

UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL
FACULDADE DE ODONTOLOGIA
PROGRAMA DE PÓS GRADUAÇÃO EM ODONTOLOGIA – NÍVEL MESTRADO
ÁREA DE CONCENTRAÇÃO CLÍNICA ODONTOLÓGICA-ENDODONTIA

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TOMADA DE DECISÃO ENTRE TRATAMENTOS APÓS EXPOSIÇÃO DO TECIDO
PULPAR: UMA ENQUETE EM CURSOS DE ESPECIALIZAÇÃO EM ENDODONTIA
DE UNIVERSIDADES BRASILEIRAS

Porto Alegre

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**TOMADA DE DECISÃO ENTRE TRATAMENTOS CONSERVADORES DA POLPA E
TRATAMENTO ENDODÔNTICO RADICAL: UMA ENQUETE EM CURSOS DE
ESPECIALIZAÇÃO EM ENDODONTIA DE UNIVERSIDADES BRASILEIRAS**

Dissertação apresentada ao Programa de Pós-Graduação em Odontologia da Universidade Federal do Rio Grande do Sul, como requisito final para a obtenção do título de Mestre em Odontologia, área de concentração Clínica Odontológica, ênfase em Endodontia.

Linha de pesquisa: Biomateriais e técnicas terapêuticas em Odontologia
Orientador: Roberta Kochenborger Scarparo

Porto Alegre

2020

*“A menos que modifiquemos a nossa
maneira de pensar,
não seremos capazes de resolver
os problemas causados pela forma como
nos acostumamos a ver o mundo.”*

Albert Einstein

AGRADECIMENTOS

Primeiramente agradeço aos meus pais, Paulo e Cármen, e ao meu filho, Bernardo, que são a base de minha vida. Meu apoio nas horas mais difíceis e minha parceria nas horas de comemoração. Muito obrigado pela confiança e amor que compartilham comigo todos os dias.

Agradeço também à minha esposa, Patrícia, que me aguentou neste período turbulento que foi o mestrado. Momentos em que não dei a devida atenção e acabei ficando um pouco ausente. Sem dúvidas tu é muito responsável por essa etapa que estou finalizando agora.

Agradeço à minha irmã, KK, e meu cunhado, Rogério, pela parceria e apoio dado, vocês são especiais.

Agradeço aos meus amigos, que fazem tudo valer a pena. Especialmente ao pessoal do Villas, meus amigos de infância, amizade que quero levar para o resto da vida.

À galera do F@G, que me ajudou a descontrair nos momentos de maior tensão.

Agradeço à minha orientadora, Roberta, por toda confiança depositada em mim, e por toda ajuda prestada durante estes dois anos, mesmo quando passou pela maior benção da vida: ser mãe. E à Patrícia Kooper, que me orientou enquanto a Roberta estava de licença maternidade.

A todo grupo de professores da Faculdade de Odontologia da UFRGS, em especial ao Ricardo e Figueiredo, que contribuíram para meu crescimento profissional e pessoal ao longo da minha trajetória na casa. Sem dúvidas os ensinamentos aqui aprendidos serão levados para sempre.

Agradeço aos amigos que fiz na UFRGS. Amigos do “*baixo clero*”. Amigas Marina Aspesi, Mariana Deluca, Natália Villa e Gabriela Crespo. Vocês fizeram parte deste período da minha vida e sou muito grato de ter conhecido vocês.

Agradeço aos componentes da banca, que aceitaram o convite para participar. Espero corresponder à altura!

Por fim agradeço à Deus que me deu forças para seguir, mesmo quando tive vontade de desistir. É uma etapa que se encerra, mas certamente recém o início de uma longa jornada.

Resumo

Objetivo A compreensão da biologia pulpar e o desenvolvimento de materiais alternativos renovaram o interesse dos pesquisadores em alternativas ao tratamento endodôntico radical e incentivaram a adoção de terapias conservadoras. Mesmo assim, a indicação de tratamentos conservadores em caráter definitivo ainda é controversa. O objetivo do presente estudo foi avaliar o planejamento clínico e os fatores associados à decisão por tratamento conservador da polpa ou tratamento endodôntico radical de alunos e coordenadores de Cursos de Especialização em Endodontia oferecidos nas universidades brasileiras.

Metodologia O estudo baseou-se em uma enquete formulada na plataforma Qualtrics, contendo 7 relatos de caso que incluíram a descrição de situações nas quais a polpa dentária foi exposta ao meio bucal. Estatísticas descritivas mostrando taxas de indicação de tratamentos conservadores e de tratamento endodôntico foram calculadas para cada caso clínico. Os dados referentes ao perfil dos participantes (n=113) e as variáveis relacionadas ao paciente e às características clínicas e radiográficas dos casos simulados foram avaliadas quanto ao seu potencial de influenciar a tomada de decisão, sendo analisados por regressão logística bivariada ($p < 0.05$).

Resultados Considerando o conjunto de decisões de tratamento apresentadas pelos participantes, abordagens minimamente invasivas para casos de exposição da polpa dentária ainda são pouco indicadas. Tratamentos conservadores estiveram associados à idade do paciente (jovens) e à casos de rizogênese incompleta. As indicações de tratamento endodôntico radical estiveram relacionadas à presença de sintomatologia, à rizogênese completa e à idade dos pacientes. No caso de exposição pulpar por trauma, o período de exposição pulpar esteve significativamente associado à indicação do tratamento endodôntico radical.

Conclusão Houve uma tendência à indicação do tratamento endodôntico radical, mesmo nos casos em que a literatura disponível apresenta dados para considerar a abordagem conservadora. As justificativas adotadas pelos participantes frequentemente não estiveram apoiadas pelas evidências científicas disponíveis, sugerindo a necessidade de revisar o conteúdo e a ênfase dada aos tratamentos conservadores da polpa nos cursos de graduação e especialização.

Palavras-chave Endodontia, educação odontológica, tratamento conservador, tratamento endodôntico, tomada de decisão.

Abstract

Aim The improved understanding of pulp biology and the development of alternative pulp capping materials have renewed the researchers' interest on treatment alternatives to root canal treatment (RCT), and encouraged the adoption of vital pulp therapy (VPT). Even so, the indication of VPT as a definitive treatment is still controversial. The aim of the present study was to assess the clinical approach, as well as to identify the factors that influence the decision-making for VPT or RCT of students and coordinating professors of graduate courses in Endodontics offered at Brazilian Universities.

Methodology The study used a mail-out survey at Qualtrics Software based on 07 reports that included the description of simulated clinical cases in which dental pulp exposure was evidenced. Descriptive statistics showing VPT/RCT indication rates were calculated for each clinical report. Data related to the participants profile (n=113) and variables related to patient and to clinical and radiographic characteristics of the simulated cases were evaluated with regards of their potential in affecting decision-making was analyzed by logistic regression ($p < 0.05$).

Results Considering the set of treatment decisions presented by the study participant's, minimal invasive approaches for cases of dental pulp exposure are still scarcely indicated by graduate students and coordinating professors of specialty courses in endodontics at Brazilian Universities. VPT were likely to be indicated in cases in which the patient was younger with immature tooth. RCT indications were related to presence of symptoms, mature root development and in older patients. In pulp exposure secondary to trauma, the period of pulp exposure was significantly associated to indicate RCT.

Conclusions There was a tendency for RCT even for the cases in which the available literature presents data for VPT being a viable alternative. The justifications for the decision-making adopted by the participants are frequently not supported by the available scientific evidence, suggesting the need of reviewing the content and emphasis given to alternative treatments for cases of pulp exposure in undergraduate and graduate courses.

Keywords: Endodontics, dental education, vital pulp therapy, root canal treatment, decision-making

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1. APRESENTAÇÃO

O objetivo principal da presente dissertação foi identificar a conduta clínica e os fatores que influenciam na tomada de decisão de alunos e coordenadores de cursos de Especialização em Endodontia de Universidades Brasileiras por tratamentos conservadores da polpa ou tratamento endodôntico radical.

Será apresentada da seguinte forma:

- Introdução
- Objetivos
- Artigo científico: o desenvolvimento e os resultados do estudo estão apresentados na forma de artigo científico que será submetido à publicação na revista *International Endodontic Journal*, fator de impacto 3.331 (Qualis A1, CAPES);
- Considerações finais.

2. INTRODUÇÃO

O diagnóstico e o plano de tratamento são a base de um atendimento odontológico bem sucedido (MOSKONA *et al.*, 1999). A estratégia de tratamento é considerada ideal quando os melhores resultados possíveis são atingidos e mantidos a longo prazo. Além disso, o tratamento deve exigir a mínima intervenção necessária, considerar as evidências científicas disponíveis, a queixa principal e as preocupações do paciente (BAIN, 2003). Estas importantes habilidades são difíceis de ensinar e avaliar (MOSKONA *et al.*, 1999), especialmente quando não há consenso sobre a precisão dos métodos de diagnóstico disponíveis e sobre as melhores opções de tratamento. Atualmente, este é o caso da pulpíte sintomática ou assintomática, decorrente de cáries profundas ou traumatismos dentários, uma vez que a indicação do tratamento conservador como um tratamento definitivo ao invés da pulpectomia seguida do tratamento endodôntico ainda enfrenta controversias na literatura (BERGENHOLTZ; SPANGBERG, 2004).

A pulpectomia é a remoção microcirúrgica do tecido pulpar vital, visando o tratamento do canal radicular (ORSTAVIK; PITT FORD T, 2004). Nesse sentido, o tratamento endodôntico é uma terapia que previne/cura a periodontite apical, proporcionando resultados previsíveis em casos de polpa vital (AGUILAR; LINSUWANONT, 2011). Por outro lado, a manutenção da polpa vital proporciona respostas a estímulos biológicos e patológicos (através da produção de dentina secundária e reacional) e confere umidade e resiliência à dentina, o que pode influenciar na resistência frente às forças mastigatórias (STANLEY, 1989). Os tratamentos conservadores compreendem modalidades terapêuticas que visam preservar a vitalidade pulpar. Estes tratamentos têm como finalidade reduzir a inflamação e permitir a recuperação do tecido. Desta forma, mantém-se as funções defensivas e proprioceptivas da polpa dentária, além da rizogênese seguir seu curso fisiológico (RANDOW; GLANTZ, 1986; OU *et al.*, 2009). Existem basicamente três tipos de tratamentos conservadores para casos de exposição direta do tecido pulpar: o capeamento pulpar direto, a pulpotomia parcial e a pulpotomia total. Para essas três modalidades, um material de revestimento biológico – como o hidróxido de cálcio ou o MTA - é aplicado diretamente sobre a polpa exposta, previamente à restauração do dente (HARGREAVES; COHEN S, 2010).

O capeamento pulpar direto foi descrito como um tratamento efetivo para manter a vitalidade e a saúde pulpar (ZHU; JU; NI, 2015). Essa modalidade de tratamento conservador da polpa é indicada principalmente em casos de pequenas exposições

acidentais, decorrentes de preparos cavitários (BERGER, 2002). Alguns estudos demonstram que essa técnica relativamente simples é eficaz (HILTON; FERRACANE; MANCL, 2013; KUNDZINA *et al.*, 2017, BRIZUELA *et al.*, 2017; AWAWDEH *et al.*, 2018; SUHAG *et al.*, 2019).

A pulpotomia parcial, também conhecida como curetagem pulpar ou pulpotomia de Cvek, consiste na remoção superficial da polpa coronária, forramento do tecido pulpar com material biocompatível, e posterior restauração do dente. Em estudo que testou a pulpotomia parcial em 60 incisivos com com fraturas coronárias complexas observou-se a formação de barreira dentinária em 96% dos casos. Dentes com formação radicular completa e incompleta e exposições pulpares por períodos de até 90 dias foram contemplados. (CVEK, 1978).

A pulpotomia pulpar total é indicada para casos de exposições mais extensas, e os percentuais de sucesso são comparáveis aos do tratamento endodôntico, tanto em casos sintomáticos quanto em casos assintomáticos (ASGARY; EGHBAL, 2013; TAHA; ABDULKHADER, 2018).

O hidróxido de cálcio (HC) tem sido amplamente utilizado como material de revestimento pulpar. Estudos histológicos demonstraram sua capacidade de induzir a formação de tecido mineralizado semelhante à dentina (CVEK, 1978; HOLLAND *et al.*, 1979). Mais recentemente, materiais de revestimento alternativos, como agregado de trióxido mineral (MTA), têm sido sugeridos. Foi demonstrado, histologicamente, que o MTA proporciona formação de barreiras dentinárias homogêneas e localizadas (FARACO; HOLLAND, 2001). Além disso, o material apresenta como vantagem a sua capacidade seladora (TORABINEJAD; WATSON; PITT FORD, 1993), o que pode auxiliar a reduzir a microinfiltração coronária.

Em um ensaio clínico randomizado, o MTA promoveu taxas de sucesso superiores (85%) ao HC (52%) quando utilizados para capeamentos pulpares diretos em exposições pulpares por cárie (KUNDZINA *et al.*, 2017). Resultados favoráveis do MTA em relação ao HC também foram relatados para casos de pulpotomias parciais (KANG *et al.*, 2016), e uma recente revisão sistemática com meta-análise reportou vantagens do MTA sobre o HC em pulpotomias totais (LI *et al.*, 2019). Entretanto, outra meta-análise (ALQADERI *et al.*, 2016) demonstrou que os diferentes materiais utilizados em pulpotomias totais não afetaram o resultado dos tratamentos em dentes permanentes com ápice fechado, apresentando taxas de aproximadamente 90% de sucesso.

Nas últimas décadas, o aprimoramento da compreensão da biologia pulpar e o desenvolvimento de materiais alternativos para o capeamento pulpar renovaram o interesse dos pesquisadores por alternativas mais conservadoras comparadas ao tratamento endodôntico radical (BJORNDAL, 2008; BJORNDAL, 2019; TOMSOM *et al.*, 2017).

Tratamentos conservadores da polpa tem menor custo e são tecnicamente menos complexos do que o tratamento endodôntico (STANLEY, 1989; ASGARY; EGHBAL; GHODDUSI, 2014; LI *et al.*, 2019). Neste sentido, razões econômicas devem ser levadas em consideração a favor da adoção de tratamentos conservadores. Dados epidemiológicos recentes mostram que a prevalência global de cárie em pacientes adultos permaneceu alta nos últimos 25 anos, com maior prevalência em pacientes de grupos sociais menos favorecidos (BERNABÉ; SHEIHAM, 2014; KASSEBAUM *et al.*, 2015; WHO 2017; SENGUPTA *et al.*, 2017). De acordo com uma análise sistemática do *Global Burden of Diseases 2015*, a prevalência de dentes permanentes cariados não tratados é de 34,1% e 2,5 bilhões de pessoas são afetadas anualmente (KASSEBAUM *et al.*, 2017). Cáries profundas não tratadas frequentemente resultam em inflamação pulpar e necessidade de intervenção. No entanto, estudos que analisaram o sistema público de saúde brasileiro revelaram que o acesso ao tratamento endodôntico ainda está muito longe de atender à demanda da população, e muitos dentes são extraídos devido ao atraso ou à falta de atendimento especializado (BRASIL, 2016; THOMAZ *et al.*, 2016; CARRER *et al.*, 2018).

Os tópicos mencionados acima apontam para a necessidade de revisar a indicação de estratégias de tratamento menos invasivas, visando evitar o tratamento endodôntico e a extração dentária. Porém, algumas questões podem fortalecer a resistência a mudanças nas práticas clínicas e de ensino, contribuindo com a insegurança do profissional para indicar tratamentos conservadores. As recentes revisões sistemáticas e meta-análises que mostram taxas de sucesso semelhantes entre os tratamentos conservadores da polpa e o tratamento endodôntico radical baseiam-se seus dados principalmente em séries de casos e em estudos experimentais com alto risco de viés, sendo ressaltada a escassez de ensaios clínicos randomizados de maior qualidade e seu déficit de padronização (ZHU; JU; NI, 2015; ALQADERI *et al.*, 2016; LI *et al.*, 2019; CHEN *et al.*, 2019).

Além disso, a identificação clínica do status de reversibilidade/irreversibilidade da inflamação pulpar ainda é um desafio. É sabido que o diagnóstico adequado do estado histopatológico da polpa dentária não pode ser obtido por meio de testes e

sintomas clínicos (SELTZER; BENDER; ZIONTZ, 1963; RICUCCI; LOGBIN; SIQUEIRA, 2014; RICUCCI *et al.* 2019). Mesmo assim, os métodos utilizados como rotina para o diagnóstico pulpar e planejamento do caso baseiam-se nos históricos de dor e de desconforto e nas experiências de cárie, traumáticas e restauradoras evidenciadas. Testes clínicos e exames radiográficos também são considerados, ainda que não sejam precisos na identificação do estado de saúde pulpar (MEJÀRE *et al.*, 2012).

Quando se pretende uma abordagem conservadora, as limitações dos métodos de diagnóstico mencionados acima também podem levar a controvérsias em relação à modalidade de tratamento a se indicar. Critérios como a etiologia da exposição pulpar, a extensão da exposição, características macroscópicas do tecido pulpar e controle do sangramento foram empregados para seleção de casos para capeamento pulpar direto, pulpotomia parcial ou total (MASS; ZILBERMAN, 1993; BOGEN, 2008), mas são necessárias mais investigações para embasar a tomada de decisão.

Embora terapias conservadoras sejam aparentemente pouco indicadas por escolas tradicionais, não há estudos que demonstrem com clareza o posicionamento atual de educadores, estudantes e clínicos em relação à exposição da polpa dentária. Neste cenário, o objetivo do presente estudo foi identificar os fatores que influenciam a tomada de decisão para terapias conservadoras ou tratamento radical de estudantes e coordenadores de cursos de especialização em Endodontia de Universidades Brasileiras.

3. OBJETIVOS

3.1 Objetivo Geral

Avaliar, por meio de resultados de uma enquete online baseada em casos clínicos simulados, a decisão dos participantes dos cursos de especialização de Universidades Brasileiras em relação à modalidade de tratamento indicado em casos de exposição direta do tecido pulpar.

3.2 Objetivos Específicos

- Descrever as decisões dos participantes por tratamento endodôntico radical ou conservador, bem como sobre a modalidade de tratamento conservador indicada em cada uma das situações clínicas simuladas.
- Caracterizar fatores relacionados ao perfil do participante que interferem na decisão de tratamento.
- Determinar a influência dos fatores relacionados às características clínicas e radiográficas dos casos que interferem na decisão de tratamento dos participantes.
- Avaliar fatores de ordem sistêmica relacionados nos casos simulados que interferem na decisão de tratamento dos participantes.

4. ARTIGO

Decision-making for dental pulp exposure: a survey in Graduate courses in Endodontics at Brazilian Universities.

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Keywords: Endodontics, dental education, vital pulp therapy, root canal treatment, decision-making.

Running head: decision-making for dental pulp exposure.

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Abstract

Aim The improved understanding of pulp biology and the development of alternative pulp capping materials have renewed researcher's interest on treatment alternatives to root canal treatment (RCT) and encouraged the adoption of vital pulp therapy (VPT). Even so, the indication of VPT as a definitive treatment is still controversial. The aim of the present study was to assess the clinical approach, as well as to identify the factors that influence the decision-making for dental pulp exposure of students and coordinating professors of graduate courses in Endodontics offered at Brazilian Universities.

Methodology The study used a mail-out survey at Qualtrics Software based on 07 reports that included the description of simulated clinical cases in which dental pulp exposure was evidenced. Descriptive statistics showing VPT/RCT indication rates were calculated for each clinical report. Data related to the participants profile (n=113) and variables related to patient and to clinical and radiographic characteristics of the simulated cases were evaluated with regards of their potential in affecting decision-making was analyzed by logistic regression ($p < 0.05$).

Results Considering the set of treatment decisions presented by the study participant's, minimal invasive approaches for cases of dental pulp exposure are still scarcely indicated by graduate students and coordinating professors of specialty courses in endodontics at Brazilian Universities. VPT were likely to be indicated in cases in which the patient was younger with immature tooth. RCT indications were related to presence of symptoms, mature root development and in older patients. In pulp exposures secondary to trauma, the period of pulp exposure was significantly associated to indicate RCT.

Conclusions There was a tendency for RCT even for the cases in which the available literature presents data for VPT being a viable alternative. The justifications for the decision-making adopted by the participants are frequently not supported by the available scientific evidence, suggesting the need of reviewing the content and emphasis given to alternative treatments for cases of pulp exposure in undergraduate and graduate courses.

Introduction

Diagnosis and treatment planning are the basis of a successful dental care (Moskona *et al.* 1999). The treatment strategy would be considered ideal when the best possible results reach a long term, with minimal intervention, considering the current scientific evidence, the patients' problems and concerns (Bain 2003). These very important skills are difficult to teach and evaluate (Moskona *et al.* 1999), especially if there is no consensus on the accuracy of the available diagnostic methods and on the best treatment options. This is currently the debate on symptomatic or asymptomatic pulpitis secondary to deep carious, or dental trauma with pulp involvement. Indication of vital pulp therapy (VPT) as a definitive treatment, instead of pulpectomy followed by root canal treatment (RCT), has faced controversial opinions in the scientific literature (Bergenholtz & Spangberg 2004, Zanini, Hennequin & Cousson 2016).

VPT comprises treatment modalities that aim to preserve pulp vitality, such as direct pulp capping, partial pulpotomy and full pulpotomy. It follows a biological concept of reducing inflammation and allowing root development. This maintains dental pulp defensive and proprioceptive functions and reduces risk of tooth fracture (Randow & Glantz 1986, Ou *et al.* 2009). Calcium hydroxide (CH) has been widely used as a pulp capping material since histological studies demonstrated its ability to induce the formation of dentin-like barriers (Cvek 1978, Holland *et al.* 1979).

During the last decades, the improved understanding of pulp biology and the development of alternative pulp capping materials presenting sealing ability - such as Mineral Trioxide Aggregate (MTA) (Torabinejad, Watson & Pitt Ford 1993) - have renewed the researchers interest on treatment alternatives to RCT and encouraged the adoption of VPT (Bjørndal 2008, Tomson *et al.* 2017; Bjørndal 2019). It has been histologically demonstrated that MTA elicits homogeneous and localized tissue barriers (Faraco & Holland 2001). In a randomized clinical trial, MTA promoted superior success rates (85%) compared to CH (52%) when used for capping carious exposures (Kundzina *et al.* 2017). In agreement, favorable results for partial pulpotomies using MTA-based materials were demonstrated (Kang *et al.* 2016), and recent findings of a systematic review and meta-analysis suggests clinical advantages of MTA over CH in full pulpotomies (Li *et al.* 2019). However, another meta-analysis (Alqaderi *et al.* 2016) showed that differences in pulp capping materials does not significantly affects success rates of full pulpotomy in permanent posterior teeth with closed apices, which reaches around 90%.

VPT is considered more cost-effective and technically easier to carry out than RCT (Asgary & Eghbal 2013, Stanley 1989; Broden *et al.* 2019, Li *et al.* 2019). In this regard, economic reasons should be taken into account in favour of VPT adoption. Recent epidemiological data shows that the global prevalence of caries in adult patients remained high over in the last 25 years, with greater prevalence in patients from disadvantage social groups (Bernabé & Sheihan 2014, Kassebaum NJ *et al.* 2015, WHO 2017, Sengupta *et al.* 2017). According to a systematic analysis of the Global Burden of Diseases 2015 the prevalence of untreated carious permanent teeth is 34.1%, and 2.5 billion people are affected annually (Kassebaum *et al.* 2017). Untreated deep caries frequently result in pulpal inflammation and intervention needs. However, studies analyzing Brazilian public health system revealed that the access to endodontic treatment is still very far from meeting population's demand, and many teeth are extracted due to the delay or lack of specialized care (Brazil, 2006, Thomaz *et al.* 2016, Carrer *et al.* 2018).

Together, the topics aforementioned have pointed to the need for revising the indication of minimally invasiving treatment strategies instead of RCT or tooth extraction. However, some issues may strengthen the resistance to changing teaching practices and might lead to clinician's insecurity to indicate VPT. The recent systematic reviews and meta-analysis showing similar success rates for RTC and VPT primarily pooled data from case series and experimental studies with high risk of bias, reporting the shortage of higher quality randomized controlled trials and their deficit of standardization (Alqaderi *et al.* 2016, Zanini *et al.* 2016, Li *et al.* 2019, Zhu, Ju & Ni 2015, Chen *et al.* 2019).

Moreover, the discrimination of irreversible or reversible pulp inflammation state is still a challenge to attain. The routine methods of determining whether dental pulp is reversible or irreversible inflamed, and thus to define treatment decision, are based on diagnostic information gained from the patient's history of pain or discomfort, experience of trauma or restorative procedures, clinical examinations, results of clinical tests and radiographic examination of the teeth and surrounding tissues (Mejère *et al.* 2012). However, it is well established that a proper diagnosis of the histopathological status of dental pulp cannot be precisely defined through clinical tests and symptoms (Seltzer, Bender & Ziontz 1963, Ricucci, Logbin & Siqueira 2014, Ricucci *et al.* 2019). Also, there is insufficient evidence base to clinically access biological markers of pulp inflammation, infection or other damage that could predict VPT outcomes (Mejère *et al.* 2012).

When conservative approaches are intended, the limitations of diagnostic methods mentioned above may also lead to controversies regarding the VPT modality.

Criteria such as the etiology of pulp exposure and the area of exposition, as well as subjective data such as macroscopic features of pulp tissue and bleeding control have been employed to case selection for direct pulp capping, partial or full pulpotomy (Mass & Zilberman 1993, Bogen 2008), but further investigations are needed to base decision making.

VPT treatment is apparently scarcely indicated by traditional schools of thought (Langeland 1981, Ward 2002), which could influence clinician's decision for RCT. As a matter of fact, a recent study evaluating treatments performed by private dentists in Finland, pulp capping, pulpotomies and root canal fillings comprised 19.2%, 0.8% and 80% of teeth receiving endodontic treatment, respectively (Vehkalahti, Palotie & Valaste, 2020). Nevertheless, there are no studies that clearly demonstrate the current attitude of educators and students in face of dental pulp exposition, and the factors that influence their decision for VPT or RCT are still to be explored. In this scenario, the aim of the present study was to assess the clinical approach adopted by Brazilian specialty course students and coordinators professors in cases of pulp tissue exposure, identifying the factors that influence their decision-making for indicating or not VPT.

Materials and Methods

The study used a mail-out survey approved by the Research Committee of the School of Dentistry of Federal University of Rio Grande do Sul (UFRGS) and by UFRGS Ethics Board. The sampling frame was created by using students and coordinating professors of the specialty courses in Endodontics developed within Brazilian Universities. The identification of the existing courses was obtained by assessing the registries of the Brazilian Federal Board of Dentistry (CFO) (<http://website.cfo.org.br/>) and of Brazilian Ministry of Education (MEC), emitted in April 5th, 2019 (<https://www.mec.gov.br/>). A total of 25 specialty courses were found in both registries and considered eligible for the study.

All students and coordinators professors enrolled in these courses were mailed a package that included a cover letter outlining an introduction and aims of the research and a survey containing 7 clinical reports and related questions in Qualtrics Software (Qualtrics, Provo, Utah, USA). A follow-up postcard reminder with the survey instrument was sent to all participants 2 times during a period of 2 months.

The study sample (n) was calculated on the basis of the size of the population, i.e. total number of eligible participants enrolled in specialty courses in Endodontics developed within Brazilian Universities (N), the proportion of the participants expected to

choose between vital pulp therapy or other treatment option (endodontic treatment or tooth extraction) ($P = .5$ to allow for the maximum variance), the assumed sampling error ($C = 0.05$), and the Z-statistic of 1,44 for the 85% confidence interval (Armstrong JS and Overton TS, 1977) : $n = [(N)(P)(1-P)] / [(N-1)(C/Z)^2 + (P)(1-P)]$. On the bases of the number of 25-registered specialization courses and assuming a mean of 10 participants in each course it was estimated a N of 250. Accordingly, the required sample size (n) of 114 participants was calculated.

Survey Instrument

The survey tool was pilot tested amongst 4 endodontists to review the design, level of understanding, face validity, and feasibility of the planned data analysis. After adjustments, the questionnaire was finalized. Data related to the participant's profile – such as age, location and details of academic formation, as well as the theoretical reference that based their treatment decisions, was collected. A questionnaire based on 07 reports that included the description of simulated clinical cases in which dental pulp was vital and presented direct exposition to the oral environment was applied. The information contained in each of the reported cases are summarized on table 1.

Participants were asked about their treatment decision for each one of the cases reported, i.e., vital pulp therapy (VPT) - direct pulp capping, partial pulpotomy or full pulpotomy - root canal treatment (RCT) or tooth extraction. Moreover, multiple choice questions were applied to verify the factors that were considered during their decision making, including patients' systemic disorders, tooth clinical history and clinical/radiographic characteristics.

To define factors affecting the decision making, the variables collected in the 07 cases reported were grouped and correlated to the indication of VPT (Yes/No) for each one of the clinical situations described. It was hypothesized that decision making of participants might be influenced by 3 main components:

1. Variables related to the participants profile: graduation completion (years), specialty course stage (first year, second year, completed), graduate location (private/public school), base for decision-making (undergraduate learning/ graduate learning/ clinical Experience).
2. Variables related to patient: systemic disorders and patient age.
3. Variables related to clinical and radiographic characteristics: symptoms, dental root (mature / immature), tooth restorability, etiology of pulp exposure (caries/dental trauma/mechanical), exposure period, exposure area and pulp macroscopic conditions.

Data Analysis

Data from the mail-out surveys were analyzed using a Statistical Package for Social Sciences software 17.0 (SPSS Inc, Chicago, IL). Descriptive statistics were performed to demonstrate the rates of indication of VPT, RCT and tooth extraction in each one of the reported cases. The rates for each treatment modality were also calculated.

Data was presented by percentages for the VPT, RCT and tooth extraction indications. For comparison between treatment indications, a binary outcome was considered, evaluating if VPT (pulp capping, partial pulpotomy or full pulpotomy) was indicated rather than RCT or tooth extraction. Binary logistic regression was used with significance of the model established by Wald's chi-square test. In the impossibility of obtaining odds ratio and significance values in logistic models, we used Fischer's exact test.

Results

Sample characteristics

Students of 19 from the 25 eligible specialization courses answered the questionnaire, totalizing 76%. The average age of the 113 participants was 30,6 years old.

Treatments preferences

Participant's treatment decisions for each simulated case report are shown in Figure 1. The influence of variables related to the participant's profile, patient characteristics and clinical and radiographic characteristics on the decision-making of the reported cases are described on tables 2, 3 and 4, respectively.

In Case 1 participants opted for VPT in 83.2% of responses, being influenced by immature root development ($p=0.0001$). In contrast, in the same simulated clinical report, the participants that opted for RCT were significantly influenced by the occurrence of intense and persistent pain ($p=0.0001$).

Case 2 simulated pulp exposition caused by dental trauma in a patient presenting epilepsy, and 73.6% of participants decided for RCT. Being graduated for more than 11 years was related to VPT indication ($p=0.01$), and the exposure period of 5 days was

the only variable related to clinical conditions that affected decision making to the choice of radical treatment ($p=0.01$).

For the occurrence of an accidental exposure of pulp in a young patient (Case 3), 87.2% of the participants decided for VPT. The patient's age was the only variable that significantly affected decision-making ($p=0.028$). In contrast, RCT was more frequently indicated in Case 4 (92.6%), being the family history of cardiovascular disease was significantly associated with this outcome ($p=0.023$).

Case 5 divided the participants decisions, but 66.7% of them opted for VPT. The exposure area of 0.5 mm affected the decision for VPT ($p=0.001$). In contrast, being a post-graduate student, base the decision-making on the philosophy adopted at the specialization course, the patient age of 40 years-old, the restorability of the tooth and the etiology of pulp exposure were significant for deciding for RCT ($p<0.05$).

The decision-making was also quite divided on Case 6, describing a hyperplasic pulpitis. Only the patient's age (15 years) had significantly affected the decision for VPT ($p=0.0001$).

The fact that the patient of case 7 present autism was not taken into account in the decision making of the participants, and 89.4% of them opted for RCT. Symptoms features were related to the decision for RCT ($p=0.013$), while mature root development was related VPT indication ($p=0.018$).

Discussion

In the last decades, the indications of VPT as a definitive treatment option have been reevaluated based on advancements in biomaterials research, knowledge on pulp biology and on the results of clinical studies demonstrating high success rates of these treatments modalities (Simon *et al.* 2013, Awawdeh *et al.* 2018, Elmsmari *et al.* 2019). VPT are more cost-effective and less technique sensitive than RCT (Asgary, Eghbal & Ghoddusi 2014), which could be explored for increasing accessibility to treatments in cases of dental pulp involvement. In this regard, the high frequency of technically inadequate root fillings and associated apical periodontitis has been demonstrated, despite new technologies in root canal preparation and filling (Boucher *et al.* 2002, Di Filippo *et al.* 2014, Van der Veken *et al.* 2017). Conversely, for many years pulp extirpation and root canal treatment have been considered the standard care for cases of pulp exposure (Langeland 1981, Ward 2002), and the systematic reviews comparing VPT with RCT suggest that a greater number of high quality randomized controlled trials

should be performed (Zhu, Ju & Ni 2015, Alqaderi *et al.* 2016, Li *et al.* 2019, Chen *et al.* 2019).

Despite of these methodological considerations, a growing paradigm shift is being noticed in scientific literature, which is supported by the comparable success rates of VPT and RCT (Asgary *et al.* 2015). Even so, to the best of the author's knowledge, this is the first investigation that evaluated the factors that have currently influenced the decision-making for VPT or RCT in cases of dental pulp exposure. In the present survey, simulated clinical cases were preferred over questionnaires for assessing professors and student's knowledge, since the indication of VPT as a definitive treatment is still a very controversial topic. For analysis of the results obtained, descriptive statistics of decision-making and logistic regression for assessing the factors that have influenced on the participants decisions were performed for each one of the seven simulated clinical reports. Multivariate regression analysis was not possible to carry out due to a high number of missing values. Notwithstanding, it was possible to highlight important issues to be discussed.

Immature root development has influenced the participant's decision for VPT in a cariously exposed and symptomatic tooth ($p=0.0001$), and only 16.8% decided to indicate RCT in the presence of these features (Case 1). This was expected since even the authors that contraindicate VPT make exceptions for immature teeth (Langeland 1981, Ward 2002), considering the importance of keeping pulp alive for promoting root development and tooth strengthen (Rafter M 2005). Even the more recently suggested approaches for immature necrotic teeth – such as revascularization - fail in providing predictable apical healing/root development (Valera *et al.* 2015, Eramo *et al.* 2018).

In both cases 1 and 7, symptoms features were determinant to the participants that opted for RCT. A limited correlation between clinical and histological conditions has been previously demonstrated (Seltzer, Bender & Ziontz 1963, Dummer, Hicks & Huws 1980), but the terminology commonly used for classifying pulp diseases seem to suggest that reversibility of pulp inflammation depends on symptoms characteristics. Although recognizes that clinical information is limited both in accurately describe the continuum of pulpal inflammation and in determine the link between its inflammatory status and healing potential, the European Society of Endodontology (ESE) recommend a pulpal disease terminology based on the symptoms features. In this regard, vital pulp irreversible damage should be characterized by episodes of spontaneous, radiating pain that lingers after removal of the stimulus, while reversible pulpitis should be considered either in symptomless teeth or in case of episodes of less intense, shorter-lasting pain

(Duncan *et al.* 2019). Similarly, the American Association of Endodontists (AAE) endorsed the currently accepted classification of pulpal disease in 2013, describing pulpitis as either reversible or irreversible depending on clinical signs and symptoms (American Association of Endodontists 2013).

Controversially, recent randomized clinical trials (Asgary, Eghbal & Ghodduzi 2014, Taha & Abdelkader 2018, Taha & Abdulkader 2018) have confirmed that VPT is viable in teeth with intense and spontaneous pain. In this regard, there is an urgent need for a revision of pulpal disease terminology, focusing on the available evidence of the healing potential of the dental pulp (Wolters *et al.* 2017, Awawdeh *et al.* 2018). The inference that observing symptoms would be effective in establishing dental pulp prognosis leads to uncertainty in clinical practice when a rational treatment plan needs to be established and might have contributed to decrease the indication of VPT in the present survey.

Besides symptoms, the report of complete root development was determinant for 89.4% of the participants that indicated RCT for case 7 ($p=0.018$). Probably, the lower vascularity of mature teeth compared to immature permanent teeth was considered to infer that host immune system responses and healing capacity were deficient. However, the limited capacity of healing of teeth presenting complete root development is also not supported by the findings of recent studies (Cushley *et al.* 2019 Tan *et al.* 2020).

The period of pulp exposure to the oral environment (5 days) was determinant for most of the participants (73.6%) deciding for RCT in a tooth presenting a 2 mm pulp exposition caused by trauma. However, there is no clear evidence that corroborates the period of pulp exposure as an impediment for VPT. As a matter of fact, the study published by Cvek (1978) reported 96% success rates in partial pulpotomies performed up to 90 days after pulp exposure. Accordingly, Borkar & Ataide (2015), suggest that the interval between trauma and treatment is not critical for pulp recovery if superficial tissue is removed and the procedure is performed with biocompatible materials and asepsis (Borkar & Ataide 2015). In this simulated clinical situation, the period of degree completion was significant for opting for VPT ($p=0.01$), which demonstrates that the recently graduate professionals present limited knowledge of dental trauma and VPT. A recent survey in South Brazil revealed that only moderate level of dentists' knowledge regarding the management of dental trauma, which corroborates the present findings (Hartmann *et al.* 2019). Thus, revising teaching methods, as well as improving the emphasis given to these topics in undergraduate and graduate curricula, should be considered.

Most of the participants (87.2%) decided for VPT in a 2 mm carious exposure of pulp tissue in a symptom-free tooth (Case 3). The patient's age (14 years) was decisive for their treatment option ($p=0.028$), probably due to the inference that the histological features of pulp tissue in young patients – including the greater number of cells, the blood supply and the content of collagenous fibers (Bernick & Nedelman 1975, Morse 1991) – would influence a favorable outcome. However, recent clinical studies indicate that the age of the patient did not affect VPT treatment success rates, suggesting that these treatment modalities could be applied regardless of the patient's age (Matsuo *et al.* 1996, Kunert *et al.* 2015, Awawdeh *et al.* 2018, Elmsmari *et al.* 2019, Suhag *et al.* 2019). In this regard, age-related alterations of the dental pulp complex have been previously discussed, emphasizing that, besides the inherent aging changes from physiologic defensive processes, pathologic irritant induced agents should affect dental pulp (Morse 1991). It is probably that clinical difficulties to access these modifications make the variable age – by itself – not a reliable predictor for VPT success.

Also, regarding the simulated clinical situation 3, direct pulp capping was the VPT modality chosen by most of the participants. The literature is controversial for the indication of this treatment modality in cariously exposed teeth, with success rates varying from 37 to 82% (Horsted *et al.* 1985, Barthel *et al.* 2000, Mente *et al.* 2014). While some authors observed similar results comparing direct pulp capping and partial pulpotomies (Awawdeh *et al.* 2018), others concluded that partial and full pulpotomies are more predictable, emphasizing the need of further observational studies that investigate the factors influencing treatment outcomes (Aguilar & Linsuwanont 2011). Although not the focus of this survey, it is noteworthy that recent consensus reports that selective carious removal should be considered when pulp exposition can be avoided (Duncan *et al.* 2019, Ricketts, Innes & Schwendicke 2018, Maltz *et al.* 2017).

In most of the simulated cases reports, the patient's systemic conditions did not affect decision-making, even when it could hinder the patient management, leading to an increase in the technical difficulties, as in patients with autistic spectrum (Case 7) (Chandrashekhar & Bommangoudar 2018). Conversely, the family history of heart disease (Case 4) led to the participant's preference for RCT (92.6%) rather than VPT ($p=0.023$) in a symptomatic tooth presenting dental pulp with normal bleeding and consistency. A positive association between apical periodontitis and coronary heart disease was previously observed (Bains & Bains 2018), which could have influenced the participants to indicate a more invasive treatment approach. However, there is no scientific evidence that confirms the effects of pulp inflammation on the development of coronal diseases. These outcomes evidence limited knowledge of the participants with

regards of the influence of the repercussions of patient's systemic conditions on clinical practice. In this regard, Moskona et al. (1999) highlights the importance of interdisciplinary approaches in dental education aiming to enhance oral diagnosis and treatment planning skills, which should be considered to improve teaching strategies.

The extent of pulp exposure (0,5 mm) was significantly associated with the decision of 66.7% of the participants for VPT in case 5. Direct pulp capping was the treatment modality chosen by most of them, probably because of the non-infectious nature of pulp exposition. Previous investigations showed that teeth with traumatic or mechanical pulp exposures have higher success rates than teeth with cariously exposed pulps, which are often severely inflamed (Horsted *et al.* 1985, Bjørndal *et al.* 2010). Interestingly, variables related to the participant profile, such as having completed specialty course ($p=0.046$) and basing the treatment decision on the graduate learning ($p=0.043$) have influenced the decision of the minority of the participants that opted for RCT. These participants were also influenced by etiology of pulp exposure ($p=0.005$), which is not supported by the available literature. The participants that opted for RCT in this clinical situation have also considered the patient's age (40 years old) ($p=0.0001$) and the need of indirect restoration ($p=0.0001$). Interestingly, amongst the presented simulated reports, this was the only one in which decision-making was significantly affected by coronal destruction. With regards to the type of tooth restoration a previous observational study revealed that the quality of coronal sealing, rather than the type of dental restoration, affects the success rates of pulpotomy (Kunert et al. 2015). As a matter of fact, the presence of prosthetic crown following pulpotomy presented the more favorable outcomes in this study.

The case report 6, describing a hyperplastic pulpitis, have divided opinions amongst the participants, and 45.3% of them opted for VPT, influenced by patient's age (15 years-old) ($p=0.0001$). A study evaluating pulp polyps revealed that cells isolated from this granulation tissue fulfill the criteria needed to multipotent mesenchymal stromal cells definition (Attar et al. 2014), which could favor the great capacity of healing of hyperplastic tissue described in previous investigations (Çalskan, Öztop & Çalskan 2003). Çalskan (1993) observed 24 permanent teeth presenting hyperplastic pulpitis in which pulpotomies were performed and observed clinical and radiographic healing in 91.6%. Besides, several clinical reports described successful pulpotomies in teeth presenting pulp polyps (Asgary & Çalskan 2015, Sachan & Mittal 2018). Clinical studies with greater samples and evaluating long-term follow up still need to be accomplished. However, the current available evidence suggests favorable perspectives for the indication of VPT in teeth presenting chronic hyperplastic pulpitis.

In a recent histopathology and histobacteriology study evaluating treated teeth that presented pulp exposure (Ricucci et al. 2019), the authors propose that more predictable treatment can be provided if the clinician take into account the examination of the deepest part of dentine and the clinical aspects of the exposed pulp tissue. Controversely, in non of the simulated cases of the present study the macroscopic conditions of pulp tissue showed significant relevance to the participants decision making.

Considering the set of treatment decisions presented by this study participant's, minimal invasive approaches for cases of dental pulp exposure are still little indicated by graduate students and coordinators professors of specialization courses in endodontics at Brazilian Universities. It is probably that the decisions adopted during students training lead to clinician's insecurity to indicate VPT. Most of the participants based their decision on undergraduate and graduate learning. It is probably that educator's approach in Brazilian Universities is not stimulating the indication of VPT, which certainly has an impact in clinical practices and should be further investigated.

Conclusions

Together, the present results demonstrated that there is a currently trend for RCT indication in most of the cases in which pulp exposure occur. Patient's age, root development and symptoms features were the main factors affecting decision-making of the participants. The justifications for the decision-making adopted are frequently not supported by the available scientific evidence, suggesting the need of reviewing the content and emphasis given to alternative treatments for cases of pulp exposure in undergraduate and graduate courses.

Acknowledgements

Conflict of Interest statement

The authors have stated explicitly that there are no conflicts of interest in connection with this article.

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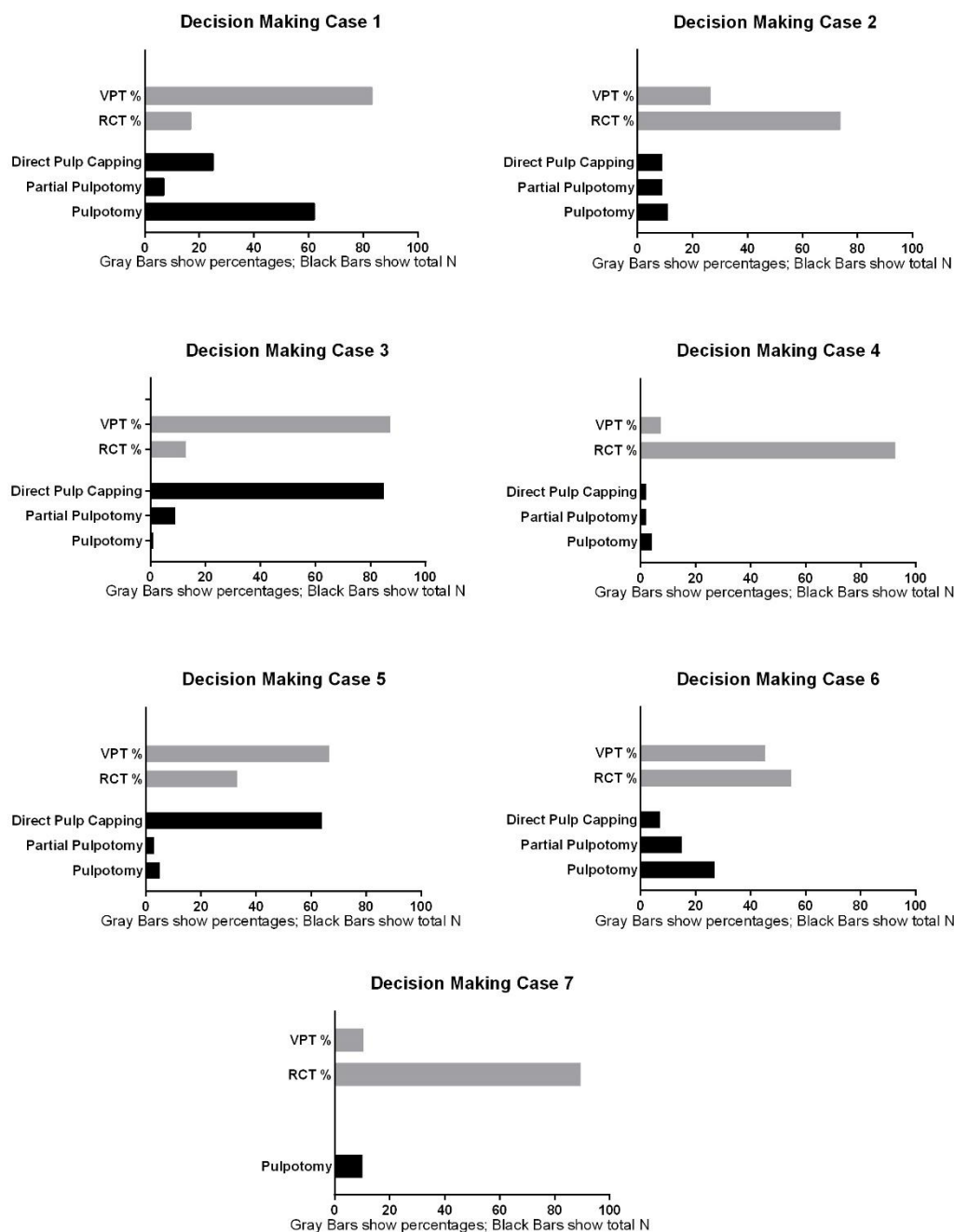
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Figure 1: Vital Pulp Therapies (VPT) and Root Canal Treatments (RCT) indication percentages and N total of VPT Modalities indications for the seven simulated clinical cases.



Tables

Table 1. Information provided in the simulated clinical case reports.

Case	Systemic disorders	Age (years)	Tooth	Symptoms	Dental Root	Tooth restorability	Etiology	Exposure period	Exporure area	Pulp macroscopic condition
1	Allergy to AAS	12	37	Intense and continuous Pain	Immature	Deep caries not affecting surrounding walls	Carie	During Procedure	Involving the entire coronal pulp	Normal bleeding and consistency
2	Epilepsy	18	21	Provoked and Mild Pain	Mature	Distal-mesial Tooth fracture involving incisal and medium third of crown	Trauma	5 days	± 2 mm	Normal bleeding and consistency
3	Not reported	14	46	Abscent	Mature	Deep carie not affecting surrounding walls	Carie	During Procedure	0.5 mm	Normal bleeding and consistency
4	History of Cardiovascular disease in family	26	15	Spontaneus Pain	Mature	Deep carie affecting oclusal surface and mesial dental wall	Carie	Unknown	3 mm	Normal bleeding and consistency
5	Smoker	40	46	Abscent	Mature	Tooth Needing indirect restoration	Mechanical	During Procedure	0.5 mm	Normal bleeding and consistency
6	Asthma	16	36	provoked Sensibility during chewing	Mature	Deep carie not affecting surrounding walls	Carie	Unknown	Involving the entire coronal pulp	Hyperplasic Pulpitis
7	Autism	16	Unknown	SpontaneusInt ense Pain	Mature	Deep carious lesion not affecting surrounding walls	Carie	During Procedure	Involving the entire coronal pulp	Normal consistency; long-lasting and Darkened Bleeding

Table 2. Bivariate logistic regression model analyzing variables related to the participants profile, presenting significant predictors ($p < .05$), Odds Ratio (OR) and Interval of Confidence of 95% (IC95%) for the preference for vital pulp therapy (VPT) versus root canal treatment (RCT) in each one of the simulated clinical cases.

	VPT n	RCT n	OR (IC95%)	P
Simulated Clinical Case 1				
Graduate Completion (years)				
0 - 2 years	45	10	-	0.793
3 - 10 years	22	5	1.023 (0.312-3.35)	0.970
11+ years	27	4	0.667(0.190-2.336)	0.526
Specialty course stage				
First year	55	10	-	0.778
Second year	21	4	1.048 (0.296 - 3.707)	0.942
Completed	18	5	1.528 (0.461 - 5.063)	0.488
Graduate Location				
Private	63	13	0.969 (0.313 - 3.002)	0.957
Public	25	5	-	-
Decision based on				
Undergraduate learning	37	5	-	0.450
Graduate learning	34	7	1.524 (0.442 - 5.257)	0.505
Clinical Experience	23	7	2.252 (0.639 - 7.941)	0.207
Simulated Clinical Case 2				
Graduation Completion (years)				
0 - 2 years	10	44	-	0.240
3 - 10 years	5	20	0.909 (0.275 - 3.008)	0.876
11+ years	14	17	0.276 (0.103 - 0.740)	<u>0.010</u>
Specialty course stage				
First year	12	52	-	0.070
Second year	7	16	0.527 (0.175 – 1.565)	0.249
Completed	10	13	0.300 (0.106 – 0.846)	0.230
Graduate Location				
Private	17	56	0.708 (0.274 - 1.833)	0.467
Public	9	21	-	-
Decision based on				
Undergraduate learning	12	24	-	0.136
Graduate learning	8	40	2.500 (0.894 - 6.987)	0.081
Clinical Experience	9	17	0.944 (0.326 - 2.738)	0.916
Simulated Clinical Case 3				
Graduation Completion (years)				

0 - 2 years	47	7	-	0.805
3 - 10 years	21	4	1.279 (0.338 - 4.845)	0.717
11+ years	27	3	0.746 (0.178 - 3.127)	0.689
Specialty course stage				
First year	57	7	-	0.728
Second year	19	3	1.286 (0.302 - 5.474)	0.734
Completed	19	4	1.714 (0.452 - 6.506)	0.428
Graduate Location				
Private	62	11	0.650 (0.168 - 2.524)	0.752
Public	26	3	-	-
Decision based on				
Undergraduate learning	41	3	-	0.325
Graduate learning	34	7	2.814 (0.675 -11.721)	0.155
Clinical Experience	20	4	2.733 (0.558- 13.397)	0.215

Simulated Clinical Case 4

Graduation Completion (years)

0 - 2 years	3	50	-	0.610
3 - 10 years	3	22	0.440 (0.082 – 2.354)	0.337
11+ years	2	28	0.840 (0.132 – 5.332)	0.853

Specialty course stage

First year	5	58	-	0.846
Second year	1	21	1.810 (0.200 - 6.409)	0.598
Completed	2	21	0.905 (0.163 - 5.025)	0.909

Graduate Location

Private	5	67	1.007 (0.184 - 5.513)	0.993
Public	2	27	-	-

Decision based on

Undergraduate learning	2	22	-	0.816
Graduate learning	3	49	1.485 (0.231 - 9.524)	0.677
Clinical Experience	3	29	0.879 (0.135 - 5.719)	0.892

Simulated Clinical Case 5

Graduation Completion (years)

0 - 2 years	35	18	-	0.198
3 - 10 years	20	5	0.486 (0.157 - 1.509)	0.212
11+ years	17	13	1.487 (0.593 - 3.728)	0.398

Specialty course stage

First year	45	18	-	0.106
Second year	16	6	0.938 (0.317 - 2.777)	0.907
Completed	11	12	2.727 (1.020 - 7.295)	<u>0.046</u>

Graduate Location

Private	43	29	0.472 (0.178 - 1.247)	0.130
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Public	22	7	-	-
Decision based on				
Undergraduate learning	34	9	-	0.091
Graduate learning	22	16	2.747 (1.034 - 7.299)	<u>0.043</u>
Clinical Experience	16	11	2.597 (0.897 - 7.516)	0.078

Simulated Clinical Case 6

Graduation Completion (years)

0 - 2 years	21	31	-	0.439
3 - 10 years	11	14	0.862 (0.329 - 2.262)	0.763
11+ years	16	13	0.550 (0.220 - 1.378)	0.202

Specialty course stage

First year	29	33	-	0.177
Second year	6	15	2.197 (0.753 - 6.406)	0.149
Completed	13	10	0.676 (0.258 - 1.772)	0.426

Graduate Location

Private	29	42	0.561 (0.235 - 1.341)	0.194
Public	16	13	-	-

Decision based on

Undergraduate learning	16	22	-	0.349
Graduate learning	18	26	1.051 (0.435 - 2.535)	0.913
Clinical Experience	14	10	0.519 (0.184 - 1.464)	0.215

Simulated Clinical Case 7

Graduation Completion (years)

0 - 2 years	5	46	-	0.938
3 - 10 years	3	21	0.761 (0.166 - 3.484)	0.725
11+ years	3	26	0.942 (0.208 - 4.264)	0.938

Specialty course stage

First year	5	56	-	0.335
Second year	4	16	0.357 (0.086 - 1.488)	0.157
Completed	2	21	0.938 (0.169 - 5.208)	0.941

Graduate Location

Private	8	61	1.770 (0.352 - 8.896)	0.488
Public	2	27	-	-

Decision based on

Undergraduate learning	3	24	-	0.742
Graduate learning	6	42	0.875 (0.200 - 3.820)	0.859
Clinical Experience	2	27	1.687 (0.260 - 0.968)	0.584

Table 3. Bivariate logistic regression model analyzing variables related to the patient systemic disorders, presenting significant predictors ($p < .05$), Odds Ratio (OR) and Interval of Confidence of 95% (IC95%) for the preference for vital pulp therapy (VPT) versus root canal treatment (RCT) in each one of the simulated clinical cases.

	VPT n	RCT n	OR (IC95%)	P
Simulated Clinical Case 1				
Systemic disorders	-	-	-	-
Patient Age	48	5	0.342 (0.114 - 1.026)	0.056
Simulated Clinical Case 2				
Systemic disorders	-	-	-	-
Patient Age	7	16	0.774 (0.281 - 2.127)	0.619
Simulated Clinical Case 3				
Systemic disorders	-	-	-	-
Patient Age	42	1	0.097 (0.012 - 0.772)	<u>0.028</u>
Simulated Clinical Case 4				
Systemic disorders	4	15	0.176 (0.040 - 0.784)	<u>0.023</u>
Patient Age	2	21	0.797 (0.150 - 4.241)	0.791
Simulated Clinical Case 5				
Systemic disorders	-	-	-	-
Patient Age	5	22	21.057(6.809-65.120)	<u>0.0001</u>
Simulated Clinical Case 6				
Systemic disorders	4	0	-	1.000
Patient Age	28	4	0.053 (0.016 - 0.170)	<u>0.0001</u>
Simulated Clinical Case 7				
Systemic disorders	4	28	0.754 (0.204 - 2.783)	0.672
Patient Age	4	12	0.259 (0.066 - 1.020)	0.053

Table 4. Bivariate logistic regression model analyzing variables related to clinical and radiographic characteristics of each one of the simulated clinical cases, presenting significant predictors ($p < .05$), Odds Ratio (OR) and Interval of Confidence of 95% (IC95%) for the preference for vital pulp therapy (VPT) versus root canal treatment (RCT).

	VPT n	RCT n	OR (IC95%)	P
Simulated Clinical Case 1				
Symptoms	17	16	24.157 (6.323 - 92.285)	<u>0.0001</u>
Root Development	86	3	0.017 (0.004 - 0.073)	<u>0.0001</u>
Tooth Restorability	13	1	0.346 (0.043 - 2.819)	0.321
Etiology of Pulp Exposure	-	-	-	-
Exposure Period	-	-	-	-
Exposure Area	1	0	-	1.000
Pulp Macroscopic Condition	8	0	-	0.348
Simulated Clinical Case 2				
Symptoms	10	18	0.543 (0.215 - 1.373)	0.197
Root Development	-	-	-	-
Tooth Restorability	7	10	0.443 (0.151 - 1.301)	0.138
Etiology of Pulp Exposure	17	33	0.485 (0.205 - 1.149)	0.100
Exposure Period	15	63	3.267 (1.332 - 8.012)	<u>0.010</u>
Exposure Area	1	0	-	-
Pulp Macroscopic Condition	-	-	-	-
Simulated Clinical Case 3				
Symptoms	10	0	-	0.355
Root Development	3	9	-	1.000
Tooth Restorability	14	0	-	0.208
Etiology of Pulp Exposure	75	13	3.467 (0.428 - 28.109)	0.244
Exposure Period	-	-	-	-
Exposure Area	-	-	-	-
Pulp Macroscopic Condition	-	-	-	-
Simulated Clinical Case 4				
Symptoms	7	81	0.609 (0.071 - 5.249)	0.652
Root Development	-	-	-	-
Tooth Restorability	1	28	2.722 (0.320 - 23.144)	0.359
Etiology of Pulp Exposure	0	4	-	1.000
Exposure Period	-	-	-	-
Exposure Area	0	9	-	-
Pulp Macroscopic Condition	-	-	-	-

Simulated Clinical Case 5

Symptoms	2	0	-	-
Root Development	-	-	-	-
Tooth Restorability	4	13	9.609 (2.847 - 32.426)	<u>0.0001</u>
Etiology of Pulp Exposure	2	8	10.000 (1.998 - 50.042)	<u>0.005</u>
Exposure Period	-	-	-	-
Exposure Area	71	19	0.016 (0.002 - 0.126)	<u>0.001</u>
Pulp Macroscopic Condition	2	0	-	0.551

Simulated Clinical Case 6

Symptoms	0	1	-	1.000
Root Development	-	-	-	-
Tooth Restorability	13	9	0.495 (0.190 - 1.284)	0.148
Etiology of Pulp Exposure	39	51	1.681 (0.575 - 4.912)	0.342
Exposure Period	-	-	-	-
Exposure Area	-	-	-	-
Pulp Macroscopic Condition	-	-	-	-

Simulated Clinical Case 7

Symptoms	4	70	5.326 (1.429 - 19.852)	<u>0.013</u>
Root Development	2	1	0.049 (0.004 - 0.594)	<u>0.018</u>
Tooth Restorability	0	13	-	0.351
Etiology of Pulp Exposure	-	-	-	-
Exposure Period	-	-	-	-
Exposure Area	0	2	-	1.000
Pulp Macroscopic Condition	7	66	1.397 (0.378 - 5.164)	0.616

5. CONSIDERAÇÕES FINAIS

De acordo com os dados obtidos na presente pesquisa, tratamentos conservadores da polpa em casos de exposição pulpar ainda são pouco indicados por alunos e coordenadores dos cursos de especialização em Endodontia de Universidades Brasileiras. É provável que os currículos de cursos de graduação e especialização não incentivem a indicação e execução de técnicas conservadoras no que tange aos casos de exposição pulpares.

A opção por tratamentos conservadores esteve relacionada a casos de pacientes jovens e de rizogênese incompleta. Por outro lado, a ocorrência de sintomatologia dolorosa, a idade do paciente e o completo desenvolvimento radicular estiveram relacionados à escolha pelo tratamento endodôntico radical. As justificativas adotadas pelos participantes para tomada de decisão entre tratamentos conservadores da polpa e tratamento endodôntico radical frequentemente não estão amparadas pela literatura científica disponível acerca do assunto. Há, então, uma necessidade de revisão do conteúdo e da ênfase dada aos tratamentos alternativos para casos de exposição pulpar nos cursos de graduação e especialização em universidades brasileiras.

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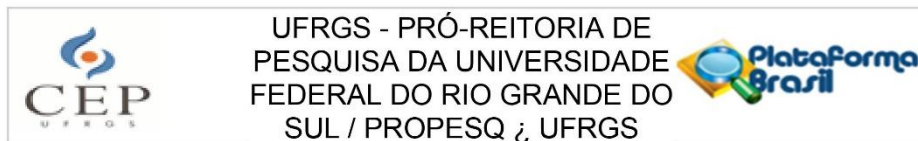
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ANEXOS



PARECER CONSUBSTANCIADO DO CEP

DADOS DO PROJETO DE PESQUISA

Título da Pesquisa: Tratamentos da polpa dental: tomada de decisão em cursos de especialização de Universidades Brasileiras.

Pesquisador: Roberta Kochenborger Scarparo

Área Temática:

Versão: 2

CAAE: 24491019.7.0000.5347

Instituição Proponente: Faculdade de Odontologia

Patrocinador Principal: Financiamento Próprio

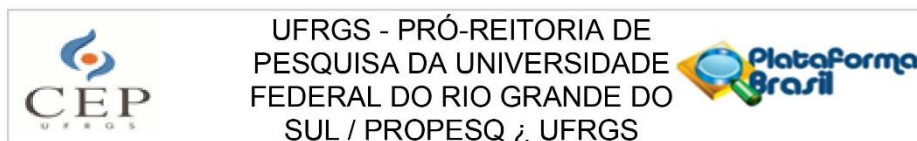
DADOS DO PARECER

Número do Parecer: 3.782.318

Apresentação do Projeto:

Esse projeto de pesquisa é coordenado pela Profa Roberta Scarparo e do qual participam o Prof. José Antonio de Figueiredo e o Mestrando Paulo Scalzilli. O objetivo é identificar os fatores que influenciam alunos da especialização em Endodontia de diferentes universidades do Brasil e seus respectivos coordenadores na tomada de decisão sobre tratamento pulpar conservador ou radical das doenças da polpa. Pretende-se realizar um senso, incluindo todos os alunos e coordenadores dos referidos cursos. Num primeiro momento, será realizado contato, por telefone e por email, com todos os coordenadores de cursos de especialização em Endodontia vinculados às Universidades Brasileiras, convidando-os a participar da pesquisa. Então, todos os alunos matriculados nesses cursos serão também convidados a participar do estudo. Aos coordenadores e alunos serão aplicados questionários contendo sete casos clínicos fictícios, descrevendo todos os sinais e sintomas referentes às condições do paciente, para que se possam ter todas as informações necessárias para o diagnóstico e plano de tratamento. Os participantes deverão também preencher um questionário com perguntas referentes ao seu perfil profissional (ano de formatura, nome da instituição de graduação e especialização, idade). Os questionários serão preenchidos por meio da Plataforma digital Qualtrics. Os pesquisadores esclarecem que é necessária a participação de pelo menos 50 participantes. Os percentuais de indicação de tratamento conservador ou radical da polpa para cada um dos casos do estudo serão levantados e

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discutidos. Da mesma forma, será realizada análise das motivações que guiaram a conduta clínica dos alunos, bem como a influência do posicionamento teórico defendido pelos professores do curso de especialização na tomada de decisão clínica.

Objetivo da Pesquisa:

Identificar os fatores que influenciam na tomada de decisão sobre tratamento pulpar conservador ou radical dos alunos da especialização em Endodontia de diferentes universidades do Brasil. Os objetivos específicos são:

*Identificar as diferentes filosofias de trabalho entre universidades do Brasil e os fatores que orientam as posturas adotadas.

*Analisar quais são os fatores sugeridos pelo profissional que alterariam o plano de tratamento.

Analisar a influência do tempo de experiência clínica na tomada da decisão do plano de tratamento.

Avaliar a influência da orientação recebida na formação profissional nos diferentes níveis (graduação e especialização) na postura dos profissionais frente ao manejo do tecido pulpar.

Avaliação dos Riscos e Benefícios:

Conforme descrito pelos pesquisadores:

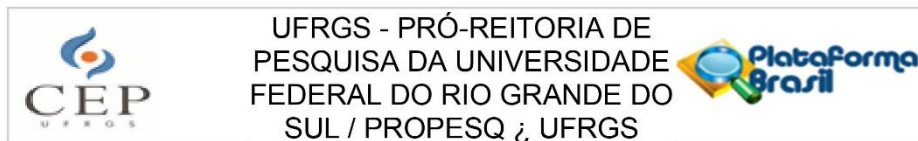
“O possível risco referente à participação no presente projeto é de quebra de confidencialidade. Esse risco será minimizado pela assinatura do termo de confidencialidade pelos pesquisadores e pela codificação dos questionários. Além disso, os questionários serão gerados pela plataforma Qualtrics, que também auxilia na preservação do anonimato dos participantes”.

O pesquisadores descrevem que: “O benefício é indireto. O trabalho contribuirá para o desenvolvimento do tema, com análise e comparação das filosofias de trabalho de cada instituição, bem como dos fatores que influenciam as tomadas de decisão feitas pelos alunos incluídos na amostra”

Comentários e Considerações sobre a Pesquisa:

Foi solicitado aos pesquisadores informar no projeto de pesquisa como os participantes (alunos dos cursos de especialização) serão convidados e informados sobre os objetivos/procedimentos

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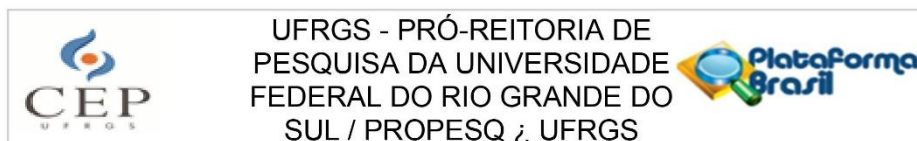
da pesquisa, bem como se dará o processo de consentimento/acesso aos questionários. Os pesquisadores responderam que "Previamente à aplicação dos questionários, será realizado contato com os coordenadores dos cursos de especialização em Endodontia, por telefone, explicando os objetivos do estudo. Além disso, as informações serão repassadas por email, convidando os coordenadores a participarem da pesquisa e repassarem aos seus alunos de especialização o convite à participação. Todos os alunos matriculados nesses cursos serão convidados a participar do estudo, bem como o coordenador do curso de Especialização de Endodontia de cada instituição. Apenas os alunos que aceitarem participar da pesquisa, mediante assinatura digital do Termo de Consentimento Livre e Esclarecido (TCLE), na própria plataforma Qualtrics, serão incluídos na amostra e terão acesso ao questionário para resposta online" (PENDÊNCIA RESPONDIDA).

Sobre o TCLE, pediu-se esclarecimento sobre quanto tempo deverá ser dedicado ao preenchimento dos questionários e se todos os sete casos clínicos deverão ser analisados num único momento. Os pesquisadores responderam: Os pesquisadores enviarão, via plataforma Qualtrix, os casos clínicos para análise a cada universidade. O questionário contendo todos os casos será respondido pelos alunos e coordenadores em um só momento, tendo duração aproximada de 1 hora." (PENDÊNCIA RESPONDIDA)

Além disso, os pesquisadores acrescentaram ao TCLE a seguinte descrição sobre benefícios e possíveis desconfortos decorrentes da participação na pesquisa (estavam faltando na versão anterior): "O benefício é indireto. O trabalho contribuirá para o desenvolvimento do tema, com análise e comparação das filosofias de trabalho de cada instituição, bem como dos fatores que influenciam as tomadas de decisão feitas pelos alunos incluídos na amostra. "A participação neste estudo não implica nenhum custo financeiro. Apesar dos resultados serem divulgados publicamente para fins acadêmicos e científicos, será preservada sua identidade e demais dados confidenciais que possam estar envolvidos nesta pesquisa. Com a utilização da plataforma Qualtrics, este risco de quebra de confidencialidade é reduzido. Os possíveis desconfortos relativos à participação do aluno/coordenador na pesquisa referem-se ao tempo despendido para completar a atividade." (PENDÊNCIA RESPONDIDA)

Solicitou-se que os pesquisadores explicassem no TCLE que recusa em participar da pesquisa não acarretará qualquer prejuízo nem comprometerá a participação do aluno nas atividades do curso

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de especialização e que após a análise de dados, os participantes terão acesso aos resultados. A nova versão diz que: "A recusa em participar ou a retirada de seu consentimento é uma opção pessoal e não acarretará em prejuízos ou comprometerá a participação do aluno/coordenador no curso de especialização. Antes e durante a investigação, terá toda a liberdade de pedir esclarecimentos sobre a metodologia utilizada ou qualquer outro questionamento". "Após a análise dos dados, os participantes terão acesso aos resultados da pesquisa, os quais serão encaminhados para o email cadastrado". (PENDÊNCIA RESPONDIDA).

O cronograma foi reformulado sendo que as atividades terão início em janeiro de 2020 com término previsto para abril do mesmo ano (PENDÊNCIA RESPONDIDA)

Considerações sobre os Termos de apresentação obrigatória:

Foram apresentados TCLE (pendências respondidas) e TCUD

Recomendações:

Pela aprovação

Conclusões ou Pendências e Lista de Inadequações:

Todas as pendências foram adequadamente respondidas. Pela aprovação

Considerações Finais a critério do CEP:

Projeto aprovado.

Encaminha-se.

Este parecer foi elaborado baseado nos documentos abaixo relacionados:

Tipo Documento	Arquivo	Postagem	Autor	Situação
Informações Básicas do Projeto	PB_INFORMAÇÕES_BÁSICAS_DO_PROJETO_1419252.pdf	16/12/2019 12:24:13		Aceito
Outros	cartaresposta.pdf	16/12/2019 12:20:00	Roberta Kochenborger Scarparo	Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	tle.pdf	16/12/2019 12:19:42	Roberta Kochenborger Scarparo	Aceito
Projeto Detalhado / Brochura	projetocorrplatbra.pdf	16/12/2019 12:19:25	Roberta Kochenborger	Aceito

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Investigador	projecorrplatbra.pdf	16/12/2019 12:19:25	Scarpato	Aceito
Parecer Anterior	PB_PARECER_CONSUBSTANCIADO_CEP_3745777.pdf	11/12/2019 17:00:08	Paulo Augusto Scalzilli	Aceito
Folha de Rosto	folhaderostopaulopolpaass.pdf	24/10/2019 11:09:48	Roberta Kochenberger Scarpato	Aceito
Outros	Casos_Qualtrix.pdf	11/10/2019 00:57:34	Paulo Augusto Scalzilli	Aceito
Declaração de Pesquisadores	Termo_de_confidencialidade_pesquisadores.pdf	11/10/2019 00:48:39	Paulo Augusto Scalzilli	Aceito

Situação do Parecer:

Aprovado

Necessita Apreciação da CONEP:

Não

PORTO ALEGRE, 18 de Dezembro de 2019

Assinado por:

MARIA DA GRAÇA CORSO DA MOTTA
(Coordenador(a))

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