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Evaluation of the knowledge and use of ART by dentists at the 15th Regional Health Care Center of the State of Paraná

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ABSTRACT. The Atraumatic Restorative Treatment (ART) has proven successful in dental caries control. However, cleaning of the cavity, handling and protection of the material affect the success. The goal of this study was to evaluate the attitudes and knowledge of dental surgeons (DS), who work in the public service, about the ART. The DS working at the 15th Regional Health Care Center of the state of Paraná were invited to answer a questionnaire. Data were analyzed through absolute and percentage distribution, and by Fisher's Exact Test ($p < 0.005$). Out of 213 sent, 107 questionnaires were returned. More than half of DS considered insufficient their knowledge about ART. There was a significant association between the knowledge on the strategy and academic degrees ($p < 0.05$). Only 14.1% affirmed to perform cavity cleaning with polyacrylic acid and 26.1% stated they protect the surface of the material. Among the respondents, 54.2% never received training on ART and 86.9% showed interest in a training for this procedure. It can be concluded that the lack of technical and scientific knowledge of DS makes it difficult to use ART in the clinical routine, and training on this procedure is necessary for efficient use in the public service.

Keywords: dental atraumatic restorative treatment; dental caries; public health.

Avaliação do conhecimento e utilização do TRA por cirurgiões-dentistas que atuam na 15ª Regional de Saúde do Paraná

RESUMO. O Tratamento Restaurador Atraumático (TRA) tem demonstrado êxito na estratégia de controle da cárie. Contudo, a limpeza da cavidade, manipulação e proteção do material influenciam no sucesso. O objetivo deste trabalho foi avaliar as atitudes e conhecimento dos cirurgiões-dentistas (CDs) que atuam no serviço público sobre o TRA. Os CDs pertencentes à 15ª Regional de Saúde do Paraná foram convidados a responder um questionário. Os dados foram analisados pela distribuição absoluta e percentual, e pelo teste exato de Fisher ($p \leq 0{,}005$). Dos 213 enviados, 107 questionários foram respondidos. Mais da metade considerou insuficiente o seu conhecimento sobre o TRA. Verificou-se associação significante entre o conhecimento da estratégia e a titulação acadêmica ($p < 0{,}05$). Apenas 14,1% afirmaram realizar a limpeza da cavidade com ácido poliacrílico e 26,1% afirmaram proteger a superfície do material. Dos entrevistados, 54,2% nunca tiveram treinamento para a realização do TRA e 86,9% demonstraram interesse por uma capacitação sobre o assunto. Concluiu-se que a falta de preparo técnico-científico dos CDs dificulta a sua utilização na rotina do atendimento, sendo a capacitação uma estratégia necessária para que o TRA possa ser utilizado no serviço público de maneira eficaz.

Palavras-chave: tratamento dentário restaurador sem trauma (TRA); cárie dentária; saúde pública.

Introduction

Caries is considered a major cause of tooth loss and has led to edentulousness in old age. In Brazil, 56% of children aged 12 years and about 80% of adolescents aged 15 to 19 have at least one tooth with experience of dental caries (Pucca et al., 2015). To reduce the prevalence of dental caries in the Brazilian population, several strategies prioritizing oral health promotion have been encouraged in accordance with the National Oral Health Policy Guidelines (Brasil, 2004).

In this context, Atraumatic Restorative Treatment (ART) emerges as a way to expand oral health care strategies through caries control, following a philosophy of treatment associated with health promotion (Figueiredo, Lima, &Moura, 2004). This is important not only in regions without adequate infrastructure, where it is more difficult to adopt actions that bring satisfactory results, but also

as a priority strategy for dentists and their teams, allowing action in social spaces such as community centers, schools and churches, among others (Monnerat, Souza, & Monnerat, 2013).

This technique has been used in several countries, proving to be an effective method (Frencken, Taifour, & Van´t Hof, 2006; Farag, Van Der Sanden, Abdelwahab, & Frencken 2009; Jordan et al., 2011), with success rates of up to 65.2% in 10 years (Zanata, Fagundes, Freitas, Lauris, & Navarro, 2011). In the study by Bussadori, Imparo and Guedes-Pinto (2000), success rates reached 93% on single surface and 67% on multiple surfaces of permanent teeth. Systematic reviews have shown that the restoration survival rate achieved by the ART strategy and its effect on caries prevention are high (62 to 95%) (Van't Hof, Frencken, Van Palenstein Helderma, & Holmgren, 2006; De Amorim, Leal & Frencken, 2012), and equal to or even greater than the survival rate of restorations performed with conventional materials (Mickenautsch, Yengopal, & Banerjee (2010); Tedesco et al., 2016). In addition, ART is a well-accepted strategy, as observed by Baía and Salgueiro (2000), in which ART restorations, associated with educational activities, led 98% of patients to feel motivated and accept treatment.

However, several factors may influence the success of the restoration, such as the proper indication, training and mastery of the ART technique (Mickenautsch & Grossman, 2006), cavity size, covering one or more surfaces (Zanata et al., 2011), cavity cleaning, correct handling of the material, use of surface protection of the restorative material (Shintome, Nagayassu, Di Nicoló, & Myaki, 2009), as well as disinfection of the cavity (Van Dijken, 1996), demonstrating the need for technical-theoretical knowledge for the clinical success of ART (Rios, Essado, & Freire, 2006). Studies have shown that 71-89.3% of the professionals (Rios et al., 2006; Menezes, Corrêa, Lima, Leite, & Granville-Garcia, 2009; Chibinski, Baldani, Wambier, Martins, & Krieger, 2014) are knowledgeable about the technique and that 55-74% of these uses the ART in national public health. Nevertheless, a portion does not consider that this is an effective technique (Busato, Gabardo, França, Moysés, & Moysés, 2011), and even knowing the ART, there is lack of technical-scientific preparation among the professionals, making it difficult its application (Rios et al., 2006; Busato et al., 2011).

Considering that ART is a very valuable strategy in oral health promotion (Zanata et al., 2011), it is important to evaluate its application by professionals of the public health care network, since there is a vast literature on the technique, but few studies on the knowledge, use and acceptance by professionals. Thus, this study aimed to identify the knowledge and the use of atraumatic restorative treatment (ART) by dental surgeons working at the 15th Regional Health Care Center of the state of Paraná (15th RS-PR).

Method

The Research Project was submitted to the Permanent Committee on Ethics in Research Involving Human Beings of the State University of Maringá - UEM (COPEP) under protocol CAAE 01838912.0.0000.0104.

This is a descriptive cross sectional study, in which the 213 dental surgeons working at the health care units belonging to the municipalities of the 15th RS-PR were invited to respond to a questionnaire. The questionnaires were delivered to the municipal coordinators in oral health, who were responsible for delivering them to dental surgeons under their responsibility. They had a period of 30 days to collect and return the questionnaires to the researcher responsible for the project. All questionnaires answered were included in the survey.

The questionnaire consisted of two parts: 1) personal data, such as age, gender, time after graduation, and professional qualification; and 2) closed questions assessing the degree of knowledge about ART, containing questions about use, acceptance, training and experience with ART, in addition to phrases to identify as true or false. The questions of this questionnaire were based on the questionnaire applied to dentists in the city of Caruaru, state of Pernambuco (Menezes et al., 2009). Before applied to the DS, the oral health coordinators, during a training course, answered the questionnaire in order to assess the ambiguity and bias of the questions.

Data were collected in the health care units of the 15th RS-PR. For this study, dental surgeons previously signed the Informed Consent, authorizing their participation. The forms were collected and delivered together with the questionnaires by the oral health coordinators. After data collection and categorization of the variables, data were transferred to a computerized database. Data were analyzed by descriptive statistics, including the absolute and percentage distribution, and by the techniques of inferential statistics, using

Fisher's exact test, to check for associations. The level of statistical significance adopted was 5%.

Results

Of the 213 dental surgeons working in the primary care of the municipalities of the 15th RS-PR, 114 (53.5%) answered the questionnaire; among them, 7 were blank and thus, the final sample was composed of 107 dentists, totaling a response rate of 50.2%. The majority of the sample consisted of the female gender (57%), the age group from 23 to 60 years and the time after graduation ranged from 1 to 31 years (Table 1).

Table 1. Percentage and absolute distribution of the sample regarding age, gender, time after graduation and time in public service.

Characteristic	N	%
Age		
23-30	17	15.8
31-40	34	31.7
41-50	36	33.6
51-60	17	15.8
Total	107	100
Gender		
Female	61	57
Male	46	43
Total	107	100
Time after graduation		
From 1 to 10	19	17.7
From 11 to 20	40	37.3
From 21 to 30	38	35.5
More than 31	7	6.5
No answer	3	2.8
Total	107	100
Time working in the public service		
From 1 to 10	43	40.1
From 11 to 20	38	35.5
From 21 to 30	18	16.8
More than 31	2	1.8
No answer	6	5.6
Total	107	100

The knowledge about ART was stated by 102 (96.2%) dental surgeons. The others, who affirmed that they did not know the technique, had their other questions disregarded, even if they were answered. More than half of dentists (58.4%, n = 59) consider insufficient their knowledge about ART.

In relation to the use of ART, 48.5% (n = 50) currently use ART in the public service, only 0.97% (n = 1) used in the private practice and 24.2% (n = 25) in both. Of the respondents, 29.1% (n = 30) performed clinical activity using ART during graduation, 26.2% (n = 27) used in private practice and 19.4% (n = 20) never used the technique. Of the respondents who did not use or never used, 52% (n = 24) answered that the reason was because they had no theoretical-practical training.

Most dental surgeons (79.5%) believe in the effectiveness of ART. Among those who did not believe in the effectiveness of ART, 57.8% (n = 11) reported lack of knowledge and experience, 57.8% (n = 11) reported ionomer durability, 52.6% (n = 10) related it to the partial caries removal and 52.6% (n = 10) consider it a palliative method.

As for the statements about the ART for identification if they were true or false, the percentage of correct answers ranged from 46.5% to 94%. Those with a higher number of correct answers were related to the use of manual instruments (94%); that the ART can be used in both anterior and posterior teeth (92.1%) and that it is not used only in the deciduous dentition (88.2 %). The highest percentages of error were related to the statements about the difference between the ART and the adequacy of the buccal medium with only 49.4% (n = 51) of correct answers and less than half of the respondents (46.5%) said to be false that the powder/liquid ratio of the restorative material allows changes according to the clinical experience of each professional.

There was a statistically significant association between dental surgeon knowledge about caries removal in the ART strategy and academic degree ($p < 0.05$) (Table 2). Table 2 shows that about 70% of participants claimed that removal of carious tissue in the ART should be partial, with adequate curettes. It is important to emphasize participants who had postgraduate degrees had 91.5% of correct answers, against only 64.2% of those who only had the graduation degree. Table 3 lists the association of the time after graduation with the evaluation of the variables of the question regarding the removal of the carious tissue in the philosophy of ART versus time after graduation. There was no significant difference between the time after graduation and the knowledge of the ART philosophy.

Among the professionals with only graduation, 6.6% affirmed they use polyacrylic acid, against 37.03% of the participants who attended update and improvement courses and 37.03% with specialization. In Table 4, we observed that only 13.4% of dentists use polyacrylic acid to clean the cavity.

Of the participants interviewed, 54.2% (n = 58) never had training for ART, and the vast majority (86.9%) answered that they would be interested in such training, and 87.8% (n = 94) considered it necessary to conduct further research on ART.

Table 2. Evaluation of the variables on the question that assessed how the removal of the carious tissue should be done according to the ART philosophy - knowledge of ART versus academic degree.

Removal of carious tissue in the ART philosophy should be:	Academic degree											
	Graduated		Update/ Improvement course		Specialist degree		Master's degree		PhD degree		Total	
	n	%	N	%	N	%	N	%	n	%	N	%
Should not be done	0	0	1	0.91	0	0	0	0	0	0	1	0.91
Partial removal with drill compatible with the size of the lesion	1	0.91	1	0.91	7	6.36	0	0	0	0	9	8.18
Partial removal with appropriate hand instruments	9	8.18	20	18.18	39	35.45	8	7.27	2	1.82	78	70.91
Total removal with drill compatible with the size of the lesion	1	0.91	0	0	1	0.91	0	0	0	0	2	1.82
Total removal with appropriate hand instruments	3	2.73	5	4.55	12	10.91	0	0	0	0	20	18.18
Total	14	12.73	27	24.55	59	53.64	8	7.27	2	1.82	110	100

*Fisher's Exact Test; Significant at 5.0%

Table 3. Evaluation of the variables on the question that assessed how the removal of the carious tissue should be done according to the ART philosophy - knowledge of ART versus time after graduation.

Removal of carious tissue in the ART philosophy should be:	Time after graduation (years)									
	Upto 10		From 11 to 20		From 21 to 30		More than 30		Total	
	N	%	n	%	N	%	N	%	N	%
Should not be done	0	0	0	0	1	0.94	0	0	1	0.94
Partial removal with drill compatible with the size of the lesion	2	1.89	2	1.89	4	3.77	1	0.94	9	8.49
Partial removal with appropriate hand instruments	15	14.15	24	22.64	28	26.42	8	7.55	75	70.75
Total removal with drill compatible with the size of the lesion	0	0	1	0.94	1	0.94	0	0	2	1.89
Total removal with appropriate hand instruments	4	3.77	9	8.49	4	3.77	2	1.89	19	17.92
Total	21	19.81	36	33.96	38	35.85	11	10.38	106	100

*Fisher's Exact Test; Significant at 5.0%

Table 4. Evaluation of the variables related to the use of some product in the cavity cleaning before insertion of the restorative material versus the academic degree of the professional.

If so, with which product?	Academic degree											
	Only graduated		Update/ Improvement course		Specialist degree		Master's degree		PhD degree		Total	
	N	%	n	%	n	%	N	%	N	%	n	%
Phosphoric acid	1	0.96	0	0	3	2.88	0	0	0	0	4	3.85
Polyacrylic acid	1	0.96	2	1.92	10	9.62	0	0	1	0.96	14	13.46
Chlorhexidine	3	2.88	10	9.62	20	19.23	4	3.85	1	0.96	38	36.54
Saline	1	0.96	2	1.92	2	1.92	1	0.96	0	0	6	5.77
Air/water spray	9	8.65	13	12.5	19	18.27	1	0.96	0	0	42	40.38
Total	15	14.42	27	25.96	54	51.92	6	5.77	2	1.92	104	100

*Fisher's Exact Test; Significant at 5.0%

Discussion

Until now, few studies on the knowledge, use and acceptance of the ART strategy by professionals have been found (Rios et al., 2006; Menezes et al., 2009; Busato et al., 2011), and this is the first performed with the dental surgeons of the 15th RS-PR.

Approximately more than half of dentists reported using the strategy in the public service (73%), as also described by Menezes et al. (2009). On the other hand, Rios et al. (2006) found only 15.9% of the professionals using ART. The main reason, reported by the participants for not using the technique, was because they did not receive theoretical/practical training to perform the ART, possibly because it is a method not widespread among the Public Health Care Programs. More than half of the participants considered the strategy as palliative (52.6%), suggesting the lack of operability and quality of the restorations made by ART, representing one of the main causes for its non-application (Frencken, Makoni, & Sithole, 1996).

Although it is a definitive procedure, we observed that the vast majority of dental surgeons confuse the ART with the control phase of dental treatment to eliminate active disease like caries and inflammation, in which almost half of the participants stated that both were the same procedure. This misconception on the part of professionals was also described by Rios et al. (2006).

Moreover, most dental surgeons consider ART as a provisional procedure, probably due to the similarities between the two procedures, since the materials and instruments used are the same and in both there is no need for the use of local anesthesia and high rotation (Frencken, Phantumvanit, Pilot, Songpaisan, & Ameronger, 1997; Frencken & Holgren, 2014).

In this study, it was observed that the dental surgeon knowledge about the ART is influenced by the academic degree of the dental surgeon ($p < 0.005$); more than half of the interviewees stated that they had never received training to perform the ART; the vast majority (86.9%) of the participants are interested in attending a training. Navarro, Modena, Freitas and Fagundes (2009) reported that the ART strategy has been approached in dental schools for about 10 years. In this sense, considering the average time after graduation of the individuals in this study, possibly the occurrence of these factors is due to the fact that the ART was recognized by the WHO from 1994, and probably these professionals did not have the theoretical and practical knowledge in undergraduate and/or graduate courses, thus requiring update courses (Navarro et al., 2009).

About 80% of participants said they believed in the effectiveness of ART. The study by Menezes et al. (2009) also describes a high percentage of professionals who believe in its effectiveness. A recent study (Oliveira, Warren, Levy, Kolker, Qian, & Carey, 2016) has shown that most dentists working in public health in the United States believe that the philosophy of minimally invasive dentistry, such as the ART strategy, meets the standard of care for primary and permanent teeth. However, in other studies, many dental surgeons do not consider that this is an effective strategy (Rios et al., 2006; Busato et al., 2011) and 57.8% do not fully agree that ART should be used as a control of dental caries (Rios et al., 2006). Of the participants who did not believe in the effectiveness of ART, a little more than half reported that it is due to the partial removal of carious tissue, demonstrating that many dentists still have doubts as to the effectiveness of partial removal of carious tissue (Rios et al., 2006).

In relation to the consistency of the Glass Ionomer Cement, its manipulation and the surface protection of the restoration, a low number of correct answers was found. Studies have shown that the success of ART is dependent on clinical factors, and the most common failures are mainly related to the lack of professional knowledge and skill (Van Dijken, 1996). Moreover, to achieve success in ART, the manufacturer's recommendations must be followed strictly, by using a correct proportion in the manipulation of the glass ionomer cement and conduct surface protection of the restoration (Frencken et al., 1996). Since most dental surgeons in this research believe in the effectiveness of the ART and its applicability in the public service, the need to carry out update courses is highlighted once again.

One of the main difficulties found in this study was the communication with these professionals, and their interest in participating in the research. We must consider that the participants who answered the questionnaire were those who had an interest in the topic, and the results may represent a different scenario from reality. Therefore, it is necessary to develop more research on the knowledge of the dental surgeon about ART, so that it is possible to elucidate the obstacles that prevent the use of ART by professionals working in the public network. Our findings may contribute to the development of new research in the area, and may serve as a basis for the managers of these services to implement ART as a strategy to control caries disease.

Conclusion

Most professionals report knowing the ART strategy and believing in its effectiveness, however, they need to be trained so that the technique can be performed adequately, for the durability and success of the restorations.

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