

Assessment of an educational strategy and application of an oral health preventive protocol in early childhood¹

Evaluación de una estrategia educativa y de la aplicación de un protocolo preventivo para el fomento del cuidado bucal en la primera infancia¹

VALENTINA DE LA ROCHE COLORADO², ÁNGELA MARÍA FRANCO CORTÉS³, EMILIA MARÍA OCHOA ACOSTA⁴, VANESSA BRAN MUÑOZ⁵

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² DDS. Professional in the administrative/research field. School of Dentistry, Universidad de Antioquia. Medellín, Colombia. ORCID: 0000-0002-2827-7277

³ PhD in Social Sciences. Dean of the School of Dentistry, Universidad de Antioquia. Medellín, Colombia. ORCID: 0000-0001-8579-058X

⁴ PhD. Professional in the research/outreach field. Universidad Cooperativa de Colombia and Universidad de Antioquia. ORCID: 0000-0001-6765-5712

⁵ DDS in private practice. ORCID: 0000-0001-5660-8523

ABSTRACT

Introduction: in Colombia, educational and preventive strategies to improve oral health in early childhood have been developed, but few evaluative studies have been conducted to assess their results. The aim of this study was to assess the knowledge on early childhood oral care acquired by education agents after participating in an educational strategy, and to evaluate the results of the implementation of the Ministry of Health's preventive protocol "I am a more smiling generation" (Soy una generación más sonriente). **Methods:** this was a mixed-focus study. The qualitative component was a participatory assessment of learning. It involved 45 education agents registered in a state program, who participated in workshops and focus groups. The quantitative component was a longitudinal study with the participation of 54 mother-child pairs belonging to the same program. The preventive protocol was applied three times over a twelve-month period. It included educational reinforcement and application of fluoride varnish to the children, using oral examination and assessment of their dental caries risk, as well as a survey to identify the families' social conditions. **Results:** after applying the preventive protocol, the average carious teeth in children decreased from 3.1 teeth in the first examination to 2.2 in the third one. Prior to application of the preventive protocol, 49% of children had a high risk of developing cavities and in the last visit 63% were at low risk while 5.6% were at high risk. A number of positive aspects result from this learning assessment, including the adoption of new pedagogical strategies to accompany children during oral care practices; there are also some aspects to improve in relation to the persistence of conflicting knowledge concerning children's rights to oral health. **Conclusion:** following the application of the preventive protocol, the children's average carious teeth decreased, as well as their risk for dental caries. Educational agents acquired new knowledge, but uniform knowledge in terms of children's health rights is still lacking.

Keywords:

childhood, education, oral health, dental caries, program evaluation

RESUMEN

Introducción: en Colombia se han desarrollado estrategias educativas y preventivas orientadas a mejorar la salud bucal de la primera infancia, pero son pocos los estudios evaluativos para valorar sus resultados. El objetivo de este estudio consistió en evaluar los aprendizajes en cuidado bucal durante la primera infancia, adquiridos por agentes educativos luego de su participación en una estrategia educativa, y valorar los resultados de la implementación del protocolo preventivo "Soy generación más sonriente" del Ministerio de Salud. **Métodos:** estudio con enfoque mixto. El componente cualitativo fue una evaluación participativa de aprendizajes con 45 agentes educativos pertenecientes a un programa estatal, quienes participaron en talleres y grupos focales. El componente cuantitativo fue un estudio longitudinal. En este participaron 54 binomios madre-hijo pertenecientes al mismo programa. Se aplicó el protocolo preventivo en tres momentos por un periodo de doce meses, el cual consistió en refuerzo educativo y aplicación de barniz de flúor al niño. Se utilizaron como herramientas el examen bucal y la valoración del riesgo de caries dental del niño, y se aplicó una encuesta para identificar la posición social de las familias. **Resultados:** luego de la aplicación del protocolo preventivo disminuyó el promedio de dientes cariados en el niño, pasando de 3,1 dientes en el primer examen a 2,2 en el tercero. Antes de la aplicación del protocolo preventivo, el 49% de los niños presentó riesgo alto de caries, y en la última visita el 63% pasó a bajo riesgo y el 5.6% quedó en alto riesgo. Como resultados de la evaluación de aprendizajes se destacan aspectos positivos, entre ellos la adopción de nuevas estrategias pedagógicas para el acompañamiento al niño durante la realización de las prácticas de cuidado bucal, y aspectos a mejorar, en relación con la persistencia de saberes contradictorios frente a los derechos en salud bucal de la niñez. **Conclusión:** luego de la aplicación del protocolo preventivo disminuyó el promedio de dientes cariados y el riesgo de la caries dental en los niños. Los agentes educativos incorporaron nuevos aprendizajes, pero aún no hay conocimientos unificados en el tema de derechos en salud de la niñez.

Palabras clave:

infancia, educación, salud bucal, caries dental, evaluación de programas y proyectos de Salud

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INTRODUCTION

Colombia is expressly committed to contributing to the development of children and adolescents, especially in early childhood, in order to provide them with the means to expand their potentials and capacities throughout life and thus contribute to the reduction of social gaps, overcoming the circle that reproduces and increases the complexities of poverty.¹ In this regard, efforts have been made to develop joint initiatives from various sectors to promote the implementation of programs and projects that contribute to the improvement of the living and health conditions of children.

Among the most important initiatives is the 2012–2021 Decennial Public Health Plan [Plan Decenal de Salud Pública 2012 -2021],² which proposes guidelines to respond to current public health challenges and is a joint effort with the coordinated participation of sectorial and cross-sectorial policies to positively impact the social determinants of health. However, despite progress in early childhood policies, there are evidences of the permanence of avoidable situations affecting the health of children aged 0 to 5 years, such as neonatal mortality, low vaccination coverage, domestic violence, low birth weight, malnutrition, and dental caries.³

It has been stated that one of the most worrisome problems in different regions of Colombia, especially in the city of Medellín, is the oral health of the child population.³⁻⁶ In order to overcome these situations, plans and strategies have been designed and implemented to promote health, prevent oral disease, and improve children's access to health care, as stated in the Decennial Public Health Plan, with a specific oral health goal of a 20% increase in the

population with no caries experience—with an emphasis on early childhood, childhood and adolescence— by increasing self-care practices in the population in order to prevent oral diseases and manage oral health. Many sectors and institutions dealing with children, such as the Municipal Secretariats of Social Inclusion and Family, Education and Health, the Good Start Program (Programa Buen Comienzo) and the Colombian Institute for Family Welfare (Instituto Colombiano de Bienestar Familiar), have been involved in this endeavor.

Despite the implementation of actions aimed at improving early childhood health, assessment strategies have been scarce, and as a result there is not enough evidence of the quality of educational processes and health promotion strategies and the relevance of such strategies, the internalization of the underlying health model, and the factors that boost or hinder health promotion.⁷

In consequence, the present project aims to evaluate the knowledge acquired by educational agents after participating in an educational strategy to strengthen the abilities to accompany children aged 0 to 5 years in their oral care practices.⁸ It also seeks to evaluate the results of the implementation of the "I am a more smiling generation" protocol⁹ among children participating in the program. This protocol consists of the implementation of specific protection measures, including the application of fluoride varnish and training educational agents since early childhood.

METHODS

This was a mixed-focused study. The qualitative component consisted of a participatory evaluation, as a methodological strategy that integrates the voice of those

involved in the evaluative process. It is used simultaneously to research learning and help to individually and collectively empower participants. It also makes it possible to identify aspects that either limit or facilitate the educational process, in order to show trends for their continuity and improvement. The approach takes up elements of socio-critical pedagogy.^{10,11}

For data collection, 4 play workshops and 4 focus groups were held, conducted by trained staff and with the participation of 45 mothers and educational agents.

Data processing and analysis involved a process of transcription, coding, and categorization of information into descriptive and interpretive units. Preset (deductive) categories were used; these were defined in accordance with the topics covered in the educational process. The analysis was then refined through trends from the data, which enabled the construction of information-based arguments. Category saturation and methodological triangulation criteria were used. A summary of the analytical process results is shown in a categorial matrix.

Simultaneously, a longitudinal study was conducted to evaluate the application of the preventive protocol of the “I am a more smiling generation” strategy. Implementation of the protocol was taken as a second phase of the strategy, aimed at reinforcing the educational messages and conducting a 12-month follow up, in which the children’s oral health situation was assessed, considering that they would receive specific protection with fluoride varnish in each of the three scheduled visits.

63 mother-child pairs initially participated in the implementation of the preventive protocol; 8 pairs were not located or refused

to continue for the second visit, and one pair more was lost for the third one, meaning that 54 pairs were evaluated at all three times. Sample size was defined for convenience, according to the available budget.

The preventive protocol included an assessment of teething status and risk of cavities in children, educational reinforcement for caregivers, and application of fluoride varnish to children. The data collection tools were oral clinical examination and a survey of dental cavity risk assessment, which was applied by two standardized general dentists. In addition, a survey was conducted to identify the social insertion of families, that is, their membership in certain social groups sharing the same position in the social relations system. This membership is considered as the structural characteristic determining livelihood. This helps define the social insertion of the economic provider or supplier of material goods in the family.^{3,12}

The data collected in the children’s dental caries risk assessment survey was entered into the Cariogram program,¹³ including eight variables out of the ten offered by the program (caries experience, related diseases, diet content, diet frequency, plaque quantity, fluorides use, salivary secretion, and clinical judgment). Thus, the program yielded a personalized cavity risk for each child as low, moderate or high tooth decay risk.

For the analysis of the oral examination results, the children’s caries experience rates were calculated through both classic and modified dmft, comparing the results of the three visits. The operationalization of dental caries experience variables considered the healthy tooth condition, tooth loss due to dental caries and the different levels of progression (severity) of the existing carious lesions.

The analysis of quantitative information was done in version 23 of the SPSS software, using univariate analyses and descriptive statistics, and thus the findings are presented in frequency distribution tables and graphs.

This is a low-risk project according to Resolution 8430 of 1993. The study was assessed and approved by the ethics committee of the Universidad de Antioquia School of Dentistry, by Minutes 2 of 2016. The mothers participating in this study voluntarily accepted their participation and that of their children by means of an informed consent.

RESULTS

Implementation of the preventive protocol in three visits over twelve months

Families' social situation and means of livelihood

The families of the mother-child pairs included in this study were inhabitants of Aranjuez, Doce de Octubre and Robledo Palenque, three neighborhoods of the municipality of Medellín. In these families, the fathers were generally the main household providers (73% of cases). However, it should be noted that 10 mothers of the 63 who were initially interviewed are household heads responsible for the economic supply, and all of them are employed.

65.1% of the families' economic providers were salaried workers, with 50.7% being non-qualified employees, including laborers. In second place there were under-wage and informal workers, with a proportion of 30.1%. The remaining 4.8% were unemployed.

As for the mothers, 40.3% had a high-school diploma and 59.7% did not achieve this level of education. All the children were covered by social security in health. 22.3% of mothers said that, on several occasions in the last month, the family did not have or lacked money for food purchases.

The children (54% females and 46% males) were 20 months old in average in the first visit, 27 months in the second visit, and 32 months in the third one.

Status of children's teething and risk of dental caries

In the twelve months of follow-up, the children underwent three oral examinations and three dental caries risk assessments; a first initial examination at baseline, the second oral examination at 6 months, and the third one at 12 months. The oral examination yielded the dental caries experience rate in primary dentition (dmft).

Table 1 shows the results of the specific average dental caries experience (modified dmft). The sample corresponds to the total number of children who had cavities at each visit. It can be seen that the total number of affected children increases from 11 affected children in the first visit to 14 in the second visit and 16 in the third one (twelve months later).

Table 1. Specific average of modified dmft per observation time

Specific average	Non-cavitation lesions	Cavitation lesions	Teeth indicated for extraction	Filled teeth	dmft
1st visit/oral examination n=11	2.45	0.64	0	0	3.09
2nd visit/oral examination n=14	1.64	1.21	0	0.29	3.14
3rd visit/oral examination n=16	1.65	0.35	0	0.24	2.24

Source: by the authors

As noted, 17.5% of all children had experience of dental caries in the first visit, the proportion increased to 25.5% in the second examination, while 29.6% of children had dental caries experience in the third one.

The average (non-cavitation) carious teeth decreased over time, down from 2.45 to 1.65. The same was for teeth with cavitation lesions, with a marked increase in teeth with cavitation lesions in the second visit, showing that, while non-cavitation lesions decrease, cavitation lesions increase and filled teeth are reported. Overall, the dmft index showed a decrease between the first and third oral examinations.

The Cariogram program was used for caries risk assessment, using 8 of the 10 variables to establish the risk of dental caries in children: high, moderate, or low. As shown in Table 2, there was a significant improvement between the risk assessment at baseline, which was of a high risk for 49.2% of the population, and low risk for 63% of the population twelve months later.

These fluctuations may be related to the different daily activities carried out by the mother and/or caregiver during the process and the educational reinforcement and specific protection activities that were carried out in the follow-up visits, aimed at preventing the onset of new carious lesions; these actions changed the behavior of the vast majority of these variables, which indisputably influenced the reduction in dental caries risk.

Aspects related to access to health services

94% of children were seen at the Growth and Development Program, perceived as the first entrance to health services. Some children did not take advantage of this program because of the health system’s own limitations.

Concerning the referral to dental service, it was observed that when children reached an average of 27 months of age, 40.4% of them had not yet been referred, whereas when children reached an average age of 32 months, the number of dental referrals

Table 2. Distribution of children according to risk of cavities and examination time

	% Children High Caries risk	% Children Moderate Caries risk	% Children Low Caries risk
First visit n=63	49.2	36.5	14.3
Second visit n=55	14.5	30.9	54.6
Third visit n=54	5.6	31.4	63.0

Source: by the authors

increased, with only 15.4% of children not yet referred to the service.

Dental service for children under the age of two faces several barriers, preventing children from enjoying their health rights as stated in the Colombian Political Constitution. While most children at 32 months of age had already been referred to the dental service, only in half of cases the mother or caregiver had requested an appointment, which means another barrier to access or timely care, this time not because of the institution's responsibility but the caregiver's, showing that the educational work must be done on both sides.

Results of the participatory learning assessment

Below is a table summarizing the process of analysis and the findings resulting from the assessment conducted with a group of 45 educational agents who participated in two activities previously established in the methodology.

The table shows preset categories and emerging sub-categories. It also includes some actual quotes by the participants (Table 3). This analysis also benefits from the recognition of external aspects that can either limit learning or encourage the generation and incorporation of new learnings.

Table 3. Categorical matrix

Categories (preset)	Subcategories (emerging)	Quotes by participants
Oral care knowledge and practices	Overcoming the imaginaries on the relationship of gestation with the deterioration of oral health associated with various factors, including lack of calcium	"It's about working with that mom, telling her no, you weren't decalcified, it's your body that is changing, and you have to increase your hygiene so that you can preserve your teeth". E1
	Starting oral care practices since gestation, continuing them in a differential way according to the stage of the child's growth and development process	"And when you are pregnant, they have to check your teeth because that is where many diseases start". "When the baby is born, his gums are cleaned, we use a soft toothbrush when he has teeth, and the elements used at each stage are different". U6
	Incorporation of fond accompaniment strategies during care practices. Overcoming the strategies traditionally used with children, such as imposition and punishment	"Because it was a fight with my boy for him to brush, but now with all the concepts and with a more loving way of doing things, as we were taught, it has been something very different". E5
Knowledge and practices about oral health rights	Permanence of conflicting knowledge regarding children's oral health rights. Lack of up-to-date knowledge about rights by professionals and educational agents.	"That children have the right to be checked since birth". U1 "But the oral health of a child begins at the age of two". U8
	Inadequate forms of rights claiming persist, associated with denial of dental care service	"Once I brought my girl to the ER and they didn't want to take care of her, I insisted and they had to take care of her, one has to claim one's rights in any possible way". U4
Oral health-general health connections	Relationship of oral health with the body and the environment	"Usually when they talk about oral health the first thing that comes to mind is one's mouth, but as we already know, it's not just the mouth, but the whole body, that is, the whole environment that surrounds you has to do with oral health". E11
Aspects that limited the implementation of learning	Presence of precarious living conditions	"In our homes there is often no money to even buy food, not to mention dental floss" E2
Aspects that favored the incorporation and implementation of learning	Assessment of the pedagogical elements and teaching tools used	"Some aids they gave us, like the puppet, have been invaluable, not only to work oral health, but for any topic".

Source: by the authors

DISCUSSION

This study considered the complementarity of approaches and methods, which allowed not only to achieve objective results from the implementation of the preventive protocol, but also to establish some social aspects of families and to approach the perceptions of mothers and other educational agents about the learnings obtained and the aspects that either blocked or facilitated successful educational actions.

Assessing the implementation of preventive and educational actions is a key component of management and a potential source of inputs for improving processes in general and quality in particular.¹⁵

The participants' social conditions were analyzed, finding out that most household providers in the mother-child pairs are salaried workers, followed by under-wage and informal workers. This is in line with the occupations in Colombia's main cities, namely laborers, employees (45.5%) and self-employed persons (39.5%).¹⁶

The fact that the families belong to these social groups is related to some aspects of the means for livelihood, defined as the necessary conditions for a decent life, in connection to structured patterns affecting their insertion into social dynamics.³

In this regard, it should be noted that, while all the children were covered by the General System of Social Security in Health [Sistema General de Seguridad Social en Salud], not all accessed the dental service. This could be established because, while the Growth and Development Program referred most kids to the dental service, only half of them requested and got an appointment. This shows that the gap between the

universalization of coverage and the real access to services is an unsolved problem, as there is a clear persistence of different barriers—the reason for constant accusations to the health reform.¹⁷ In addition, the learning assessment process helped identify another factor that may be influencing children's limited access to dental care: the practitioners' ignorance and varying criteria regarding early childhood oral health rights, as shown by the instructions given about the age at which parents should seek the first dental appointment.

Similarly, other studies report that educational agents in charge of children in Medellín perceive the existence of such barriers, as sometimes they are told that the child is too young for a dental visit and that they must wait for the kid to be older.¹⁸

Another aspect in relation to means for livelihood was the educational level of mothers, because only 26.4% had a high-school diploma. This is a worrying finding as several studies report an association between maternal schooling and the prevalence of dental caries in children.^{19,20,21}

As for the results of the application of the preventive protocol, it can be said that over time it helped decrease the average number of decayed teeth, including non-cavitation and cavitation lesions, from 3.1 affected teeth in the first examination to 2.2 in the third one. In this sense, several studies have demonstrated that applying fluoride varnish reduces the number of cavities and is a cost-effective method, especially if targeted at high-risk groups and offered in non-clinical environments.^{22,23} In this same line, Marinho et al suggest that applying fluoride varnishes two to four times a year is associated with a significant reduction in dental caries.²⁴

Despite the described improvement in indicators of dental caries experience following the application of the preventive measures, 29.6% of children still experienced dental caries 12 months after the intervention began. In Colombia's latest National Oral Health Survey [Estudio Nacional de Salud Bucal], children aged 1.3 to 5 years were evaluated, showing a proportion of 29.3% dental caries experience—a similar value to that found in the present study.²⁵

Given the reported results, it is a priority to understand dental caries as a complex chronic disease concentrated in often disadvantaged social groups,²⁶ thus the relevance of exposing the situations of families, which reflect social inequities that may be linked to dental caries indicators. These situations include additional problems, such as lack of money to buy food during the last month, as stated by 22.3% of mothers.

The mothers reported precarious living conditions, which limit the chances of accessing adequate food and oral care elements.

This all requires analyzing the need to articulate specific oral care actions with wide poverty reduction policies and strategies such as Primary Health Care [Atención Primaria en Salud], as the former alone fail to transform the health situation as expected. However, one can't ignore the role played by the services and the accessibility of this population group,²⁷ as well as the actions aimed at the prevention of oral disease, as evidenced by the improvement of some indicators following the application of the preventive protocol. Similarly, this improvement may be related to the mothers' learnings concerning the accompaniment of children during care practices. In this sense,

studies have shown that attempts to improve parental knowledge and attitudes have a substantial impact on the improvement of the next generation's oral health.²⁸

That being said, it is worth highlighting some advances and limitations of incorporating learning to improve children's oral care practices, as shown in this assessment. For instance, it could be noted that the concept of care was less reductionist and was not exclusively associated with oral hygiene, but with the living conditions of families. A less mechanistic approach of health was also perceived when the group of mothers referred to oral health from the point of view of the body as a whole. These notions may be showing a change from an individualistic social order, in which the body of others and their care is the responsibility of each other.²⁹

One achievement of the educational process was a change of the traditional conceptions of oral health education—a change corroborated by other studies which have recognized the importance of overcoming the traditional approach of information-based health education and a behavioral change, subsidiary of the biomedical model—.³⁰ Hence the importance of adopting broad approaches linked to the conception of self-care and caring for others with love, as a possibility to produce healthy practices.

These inclusive conceptions were worked through the adoption of socio-critical education and evaluative models seeking to overcome traditional models anchored in behavioral pedagogical perspectives and in biomedical conceptions that hold the individual accountable for unhealthy behaviors.³¹

Finally, it should be noted that the participants expressed their wish to continue multiplying the lessons learnt, which confirms the value of a pedagogical process in which a caregiver acquires knowledge and shares it in the context of a dialogical process,³² as it fosters the application of learned lessons and closes the gap between scientific and popular knowledge.

The main limitation of the present study had to do with sample size, as it was hard to achieve the permanence of mother-child pairs over time, and this influenced the results of the quantitative component.

CONCLUSIONS

The analysis of the results of the implementation of Colombia's Ministry of Health preventive protocol "I am a more smiling generation" shows that the protocol helped decrease dental caries rates (dmft) among children as well as dental caries risk, with a significant decrease during a twelve-month period, showing "low risk" in the last visit.

Regarding the evaluation of early childhood oral care learnings acquired by educational agents after participating in an educational and preventive strategy, it can be concluded that the expansion of some imaginaries and the incorporation of new conceptions were

important achievements and validate the need for education processes within a socio-critical approach. In addition, the adoption of new pedagogical strategies to accompany children during oral care practices were highly valued by mothers, as these strategies helped overcome negative early childhood experiences during oral care practices.

As a recommendation, it is necessary to continue working towards oral health rights, due to the persistence of conflicting knowledge among mothers and other educational agents involved in the educational process.

CONFLICT OF INTEREST

One of the authors (AMFC) is part of the Editorial Committee of Revista Facultad de Odontología Universidad de Antioquia, but transparency in the editorial processing of the manuscript has been guaranteed since she did not participate in such process.

CORRESPONDING AUTHOR

Valentina De La Roche Colorado
Facultad de Odontología, Universidad de Antioquia
(+57) 3174254725
valentina.delaroche@udea.edu.co
Carrera 45 # 1-59
Medellín, Colombia

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