

Knowledge and conduct of public health system dentist about atraumatic restorative treatment

Conhecimento e conduta dos cirurgiões-dentistas da estratégia saúde da família sobre tratamento restaurador atraumático

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Resumo

Objetivo: Avaliar o conhecimento e conduta dos Cirurgiões-Dentistas (CD) da Estratégia Saúde da Família (ESF) sobre o Tratamento Restaurador Atraumático (ART). **Material e método:** A amostra foi censitária e todos os CD da ESF da zona urbana da cidade de Teresina – PI foram visitados em seus locais de trabalho e convidados a participar do estudo. Questionários autoaplicáveis foram utilizados como técnica de coleta de dados. Para as análises estatísticas aplicou-se o teste qui-quadrado com nível de significância de 5% e o teste de associação linear. **Resultado:** Participaram do estudo 183 profissionais, a maioria do sexo feminino (71,0%), na faixa etária de 20 a 39 anos (49,2%), com vinte ou mais anos de formados (45,9%), que tem apenas o serviço público como vínculo empregatício (70,5%), e especialização em área clínica (44,3%). A maioria acredita no ART (82,7%) e a realiza (95,8%), apenas no serviço público (58,9%). O conhecimento individual dos profissionais sobre ART foi mensurado e a maioria apresenta informações corretas sobre o tratamento. Houve associação significativa do autorrelato de conhecimento de ART com a faixa etária, o tempo de formado e a titulação dos participantes. A avaliação do nível de conhecimento teve associação significativa com a faixa etária e tempo de formado. **Conclusão:** A maioria dos Cirurgiões-Dentistas da Estratégia Saúde da Família de Teresina, Piauí, Brasil possui um bom conhecimento e conduta positiva em relação ao ART, mas necessita de aprimoramento com relação à técnica e sua correta indicação.

Descritores: Avaliação; tratamento restaurador sem trauma; estratégia saúde da família.

Abstract

Objective: To evaluate the knowledge and conduct of dentists of the Public Health System (Family Health Strategy – FHS) regarding Atraumatic Restorative Treatment (ART). **Material and method:** A census survey was conducted and all FHS dentists from the urban area of the city of Teresina, Piauí, Brazil were visited in their workplaces and invited to participate in this study. Data collection was carried out between July and October, 2014 through self-administered questionnaires. For statistical analysis the chi-square test with a significance level of 5% and the linear association test were applied. **Result:** One hundred and eighty-three professionals participated in the study (with a response rate of 89.7%), mostly women (71.0%), aged twenty to thirty-nine years (49.2%), with twenty or more years' experience since graduation (45.9%), working only in the public service (70.5%), and with expertise in the clinical area (44.3%). Most of them believe in ART (82.7%) and 95.8% of them apply it (of those, 58.9% apply it only in public service). The professionals' individual knowledge of ART was measured and most of them have correct information regarding the treatment. The knowledge level evaluation was significantly associated with age and time since graduation ($p < 0.05$). **Conclusion:** Most of the dentists working in the public health system of Teresina, Piauí, Brazil have a good knowledge of and show positive behavior toward dentists ART, but improvement is needed regarding the technique and its correct indication.

Descriptors: Evaluation; restorative treatment without trauma; family health strategy.

INTRODUCTION

Minimally invasive dentistry is based on the early diagnosis of dental caries and interception of the lesions with maximum healthy tooth structure preservation and enamel remineralization¹. This method has led to changes in the paradigm of restorative treatment of the disease².

In this context, a minimally invasive restorative alternative called "atraumatic restorative treatment" (ART) emerged in the mid 1990s and was officially recommended by the World Dental Federation in 2002³. The technique is based on the removal of necrotic caries using hand instruments and restoration with adhesive -high-viscosity glass ionomer cement (GIC)⁴.

When implemented, ART was intended to enable carious lesion restoration in communities with poor access to dental services in places where there were no technological resources or even electricity⁴. However, the scientific evidence attesting to the efficiency and longevity of the technique⁵ led clinicians to extend its use for the treatment of pediatric patients, anxious individuals⁶ and in traditional clinical settings^{5,7}. Thus, the treatment is no longer considered restricted to disadvantaged communities, but a contemporary approach to caries control³.

In public health, the use of ART is a promising strategy for the control of caries given its simplicity and low cost^{8,9}. In the Brazilian scenario, there is no dissemination of the technique and no technical improvement offered to professionals to promote the successful use of ART^{10,11}. Maybe through ignorance of the technique, many professionals question its effectiveness and the fact that the restorative procedure is considered definitive.

Given the above, the objective of this study was to evaluate the knowledge and conduct of Public Health System (Family Health Strategy) dentists of Teresina, Piauí, Brazil regarding atraumatic restorative treatment.

MATERIAL AND METHOD

Ethical Considerations

This study was approved by the Ethics Committee of the Federal University of Piauí (opinion: 708.718). The dentists who agreed to participate signed a consent according to the Declaration of Helsinki.

Calculation and Selection of Sample

The sample was selected using a census survey and intended to thereby interview all the dentists of the Family Health Strategy (FHS) in the municipal health service of the urban area of the city of Teresina, Piauí, who were visited in their workplaces and invited to participate. There are only five dentists working in rural areas of Teresina. They were not included because of the distance and difficulty of access. Data collection was carried out between July and October, 2014.

Project Development

Structure of questionnaires and approach to dentists

A questionnaire with sociodemographic data and issues related to knowledge of and behavior regarding ART was used as the data collection instrument. The structure of the questionnaire was based on literary research¹² and adapted to the objectives of the study. The questionnaire consisted of 24 questions, of which 12 were multiple choices, six were related to professional profile and six were questions about the knowledge and application of ART. The other 12 questions were true or false, addressing specific knowledge about the ART technique.

All dentists registered in the Family Health Strategy of the urban area of Teresina were visited at their work environments. Those who accepted to participate in the study received two envelopes - one containing the questionnaire and the other the informed consent form. The researchers handed the questionnaire to the dentists and waited while they answered it. The envelopes with the answered questionnaire and with the signed informed consent form were sealed and inserted into two sealed boxes, one for the questionnaires and another for the terms of free and informed consent. These boxes were opened at the end of the survey, thus ensuring the non-identification of the respondents and ensuring the reliability of the responses.

Pilot study and calibration of researchers

A pilot study was carried, in which 10 dentists of the Family Health Strategy (FHS) of the city of Teresina, Piauí, not involved in the study, were drawn. This study was carried out with the objective of making the necessary adjustments in the questionnaire and standardizing the approach of dentists. After this initial study, it was not necessary to make changes to the methodology.

After the pilot study, the two researchers responsible for collecting the data were trained. This step was performed by a doctor in dentistry, who used a slide presentation to explain the approach of dentists and the possible situations of confusion.

Statistical Analysis

The individual knowledge level of professionals regarding ART was measured by applying twelve objective questions about the technique, and classified, according to the number of correct answers, as bad-regular (0-4 correct answers), regular-good (5-8 correct answers) and good-excellent (9-12 correct answers). The association between the level of knowledge about ART and age, time since graduation (years) and highest degree was tested using the chi-square test with a significance level of 5% and linear regression.

For the statistical analysis, the statistical software for the generation of results, SPSS version 18.0 (Chicago USA), was used.

Training of Family Health Strategy (FHS) Dentists

Upon completion of the survey regarding the level of knowledge and attitudes of the dentists in relation to ART, the FHS dentists were trained in the implementation of the technique. The training

included three hours theory, with an oral presentation and discussion of scientific papers. Later, there was a moment with practical training in extracting teeth using ART, lasting an hour. The professionals were divided into six groups to improve discussions and learning.

RESULT

Of the 204 working professionals, twelve refused to participate in the survey, nine were on vacation or leave during the survey period. Thus, 183 questionnaires were applied, obtaining a response rate of 89.7%.

Data for the profile of dentists working in the FHS are shown in Table 1. The dentists of Teresina municipal FHS are mostly female (71.0%), aged twenty to thirty-nine years (49.2%) and have more than twenty years' experience since graduation (45.9%). Most of them work only in the public sector (70.5%) and have specialization course as their highest degree (69.4%), mainly in the clinical area (44.3%).

Table 2 shows the data on the knowledge and application of the ART technique. The vast majority of the assessed dentists claimed to know the technique (91.8%) and to have obtained information about it during graduation (43.3%). A considerable portion believe in ART (82.7%) and apply it (95.8%), of those, 58.9% apply it only in the public service. A significant number of professionals believe that the ART technique should be part of routine care in the FHS (79.8%).

Table 3 shows the significant association of self-reported knowledge of the ART technique with age, time since graduation and titration of the dentists. The self-reported knowledge increases with decreasing age and training time, and with the highest degree of titration.

Table 4 shows that 72.6% of the dentists have an excellent knowledge about ART. The level of knowledge was significantly associated with age and training time. Young professionals, aged between twenty and thirty-nine, and those who graduated in the last nine years are the ones who dominate the technique. The level of knowledge about ART decreases with the increasing age and time of training of dentists.

Table 5 gives the details of the questions formulated to assess the knowledge of the dentists on the ART technique. The items addressed issues relating to indications and contraindications of the technique, its relation to the adequacy of the oral environment, whether the treatment is used on a permanent or temporary basis, the materials and equipment required as well as issues concerning the execution of the technique.

The professionals performed best in issues that highlighted the use of glass ionomer cement (GIC) in the ART technique (94.6%), the instruments recommended for the technique (92.3%), indications for all types of patients (88.7%), their use in both anterior and posterior teeth (81.0%), and the lack of a need for dental equipment for its realization (81.0%). The items with the highest number of errors related to the provisional basis of the ART technique (38.7%), being the same as oral environment control (24.4%), the use of materials, such as composite resin and provisional restorative material (19.0%),

and the need for the removal of all carious dentin for its realization (19.0%). The average performance of correct answers was 77.8%.

DISCUSSION

Despite the advantages of ART, its application is still under discussion among the dentists and regarding its viability and effectiveness compared to the technological advances of materials and dental equipment. This study used self-administered questionnaires

Table 1. Profile of the family health strategy dental surgeons

Characteristics	N	%
Dental surgeons		
Evaluated	183	89.7%
Not evaluated	21	10.3%
Gender		
Male	50	27.3%
Female	130	71.0%
No reply	3	1.7%
Age (years)		
20 to 39	90	49.2%
40 to 49	34	18.6%
50 and +	54	29.5%
No reply	5	2.7%
Time since graduation (years)		
0 to 9	49	26.8%
10 to 19	50	27.3%
20 and +	84	45.9%
Type of affiliation		
Only public	129	70.5%
Public and private	47	25.7%
No reply	7	3.8%
Highest degree		
Graduation	37	20.2%
Specialization	127	69.4%
Masters and doctorate	17	9.3%
No reply	2	1.1%
Graduate area		
Public health / family health / collective health	35	19.1%
Clinical	81	44.3%
Public health / Clinical	22	12.0%
None	37	20.2%
No reply	8	4.4%

Table 2. Knowledge and application of ART by Family Health Strategy dental surgeons

Variables	N	%
Do you know ART ?		
%		
Yes	168	91.8%
No	15	8.2%
Source of information		
N		
%		
Graduation	72	43.3%
Postgraduate studies	23	14.1%
Conferences	17	8.2%
Internet	22	13.3%
Publications	1	0.7%
Others	24	14.5%
Unknown	9	5.9%
Do you believe in ART?		
N		
%		
Yes	139	82.7%
No	3	1.8%
More or less	26	15.5%
Do you perform ART		
N		
%		
Yes	161	95.8%
No	7	4.2%
Where?		
N		
%		
Public service	99	58.9%
Private surgeries	2	1.2%
In both	59	35.1%
Not performed	7	4.2%
Unknown	1	0.6%
ART routine in the FHS		
N		
%		
Yes	134	79.8%
No	33	19.6%
Unknown	1	0.6%

completed by dentists who were evaluated in terms of their knowledge of and attitude toward dentists ART. They were visited at their places of work, a strategy that explains the high response rate of approximately 90%, which does not occur in studies where questionnaires are sent by email¹⁰ or mail¹¹.

Most dentists participating in the study were female (71.0%), reflecting the feminization of the odontological profession¹³, were aged twenty to thirty-nine years, had graduated twenty or more years ago and were employed in the public service. As noted by Rios et al.¹⁰, most dentists working in the FHS are postgraduate specialists, especially in the clinical area.

A significant number of the evaluated professionals reported knowing the ART technique, and having obtained information

Table 3. Knowledge of the association between self-reported ART in relation to age, time since graduation and academic degrees of Family Health Strategy dentists

Variables	ART Knowledge				P
	Yes		No		
	N	%	N	%	
Age group	N	%	N	%	P
20 to 39	90	100.0%	0	0.0%	<0.0001**
40 to 49	31	91.2%	3	8.8%	
50 and +	43	79.6%	11	20.4%	
Time since graduation (years)	N	%	N	%	P
0 to 9	49	100.0%	0	0.0%	<0.0001*
10 to 19	50	100.0%	0	0.0%	
20 and +	69	82.1%	15	17.9%	
Highest degree	N	%	N	%	P
Graduation	30	81.1%	7	18.9%	<0.0123**
Specialization	120	94.5%	7	5.5%	
Masters and doctorate	17	100.0%	0	0.0%	

*Chi-square test. **Linear regression test.

about it, especially during their degree course. In addition, a considerable proportion of them perform this restorative technique. Other professionals did not support the use of ART due to a lack of knowledge and / or experience of the technique and do not believe in this type of restorative treatment. Mickenautsch et al.¹³ also evaluated the opinion of dentists about the factors that inhibit the use of ART by public health professionals, one year after the completion of technical training. High workload followed by inadequate supply of materials / tools were the two most significant reasons for non-use of ART. The inability of dentists was significant when the treatment was performed on children.

Atraumatic restorative treatment is performed not only in the public service but also in private practices, showing that this technique can be appropriated to any socioeconomic segment, not just low-income populations in technologically resource-poor settings⁵. In this study, most professionals use the technique in the public service only, followed by a proportion who also apply it in particular dental surgeries. As reported by Camargo et al.¹⁴, the evaluated professionals mostly believe in the ART technique and point out that it should be part of routine care in the FHS.

There was a significant association between the level of knowledge of ART and a lower age, shorter training and higher level of degree. However, in assessing the level of knowledge of ART from the responses to statements about the issue, an association was obtained only with age and training time. The lower the age group and training time the higher the knowledge level of the

Table 4. The association between individual knowledge level of the ART and age, time since graduation and academic degree of Family Health Strategy dentists

Variables	Knowledge level ART						Total
	Bad-Regular (0-4 correct answers)		Regular-Good (5-8 correct answers)		Good-Excellent (9-12 correct answers)		
	N	%	n	%	N	%	
Distribution of Dentists	8	4.8%	38	22.6%	122	72.6%	168
Age group							P
20 to 39	2	25.0%	11	28.9%	78	63.9%	0.0005*
40 to 49	1	12.5%	11	28.9%	20	16.4%	
50 and +	5	62.5%	16	42.2%	24	19.7%	
Time since graduation							P
0 to 9	0	0.0%	6	15.8%	43	35.2%	0.0112*
10 to 19	2	25.0%	10	26.3%	38	31.1%	
20 and +	6	75.0%	22	57.9%	41	33.7%	
Highest degree							
Graduation	2	25.0%	10	26.3%	19	15.5%	0.4859*
Specialization	6	75.0%	25	65.8%	89	72.9%	
Masters and doctorate	0	0.0%	3	7.9%	14	11.6%	

*Chi-square test.

dentists. Slavutzky et al.¹⁵ reported that most dentists claim to have some knowledge and a positive attitude toward dentists ART, however, they require more information regarding the technique, its effectiveness and use in public service.

Most researched professionals demonstrated a good knowledge of ART, with nine to twelve correct answers to the objective questions. The average assertive performance was satisfactory (77.8%), especially regarding the use of GIC in the ART technique, the instruments recommended for the technique and indications for all patients. However, despite being a definitive treatment, it is still confused with the oral environment control and is believed to be a temporary restorative treatment, which can be explained by points in common between the two procedures, such as the materials and instruments used, the lack of a need for local anesthesia and high rotation^{4,16}.

Some research participants said that for ART to be applied, all carious dentin must be removed. The most common explanation for this error is the fact that for many years in dental practice it was advocated that restorative treatment should involve the removal of all carious dentin and enamel without support, according to the restorative material characteristics, with the intention of eliminating the disease¹⁷. However, several studies have shown that the removal of infected dentin with hand instruments, as

advocated by the ART technique, reduces the levels of *Streptococcus mutans*^{18,19} and remaining bacteria do not compromise the restoration or dental health²⁰. This has been explained as being due to the cariostatic and mainly adhesive properties of the glass ionomer, which prevent the continuation of the carious process or the reactivation of residual decayed tissue²¹.

The use of GIC was reported by almost all professionals as the restorative material used in the ART technique. However, some participants mistakenly thought that composite resin and temporary material based on zinc oxide and eugenol may also be used to perform the technique.

In addition, some dentists have not taken into consideration the importance of applying digital pressure with a Vaseline-gloved finger after the insertion of the restorative material. The most common cause of ART failure has been loss of material²², although newer materials have shown better results than those used in the earliest studies²³. The unfavorable properties of GIC are the risk of loss and water uptake (syneresis and imbibition), which occur mainly in the first 24 hours and can result in dimensional changes, loss of mechanical properties and cracking. Therefore, the protection of the restoration surface after the initial setting of the material is fundamental²⁴.

Table 5. Evaluation of knowledge by means of statements about ART of Family Health Strategy dental surgeons

Answer	N	%
Average performance		
Correct	-	77.8%
Incorrect	-	22.2%
Individual performance in each question		
The restorative material used in ART is the glass ionomer	N	%
Correct	159	94.6%
Incorrect	4	2.4%
No reply	5	3.0%
To accomplish ART the following instruments are required: dentin spoon, dental ax, spatula, glass plate and insertion of spatula	N	%
Correct	155	92.3%
Incorrect	6	3.6%
No reply	7	4.1%
ART can be used for any patient	N	%
Correct	149	88.7%
Incorrect	16	9.5%
No reply	3	1.8%
ART can be used in both anterior and posterior teeth	N	%
Correct	136	81.0%
Incorrect	25	14.8%
No reply	7	4.2%
No dental equipment is necessary to perform ART	N	%
Correct	136	81.0%
Incorrect	24	14.3%
No reply	8	4.7%
ART can be used both in primary and permanent dentition	N	%
Correct	134	79.8%
Incorrect	28	16.7%
No reply	6	3.5%
ART cannot be used in teeth with pulp exposure or history of spontaneous pain	N	%
Correct	134	79.8%
Incorrect	25	13.7%
No reply	9	6.5%
It is important that after insertion of the restorative material, it is held with pressure using a Vaseline gloved finger	N	%
Correct	129	76.8%
Incorrect	28	16.7%
No reply	11	6.5%

Table 5. Continued...

Answer	N	%
To perform ART not all carious dentin must be removed	N	%
Correct	128	76.2%
Incorrect	32	19.0%
No reply	8	4.8%
Composite resin and restored provisional materials cannot be used to perform ART	N	%
Correct	126	75.0%
Incorrect	32	19.0%
No reply	10	6.0%
ART is the same as adjustment of the oral environment	N	%
Correct	115	68.5%
Incorrect	41	24.4%
No reply	12	7.1%
ART is a definitive restorative treatment	N	%
Correct	94	56.0%
Incorrect	65	38.7%
No reply	9	5.3%

The success of the restoration is also associated with the dentist's experience with the technique²⁵, making it necessary to increase the knowledge and skills of dentists with regard to ART, which explains the importance of training them.

This study has limitations inherent to studies that use self-administered questionnaires, regarding the reliability of the answers. However, the anonymity of respondents gives them the opportunity of being more honest. Furthermore, it is important

to develop studies that evaluate not only the dentists' knowledge, but their practice of ART in the dental workplace.

CONCLUSION

Most dentists in the Public Health System of Teresina, Piauí, Brazil have a good knowledge of, and positive attitude in relation to ART, but need to make some improvements regarding the technique and its correct indication.

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CONFLICTS OF INTERESTS

The authors declare no conflicts of interest.

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