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CENTRO DE CIÊNCIAS DA SAÚDE
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ODONTOLÓGICAS

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**O USO DE CRITÉRIOS PARA AVALIAÇÃO DE RESTAURAÇÕES EM
DENTES DECÍDUOS POR ALUNOS DE GRADUAÇÃO E PÓS-
GRADUAÇÃO IMPACTA NA DECISÃO DE TRATAMENTO?**

Santa Maria, RS
2019

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NA DECISÃO DE TRATAMENTO?**

Dissertação apresentada ao Curso de Mestrado do Programa de Pós-Graduação em Ciências Odontológicas, Área de concentração em Odontologia, ênfase em Odontopediatria, da Universidade Federal de Santa Maria (UFSM, RS), como requisito parcial para a obtenção do título de **Mestre em Ciências Odontológicas**.

Orientadora: Prof^a. Dr^a. Tathiane Larissa Lenzi

Santa Maria, RS
2019

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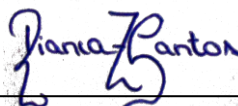
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DEDICATÓRIA

*Com amor, ao meu namorado Rodrigo, aos meus pais e aos meus irmãos.
Gratidão desmedida a vocês por sempre estarem ao meu lado, ensinando e
dedicando amor!*

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À Universidade Federal de Santa Maria, ao Curso de Odontologia e ao Programa de Pós-Graduação em Ciências Odontológicas por todas as experiências e pela oportunidade de continuar estudando nessa instituição, que me proporcionou grande crescimento, profissional e pessoal.

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*“Quem caminha sozinho pode até chegar mais rápido, mas aquele que vai acompanhado, com certeza vai mais longe”
(Clarice Lispector)*

“Keep your eyes on the sky and your feet on the ground”

(Theodore Roosevelt)

RESUMO

O USO DE CRITÉRIOS PARA AVALIAÇÃO DE RESTAURAÇÕES EM DENTES DECÍDUOS POR ALUNOS DE GRADUAÇÃO E PÓS-GRADUAÇÃO IMPACTA NA DECISÃO DE TRATAMENTO?

AUTORA: Djessica Pedrotti
ORIENTADORA: Tathiane Larissa Lenzi

Este estudo visou avaliar o impacto da utilização de critérios clínicos para avaliação de restaurações em dentes decíduos. Para isso, uma amostra de conveniência foi utilizada. Foram selecionadas 27 restaurações de resina composta realizadas em molares decíduos de 11 crianças atendidas na Clínica de Odontopediatria da Universidade Federal de Santa Maria. Cinco alunos do curso de graduação e cinco alunos do curso de pós-graduação foram treinados para a avaliação da qualidade das restaurações por meio dos critérios propostos pela Federação Dentária Internacional (FDI). Os examinadores realizaram, independentemente, as avaliações clínicas das restaurações. Previamente ao treinamento dos examinadores, as restaurações foram avaliadas de acordo com o julgamento pessoal a fim de determinar a necessidade ou não de intervenção (reparo ou substituição). Em caso de necessidade de reintervenção, o motivo foi registrado. Após 2 semanas, as mesmas restaurações foram avaliadas de acordo com os critérios da FDI. Após todas as avaliações, dois examinadores com experiência na avaliação da qualidade de restaurações e no uso dos critérios da FDI examinaram os mesmos dentes restaurados das crianças envolvidas no estudo. Em consenso, os mesmos julgaram se cada restauração apresentava-se clinicamente satisfatória, necessitava de reparo ou substituição. Esses resultados foram considerados o padrão de referência. Para as análises, dois desfechos foram considerados: ser mais ou menos invasivo com a utilização dos critérios da FDI em comparação com o julgamento pessoal. Análise de regressão de Poisson foi utilizada para identificar possíveis fatores associados com os desfechos. O número de resultados verdadeiro positivo, verdadeiro negativo, falso positivo e falso negativo, de acordo com o padrão de referência, também foi registrado. Os examinadores que levaram mais tempo para a avaliação das restaurações foram mais invasivos com o uso dos critérios da FDI (razão de taxa (RT)=1,00, 95% intervalo de confiança (IC)=1,00-1,00; $p=0,03$). O tempo médio para avaliação das restaurações com os critérios da FDI foi duas vezes maior do que com o julgamento pessoal. Os alunos foram mais invasivos com o uso dos critérios da FDI quando examinaram crianças com maior experiência de cárie (RT=1,16,95%IC=1,01-1,32; $p=0,03$). Examinadores foram menos invasivos com o uso dos critérios da FDI quando restaurações envolvendo múltiplas superfícies foram avaliadas (RT=2,04,95%IC=1,03-4,05; $p=0,04$). A experiência dos examinadores não influenciou na tomada de decisão clínica. Um maior número de resultados falso positivos foi observado quando a tomada de decisão foi mais invasiva com o uso dos critérios da FDI, enquanto que um maior número de resultados falso negativos foi reportado quando os estudantes foram menos invasivos com o FDI. Em geral, os estudantes tenderam a acertar a avaliação clínica das restaurações e subsequente decisão de tratamento. Em conclusão, o uso dos critérios propostos pela FDI impactou na avaliação da qualidade das restaurações e na decisão de tratamento. No entanto, o nível de experiência do examinador não influenciou a tomada de decisões.

Palavras-chave: Dente Decíduo. Falha de Restauração Dentária. Odontopediatria. Reparação de Restauração Dentária.

ABSTRACT

DOES USE OF CRITERIA FOR RESTORATIONS' ASSESSMENT IN PRIMARY TEETH BY UNDERGRADUATE AND GRADUATE STUDENTS IMPACT IN THE TREATMENT DECISION?

AUTHOR: Djessica Pedrotti
ADVISOR: Tathiane Larissa Lenzi

This study aimed to evaluate the impact of the use of clinical criteria for the evaluation of restorations in primary teeth. For this, a convenience sample was used. Twenty-seven composite resin restorations of primary molars performed in 11 children who attended the Odontopediatric Clinic of the Federal University of Santa Maria were selected. Five undergraduate students and five graduate students were trained to evaluate the quality of restorations based on the criteria proposed by the World Dental Federation (FDI). Examiners independently performed the clinical evaluations of the restorations. Prior to the training of examiners, restorations were evaluated according to personal judgment to determine the need for intervention (repair or replacement). In case reintervention was needed, the reason was recorded. After 2 weeks, the same restorations were evaluated according to the FDI criteria. After all evaluations, two examiners with experience in assessing the restorations' quality and using the FDI criteria examined the same restored teeth in children involved in the study. In consensus, they judged whether each restoration was clinically satisfactory or required repair or replacement. These results were considered the reference standard. For the analyses, two outcomes were considered: more or less invasive based on the FDI criteria in comparison with personal judgment. Poisson regression analysis was used to identify possible factors associated with outcomes. The numbers of true positive, true negative, false positive, and false negative results, according to the reference standard, were also recorded. Examiners that took more time to evaluate the restorations were more invasive based on the FDI criteria (rate ratio (RR)=1.00, 95% confidence interval (CI)=1.00–1.00; $p=0.03$). The mean time to evaluate restorations based on the FDI criteria was two times greater than for personal judgment. The students were more invasive with the use of the FDI criteria when examined children with greater caries experience (RR=1.16, 95% CI=1.01–1.32; $p=0.03$). Examiners were less invasive with FDI criteria when restorations involving multiple surfaces were evaluated (RR=2.04, 95% CI=1.03–4.05; $p=0.04$). The examiners' experience did not influence the clinical decision-making. A greater number of false positive results were observed when decision-making was more invasive based on the FDI criteria, while a greater number of false negative results were reported when students were less invasive based on the FDI criteria. Overall, the students tended to agree with the clinical evaluation of the restorations and subsequent treatment decision. In conclusion, the use of the criteria proposed by FDI had an impact on the evaluation of restorations' quality and treatment decision. However, the level of examiner experience did not influence the decision-making.

Keywords: Tooth, Deciduous. Dental Restoration Failure. Pediatric Dentistry. Dental Restoration Repair.

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1 INTRODUÇÃO

Restaurações adesivas são amplamente utilizadas em Odontopediatria e a taxa de falha anual dessas restaurações em dentes decíduos varia entre 4 e 9% (BÜCHER et al., 2014; PINTO et al., 2014). Nesses casos, a substituição de restaurações é um dos procedimentos mais comuns na prática clínica odontológica (WILSON et al., 2016). Os principais motivos de falha das restaurações em dentes posteriores são o diagnóstico de cárie recorrente e fratura (GORDAN et al., 2006). Por outro lado, aspectos relacionados à estética, como cor, forma anatômica e manchamento, frequentemente levam à substituição de restaurações nos dentes anteriores (DEMARCO et al., 2015). No entanto, os parâmetros utilizados para avaliação da qualidade das restaurações são muitas vezes subjetivos e pequenas alterações podem determinar a substituição da restauração.

Tem sido demonstrado que quando a restauração defeituosa é em molares, os dentistas que realizaram a restauração original são mais propensos à realização do reparo (GORDAN et al., 2014). Ademais, os profissionais tendem a realizar a substituição quando a restauração está associada com fratura (GORDAN et al., 2014). Além da decisão ser subjetiva, como supracitado, a falta de treinamento e de experiência clínica com reparo de restaurações pode contribuir para essa tomada de decisão.

Neste sentido, diferentes critérios foram propostos a fim de padronizar a avaliação de restaurações em estudos clínicos. Além disso, esses critérios poderiam ser úteis para os dentistas acompanharem as restaurações realizadas na prática clínica ao longo do tempo. Estudantes também poderiam ser treinados como parte da avaliação clínica para determinar se uma restauração pode ser mantida ou se necessita ser reparada ou substituída (HICKEL et al., 2010).

Os critérios propostos pela Federação Dentária Internacional (FDI) são baseados na avaliação de parâmetros biológicos, estéticos e funcionais, sendo mais sensíveis para identificar alterações nas restaurações adesivas (MARQUILLIER et al., 2018; HICKEL et al., 2010). Para cada parâmetro, um escore é registrado, sendo: 1. clinicamente excelente, 2. clinicamente bom, 3. clinicamente suficiente, 4. clinicamente insatisfatório e 5. clinicamente muito ruim. Os escores 4 e 5 fornecem uma série de situações em que o reparo ou substituição deveriam ser indicados,

auxiliando o profissional na tomada das decisões clínicas.

No entanto, nenhum estudo prévio investigou o impacto da utilização de um critério por alunos de graduação e pós-graduação em Odontologia na avaliação da qualidade de restaurações e na decisão de tratamento referente às restaurações avaliadas. Além disso, os critérios da FDI não têm sido adotados na prática clínica para decidir entre reparo e substituição (WILSON et al., 2016).

Um estudo recente (KIM et al., 2017) avaliou a reprodutibilidade inter e intra-examinador quando os critérios propostos pela FDI foram utilizados para avaliação de fotografias de restaurações em dentes posteriores permanentes. Em geral, a concordância intra-examinador foi melhor do que a reprodutibilidade interexaminadores e as maiores discordâncias ocorreram quando propriedades estéticas foram avaliadas. Ademais, a avaliação foi realizada apenas por dentistas com experiência clínica.

Embora a experiência dos examinadores não seja um fator determinante para a detecção de lesões de cárie em dentes decíduos, dentistas com pouca experiência tendem a realizar tratamentos mais invasivos e até mesmo intervir em dentes sem necessidade de tratamento (BUSSANELI et al., 2015). Neste contexto, parece relevante o ensino e a utilização de critérios que auxiliem estudantes de Odontologia no julgamento da qualidade de restaurações.

Um critério que leva ao sobretratamento não seria desejável nos dias de hoje. O ciclo restaurador repetitivo, além de não estar adequado à atual filosofia de mínima intervenção, pode levar a perda de estrutura dentária sadia, assim como ao seu enfraquecimento (GORDAN, MONDRAGON & SHEN, 2002). Conseqüentemente, a decisão de reparar ou substituir uma restauração é um passo clínico importante, pois afetará a longevidade do dente restaurado (GORDAN et al., 2014).

Sendo assim, a realização de um estudo que avalie se a utilização de critérios clínicos minimiza a necessidade de reintervenção das restaurações, bem como, se a experiência do examinador influencia a avaliação clínica, se faz necessária.

2 ARTIGO - Can the use of FDI criteria for evaluating restoration quality affect clinical decision-making?

Este artigo será submetido ao periódico *International Journal of Paediatric Dentistry* (ISSN online:1365-263X) - Fator de Impacto: 1.383; Qualis CAPES A1. As normas para publicação estão descritas no ANEXO A.

Can the use of FDI criteria for evaluating restoration quality affect clinical decision-making?

Short title: Use of FDI criteria in restorations' evaluation

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Author contributions

D.P. performed the methodology, wrote the manuscript; C.P.C performed the methodology; R.O.R performed the methodology, contributed substantially to discussion; M.M.B consulted on and performed statistical evaluation, proofread the manuscript; T.M.A proofread the manuscript and T.L.L idea, performed the methodology, proofread the manuscript.

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Summary

Aim: To investigate the impact of World Dental Federation (FDI) criteria for evaluating restorations' quality in primary teeth. *Design:* A cross-sectional study in a dental office setting was performed selecting 11 children (with 27 composite restorations). Five undergraduate dental students and five graduate students examined the restorations. First, evaluations were performed based on personal judgment, and 2 weeks later, with FDI criteria. All examiners underwent training to use the FDI criteria after the first evaluation. Two benchmark examiners evaluated the children, and their consensus was considered to be the reference standard. Multiple Poisson regressions analyses were used to identify possible associated factors with outcomes. *Results:* Examiners who spent more time for evaluation with FDI criteria were more invasive (RR=1.00, 95%CI=1.00-1.00; p=0.03). Students were more invasive when examined children with greater *dmf-t* (RR=1.16, 95%CI=1.01-1.32; p=0.03). Examiners were less invasive when restorations involving multiple surfaces were evaluated with FDI criteria (RR=2.04, 95%CI=1.03-4.05; p=0.04). A greater number of false positive and false negative results were found when examiners were more and less invasive with FDI criteria, respectively. *Conclusion:* Use of FDI criteria influenced the evaluation of restorations' quality and treatment decision; however, the examiners' experience levels did not affected the decision-making process.

Keywords: Clinical decision-making; Deciduous tooth, Dental restoration; Resin composite; Paediatric dentistry

Introduction

Restoration replacement is the most common treatment for managing defective restorations, and is well-accepted within paediatric dentistry¹. Recurrent caries and fractures are the main reasons for restoration failure in posterior teeth,² whereas aspects related to aesthetics, such as colour, anatomic form, and staining, frequently lead to the re-intervention for anterior restorations³. However, parameters for evaluating the restoration quality are often subjective, and slight alterations may determine the replacement, as each one has its own concept of defective restorations.

Most dentists are not conservative when they revisit a restoration that they performed, irrespective of the type of failure⁴. Nonetheless, dentists who had placed the original restoration are significantly more likely to repair defective restorations placed in molars⁴. The examiners' experience also may be a determinant in the clinical evaluation of restorations and subsequent decision-making process.

It has been shown that dentists with little experience tend to perform more invasive treatments in primary teeth, or in some cases, even intervene in teeth that do not need any treatment⁵. Moreover, due to the relatively short lifespan of primary teeth, the decision for re-intervention in a defective restoration is not always an easy task.

Therefore, criteria proposed for standardising the evaluation of restorative materials in clinical trials could be useful for assessing the restorations' quality placed by clinicians in their own practices. Dental students should also be trained to use them as part of clinical evaluations to determine whether a restoration can be maintained or whether it needs repair or replacement⁶.

The criteria proposed by the World Dental Federation (FDI) are based on the

evaluation of biological, aesthetic, and functional properties, and they have been considered more sensitive to identify changes in adhesive restorations^{6,7}. Interestingly, the FDI criteria classify non-acceptable restorations in two categories: whether the restoration can be corrected/repared and whether it must be replaced completely⁶.

Despite that, to the best our knowledge, no previous study has investigated if the use of clinical criteria affects the decision for restoration re-intervention. Thus, this study aimed to investigate the impact of the FDI criteria on the evaluation of restorations' quality and treatment decision and if the examiners' experience influences this process.

Material and Methods

Ethical concern and sample selection

The research protocol was approved by the Local Research Board and the parents or guardians provided written informed consent. The personal information of the children was kept confidential.

A convenience sample was used in this study. The inclusion criteria were children with primary or mixed dentition who had sought dental treatment at the School of Dentistry of the Federal University of Santa Maria. An examiner (D.P.) who was not involved in the evaluations visually selected satisfactory and defective restorations based on aesthetics, functional, and biological reasons. Thus, 27 composite restorations of 11 children, aged 5 to 10 years old, were included.

Dental examinations

Ten examiners with different levels of clinical experience performed the assessments: five undergraduate dental students and five graduate students. The undergraduate students were in their last year of study in the course of Dentistry. The

graduate students were enrolled in the MSc course at the same university, and they had at least 2 years of clinical experience. Furthermore, no students had previous experience in using FDI criteria.

First, the examinations were performed based on personal judgment and on a second occasion, 2 weeks later, the restorations were assessed according to the FDI criteria.⁶ FDI criteria were categorized into three groups: aesthetic (colour, anatomic form, staining, and lustre), functional (fracture and marginal adaptation) and biological (recurrent caries) parameters. Each criterion of the FDI can be expressed with five scores; three for acceptable (1. clinically very good; 2. clinically good; 3. clinically sufficient/satisfactory) and two for non-acceptable (4. clinically unsatisfactory – repairable restoration; 5. clinically poor – restoration replacement). For clinical decision-making, the worst grading among all parameters of the criteria was considered.

The students underwent a total of 8 h of specific training involving theoretical explanations, discussions, and assessment of 20 photographs that were representative of each score of the FDI criteria. A benchmark examiner (R.O.R.) was responsible for the training session and had been trained and calibrated for using the criteria.

Before the examinations, the teeth were carefully cleaned with rotating bristle brush and pumice/water slurry. Visual inspection was performed with the subjects positioned in a dental unit with operating light illumination, using a 3-in-1 syringe, plane dental mirror, and World Health Organization periodontal probe (Hu-Friedy, Rio de Janeiro, Brazil). All restorations were assessed independently and randomly distributed in the two assessments to avoid memory bias. The duration of each examination was measured using a digital stopwatch for all evaluations.

Reference standard

After the examinations, two examiners who had experience in the assessment of restoration quality and in using the FDI criteria (R.O.R. and T.L.L.) also examined the children in a joint session and judged if the restorations were clinically acceptable or required repair or replacement. The consensus of these examiners was considered the reference standard.

Statistical analysis

Data analyses were performed using STATA 13.0 software (Stata Corp., College Station, Texas, USA). For the analyses, two outcomes were considered: to be more or less invasive based on the FDI criteria in relation to personal judgment. Multiple Poisson regression analyses were used to identify possible associated factors with outcomes. A level of significance of 0.20 in the unadjusted analyses was regarded for variables entry into the model, and a level of 0.05 was considered to be retained in the final models. Rate ratios (RRs) were calculated with 95% confidence intervals (CIs).

The descriptive analysis provided the distribution of true positive, true negative, false positive and false negative results, according to the reference standard.

Results

Six (54.5%) boys and five (45.5%) girls, with a mean age of 8 years (standard deviation (SD) = 1.4), participated in the study. Considering the reference standard examination, 7 (25.9%) restorations were clinically satisfactory, 14 (51.9%) were reparable, and 6 (22.2%) were required replacement.

The children presented a mean decayed, missing, and filled tooth (*dmf-t*) index of 6.3 (SD=2.8). The mean times to evaluate the restorations based on the FDI

criteria were 34.4 min (standard deviation=7.1) and 31.6 min (standard deviation=4.6) for undergraduate and graduate students, respectively. The mean times to evaluate the restorations based on personal judgment were 15.2 min (standard deviation=4.3) and 7 min (standard deviation=0.7) for undergraduate and graduate students, respectively.

The multiple Poisson regression analyses are summarised in Table 1. Examiners who spent more time for evaluation based on the FDI criteria were more invasive (RR=1.00, 95%CI=1.00-1.00; $p=0.03$). Moreover, students were more invasive when examined children with higher *dmf-t* (RR=1.16, 95%CI=1.01-1.32; $p=0.03$). Conversely, examiners were less invasive when restorations involving multiple surfaces were evaluated using the FDI criteria (RR=2.04, 95%CI=1.03-4.05; $p=0.04$).

Table 2 shows the distribution of the results according to the reference standard considering the two outcomes. Overall, the examiners tended to make proper treatment decision. Irrespective of the clinical experience level, the number of false positive results was greater than false negative ones when decision-making was more invasive using FDI criteria in comparison with personal judgment. Thus, a probability of overtreatment was observed when FDI criteria were used.

Conversely, a greater number of false negative results were observed when examiners were less invasive in the assessment of restorations with FDI criteria in relation to personal judgment, leading to underestimation of the restorations' quality.

Discussion

In recent years, the use of FDI criteria in clinical trials has increased significantly, accounting for 50% of the published papers in 2016⁷. The FDI criteria have been described as practical, relevant, and standardised criteria⁷. Through these

criteria, the restorations are examined according to different parameters and then classified as acceptable or non-acceptable (with the latter indicating that the restoration must be repaired or replaced). Therefore, we hypothesised that their use makes decision-making less intuitive, aiding in the assessment of restorations' quality. This is the first study that investigated the impact of the FDI criteria on the evaluation of the restoration quality and treatment decision by undergraduate and graduate students.

In our study, two outcomes were considered: FDI criteria being more and less invasive than personal judgment. Examiners who spent more time for evaluation with FDI criteria were more invasive. Overall, clinicians are more accustomed to drawing on previous experiences to establish a diagnosis⁸. This process is less time consuming and more practical to perform as part of a daily clinical routine⁸. Hypothetical-deductive models of clinical reasoning, such as the FDI criteria, involve a stepwise process and, therefore, are more time-consuming. Clinicians consider more information and different possibilities to arrive at a diagnosis and the respective treatment decision⁸.

The mean time to evaluate the restorations using the FDI criteria was approximately 2 times greater than that spent with personal judgment, irrespective of the examiners' experience level. On one hand, a more time-consuming process may lead to more doubts and may lead to the restorations' evaluation to be more prone to errors influenced by external factors such as patients' oral health conditions. On the other hand, the evaluation based on personal judgment was less time-consuming, but was influenced by the examiners' experience because undergraduate students spent more time performing the evaluations than the graduate students.

No examiners had previous experience using the FDI criteria and all

examiners received the same training for their use. It is important to highlight that the examiners were trained to use the FDI criteria after the first evaluation of the restorations based on personal judgment to avoid a possible effect residual from one method over the other.

Students tended to intervene more in the restorations using the FDI criteria when examining children with higher *dmf-t*, i.e. examiners tended to overestimate the decision-making in children with greater caries experience due to their worse oral health conditions. A greater number of false positive results were found when examiners were more invasive using FDI criteria. This may be attributed to cognitive bias related to the individuals' mental processing⁹, which likely occurs when clinicians filter the information available according to their own experiences and beliefs¹⁰. Previous studies reported that the children's caries experience influenced the performance of visual inspection in detecting caries lesions in primary teeth, evidencing the occurrence of cognitive biases^{11,12}.

In contrast, examiners were 2.04 times less invasive when restorations involving multiple surfaces were evaluated with FDI criteria in comparison with personal judgment. A greater number of false negative results were verified when examiners were less invasive in the assessment of restorations with FDI criteria, indicating a tendency toward underestimation. Several parameters proposed by the FDI, each expressed in five scores (three acceptable and two unacceptable), can be difficult to evaluate in proximal restorations due to arch position, and consequently, examiners tend to be more conservative. Meanwhile, the evaluation of the restorations based on personal judgment is strongly influenced by previous experience and knowledge. It has been shown that a higher number of surfaces enrolled in cavity preparations can decrease the tooth resistance to fracture², even in

primary teeth that had lower occlusion loading compared than that in permanent ones¹³. Moreover, there is a greater risk of failure when the proximal surface is involved because of recurrent caries in the cervical wall¹⁴. Thus, there was a tendency of overtreatment when examiners judged the restoration quality based on personal judgment.

The experience levels of the examiners did not influence clinical decision-making. Similar results were found when the influence of examiner experience on the performance of visual inspection for caries detection was evaluated.^{5,15-16} In our study, undergraduate students were in their last year of study in the course of Dentistry and MSc graduate students had at least 2 years of experience, which may explain the similar performances in evaluating restoration quality. Furthermore, a detailed description of five possible conditions of each parameter examined using the FDI criteria was provided for the examiners, and consequently, the evaluations would be less influenced by the examiners. Overall, the examiners tended to make proper treatment decisions using the FDI criteria (most results were true positives and true negatives).

A limitation of our study was the small convenience sample of restorations and examiners, which may have influenced the findings. These students may present several differences considering a general sample of undergraduate and graduate students, including individual skills such as knowledge, interest, and practical abilities.

Although the use of FDI criteria seems to be logical, clinicians (mainly more experienced ones) think differently from each other in clinical settings. They are accustomed to drawing on past clinical experience to make a diagnosis, and therefore they can be more resistant to learning about prescriptive methods of clinical

examination. Further studies addressing the performance of examiners more experienced in the evaluation of restorations based on FDI criteria are necessary.

In conclusion, the FDI criteria influenced the evaluation of the restoration quality and treatment decision. A more time-consuming process for evaluation and greater children's caries experience were related to more invasive decision-making using the FDI criteria, while the evaluation of multi-surfaces restorations was associated with lower frequency of intervention based on the FDI criteria. The decision-making process was not affected by examiners' experience levels.

Why this paper is important to paediatric dentists

The use of the FDI criteria could aid the paediatric dentists in the evaluation of the restoration quality and treatment decision, independent of their clinical experience levels.

Factors such as a more time-consuming process for restoration evaluation and children's poor oral health conditions are related to more invasive decision-making with FDI criteria, while the higher number of restorations surfaces is associated with more conservative approaches when using the clinical criteria.

Conflict of interest

The authors declare no conflict of interest.

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Table 1. Multiple Poisson regression analyses.

Variables	RR _{crude} (95%CI)	p-value	RR _{adjusted} (95%CI)	p-value	Variables	RR _{crude} (95%CI)	p-value	RR _{adjusted} (95%CI)	p-value
More invasive with FDI criteria					Less invasive with FDI criteria				
<i>Examiner</i>					<i>Examiner</i>				
Gold standard	1				Gold standard	1			
Undergraduate student	0.61 (0.10-3.80)	0.60			Undergraduate student	0.82 (0.34-2.00)	0.67		
Graduate student	1.10 (0.44-2.78)	0.84			Postgraduate student	1.15 (0.27-4.93)	0.85		
<i>dmf-t</i>	1.16 (1.02-1.32)	0.02	1.16 (1.01-1.32)	0.03	<i>dmf-t</i>	1.05 (0.92-1.20)	0.49		
<i>Type of arch</i>					<i>Type of arch</i>				
Superior	1				Superior	1			
Inferior	0.65 (0.30-1.42)	0.28			Inferior	0.75 (0.33-1.70)	0.48		
<i>Number of restored surfaces</i>					<i>Number of restored surfaces</i>				
One	1				One	1		1	
Two or more	1.24 (0.65-2.35)	0.52			Two or more	2.00 (1.05-3.82)	0.04	2.04 (1.03-4.05)	0.04
<i>Time spent with FDI criteria</i>	1.00 (1.00-1.00)	0.03	1.00 (1.00-1.00)	0.03	<i>Time spent with FDI criteria</i>	1.00 (1.00-1.00)	0.14	1.00 (1.00-1.00)	0.14
<i>Decision-making</i>					<i>Decision-making</i>				
None intervention	1				None intervention	1			
Repair	1.33 (0.61-2.91)	0.47			Repair	1.57 (0.70-3.53)	0.27		
Replacement	1.42 (0.55-3.69)	0.47			Replacement	1.40 (0.04-0.18)	0.52		

Table 2. Distribution of the results according to the reference standard.

More invasive using the FDI criteria	Undergraduate Students (n=5)	Graduate Students (n=5)	Less invasive using the FDI criteria	Undergraduate Students (n=5)	Graduate Students (n=5)
True positive	1	1	True positive	0	4
True negative	108	108	True negative	99	104
False positive	17	17	False positive	16	10
False negative	9	9	False negative	20	17

3 CONCLUSÃO

Tem sido evidenciado que dentes com restaurações são mais propensos a exigir restaurações adicionais e outros tratamentos relacionados (ELDERTON, 2003). A decisão de intervir ou não em uma restauração terá repercussões biológicas e financeiras, uma vez que irá afetar a sobrevivência do elemento dentário e o custo do tratamento ao longo do ciclo biológico do dente decíduo. A avaliação da qualidade das restaurações é passível de subjetividade e o uso de critérios clínicos poderia tornar a tomada de decisão menos intuitiva. Com isso, o risco de intervenções desnecessárias ou mais invasivas poderia ser reduzido, sendo especialmente vantajoso no atendimento de pacientes infantis.

Os critérios propostos pela FDI são considerados práticos, relevantes e padronizados e, nos últimos anos, seu uso em ensaios clínicos aumentou significativamente, alcançando 50% dos estudos publicados em 2016 (MARQUILLIER et al., 2018). O presente estudo investigou a influência da utilização dos critérios da FDI na avaliação da qualidade das restaurações e subsequente decisão de tratamento por alunos de graduação e pós-graduação.

De fato, o uso dos critérios propostos pela FDI impactou na avaliação das restaurações e na decisão de tratamento. Os examinadores que levaram mais tempo para a avaliação das restaurações foram mais invasivos ao utilizarem os critérios da FDI. O tempo médio para avaliação das restaurações com os critérios da FDI foi duas vezes maior em relação ao julgamento pessoal. Modelos hipotético-dedutivos de raciocínio clínico, como os critérios da FDI, envolvem um processo gradual e, portanto, mais demorado. Os clínicos consideram mais informações e diferentes possibilidades para se chegar a um diagnóstico e a respectiva decisão de tratamento (GOWDA & LAMSTER, 2011).

Os examinadores também foram mais invasivos com os critérios da FDI quando examinaram crianças com maior experiência de cárie, possivelmente devido às suas piores condições de saúde oral. Isso pode ser atribuído a viés cognitivo (EVANS, 2008), onde a tomada de decisões é influenciada pelo julgamento e experiências prévias do examinador. Ademais, um maior número de resultados falso positivos foi observado quando a tomada de decisão foi mais invasiva com o uso dos critérios propostos pela FDI, levando a um sobretratamento.

Por outro lado, os examinadores foram 2 vezes menos invasivos com o uso dos critérios da FDI quando restaurações envolvendo múltiplas superfícies foram avaliadas. Além disso, um maior número de resultados falso negativos foi reportado quando os estudantes foram menos invasivos ao utilizarem os critérios da FDI, subestimando a real condição clínica das restaurações. A avaliação de vários parâmetros propostos pela FDI, cada um deles expresso em cinco escores (três aceitáveis e dois inaceitáveis), pode ser difícil de ser realizada em restaurações ocluso-proximais devido à posição do arco e, conseqüentemente, os examinadores tendem a ser mais conservadores. Por outro lado, tem sido demonstrado que restaurações envolvendo mais de uma superfície são mais propensas à falhas (DEMARCO et al., 2012). Assim, a avaliação das restaurações com base no julgamento pessoal, que é fortemente influenciada pela experiência e conhecimento prévios, pode levar a uma decisão de tratamento mais invasiva frente a essa situação clínica.

Em geral, estudantes tenderam a acertar a decisão de tratamento, visto que um grande número de resultados verdadeiro positivo e verdadeiro negativo foram encontrados, independente do desfecho. Deve-se ressaltar que os examinadores eram alunos do último ano do curso de graduação em Odontologia e estudantes de mestrado com pelo menos 2 anos de experiência clínica, o que pode explicar o fato do nível de experiência dos examinadores não ter influenciado na decisão de tratamento. Ademais, uma pequena amostra de conveniência de restaurações e examinadores foi utilizada no presente estudo, o que também pode ter influenciado os resultados.

Embora o uso dos critérios da FDI pareça ser lógico, os clínicos (principalmente os mais experientes) pensam de maneira diferente uns dos outros em contextos clínicos. Eles estão acostumados a recorrer à experiência clínica anterior para fazer um diagnóstico e, portanto, podem ser mais resistentes ao aprendizado sobre métodos prescritivos para avaliação clínica. Pesquisas futuras avaliando o uso dos critérios propostos pela FDI por examinadores mais experientes, bem como, o custo-benefício de sua aplicabilidade clínica, são necessárias.

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ANEXO A – Normas do periódico *International Journal of Paediatric Dentistry*

Author Guidelines

Sections

1. Submission
2. Aims and Scope
3. Manuscript Categories and Requirements
4. Preparing the Submission
5. Editorial Policies and Ethical Considerations
6. Author Licensing
7. Publication Process After Acceptance
8. Post Publication
9. Editorial Office Contact Details

1. SUBMISSION

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Once the submission materials have been prepared in accordance with the Author Guidelines, manuscripts should be submitted online at <https://mc.manuscriptcentral.com/ijpd>

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2. AIMS AND SCOPE

International Journal of Paediatric Dentistry publishes papers on all aspects of paediatric dentistry including: growth and development, behaviour management, diagnosis, prevention, restorative treatment and issue relating to medically compromised children or those with disabilities. This peer-reviewed journal features scientific articles, reviews, case reports, short communications and abstracts of current paediatric dental research. Analytical studies with a scientific novelty value are preferred to descriptive studies. Case reports illustrating unusual conditions and

clinically relevant observations are acceptable but must be of sufficiently high quality to be considered for publication; particularly the illustrative material must be of the highest quality.

3. MANUSCRIPT CATEGORIES AND REQUIREMENTS

i. Original Articles

Divided into: Summary, Introduction, Material and methods, Results, Discussion, Bullet points, Acknowledgements, References, Figure legends, Tables and Figures arranged in this order.

- **Summary** should be structured using the following subheadings: Background, Hypothesis or Aim, Design, Results, and Conclusions and should be less than 200 words.
- **Introduction** should be brief and end with a statement of the aim of the study or hypotheses tested. Describe and cite only the most relevant earlier studies. Avoid presentation of an extensive review of the field.
- **Material and methods** should be clearly described and provide enough detail so that the observations can be critically evaluated and, if necessary repeated. Use section subheadings in a logical order to title each category or method. Use this order also in the results section. Authors should have considered the ethical aspects of their research and should ensure that the project was approved by an appropriate ethical committee, which should be stated. Type of statistical analysis must be described clearly and carefully.
- **Results** should clearly and concisely report the findings, and division using subheadings is encouraged. Double documentation of data in text, tables or figures is not acceptable. Tables and figures should not include data that can be given in the text in one or two sentences.
- **Discussion** section presents the interpretation of the findings. This is the only proper section for subjective comments and reference to previous literature. Avoid repetition of results, do not use subheadings or reference to tables in the results section.
- **Bullet Points:** Authors will need to provide no more than 3 'key points' that summarise the key messages of their paper to be published with their article. The key points should be written with a practitioner audience in mind under the heading:
*Why this paper is important to paediatric dentists.

ii. Review Articles

May be invited by the Editor.

iii. Systematic reviews

We consider publishing systematic reviews if the manuscript has comprehensive and unbiased sampling of literature and covering topics related to Paediatric Dentistry. Articles for the *International Journal of Paediatric Dentistry* should include: a) description of search strategy of relevant literature (search terms and databases), b) inclusion criteria (language, type of studies i.e. randomized controlled trial or other, duration of studies and chosen endpoints, c) evaluation of papers and level of evidence. For examples see:

Twetman S, Axelsson S, Dahlgren H et al. Caries-preventive effect of fluoride toothpaste: a systematic review. *Acta Odontologica Scandinavica* 2003; 61: 347-355.

Paulsson L, Bondemark L, Söderfeldt B. A systematic review of the consequences of premature birth on palatal morphology, dental occlusion, tooth-crown dimensions, and tooth maturity and eruption. *Angle Orthodontist* 2004; 74: 269-279.

iv. Short Communications

Brief scientific articles or short case reports may be submitted, which should be no longer than three pages of double-spaced text and include a maximum of three illustrations. They should contain important, new, definitive information of sufficient significance to warrant publication. They should not be divided into different parts and summaries are not required.

v. Brief Clinical Reports/Case Reports

Short papers not exceeding 800 words, including a maximum of three illustrations and five references may be accepted for publication if they serve to promote communication between clinicians and researchers. If the paper describes a genetic disorder, the OMIM unique six-digit number should be provided for online cross reference (Online Mendelian Inheritance in Man).

A paper submitted as a Brief Clinical/Case Report should include the following:

- a short **Introduction** (avoid lengthy reviews of literature);
- the **Case report** itself (a brief description of the patient/s, presenting condition, any special investigations and outcomes);
- a **Discussion** which should highlight specific aspects of the case(s), explain/interpret the main findings and provide a scientific appraisal of any previously reported work in the field.
- **Bullet Points:** Authors will need to provide no more than 3 'key points' that summarise the key messages of their paper to be published with their article. The key points should be written with a practitioner audience in mind under the heading:
*Why this paper is important to paediatric dentists.

vi. Letters to the Editor

Should be sent directly to the editor for consideration in the journal.

4. PREPARING THE SUBMISSION

Cover Letters

Cover letters are not mandatory; however, they may be supplied at the author's discretion.

Parts of the Manuscript

The manuscript should be submitted in separate files: title page; main text file; figures.

Title page

The title page should contain:

- i. A short informative title that contains the major key words. The title should not contain abbreviations (see Wiley's [best practice SEO tips](#));
- ii. A short running title of less than 50 characters;
- iii. The full names of the authors and a statement of author contributions, e.g.
Author contributions: A.S. and K.J. conceived the ideas; K.J. and R.L.M. collected the data; R.L.M. and P.A.K. analysed the data; and A.S. and K.J. led the writing;
- iv. The author's institutional affiliations where the work was conducted, with a footnote for the author's present address if different from where the work was conducted;
- v. Acknowledgments;
- vi. Word count (excluding tables)

Authorship

Please refer to the journal's authorship policy the Editorial Policies and Ethical Considerations section for details on eligibility for author listing.

Acknowledgments

Contributions from anyone who does not meet the criteria for authorship should be listed, with permission from the contributor, in an Acknowledgments section. Financial and material support should also be mentioned. Thanks to anonymous reviewers are not appropriate.

Conflict of Interest Statement

Authors will be asked to provide a conflict of interest statement during the submission process. For details on what to include in this section, see the section 'Conflict of Interest' in the Editorial Policies and Ethical Considerations section below. Submitting authors should ensure they liaise with all co-authors to confirm agreement with the final statement.

Main Text File

As papers are double-blind peer reviewed the main text file should not include any information that might identify the authors.

The main text file should be presented in the following order:

- i. Title, abstract and key words;
- ii. Main text;
- iii. References;
- iv. Tables (each table complete with title and footnotes);
- v. Figure legends;
- vi. Appendices (if relevant).

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Abstracts and keywords are required for some manuscript types. For details on manuscript types that require abstracts, please refer to the 'Manuscript Types and Criteria' section.

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Please provide 3-6 keywords. Keywords should be taken from the list provided at submission in ScholarOne.

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- The journal uses British spelling; however, authors may submit using either option, as spelling of accepted papers is converted during the production process.

References

All references should be numbered consecutively in order of appearance and should be as complete as possible. In text citations should cite references in consecutive order using Arabic superscript numerals. For more information about AMA reference style please consult the **AMA Manual of Style**

Sample references follow:

Journal article

1. King VM, Armstrong DM, Apps R, Trott JR. Numerical aspects of pontine, lateral reticular, and inferior olivary projections to two paravermal cortical zones of the cat cerebellum. *J Comp Neurol* 1998;390:537-551.

Book

2. Voet D, Voet JG. *Biochemistry*. New York: John Wiley & Sons; 1990. 1223 p.

Internet document

3. American Cancer Society. *Cancer Facts & Figures 2003*.
<http://www.cancer.org/downloads/STT/CAFF2003PWSecured.pdf> Accessed March 3, 2003

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