

## Original Research Article

# Clinical conduct of dentists in the treatment of deep dental carious lesions

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### Abstract

**Introduction:** Different techniques are employed to contain the carious process: non-invasive, microinvasive, and invasive, and with restorative needs. Thus, it is essential that dentists are duly updated regarding scientific evidence and perform with skill and precision the techniques proposed as treatment, being aware of the consequences and risks, and aiming at the most conservative therapy. **Objective:** To identify the clinical practices for the treatment of deep carious lesions used by dental surgeons of the Family Health Strategy (FHS) program of a Brazilian city. **Material and methods:** This was a quantitative and cross-sectional study carried out with 43 dental surgeons from the FHS program in the city of Sobral, State of Ceará, Brazil, using a Google Forms online questionnaire, containing questions related to the clinical criteria used during caries removal, deep dentin caries removal techniques, lining materials, survival rate of some treatments, in addition to sociodemographic data and questions regarding professional qualification. **Results:** Among those interviewed, 62.8% were aged between 25 and 30 years. Most dentists (58.7%) considered that the cavity floor should be hard at the end of the carious dentin removal, which demonstrates the non-adherence to Selective Carious Tissue Removal (SCTR) protocols.

Only 25.6% considered SCTR a treatment with a chance of success and a 2-year survival rate greater than 80%. More than half of the interviewees (51.2%) disagreed with the maintenance of carious tissue in the axial/pulp walls of deep cavities to preserve pulp vitality. More invasive treatments were preferred in a greater proportion by dentists who work exclusively in the public sector (66.7%) compared to those who also work in the private sector (17.6%) [ $p=0.002$ ], with an evident need for cariology education workshops and more studies on the topic. **Conclusion:** The dentists who participated in the study showed little adherence to less invasive techniques in the treatment of deep carious lesions.

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## Introduction

Previously considered an infectious disease, dental caries is now understood as a biofilm-sugar-dependent disease. This has led to changes in dental caries management protocols. The understanding of these characteristics enabled deeper investigations on the pathogenesis of the disease, which allowed the development of less invasive and more conservative approaches to the treatment of these lesions, resulting in new recommendations for professionals, while providing greater preservation of tooth structure and maintenance of pulp vitality [19, 28]. The intake of fermentable carbohydrates alters the composition and activity of the biofilm, as its metabolism generates acids that cause mineral loss. Thus, selective removal of carious tissue and hermetic sealing inhibit bacterial nutrition, inactivating caries [20] and promoting dentin remineralization [2].

For most of the last century, caries was considered an infectious disease caused by specific bacteria (Specific Plaque Hypothesis), whose treatment was based on the premise of its eradication [5]. Therefore, removing all infected tissue and replacing the lost tissue was the best form of treatment, however, limited by the restorative materials available, which required extensive cavity preparation. Over time, the understanding of caries has changed. Now, the ecological factors of this disease consist in the imbalance of the dental biofilm associated with the abundant intake of fermentable carbohydrates [20]. In addition, a wider range of treatments has been proposed, such as sealing the carious lesion, infiltration with composite resins, and adhesive restorations [10]. This new treatment philosophy aims at tissue preservation rather than removal, avoiding the subsequent cycle of restorations, which eventually leads to the loss of the tooth, the so-called "tooth death spiral" [6].

Different techniques are employed to contain the carious process: non-invasive, microinvasive, and invasive, and with restorative needs. The perception of the first two is that they are successful many times, when properly indicated and used, but the latter, despite being more radical, are inevitable in some cavities [23]. These notions raise some questions: how clean the cavity must be [12] and to what extent the carious tissue must be removed. Despite these questions, there is no consensus in dentistry regarding diagnostic criteria, technique, or excavation depth for caries removal [25].

The clinical appearance of dentin during carious tissue removal does not correlate with any histological finding, and its removal is based on clinical criteria, with hardness being the most used. As for hardness, dentin can be classified as soft, leathery, firm, and hard (sound) [24].

Recent research has shown that complete caries removal in active deep lesions results in increased pulp exposure and postoperative symptoms compared to selective carious tissue removal (SCTR) [15, 24, 26]. In deep lesions of vital teeth, maintenance of pulp vitality is of utmost importance. Dentists should, therefore, avoid pulp exposure and pulp complications whenever possible. The three main carious tissue removal options are described as (1) selective carious tissue removal, (2) expectant treatment, and (3) non-selective hard dentin removal (formerly known as complete removal) [27]. In contrast to non-selective caries removal, selective caries removal only removes some of the softened dentin before sealing the cavity, reducing the risk of pulp exposure, pulp symptoms [12], and postoperative pulp complications [7, 8, 29].

The SCTR showed acceptable clinical results [27]; however, concerns have been raised about its long-term efficacy because of the persistence of viable acidogenic and proteolytic bacteria in the dentin [2, 20, 31]. On the other hand, a comparative study of the

evaluation of bacterial levels in cavities demonstrated lower values in six months after sealing using the selective removal technique compared to the microbial load recorded before sealing with the non-selective removal technique for hard dentin. Moreover, there are no data on the post-sealing situation of this technique [16]. Another study showed that hermetic sealing caused a drastic reduction in bacterial load of *Lactobacilli* and *Streptococci* in the cavities three months after the intervention, with practically insignificant differences compared to the selective and non-selective removal for hard dentin [1]. A previous meta-analysis concluded that selective removal is more advantageous than total removal, although more studies are needed to increase the certainty of evidence and reduce the risk of bias [30]. Leaving caries under a restoration is often seen as professional negligence. Thus, in practice, dental treatment seems to be guided more by experiences than by evidence [26].

Expectant Treatment (ET), also known as two-step carious tissue removal or stepwise excavation, consists of incomplete removal of carious dentin as the first step, keeping the softened dentin close to the pulp under temporary sealing. As the second step (6 to 12 months later), a reopening procedure to the carious area is performed, and complete removal of all carious tissue occurs, followed by definitive restoration [3, 4, 22].

Studies have shown that the treatment of deep carious lesions using ET has a high risk of pulp exposure compared to the one-step SCTR technique. In addition, the clinical cost that the second session demands is financially disadvantageous for the patient [17, 21]. The practice of treating deep caries is routine [24] and there are limited data on how dentists perform their removal. A German study, based on a questionnaire directed to local dentists, showed that the non-selective removal technique for hard dentin was the most used option, regardless of the risk of pulp exposure, corresponding to half of the interviewees. Among the others, most opted for the ET technique, while the minority of participants used the SCTR technique. Most respondents still prefer more invasive treatments, refusing to adhere to incomplete excavation because of fear of caries progression [29].

Despite this apprehension, evidence indicates that the hermetic sealing of cavities, by itself, is already important to guarantee the success of the treatment of deep carious lesions. In addition to isolating the lesions from the environment, thereby inhibiting bacterial nutrition and causing consequent stagnation of the carious process, it can restore

the surface smoothness, which reduces plaque retention rates [13]. A study comparing the survival of restorations after SCTR or ET showed that, as long as the hermetic sealing is well performed, both techniques are functional and do not interfere with restoration longevity [11].

Despite the high success rate of SCTR, a correct diagnosis of pulp conditions is necessary [14]. There are defining diagnostic criteria through which the choice of appropriate treatment is guided, namely: pulp vitality (positive and non-exacerbated response to the pulp sensitivity test) and absence of periapical alteration [18]. Thus, it is essential that dentists are duly updated regarding scientific evidence and perform with skill and precision the techniques proposed as treatment, being aware of the consequences and risks, and aiming at the most conservative therapy. Thus, the objective of this study was to identify the clinical practices used for the treatment of deep caries lesions by dentists of the Family Health Strategy (FHS) program in the city of Sobral, Ceará, Brazil.

## Material and methods

This is a quantitative and cross-sectional study involving a population of dentists registered in the Family Health Strategy in Sobral, located in the northern region of the state of Ceará, 235 kilometers from the state capital, Fortaleza. The survey was carried out using a form adapted from a questionnaire applied in a survey at the University Medical Center Schleswig Holstein, Germany [29].

The inclusion criterion encompassed primary care dentists in Sobral, registered with the city's oral health staff. Dental surgeons from the Multiprofessional Residency in Family Health and those who were on leave or vacation at the time of application of the form were excluded. The questionnaire was the data collection instrument, which contained nine objective questions. It was applied using Google Forms between September and October 2020. The content of its questions allowed the collection of sociodemographic data, in addition to obtaining answers to questions regarding professional qualification and questions related to the practices and techniques used in the treatment of deep carious lesions. For better adequacy of the questionnaire, a previous pilot study was carried out with five dentists belonging to the study population to assess the internal consistency and objectivity of the questionnaire. The dentists involved in the pilot study were excluded from the final sample.

The objective of the questionnaire was to identify the use of clinical practices for the treatment of deep dentin lesions by dentists in Sobral. A teaching material was developed by the research team and sent to all participating dentists after the end of the research.

The statistical analysis of the data was performed based on absolute and percentage frequency. Once tabulated in the Excel for Windows® software (Office 2016, Microsoft Corporation, USA), the analyses were performed in the Statistical Package for the Social Sciences (SPSS) software, version 20.0 for Windows, adopting a confidence level of 95%. The results obtained in each phase of the study were submitted for exploratory analysis. Fisher's Exact Test, Mann-Whitney, and Chi-square tests were performed to verify the association between exploratory variables and the dentist's workplace (public sector only or both public and private sectors).

The present study followed the norms and guidelines of Resolution No. 466/12 of the National Health Council. First, the research project was submitted to the Scientific Committee of the Visconde de Sabóia Public Health School in Sobral and, after approval, it was sent to the Research Ethics Committee (protocol n. 4,036,924) of the Vale do Acaraú State University (CEP/UVA) to carry out the study. As it involves the application of a questionnaire, data collection did not present a direct risk to the physical integrity of the participants. All those who responded agreed to a Free Informed Consent Form.

The survey was sent through an electronic link via WhatsApp to all dentists of the Family Health Team in the city of Sobral.

## Results

The questionnaire was answered by 43 dentists from the FHS of the public service of Sobral (CE), out of a total of 60 dentists active at the time of the research (71.6%).

### Sociodemographic data

Among the interviewees, in terms of age groups, 27 dentists (62.8%) were aged between 25 and 30 years; 12 (27.9%) 31 and 35 years; and 4 (9.3%) >35 years. Regarding the time since graduation, 76.7% had recent training, up to 5 years, 14%

from 6 to 10 years, 4.7% from 11 to 15 years, and 4.7% with more than 15 years. Female respondents corresponded to 81.4% of the sample, and males 18.6%.

Regarding the work environment, 37.2% shared it with another dentist, 32.6% worked alone, 18.6% with two more dentists, and 11.6% with more than two. Most FHS dentists in Sobral (67.4%) worked exclusively in urban areas, while 20.9% worked exclusively in rural areas. Only 11.6% worked in both zones.

Regarding the work sector, 41.9% worked exclusively in the public sector, whereas 58.1% worked in both the public and private sectors. As the included dentists were part of the FHS program, which is a government-run initiative, none were exclusive to the private sector. Most respondents (69%) had graduated in a dental specialty. Family Health, Implantology, Orthodontics, Prosthodontics, and Periodontics were the most cited specialties. Only two professionals (5%) had an academic master's degree, both in Health Sciences. Professional master's or doctorate were not mentioned by any volunteer.

### Diagnosis

Regarding the clinical criteria used in the daily removal of caries, the ideal parameter used as a guide to stop the removal of carious dentin was questioned, addressing three aspects: consistency, color, and dentin moisture, seeking to determine the use of SCTR protocols. Only 10.9% indicated that the removal limit should be in soft dentin. Regarding the ideal color to stop carious dentin removal, only 18.6% judged the color as a non-contributing factor for the evaluation of caries removal. Regarding the ideal moisture to interrupt the removal of carious dentin, 44.2% admitted slightly moist to be the ideal (table I).

As additional criteria to be considered when evaluating carious lesions (optional response), only 12 responses were obtained, totaling 7 criteria, namely: possibility of pulp necrosis (n=1), pulp proximity (n=1), referred pain (n=2), depth of the carious lesion (n=1), restorative material (n=2), and sensitivity (n=5) (table I).

As for the excavation technique, 97.7% said they used hand excavators, 69.8% used metal burs, and 53.5% used diamond burs (table I).

**Table I** - Criteria chosen for evaluation and methods for excavating deep dentin caries

<b>Hardness (n=43)</b>	<b>Color (n=43)</b>	<b>Moisture (n=43)</b>	<b>Further criteria (n=12)</b>	<b>Excavation (n=43)</b>
10.9% Soft	2.3% Very discolored	0% Wet	38.5% Sensitivity	69.8% Metal bur
30.4% Leathery	32.6% Slightly discolored	44.2% Slightly moist	15.4% Restorative material	53.5% Diamond bur
58.7% Hard	46.5% Yellowish- colored (with solid dentin)	46.5% Dry	7.7% Lesion depth	97.7% Hand excavator
0% Not relevant	18.6% Not relevant	9.3% Not relevant	38.4% Other	4.7% Chemical removal 0% Polymeric bur 18.6% Other methods

n = number of participants

Regarding the protocol for removing deep dentin caries, 25.6% considered removing all the carious pulp dentin and, in case of pulp exposure, they would recommend endodontic treatment, whereas 69.8% stated that they would consider the removal of all the carious dentin as a possible treatment and, if the exposure occurred in a localized way, they would resort to direct pulp capping. On the other hand, 34.9% claimed to adopt ET for the treatment of this type of caries lesion. Of the respondents, 41.9% would consider excavation, albeit keeping carious dentin in case of risk of pulp exposure, completely removing caries in the proximal walls followed by restoration, while the other 58.1% would not consider this technique (table II).

**Table II** - Protocols considered during deep dentin carious removal (n=43)

<b>Propositions</b>	<b>Yes</b>	<b>No</b>
“I remove all the carious dentin. If the pulp exposure is localized, I perform direct pulp capping.”	69.8%	30.2%
“I remove all the carious dentin. If pulp exposure occurs, I proceed with endodontic treatment.”	25.6%	74.4%
“I perform excavation, but I leave carious dentin if pulp exposure is likely to occur. Afterward, I proceed with the gradual removal of caries (partial removal in one session and the full excavation in a few weeks or months).”	34.9%	65.1%
“I perform excavation, but I leave carious dentin if pulp exposure is likely to occur. I remove all caries in the proximal walls, followed by permanent restoration.”	41.9%	58.1%

Among the lining materials for treating the floor in deep cavities before an adhesive restoration, 90.7% stated that they used calcium hydroxide cement. In addition, 14% stated that they applied adhesive directly to the proximal dentin, 9.3% applied a calcium hydroxide suspension, and 4.7% used other linings.

When asked about the survival rate of at least 2 years after some procedures in a hypothetical 20-year-old patient, some projections were obtained. In this analysis, two individuals were excluded because of incomplete data. Regarding indirect pulp capping, 76.7% of dentists believed they had a chance of success greater than 60%. Regarding the selective removal of caries in walls close to the pulp, 51.2% of dentists believed they had a chance of success greater than 60%. When asked about direct pulp capping, 30.3% believed they had more than a 60% chance of success. Regarding endodontic treatment, 41.9% of dentists believed they had an 81% or greater chance of success.

#### Attitudes and behaviors

Further analysis investigated dentists' attitudes toward caries and its removal. It was observed that 51.2% agreed with the proposition that "the carious tissue should be removed completely to prevent the progression of caries", while 44.2% disagreed. Two individuals did not specify their answers and were therefore excluded. The other proposition, which stated that "a certain amount of carious tissue could be left, as restorations with good marginal sealing would prevent the progression of caries", obtained 59.5% agreement/total agreement, 39.5% disagreement/total disagreement. Again, two individuals were excluded.

On the other hand, the proposition that "caries should always be removed completely because residual caries is a risk for pulp vitality", obtained 58.1% of disagreement/total disagreement, 37.3% of agreement/total disagreement, and 4.7% abstention from responding. Finally, the proposition "caries in proximity to the pulp must be left to avoid pulp exposure", obtained 51.2% of disagreement/total disagreement, 46.6% of agreement/total agreement, and 2.3% of abstention of response.

A radiographic image of a clinical case (with a tooth restored six months before by another dentist, with evident radiolucency in proximity to the pulp, suggestive of caries, under a clinically intact restoration and a vital and asymptomatic tooth) was attached to the questionnaire, and dentists were asked about the need to replace the restoration. The majority (88.4%) disagreed/strongly

disagreed with the need to replace it, 9.4% fully agreed/agreed, and 2.3% refrained from answering. When asked about maintaining and observing the restoration, 95.4% fully agreed/agreed, and 4.7% disagreed.

Over half of the sample (67.4%) strongly disagreed/disagreed with "preferring invasive treatment if it would enhance the longevity of the restoration", while 30.3% strongly agreed/agreed, and 2.3% preferred not to specify. The item "preferring the least invasive method and accepting possible retreatment (e.g. restoration repair)" was met with 86% strongly agree/agree, while 11.6% responded strongly disagree/disagree, and 2.3% did not want to specify. As for the statement about "legal regulations generally require more invasive treatment, as a possible corrective work is part of my duty to guarantee the patient", 39.5% strongly disagreed/disagreed, 41.9% strongly agreed/agreed and 18.6% preferred not to specify.

The crossing of variables was carried out to compare FHS dental surgeons who work in the public sector only and the FHS dentists who work in both the public and private sectors using the Fisher's exact, Chi-square, and Mann of Whitney tests. Only those that were considered significantly associated ( $p < 0.05$ ) were described in Table III. From this analysis, it was observed that a significantly greater number of females worked exclusively in the public sector ( $p = 0.013$ ). Regarding the age of the interviewees, it was observed that dentists who work in both the public and private sectors were significantly older than those who work only in the public sector ( $p = 0.001$ ) (table III). As for the degree of professional training of respondents, the percentage of individuals with a specialty and/or master's degree is significantly higher in professionals who also work in both sectors (80%) compared to those who work only in the public sector (38.9%) [ $p = 0.01$ ] (table III).

As for the proposition that "caries tissue must be removed completely, as caries can progress", most respondents agreed (53.7%), with this response being much higher among those working exclusively in the public sector (82.4%), while only 33.3% of those who worked in both sectors agreed with this assertion ( $p = 0.002$ ) (table III). Regarding the proposition that "the carious tissue must be removed completely, as residual caries is a risk for pulp vitality", most of the interviewees disagreed (61%), with this disagreement being slightly greater among dentists who worked in both sectors (66.7%) compared to those exclusive in the public sector (52.9%) [ $p = 0.0375$ ] (table III).

**Table III** - Statistically significant differences between dentists from the Family Health Strategy of Sobral who work exclusively in the public sector and those who also work in the private sector

Variable		Total sample (n=43)	Public sector only (n=18; 41,9%)	Public and private sector (=25; 58,1%)	P-Value
Sex	Male - n (%)	8 (18.6)	0 (0.0)	8 (32.0)	0.013#
	Female - n (%)	35 (81.4)	18 (100.0)	17 (68.0)	
Age	Mean ± SD	30.72±5.46	27.61±2.17	32.96±6.02	0.001α
	Median	(29.0)	(27.5)	(33.0)	
Carious tissue must be removed completely, as caries can progress	Disagree/Strongly Disagree - n (%)	19 (46.3)	3 (17.6)	16 (66.7)	0.002*
	Totally agree/agree - n (%)	22 (53.7)	14 (82.4)	8 (33.3)	
	excluded	2	-	-	
Caries must always be removed completely, as residual caries is a risk to pulp vitality	Disagree/Strongly Disagree - n (%)	25 (61.0)	9 (52.9)	16 (66.7)	0.0375*
	Totally agree/agree - n (%)	16 (39.0)	8 (47.1)	8 (33.3)	
	Excluded	2	-	-	
Specialty or master's degree	Yes - n (%)	27 (62.8)	7 (38.9)	20 (80.0)	0.010*
	No - n (%)	16 (37.2)	11 (61.1)	5 (20.0)	

# = Fisher's Exact Test; \* = Chi-square test; α = Mann Whitney test; n = number of participants

## Discussion

SCTR has been considered a less invasive technique, obtaining favorable results with high success rates during the treatment of deep carious lesions, provided it is correctly indicated [31]. Even so, it is a little-known technique despite its widely discussed implementation. According to a German study, the use of traditional and more invasive techniques has still been predominant in clinical dental practice [14] despite all the advantages offered by selective removal and hermetic sealing [15, 17].

In the present study, 43 FHS dentists in the city of Sobral (State of Ceará, Brazil) were interviewed on their diagnostic and therapeutic methods, attitudes, and behaviors regarding the excavation of deep dentin caries. The lack of recent studies is a deficiency observed during the search for specific articles on the subject on the PubMed platform, which led to the search for classic articles that better complement the collection of material obtained for the basis of the present study, reducing the risk of bias and increasing the level of evidence [26].

The absence of well-defined excavation criteria makes it difficult to investigate the removal of dentinal caries, mainly because of the lack of objective, precise, and reproducible methods. The use of subjective descriptions can, however, cause a degree of interpretation bias, and various terms (eg, leather-like) can be understood differently. Among the interviewees, most were female employees (p=0.013). In general, most participants were young individuals, with an average of 30 years, indicating a little age discrepancy. There is a noticeable tendency for younger individuals to exclusively work in the public sector, while probably more experienced individuals were linked to the private sector (p=0.001).

Hardness is considered the most important criterion to assess and determine the need for caries removal in deep cavities [31], and only 10.9% of the participants considered the soft consistency of dentin as an ideal possibility for interrupting the removal of this compromised tissue, with 58.7% considering that the dentin must be hard and firm when using drills. In addition, less than half

(44.2%) considered slightly moist dentin as a limit. This percentage demonstrates little adherence to the proposed SCTR protocols, which aim to preserve tissues susceptible to remineralization, suggesting skepticism regarding the technique.

Regarding the instruments used in caries removal, wide use of hand excavators (97.7%) was observed, which is the most suitable instrument for SCTR. It was also possible to observe the recurrent use of metal burs (69.8%), which are less suitable for removing carious dentin in the axial/pulpal wall, and diamond burs, instruments not indicated for removing carious dentin. This demonstrates that, despite the preference for manual instruments, there is still a very recurrent use of rotary instruments.

Among those interviewed, 69.8% stated that they chose to remove all the carious dentin in deep caries lesions, and, in case of localized pulp exposure, they chose direct pulp capping. A much smaller number of participants (25.6%) indicated that they would remove all the carious dentin and, in case of exposure, they would proceed with conventional and radical endodontic treatment. In turn, 34.9% indicated ET as the most viable alternative, while 41.9% would avoid the risk of pulp exposure, proceeding with the SCTR protocol. These rates illustrate the presence of a traditional and dogmatic approach to dentistry in the public service of Sobral. It is also worth mentioning that conventional endodontic treatment, which is an invasive and irreversible procedure, may have its decision value influenced as the first step of intervention protocols by the interviewees [29].

Data revealed that 90.7% were adept at using calcium hydroxide cement (Dycal and Life) for lining in the treatment of the dentinal floor of deep cavities, while 14% defended the direct application of adhesive over the axial/pulp wall. Of the interviewees, 9.3% were adept at using a calcium hydroxide suspension (Caxyl, Hypocal), and 4.7% reported using another type of lining. Although recent studies have shown no advantages to using calcium hydroxide liner on the floor of deep cavities, the treatment of these cavities with this material is still widespread in the clinical protocols of the interviewees [9].

In the analysis of the expectations of dentists regarding the possibilities of treating deep caries in young patients, great optimism for success in techniques such as indirect pulp capping and conventional endodontic treatment was identified. This optimism was somewhat lower when considering the selective removal of caries in the cavity walls close to the pulp and was even lower for direct pulp capping.

Half of the interviewed dentists disagreed with the fact that carious tissue in proximity to the pulp should be maintained to avoid pulp exposure, which suggests that most of them still did not have full confidence in the results offered by the SCTR technique. Among the professionals interviewed, a much higher trend toward the removal of all carious tissue was observed in the answers of those who worked exclusively in the public sector (66.7%) compared to those who worked in the private sector as well (17.6%), which suggests less knowledge about selective removal among FHS-exclusive dentists ( $p=0.002$ ). A relationship between working in the private sector and a higher degree of professional training (80%) compared to FHS-exclusive dentists was observed. Therefore, professionals with a higher level of training tend to be more educated and more up-to-date regarding the evidence that guides SCTR protocols ( $p=0.01$ ). These characteristics might reflect that professionals who work in both sectors are more likely to have an extra and independent income, which allows them to enter postgraduate courses, or it might also be a consequence of a higher qualification demanded in private companies and greater intimacy with the academic environment.

Studies have shown that dental treatment is more guided by professional experience than by scientific evidence, which might contribute to the unfounded perception that a technique based on the maintenance of carious tissue displays professional negligence [29]. However, evidence already points to similar results between SCTR and non-selective removal for hard dentin, consolidating the latter as unnecessary, excessive, and risky for the treatment of deep carious lesions [1].

The presentation of a clinical case via a questionnaire revealed that most of the interviewees preferred to follow up the case with a tooth exhibiting carious tissue close to the pulp (radiographically visible). However, it was not clear whether this was motivated by the asymptomatic condition and/or by the circumstances of the sealing quality of the restoration or even by an imprecise diagnosis due to image interpretation, considering the previous indication of a more radical approach concerning the removal of carious tissue indicated by the answers to the other items of the questionnaire. In addition, the short time after therapy and the cost of more invasive procedures are factors that could lead the dentist to avoid intervening in this case and displease the patient, which may represent a bias to this question of the questionnaire [29].



The main limitations of the present study were its cross-sectional nature and the online format in which the data were collected, which were necessary due to the covid-19 pandemic restrictions.

## Conclusion

Basic dental care in the public sector of the city studied showed little adherence to less invasive procedures in situations that could undergo safer therapeutic interventions, which highlights the need for health education efforts aiming at updating and further training dentists belonging to this sector, such as educational workshops and access to updated teaching materials.

More studies are needed to enrich the literature, given that the bibliographic search revealed very limited results regarding clinical studies in permanent dentition, within the defined search period.

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