects them. Under the enamel of the teeth there is dentin, and under the peel of the apples – the fruit. In the center of the tooth is the pulp, and in the center of the apple – the seeds and the core. We end with the question: “What will happen if we make a hole with a sharp pencil in the apple? The child gives his guess and we proceed to the experiment.

Materials needed: 2 apples, 2 paper bags and a pencil. We give the child a sharp pencil and invite it to make a hole in one of the apples. We put the healthy and the perforated apple in separate paper bags. After 5 days, cut each apple in two and observe the result (Fig. 8). The adolescent draws the result on the blank form (Fig. 9), which is discussed at the next visit.



**Fig. 8.** Result of the experiment [15]



**Fig. 9.** Blank form

2) *Dental plaque and sugars* – the experiment “Food for plaque” [16] gives visual information to the child about the connection of bacteria with sugar. Its purpose is to illustrate their affinity for sucrose, as well as its pathological effect on dental structures. Thanks to this experiment, the second level of education from the Bloom’s pyramid is realized – the child synthesizes the knowledge about dental plaque, obtained through the presentation and demonstration methods. Furthermore, the patient is motivated regarding the harmful effects of sucrose and is encouraged to avoid foods containing sugar. Required materials: 2 packets of dry yeast; 2 cups warm water; 1 tbsp sugar (Fig. 10).



\*<https://missramoskindergarten.weebly.com/blog/plaque-attack>

**Fig. 10.** Result of the experiment\*

We explain to the child that the yeast is made of bacteria similar to those in dental plaque. Then in each glass of warm water dissolve 1 packet of yeast. Put a spoonful of sugar in one cup and mix well. Mark the liquid level in the glasses with a marker. After 15 minutes the result is observed. In the cup with added sugar, the yeast has activated and formed a foam that can be associated with dental plaque, which indicates the affinity of bacteria for sugar. The experiment is discussed with the child and the appropriate conclusions are made.

3) *Oral hygiene, nutrition and caries* – by the experiment “Egg teeth” [17]. The patient receives visual information about the effect of acids on teeth and the protective effect of fluoride toothpaste. The objectives of the experiment include education and demonstration of the harmful effects of acids on teeth, especially sweetened carbonated beverages (Coca Cola), which cause demineralization of teeth

Materials needed: 4 boiled eggs, 2 cups of vinegar, 1 cup of Coca-Cola, 1 cup of water, toothpaste with fluoride. One of the eggs is covered with fluoride toothpaste and dipped in a glass of vinegar. The remaining 3 eggs are dipped in the other cups. After 24 hours, remove from the solutions and examine the type of shell, color, hardness. We then discuss with the child what are the expected results – will there be a change in the eggs, will it be different in the different liquids and what does it think it will be. The results are shown in Figures 11, 12, 13 and 14 [17]:



**Fig. 11.** The egg in Cola is coloured brown and its shell has changed structure due to the acids



**Fig. 12.** The egg in vinegar without toothpaste is with a soft, bubbly shell, even missing in spots



**Fig. 13.** The egg in vinegar but with toothpaste has preserved its shell because of the fluor



**Fig. 14.** The egg in water has not changed

**Game methods** – for the second and third level we have added games, which aim to remotivate the adolescent and to consolidate the acquired information. Research in the Department of Pediatric Dentistry at the FDM – Sofia shows that the use of game methods gives significantly better results than the didactic ones [10]. When playing a role game, the child can analyze and synthesize the knowledge, which is the next level according to Bloom's pyramid. The games help with the education and motivation in the following themes:

1) *Structure of the tooth* – the child applies the acquired knowledge about the structure of the teeth, by performing the task to draw the parts of the tooth on a blank template in the shape of a tooth;

2) *Cariogenic and caries-protective foods* – the patient applies the previously learned information about the good and the bad foods for teeth by placing pictures of them accordingly on a picture of a happy and of a sad tooth. The purpose of the game “Good or Bad?” is application of the new knowledge about nutrition and motivation for continuing the participation in the program by a positive stimulus if the task is correctly done.

3) *Oral health* – by a role playing game method called “Changing places” the child must take the role of the training and demonstrating dentist. This way it should use the previously learned knowledge by synthesizing and analyzing the informa-

tion through its own understanding. Through role play we give the child powers and responsibilities and thus motivate it to be responsible for its own health.

4) *Nutrition and oral hygiene and their relation to dental caries:*

– *Game “Who brushes his teeth better?”* – The purpose of the game is to motivate the child to maintain a regular oral hygiene habit and diligence to properly perform oral hygiene. The child receives a “diary of oral hygiene”, on which it marks “+” every day when it brushes its teeth. We turn this habit into a contest who brushed their teeth better – the child or mom/dad. After both participants have brushed their teeth, it is necessary to check who did better. This is done through a dental plaque detector (based on fluorescence). The referee of the game is the other parent who inspects the brushed teeth with the detector and according to what he observes (the bacterial plaque fluoresces in pink to red and the clean teeth - in pale green) decides the winner and if it is the child, it is noted in the diary with “++”. At the end of the week, all “+” counts and the more they are, the bigger the prize for the winner. This game will help the child with applying the knowledge about maintaining proper oral hygiene and the positive stimulus will motivate him to be neat in its performance.

– *Game for phone “Dental care”* [18] – provides interactive influence of the child, and through

fun it is stimulated to maintain proper oral hygiene and eating habits.

– *Plasticine game “Play Doh Dr Drill N Fill®”* – we provide the adolescent with a plasticine play kit and invite him to take on the role of a dentist. We discuss its actions and give him tasks: to explain to the “patient” how to brush the plaque from your teeth and show him how to do it with the brush; to advise the “patient” what foods to eat and which to avoid.

### **Distribution of the program over time**

The program includes three stages in time, as each stage builds on the previous one, maintains the interest of the child and gradually strengthens new habits and health behavior. According to the individual progress of the child, the stages of the program are divided into several visits, with an interval of 7-10 days.

#### *First stage (first visit):*

The goals of the first stage of the motivation and education program are:

- introduction of the child in the program through health education;
- maintaining the child’s attention and interest in the goals of the program through demonstrations, experiments and games;

#### *Second stage (second visit):*

The goals of the second stage of the program are to build and strengthen a new value system for oral health. They are achieved through the following steps:

- assessment of what has been learned through a survey method;
- consolidation of what has been learned from the first stage and upgrading of knowledge through information and motivation for the connection of oral hygiene and nutrition.

#### *Third stage (third visit):*

The objectives of the third stage of the program are:

- control of the newly acquired knowledge from the second stage through a survey method;
- consolidation and maintenance of knowledge through analysis of the results of the homework given;
- application of new information and remotivation in the form of game methods.

The final objective of the program is to create a new value system containing the most important concepts for the oral health of the individual. The stability of values depends on the quality of the supporting information. In parallel with this program, the child is educated in proper oral hygiene, which becomes a part of the child’s health habits.

The presented preventive program was tested on a group of children aged 7-10 years and the summarized results of its effectiveness will be the subject of a subsequent publication.

In conclusion, we can say that the age of 7-10 years is favorable for the creation and strengthening of health habits, for which we can use the proposed individual prevention program. This can be done in dental practices with the necessary trained staff and conditions for this type of work. As part of the comprehensive prevention in childhood, which is the subject of pediatric dentistry, such programs are extremely useful and necessary to preserve the oral health of the adolescents.

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