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ORIGINAL ARTICLE

Atraumatic Restorative Treatment (ART) in the Oral Health Care Network of São Paulo-SP (ARTSUS-SP): Development of an Evidence-Informed Public Health Strategy

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ABSTRACT

Objective: To describe and analyze the context and decision-making process to deal with a major problem: the high prevalence of dental caries and the great difficulty in moving students from schools to the Basic Health Units of the Unified Health System for carrying out treatments in a metropolis. **Material and Methods:** To conduct this work, we used the "3-i+E Framework", which can help explore how key factors interact to influence, define, and structure policy choices. The data were collected from different sources using a qualitative exploratory approach. A documentary analysis of the minutes from meetings of a committee of specialists and an analysis of interviews with key informants were carried out. **Results:** As for institutions, governmental structures, policy networks, the oral health care network implemented at the municipality level were considered fundamental aspects that enabled the development of the strategies. As for ideas, three factors were highlighted: 1) the teaching-service relationship, which was fundamental for the decision to be based on scientific evidence; 2) managers valued scientific evidence, and 3) university was effective in communicating research results. With regard to interests, the decision-making was consolidated from the convergence of interests of public officials, politicians and researchers. **Conclusion:** The problem and its solutions were addressed at the political agenda by a window of opportunity, and the decision-making process was well-informed.

Keywords: Dentistry; Public Policy; Oral Health; Health Policy.

Introduction

The World Health Organization (WHO) estimates that dental caries is one of the main public health problems and the most prevalent noncommunicable disease worldwide, directly affecting the loss of permanent teeth in more than 2 billion adults and primary children of more than 560 million children under the age of twelve [1]. This disease can have consequences such as pain, suffering, worsening performance, and school attendance, among other problems [2]. In addition, health services face great difficulty in displacing service users to treat the disease in health facilities before painful symptoms occur, which is generally associated with deep caries lesions and complex treatments, causing more suffering for people and higher costs to health systems. This situation is more serious in places of high social vulnerability and socioeconomic inequalities since this disease is socially determined [3]. Considering all this complexity, this is a problem that needs to be addressed in the political agenda and its confrontation requires great efforts from different actors [4-6].

Atraumatic Restorative Treatment (ART) is an alternative to face the problem, as it was designed to be used in places where conventional treatment was not possible [7,8]. Currently, it is understood as a minimal intervention approach, which includes preventive, therapeutic and restorative measures in relation to dental caries and to control this disease, being provided by WHO as part of its Basic Package of Oral Care (BPOC) [9,10].

However, literature recognizes that there are several barriers that hinder the use of scientific evidence in the formulation of public policies, including: 1. scientific evidence competes with other factors in the policy-making process; 2. scientific evidence may not be assessed as a subsidy; 3. scientific evidence may not be relevant; 4. scientific evidence is not easy to use (results are not communicated effectively, they are not available when decision makers need them and decision-makers do not have mechanisms to facilitate the use of evidence) [11,12]. In that regard, the important role of leaders (managers, researchers, politicians) who value the use of scientific evidence is highlighted, which can contribute to the reduction of the gap between research results and what is done in services ("know-do gap") [11-13].

In view of the above, this study aimed to describe and analyze the context and the decision-making process informed by the scientific evidence to face dental caries in the primary health care context.

Material and Methods

Framework

To better conduct this work, a framework published in the literature was used, the "3-i+E Framework: Interests, Ideas and Institutions + External Factors" [14]. This framework holds that policy developments and choices are influenced by interests, as defined by agendas of social groups, elected officials, government officials, researchers and political entrepreneurs [14,15]; ideas, which include scientific evidence, but also professional experience, dominant values and culture, among other aspects [14,16]; institutions, composed of formal and informal rules, norms, precedents and organizational factors that structure political behavior (government structures, policy networks and political legacies); as well as external factors, such as political changes, unexpected problems and the media [14-16].

Setting

This case study describes the development of a municipal strategy called "ART-SUS", within the scope of the Health at School Program (*Programa Saúde na Escola* - PSE) in São Paulo, SP, Brazil. The study was carried out by observing the following steps: 1. Local context; 2. Decision-making process. This research was

approved by the Research Ethics Committees of the Municipal Health Secretariat (SMS) of São Paulo - SP, under protocol No. 3,144,396, and of the School of Dentistry (*Faculdade de Odontologia da Universidade de São Paulo*), under protocol 3,141,308.

Design, Data Collection and Data Analysis

Data was collected from different sources by a qualitative / quantitative exploratory approach [17] and analyzed by two researchers independently: FCM, with experience in implementation science and FCAC, with experience in qualitative research and evidence-informed policies. Data collection and analysis were interrelated and occurred simultaneously.

In 2018, through the Secretariat of Health (Technical Area – Oral Health) of São Paulo, SP, as well as the Department of Social Dentistry and the Department of Orthodontics and Pediatric Dentistry of the Faculty of Dentistry of the University of São Paulo (FOUSP), managers, teachers, postgraduate students and health professionals participated in meetings to define the problem and prepare proposals to address its solution. They were considered key informants in the development process, and interviews were used to collect data.

Dialogues and minutes of these meetings were transcribed. Then, the other steps of the Bardin content analysis [18] were carried out. During the pre-analysis, a floating reading of the meeting minutes was carried out to develop analyses using the 3i+E framework.

Codification

The registration units were defined by topics of interest related to the development step of the political strategy proposed by the 3i+E framework.

Categorization

Initially, each researcher inductively generated categories and subcategories, which were then compared and discussed until a consensus between the two researchers had been reached. Furthermore, it was verified whether the indicators of the used framework would be sufficient to promote the analysis, resulting in new emerging categories. The synthesis of this process is described in Chart 1.

Chart 1. Data extraction and analysis according to the Framework used.

Step	Categories	Subcategories	Framework	Data Extraction Sources
Policy Development	1. Local Context; 2. Decision Making	■ Institutions (government structures, policy networks, political legacy); ■ Involvement of decision makers; ■ Problem definition; ■ Ideas (knowledge/ scientific evidence, values); ■ Interests (agenda of civil servants, politicians, researchers, social participation). ■ External Factors	3-i + E	■ Discourse analysis of key informants (members of the municipal health management and university); ■ Documentary analysis of the minutes of deliberative dialogues; ■ Epidemiological surveys.

Results

1. Local Context

As a result of the analyses, the speech of the key-informants highlighted the importance of the following "institutions" component of the "3-i+E" framework [14] in the process: the first component is the Unified Health System (*Sistema Único de Saúde* – SUS), which guarantees health as a right for everyone and induces programs

and policies based on the principles of universality of health access, the integrality and equity of the actions [19,20].

With regard to oral health, since 2004, Brazil has had a National Oral Health Policy called Smiling Brazil (*Brasil Sorridente*), which guarantees access to users at the three levels of care in the system (primary, medium, and high complexity). Smiling Brazil can be considered a "political legacy", as it provided the country with an "oral health care network" and one of the largest public oral health policies in the world [4,21,22].

Still within the scope of the "institutions" component, the Health at School Program (*Programa Saúde na Escola* - PSE) can be considered a "policy network" that targets multiprofessional actions to promote, prevent, and cure students within the school environment [23-25]. This program was implemented in São Paulo in 2013, which contributed to the realization of collective actions in schools, such as the identification of children at high risk for dental caries or who needed treatment for caries lesions.

As for the municipality of São Paulo, it is a metropolis with an estimated population of about 12 million inhabitants, spread over a territory of 1,521 km²; this city is the richest in Brazil but with profound social and locoregional inequalities [26]. São Paulo has more than 400 Basic Health Units and about 2,400 oral health professionals (Dentists, Technicians, and Oral Health Assistants) who serve a population mostly dependent on SUS [27].

Regarding the "problem definition" to be faced, after the first 6 years of implantation of Smiling Brazil (*Brasil Sorridente*), the country entered the select group of countries with a low prevalence of caries at 12 years old [28]. However, the disease is polarized, that is, there is still an unequal distribution of the disease, fundamentally related to the social inequalities present in the country [3,5]. In São Paulo, there were identified through the actions of the Health at School Program (*Programa Saúde na Escola* – PSE) about 80,000 children who had at least one active and cavitated caries lesion, with high rates of absenteeism. This information was identified through the Health at School Program (*Programa Saúde na Escola* – PSE) actions, in which oral health teams had gone to municipal schools to carry out activities such as health education, supervised brushing, and situational diagnosis. This was the initial configuration of the problem defined during the deliberative dialogues with the interested parties.

Returning to the "3-i+E" framework, there was "interest" of the management ("politicians") to propose and implement solutions to the problem, also recognized by the literature, which mentions the appointment scheduled at work or school, the fear of losing the employment, misery, and lack of information, as the main roots of the faced absenteeism [29-31]. It is worth mentioning that in São Paulo-SP, the difficulties that the territory imposes on urban mobility are also present. In the case of children who depend on an adult for their displacement, this situation is even more serious. It was clear in the analyzed speeches that there was a need to formulate resolutive strategies so that the Oral Health Teams were placed as protagonists in order to increase the offer of services in school spaces.

> *Dental surgeons have reported that children who go to consultations when referred from school for treatment in the units, in most cases, have medium or low risk of dental caries. There is a great difficulty in displacing high-risk children, who are mostly in a situation of greater vulnerability. We need to increase the supply of care in schools, as they only arrive at the Primary Health Care Unit when they feel pain (SUBJECT 1 - Manager)*

2. Decision-Making Process

In order to face the problem in the context presented, management already had guidelines from the municipality of São Paulo, which provided ART since 2009 as a possible strategy, but indicated to be carried out as: 1. Complementary treatment, when there was no possibility of concluding the conventional treatment with the recommended consultations; 2. Adequacy of the environment, particularly in cases where Family Health Strategy (*Estratégia Saúde da Família* - ESF) was being implemented or where there was a lot of demand and few human and material resources. In this case, the region and/or the health unit should establish the treatment in two phases (ART with subsequent replacement of restorations by amalgam or resin) and 3. Optional restoration, in the case of collective actions in social spaces [32].

In 2017, when management showed interest in using ART as a solution, the proposal was for the teaching staff to carry out an update course on the technique for Oral Health Teams. However, after meetings with key informants, it became clear that there was a need to review the work process to implement the strategy. Therefore, during the following meetings, after carrying out a literature review, the experiences of implementing ART in the health policies of other countries, the impact of this strategy, facilitators and barriers were presented and discussed. The impacts, implementation facilitators and barriers identified were compared with the context of the city of São Paulo, and consensus was reached that Oral Health Teams should carry out ART in school spaces, without the need for subsequent replacement of restorations, as suggested by recent and solid scientific evidence [8-10,33-35].

> *The members of the oral health teams and school professionals have been working hard but have had little result with the actions taken in schools for children with caries injuries without symptoms of pain. Even when provisional treatments are performed, there are many shortages in the next consultations, when the replacement of these restorations with permanent restorations should occur. This creates many problems, such as spontaneous demand, the need for complex treatments, referrals, increased repressed demand, early tooth loss. It is very important to carry out resolutive treatments at schools where the children are (SUBJECT 2 - Manager)*

> *ART was thought and developed to be carried out in alternative environments. Today, there are excellent quality materials with high survival rates. Why not try to review the work process to include treatments in the routine of professionals since they already carry out other activities weekly in school spaces? (SUBJECT 3 - Researcher)*

About the "interests" of the researchers, there was an expectation that the results of their studies could be implemented in the reality of the services. This group played a fundamental role in decision-making, as in addition to having already had positive experiences in research and/or university extension projects with ART, they gave security to managers that they were supported by scientific evidence and that the implementation process would occur with continuous support. The experiences/values themselves were in line with the results of the studies tracked by the literature review discussed previously, which reinforced the interest in implementation.

> *Participating in a project like this and proposing minimal intervention and using ART on a large scale as a solution to real problems in society gives us*

> *the feeling that our research is useful, makes sense. In addition, it is essential to carry out research outside such controlled environments, as it is in the daily routine of health services that the performance of materials needs to be assessed (SUBJECT 3 - Researcher)*

The presence of external factors such as media pressure or popular pressure that influenced the development process was not identified.

Based on the 3-i+E Framework, the decision was made to carry out a project to incorporate the ART approach in the activities of the Health at School Program as a definitive treatment with the performance of procedures in schools. Based on meetings between key informants, joint efforts were agreed to make the ART approach viable in the routine of Oral Health Teams. Decision-making focused on innovating the work process, increasing and qualifying access to health care in alternative environments, such as school environments.

Another item of the framework that deserves to be highlighted are the dominant "values/culture" in the network's professionals, because when the implementation proposal was presented to Supporters, 53% of the group members stated that they felt uncomfortable or very uncomfortable to perform ART in schools. Therefore, the group decided to carry out a pilot project in one of the SUS Basic Health Units, where undergraduate internships take place. The idea was to identify critical factors for implementing the strategy and incorporate them into preparatory courses. The synthesis of the main aspects identified in the description and critical analysis of the development stage was described in Chart 2.

Chart 2. Main aspects identified in the description and critical analysis of the policy development stage.

Aspects	Government Structures	Policy Networks	Legacy
Institutions	Unified Health System and the National Oral Health Policy (Smiling Brazil – Brasil Sorridente), with an impact of 2,400 professionals working in Oral Health Care in São Paulo, SP, Brazil	School Health Program (PSE) - Oral Health Teams and professionals from schools were already running intersectoral actions	Oral Health Care Network implemented in the municipality
Problem definition	High difficulty in moving 80,000 children with at least one active caries lesion with restorative needs from schools to health facilities.		
Ideas	**Knowledge/scientific evidence**	**Values**	
	Idea of using ART in schools was supported by the best evidence available and the expertise of the group of researchers involved in the process	■Resistance of some professionals to perform the attendance in schools; ■Common sense that ART is a restoration of low quality or indicated only for temporary treatment	
Interests	**Civil servants**	**Researchers**	**Politicians**
	Annoyance reported because of the high Absenteeism	Positive expectation of using research results to inform decision making	Support for strategy implementation
External Factors	Not identified		

Discussion

When observing the "institutions" component of the 3-I framework, it is evident that the "government structures", identified in this study by the Unified Health System (SUS) and Smiling Brazil contributed to the decision-making process, as both have aspects in their guidelines that reinforce the principles of SUS (universality, integrality, and equity) [21,22,36,37]. These principles make it possible to formulate inclusive oral health policies aimed at increasing access to health services and to correct health inequities, which in addition to being systematic and relevant are also considered preventable, unfair, unnecessary and one of the most striking features of the health situation in Brazil [38,39].

Especially in Brazil, on the "Policy Networks" component, the existence of a program that includes health professionals weekly in the school environment (Health at School Program) [23,25] was a factor that created the conditions for this decision-making process possible, because according to the municipal guidelines for oral health care, dentists were already going to schools and the new proposal complemented the actions that were already carried out [32]. ART itself, despite being provided as an optional restoration, was already involved in the Health at School Program activities' (educational activities, supervised brushing, risk assessment, atraumatic restorative treatment and topical fluoride application). Therefore, as the program activities were already established, it became feasible to complement them, adding the strategy to the Oral Health Care Network in the context of the Smiling Brazil Oral Health Teams' routine [9,23,36].

The "political legacy" component was characterized by the Oral Health Care Network of São Paulo, which imposed restrictions and challenges on decision making related to the implementation process in a complex context (a city with a vast territory and social inequalities requires great effort from different actors, such as professionals from oral health teams, regional education boards, members of management, among others). Added to this, there were management models adopted in São Paulo, which would require intersectoral articulations and agreements at various government levels, among them: Regional Education Directorate, Regional Health Coordinators, Oral Health Supervision; Social Organizations, Municipal Health Secretariat, and University.

Finishing the "context" category, after diagnosing that we've had solid "institutions", that allowed the decision-making process to progress [25,36,37,40], this study identified, through speeches and data from the risk rating carried out in 2017, provided by the municipal management, that the "problem" to be faced was a large number of children with untreated dental caries lesions and difficulty in moving to health care units, especially due to the deep socioeconomic inequalities, which impose barriers to access of children and others public health users in a situation of greater vulnerability, with schools being considered a protective factor [41]. The polarization of dental caries disease, characterized by the high concentration of the disease in populations with greater social vulnerability, is recurrent in most Brazilian municipalities and in many others around the world [3,10].

As for the "decision-making", about the "ideas" component of the conceptual model, the use of ART as a non-provisional restoration technique in the entire municipal network was informed by systematic reviews and meta-analyses [42,43], with the consensus of the actors involved (key informants), which corroborated for the decision-making.

Still, regarding the "ideas" component, the "values" were perceived as discomfort felt by some health professionals. The literature reports some hypotheses that would explain this phenomenon, such as the common sense that ART is a restoration of inferior quality to conventional treatments, whereas the procedure should be indicated only for provisional treatment or should only be used in cases where there are problems with the behavior of service users and, should be indicated for children or patients with special needs [44-47]. With regard to the case studied, other factors that could reinforce this behavior are: 1. The fact that in the guiding document of municipal practices and guidelines for oral health care in the municipality, published in 2009, ART appears as a complementary restoration (indicated to complete complex cases where the complete treatment is not completed in the recommended number of consultations); adequacy of the environment, which should be replaced later (indicated for territories with high demand and few resources); or preferential but optional treatment (for collective actions in social spaces) [32]; 2. Possible past unsuccessful experiences once treatment has been planned since 2009.

As for the "interests" component, in addressing these barriers, the importance of the teaching-service relationship is highlighted, in which members of the oral health department ("politicians") and from the academy ("researchers") were important leaders who enabled the use of scientific evidence to inform decision making in this process. With regard to managers, they analyzed the risk assessment carried out in 2017 and defined the problem discussed as a priority ("political interest"). In relation to members of the academy, these actors played an important role in effectively communicating research results.

It is worth mentioning that the scientific literature has reported the importance of using evidence in the decision-making process, so that policies can be formulated through a decision-making process that is able to articulate the evidence with the local context, values and people's knowledge affected by the decision, through reliable, quality and accessible sources of information [12]. In addition, the 2012 WHO Global Health Report, with the theme "No Health without Research", defends the massive investment in the use of scientific research to inform the formulation of health policies [12,48].

Therefore, the aspects considered ("problem definition", "institutions", "ideas" and "interests") for the description of the categories ("Context" and "Decision making") evidenced what scientific literature recognizes as a window of opportunity, defined by the integration of problem flows, solution proposal flows and political flow, favorable to decision making [49]. The context and decision-making process culminated in the development of ART-SUS, a strategy with steps for implementing ART as a routine in health services (and not as punctual and temporary actions), which can be consolidated as a solution to the problem presented. For this to be possible, in São Paulo or elsewhere, it is necessary to review the work process according to the local context, so that the implementation can be carefully planned, as a systematic and complex process with sequential steps because it is about changing professional practices that have been established for many years and certainly some barriers will be faced.

Regarding the limitations of the study, although it was possible to analyze the decision-making process, as well as identify the existence of barriers that would need to be faced for implementation, the proposed methodology does not allow us to analyze them in depth, which could favor implementation planning.

The results of this study indicate that the Brazilian context, which has a universal health system and intersectoral policies, is favorable and promising for the implementation of ART as a political strategy. However, the barriers need to be understood in depth and addressed so that innovative practices can be sustainable.

Conclusion

About Institutions

In a country with a continental dimension like Brazil, in the context of a complex and huge metropolis like Sao Paulo city, government structures, through the principles of the Unified Health System, are fundamental for the formulation of inclusive oral health policies; policy networks, such as the Health at School Program, make it possible for policies to aim at increasing the access of the school population to the health system; the complex oral health care network in the municipality requires that facilitating aspects and barriers are quickly known and that different leaders are involved in the decision-making process.

About the Problem and Ideas

ART allows the expansion of access to health care, as, according to strong and recent scientific evidence, it can be performed in alternative environments to the conventional office. In this way, it meets a problem in

many Brazilian municipalities and other countries: the high prevalence of caries disease, with great difficulties in getting users to attend appointments at health service units for treatment (where there is assistance).

If a similar problem is identified, if health service managers in any location make a favorable decision to incorporate ART into the routine of professionals, it is necessary to be aware that some barriers, with regard to the dominant values / culture between professionals and society, need to be addressed, known and overcome.

The teaching-service relationship is fundamental for the identification of the problem to take place from different perspectives to enable a closer relationship between employees, researchers, and politicians, which can contribute to increasing the chances that decisions are informed by scientific evidence. The managers valued the scientific evidence and the academy was effective in communicating the results of the research.

About Interests

In the case studied, it can be concluded that the decision-making for the implementation of ART-SUS in the oral health care network of São Paulo, Brazil, was an experience that occurred due to a window of opportunity consolidated by the convergence of interests of civil servants, politicians and researchers, integrating the problem, proposals, political flows and meeting the needs of the population.

Authors' Contributions

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MG	https://orcid.org/0000-0001-8824-5827	Methodology, Validation and Writing - Review and Editing.
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All authors declare that they contributed to critical review of intellectual content and approval of the final version to be published.

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Conflict of Interest

The authors declare no conflicts of interest.

Data Availability

The data used to support the findings of this study can be made available upon request to the corresponding author.

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