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Mona IONAS, Laura STEF

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Closing the Assessment Loop of Dental Health Education of Children from Disadvantaged Backgrounds

Mona IONAS¹, Laura STEF²

Abstract

This study aims to identify the level of knowledge of a group of children from disadvantaged backgrounds regarding the prevention of teeth decay, after having participated in courses of dental health care. The study is based on 107 socially disadvantaged children. They have been applied questionnaires referring to the scope of the study. After having completed the courses in the dental health field and dental hygiene, the children became more aware of the importance of a proper tooth brushing (77.6%) than they were before the educational program (66.3%). The number of children who acknowledged that the toothbrush is a personal property has increased in percent from 96.5% to 99.1%. After the first educational program they became more aware of the role of mouthwash (the percentage increased from 79.1 % to 91.5%) and of the use of the dental floss (from 50% to 91.5%). Psychologically, a very useful procedure to make children aware of the importance of the oral hygiene is to highlight the loss of a beautiful smile (96%) because of tooth decay or of extractions (72%). All the indicators measured have shown an increase in the knowledge level of dental health care. The knowledge level of the use of dental floss and mouthwash proved a statistically significant increase. The results we obtained showed that the knowledge gap between the use of dental floss and mouth wash observed at the beginning of the study was closed after just one educational lesson. At the end of our program we were able to create an assessment loop process that can offer enough feedback to the management team so as to deliver the most suitable dental healthcare education for the socially disadvantaged children.

¹ Corresponding author, Lucian Blaga University, Department of Dentistry, Faculty of Medicine, Pompeiu Onofreiu str., no. 2-4, Sibiu, ROMANIA, mobile 0040.730210525. E-mail: monaionas@yahoo.com.

² Lucian Blaga University, Department of Dentistry, Faculty of Medicine Pompeiu Onofreiu str., no. 2-4, Sibiu, ROMANIA, mobile 0040.722425717. E-mail laurastef1@yahoo.com.

Keywords: Dental decay prophylaxis education; children; disadvantaged backgrounds; questionnaire; assessment loop; indicators.

Introduction

The collaboration initiated in 2010 between the SOS Children’s Villages and the “Lucian Blaga” University became successful through an educational project for socially disadvantaged children. Within this project the children were informed on the importance of the dental health. The educational project has been designed to meet the functioning principle of an Assessment Loop (Benson & Miller, 1991; Donabedian, 1980; Post & Anderson 1997).

The assessment of educational programs is not a new activity. From the very beginning, teaching was based on tests and exams for students. But in the last 40 years the term ‘assessment’ became more and more used in relation to education. To avoid confusions we want to clarify the meaning of four terms related to an assessment loop: *measurement, testing, evaluation, and assessment*. ‘Measurement’ refers to the process by which a value is assigned to the attributes or dimensions of some concept or physical object. ‘Testing’ refers to the process of administering a test to measure one or more concepts, usually under standardized conditions. ‘Evaluation’ refers to the process of arriving at judgments about abstract entities such as programs, curricula, organizations, and institutions. ‘Assessment’ is defined as “the process of obtaining information that is used to make educational decisions.(Keeves, Darmawan, 2009; Braun, Kanjee, Bettinger & Kremer, 2006; Huba, Freed, 2000)



Figure 1. The main steps of an assessment loop

An assessment loop has two stages, each one with a few steps. The first stage is the monitoring and evaluating stage. The first step implies defining the domain of interest, identifying the most important aspects, it establishes the significant components (indicators), the monitoring details (frequency, data acquisition) and last but not least performs data evaluation. The domain of interest of our study was the dental care knowledge of socially disadvantaged children. (Ionaș, Marza & Sabau, 2010). The aspects we initially explored were means of dental hygiene, carioprophyllactic nutrition and special ways to prevent teeth decay. The indicators measured at the beginning reflect aspects like brushing, auxiliary means of dental hygiene, carioprophyllactic nutrition and special prophylactic means. The indicators were measured using questionnaires. Children were asked, before starting any activity, to answer the questions in the questionnaire. This way we could determine the knowledge level of the children regarding the studied indicators. Because it was the first time we measured this indicators we established initial base values. A training session was organized for them on dental health issues. The information content of the first educational stage followed the standard requirements for dental hygiene with very few modifications being based on the recommendations of the social workers who were familiar with the children (Gafar, 1995).

The second stage of the assessment loop is the quality improvement stage. In this stage of our project we identified the specific directions which the dental health care education must follow for the socially disadvantaged children. The results have been communicated to the participating institutions in the study who were then able to develop specific (dental) and general (sanitary hygiene) education programs. To close the assessment loop we had to analyze all the processes and data gathered, to improve the quality of the means of evaluation and to measure the indicator values after the first session of education.

Material and method

At the end of the first assessment loop we reanalyzed the way in which we defined and measured the monitored indicators. The monitoring method was modified in order for the applied questions to be easier understood by the children but the obtained results to be still comparable to those previously obtained. Further we followed the indicators which we considered relevant for our group of children: tooth brushing, mouthwash, dental floss and then we added questions which could indicate the motivational elements in changing the children's attitude towards dental hygiene. The values resulted from the first assessment loop became internal standard values for the second one. With the end of the second assessment loop were revealed the desired internal standards for the measured indicators and the minimum thresholds below which serious educational measures must be

applied for the studied group. We highlight the fact, that the entire assessment process is a dynamic one provided that the techniques are adapted to the modifications occurred within the group or within the studied activities, maintaining at the same time an informational continuity which allows the comparison of the results in time. The internal standards and the minimum thresholds can be modified depending on the future evolution of the group.

The indicators were measured using questionnaires. Like in the first step, children were asked at the beginning of their activities to answer a questionnaire. The questionnaire was applied after three months from the first educational lessons. The questions used as indicators for both assessment steps can be found in Table 1. We introduced two new questions (Table 2) to identify the motivational elements which can create a link between the dental hygiene and the success in life. The aspects of dental hygiene can be better stored this way in the long term memory (Tulving & Thomson, 1973).

According to results from the first assessment loop the educational content of the course focuses on dental hygiene, on the correct brushing technique and the role of flossing to prevent tooth decay. There was provided additional explanation about the special means of preventing dental caries and the possibilities of access to dental treatments. The lessons taught were used as teaching methods of the issue, there were made demonstrations on the study models, there were used chewing disclosing tablet and oral hygiene instructions, games. The course was adapted based on the age of each group, respectively on the group of children from the classes I-IV and V-VIII.

Table 1. Common questions to both assessment steps

Educational program I	Educational program II
1. Do you think you brush your teeth properly? yes <input type="checkbox"/> no <input type="checkbox"/> I don't know <input type="checkbox"/>	1. Do you think you brush your teeth properly? yes <input type="checkbox"/> no <input type="checkbox"/> I don't know <input type="checkbox"/>
2. Do you think it is important to have an individual toothbrush? yes <input type="checkbox"/> no <input type="checkbox"/> I don't know <input type="checkbox"/>	2. Do you think it is important to have an individual toothbrush? yes <input type="checkbox"/> no <input type="checkbox"/> I don't know <input type="checkbox"/>
3. Do you consider dental floss useful after tooth brushing? yes <input type="checkbox"/> no <input type="checkbox"/> I don't know <input type="checkbox"/>	3. Do you consider dental floss useful after tooth brushing? yes <input type="checkbox"/> no <input type="checkbox"/> I don't know <input type="checkbox"/>
4. Do you consider mouth wash important after tooth brushing? yes <input type="checkbox"/> no <input type="checkbox"/> I don't know <input type="checkbox"/>	4. Do you consider mouth wash important after tooth brushing? yes <input type="checkbox"/> no <input type="checkbox"/> I don't know <input type="checkbox"/>

Table 2. Specific questions of second educational step

5. Is a beautiful smile important for you?		
yes		<input type="checkbox"/>
no		<input type="checkbox"/>
I don't know		<input type="checkbox"/>
6. What do you most dislike at a smile?		
the caries and the missing teeth		<input type="checkbox"/>
the teeth which are not properly aligned		<input type="checkbox"/>
the red and irritated gums		<input type="checkbox"/>

Results

Statistical analysis was performed with IBM SPSS Statistics 21 (IBM Corp) using nonparametric statistical tests. Data were considered of the nominal type, grouped after the step of measurement (at the beginning of the program or before the second educational lesson). There were 86 children answering questionnaires in the first step and 107 in the second one.

The knowledge gathered during the first specific dental health training courses and the general sanitary courses made the children become more aware (77.6 %) of the importance of a correct tooth brushing than before the first educational program (66.3%). An increase was obtained also in the awareness of the importance of using an individual tooth brush (96.5% at the beginning compared to 99.1% before the second educational program). The importance of auxiliary dental cleaning methods has increased as well from 50% to 91.5% (regarding the use of dental floss) (*Figure 2.*) and from 79.1% to 91.5% (regarding the use of mouth wash) (*Figure 3.*). The variations are significant statistically only for the level of knowledge of using mouthwash and dental floss (*Table 3.*).

The results obtained indicate a significant improvement in the knowledge level of dental hygiene among the children from the studied group compared to the initial values. The first study showed there is a great need for education in auxiliary oral hygiene aids (mouthwash and dental floss) (Ionas, Marza, & Sabau, 2010). The efficiency of the first educational session has clearly been proved through the favourable evolution of the responses to the questions about the importance of using the mouthwash and the dental floss. The important motivational factors identified from the questions 5 and 6 are: (1) the importance of a beautiful smile (psychological) has been considered important by 96% of the children; (2) carries and missing teeth (aesthetical) have been considered important by 72% of the children. Teeth not aligned straight and irritated gums have been considered important by 29% respectively 28% of the children.

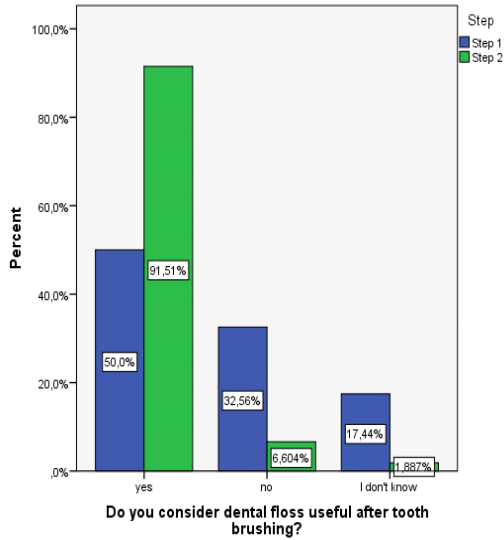


Figure 2. The biggest improvement in broadening the knowledge of dental care after the first lesson was related to the use of dental floss, from 50% before education to 91.5% after the first round of education

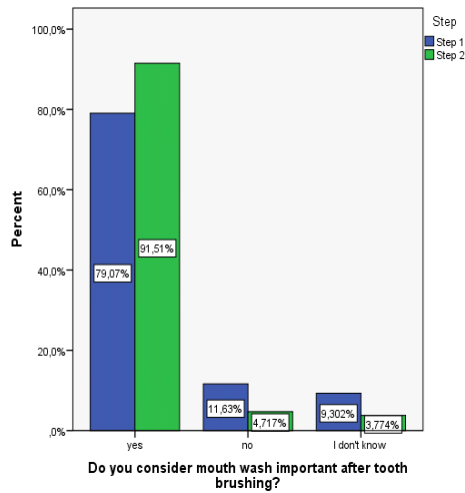


Figure 3. Knowledge level of mouthwash as a means of dental healthcare has increased after the first educational lesson

Table 3. Results of statistical tests questions 1-4. The statistical analysis results suggest that dental health care education did have a beneficial effect on the knowledge level regarding the use of mouthwash and dental floss

Test Statistics ^a	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)
Do you think you brush your teeth properly?	4066,500	9844,500	-1,777	,076
Do you think it is important to have an individual toothbrush?	4484,000	10262,000	-1,229	,219
Do you consider dental floss useful after tooth brushing?	2641,500	8312,500	-6,432	,000
Do you consider mouth wash important after tooth brushing?	3991,000	9662,000	-2,452	,014

a. Grouping Variable: Step

In our previous paper (Ionaş, Marza & Sabau, 2010) we compared the knowledge level regarding the use of mouthwash versus dental floss because we didn't have a reference value for the same indicator. In this second assessment loop we can admit with a 95% confidence that the knowledge regarding the use of mouthwash and dental floss has improved significantly compared to the basic values. (Table 3) To do the same comparative analysis as in the first study, we present in Table 4 the statistical results of a Wilcoxon Signed Ranks Test, comparing the answers regarding the auxiliary means of oral hygiene after the first education lessons with those prior to it. The obtained result shows that education was effective in correcting knowledge deficiency regarding the use of dental floss.

Table 4. A statistical comparative analysis of answers to questions regarding mouthwash and dental floss before and after the first educational lesson. After first educational lesson there is no more difference of the knowledge level between those two indicators.

Test Statistics ^a	Step	Z	Asymp. Sig. (2-tailed)
Do you consider mouth wash important after tooth brushing? - Do you consider dental floss useful after tooth brushing?	1 Before education	-4,023 ^b	,000
	2 After first education round	-,489 ^c	,625

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

c. Based on negative ranks.

Discussions

Assessment policy and practices are critical to any successful educational improvement strategy (Braun, Kanjee, Bettinger & Kremer, 2006). Assessment does not end in itself, it is a continuing process which leads to an improvement in the wellbeing of children. The conclusion of an assessment should result in an analysis of the needs of the children, a realistic plan of action (including services to be provided), detailing who has responsibility for action, a timetable and a process for review (Department of Health, Department for Education and Employment, Home Office, 2000).

In general the health and in particular the oral health has multiples factors genetic and biological factors, social and physical environment, health behaviors, and dental and medical care (Fisher-Owens, Gansky, Platt et al., 2007; Kinding & Stoddart, 2003). Socially disadvantaged patients are more vulnerable regarding their access to health services; they choose the less expensive treatment due to their poor material condition (Vicol, 2010; Vicol, 2011a; Vicol & Gergely, 2011; Oprea, Cojocaru, Sandu., & Bulgaru-Iliescu, 2013), and the main reason for appointment is the pain (Cernuşcă, Ştef, Pavel, & Morar, 2013). Lower socioeconomic status is associated with higher prevalence of severe caries (Polk, Weyant, & Manz, 2010; Zmarandache & Luca, 2012), lower rates of brushing, less use of sealants, and less recent receipt of dental services (Polk, Weyant, & Manz, 2010). Higher incomes and a higher education level allow access to information and to health services (Petersen, Bourgeois, Bratthall, & Ogawa, 2005; Maxim, Savin, Balan et al, 2006; Petersen et al., 2004). School children are considered an important target group for various health education activities (Goel, Sehgal, & Mitta, 2005). Our study reveals the improvement of the dental health knowledge awareness of the children after education. Other studies showed that although educational intervention is successful in improving knowledge level (Worthington et al., 2001; Goel , Sehgal, & Mitta, 2005) the socioeconomic background is an important determinant for the result (Goel , Sehgal & Mitta, 2005).

It is reported that the majority of school children in developing countries do not brush their teeth or do not know proper brushing techniques (Fjellstrom, Yakob, & Soder, 2010; Harikiran, Pallavi, Sapna, & Ashoutosh, 2008). The following oral and dental diseases have negative impact on the nutrition, sleep, growth, play, rest, learning and quality of life of children (Dorri, Sheiham, & Watt, 2009; Efe, Sarvan, & Kukula, 2007). In our study the use of dental floss was known by 50% before dental education and increased to 91.5% after dental education, while the use of mouth wash noted an increase from 79.1% to 91.5%. Zmarandache and Luca (2012), claim that 91% of the Romanian children do not use auxiliary means of oral hygiene. The Greek children, with ages between 12 and 15 did not use mouth wash containing fluorine of which 51.8% and,

respectively 43.6% (Vadiakas et al., 2012). The difference between our data and the one mentioned above can be explained by the fact that we explore the knowledge level of auxiliary means of oral hygiene and not the actual use of them. In our study the number of children who acknowledged that the toothbrush is a personal property has increased in percents from 96.5% to 99.1%. The percent of children who know that the toothbrush is a personal property is now close to the percent of the children with normal socio-economic status as claimed by Fleancu and Neamțu, (2009).

The knowledge of psychological concepts and their application to educational programs has the potential to help teachers having better results. (Snowman, McCown, & Biehler, 2012) The answers to the questions 5 and 6 have shown that a dental healthcare educational program must have a psychological component in order to increase its efficiency. The most useful approach resulted from our study is to underline the loss of a beautiful smile due to dental carries or extractions. The other two aspects (teeth not aligned straight and irritated gums) must be part of the information within the educational program to increase their importance in time.

At the beginning of the educational programs the basic idea was, that the socially disadvantaged children shall benefit of a specialized education which helps them indirectly to be successful in life. We chose to follow the snow ball principle presented by Mason (2008): information reduced quantitatively but efficient in quality and temporally well placed (childhood) will have significant effects in adulthood. Our aim is to trigger beneficial changes such as self-esteem increase, improvement of the general aspect. Having in mind the reaction of the group of socially disadvantaged children to the educational program we asked ourselves whether there can be determined a critical mass which can create a “tipping point” beyond which the dental education is self-supported at the level of the target group (Gladwell, 2002). Because of the dynamic structure of the study group we have a different number of children answering the two questionnaires. Just a part of the second group was present at the first education lessons. In spite of this fact we observed a great improvement of some indicators. We presume that this effect is due to the fact that children who took part in the first educational session shared the information with their brothers or sisters, indirectly educating them, and convincing them to be present at the second educational lesson. This problem is however the subject of a further study.

Throughout these studies we identified the aspects which must be insisted on in the educational programs for socially disadvantaged children. There has been a marked improvement of oral health knowledge among the children of the study. Last but not least we, the doctors participating in this educational program, changed the approach to the education for these children. (Jabarifar et al., 2011; Willems et al., 2005). Leaving behind the deficiencies of general hygiene and education, the socially disadvantaged children will enjoy the attention they receive

and will absorb like a sponge the given information. The aspects we consider that need improvement in the educational programs for children especially from socially disadvantaged families are following: (1) the correct usage of dental hygiene products (technical); (2) the motivation of the children to use dental hygiene products (psychological): pleasant appearance, success in the relationship with the opposite sex etc.; (3) the correct nutrition in the prevention of dental carries, favorably also for the healthy development of the organism

Conclusions

We consider that our project has reached its educational objectives triggering a better knowledge of information on dental hygiene among the members of the studied group. All the indicators measured have shown an increase of the knowledge level of dental health care. We find statistically significant increases of the knowledge level in the use of dental floss and mouthwash. The results we obtained show that the knowledge gap between the use of dental floss and mouthwash observed at the beginning of the study was closed after just one educational lesson. Our study reveals a very high awareness of the value of healthy teeth, thus we consider that questions which imply psychological aspects must be present in any survey or educational activities that is part of a dental health care assessment loop. This way we can increase the effectiveness of the educational program. At the end of our program we were able to create an assessment loop process that offers enough feedback to the management team so as to be able to deliver the most suitable dental healthcare education for the socially disadvantaged children. At the same time we consider that the children participating in the study gained a better understanding of the importance of proper dental health care to achieve success in life.

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