Provision of endodontics in specialized public centers for dental care in the Center-West of Brazil

Thiago Machado Pereira*; Alvaro Henrique Borges*; Laura Maria de Amorim Santana Costa*; Durvalino Oliveira*; Luiz Evaristo Ricci Volpato*

* Department of Oral Sciences, Universidade de Cuiabá

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ABSTRACT

Little is known about the use of public dental services in the Center-West region of Brazil, and even less about the number of endodontic treatments. Endodontic procedures through the Brazilian Unified Health System (Sistema Único de Saúde; SUS) are performed mainly in specialized public centers for dental care, and these data are available from the database of the Brazilian Ministry of Health (DATASUS). This study aimed to determine the number of endodontic procedures performed in state capitals in the Center-West of Brazil. We conducted a cross-sectional study with retrospective data collection of all endodontic procedures performed through the SUS from January 2011 to December 2016. Data were obtained from the DATASUS and from the website of the Brazilian Institute of Geography and Statistics and were compared by analysis of variance, using Kolmogorov-Smirnov and Levene’s tests followed by Tukey post hoc test at a significance level of p<0.05. Campo Grande had the largest number of endodontic treatments per inhabitant (0.063), followed by Cuiabá and Goiânia, with similar rates (0.028 and 0.026 respectively), and Brasília (0.006). Teeth with three or more root canals had significantly more endodontic interventions than teeth with one or two root canals (p<0.05). Higher education institutions must be attentive to the changes in the model of dental care offered by the SUS so that their graduates are trained in accordance with the epidemiological profile of the population as well as with health public policies. Descriptors: Dentistry. Endodontics. Unified Health System.
1 INTRODUCTION

The model of public dental care in Brazil has undergone major changes in the past decades\textsuperscript{1-3}. Since the implementation of the Brazilian National Oral Health Policy in 2004, the quality of dental care has improved considerably\textsuperscript{2,3}. Given the once widespread acceptance of tooth extraction via primary care, the increased availability of alternative conservative treatment modalities, such as endodontic treatment, may represent a paradigm shift\textsuperscript{4-6}.

The academic boards of dental schools must be attentive to the changes in the model of dental care offered by the Brazilian Unified Health System (\textit{Sistema Único de Saúde}; SUS) so that their focus can be redirected by such changes, as this type of assistance is influential in determining the profile of human resources that will enter the health-care market\textsuperscript{7}. Therefore, in addition to engaging students in the SUS health-care services and procedures by using different strategies, such as extramural activities, it is also important to prepare them for critical thinking that challenges the status quo\textsuperscript{7,8}.

Maintenance of the dentition can positively affect the overall health and quality of life of individuals\textsuperscript{9}. However, endodontic treatment is a much more complex procedure than the extraction of damaged teeth, and its large-scale implementation in the public sector requires a change not only in philosophy but also in investment\textsuperscript{5,10}. The increasing number of specialized dental procedures performed through the Brazilian Unified Health System (\textit{Sistema Único de Saúde}; SUS) in some Brazilian states may signal a change\textsuperscript{4}.

Little is known about the use of public dental services in the Center-West region of Brazil, and even less about the number of endodontic treatments\textsuperscript{6,11,12}. Endodontic procedures through the SUS are performed mainly in specialized public centers for dental care, and these data are publicly available from a database of the Brazilian Ministry of Health (DATASUS), which makes public health data and information easily accessible for managers, health professionals, and researchers\textsuperscript{13}. The present study was therefore designed to determine the number of endodontic procedures performed through the SUS in state capitals in the Center-West of Brazil.

2 METHODS

We conducted a cross-sectional study with retrospective data collection of all endodontic procedures performed through the SUS in the Brazilian Federal District and in the capital cities of the three states in the Center-West region of Brazil from January 2011 to December 2016. The study was approved by the Research Ethics Committee of the University of Cuiabá (approval number 68813517.5.0000.5165).

Data were collected from the DATASUS\textsuperscript{14}. The search strategy followed a standardized format designed for the database used, including searches in the health information system (TABNET) and outpatient information system (SIA/SUS). The following variables were selected: state capital where the service was provided (Brasília – Federal District, Campo Grande – state of Mato Grosso do Sul, Cuiabá – state of Mato Grosso, and Goiânia – state of Goiás); year of completion (January 2011 to December 2016); and type of procedure (permanent teeth with one root canal, permanent teeth with two root canals, and permanent teeth with three or more root canals).

The data were tabulated using the Tab Program for Windows (TABWIN; Brazilian Ministry of Health, Brasilia, DF, Brazil) and presented as tables and graphs using Microsoft Excel version 15.0 (Office 2013; Microsoft Corp., Redmond, USA). Population data were
obtained from the website of the Brazilian Institute of Geography and Statistics (IBGE; www.ibge.gov.br).

Comparisons between data were performed by analysis of variance, using Kolmogorov-Smirnov and Levene’s tests followed by Tukey post hoc test at a significance level of p<0.05. All statistical analyses were performed using SPSS, version 18.0 for Windows (SPSS Inc., Chicago, IL, USA).

3 RESULTS

Table 1 shows the number of endodontic treatments performed from 2011 to 2016 in specialized public centers for dental care in the Brazilian Federal District and in state capitals in the Center-West of Brazil. The treatment-population ratio per city over 2011-2016 is shown in table 2. Campo Grande had the largest number of endodontic treatments per inhabitant, followed by Cuiabá and Goiânia, with similar rates, and Brasília (table 2). Figure 1 shows the number of endodontic procedures per dental groups in the Center-West of Brazil from 2011 to 2016.

Table 1. Endodontic treatments performed in specialized public centers for dental care in the Federal District and in state capitals in the Center-West of Brazil from 2011 to 2016

<table>
<thead>
<tr>
<th>Procedure/Year</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Brasília, DF</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permanent teeth with one root canal</td>
<td>860</td>
<td>1172</td>
<td>1090</td>
<td>1064</td>
<td>1133</td>
<td>977</td>
<td>6296</td>
</tr>
<tr>
<td>Permanent teeth with two root canals</td>
<td>497</td>
<td>772</td>
<td>699</td>
<td>756</td>
<td>600</td>
<td>814</td>
<td>4138</td>
</tr>
<tr>
<td>Permanent teeth with three or more root canals</td>
<td>1113</td>
<td>1572</td>
<td>1433</td>
<td>1378</td>
<td>1294</td>
<td>1294</td>
<td>8084</td>
</tr>
<tr>
<td><strong>Campo Grande, MS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permanent teeth with one root canal</td>
<td>2593</td>
<td>2241</td>
<td>2657</td>
<td>2794</td>
<td>2743</td>
<td>2558</td>
<td>15586</td>
</tr>
<tr>
<td>Permanent teeth with two root canals</td>
<td>2187</td>
<td>1857</td>
<td>2372</td>
<td>2820</td>
<td>2781</td>
<td>2514</td>
<td>14531</td>
</tr>
<tr>
<td>Permanent teeth with three or more root canals</td>
<td>3815</td>
<td>3513</td>
<td>4049</td>
<td>4515</td>
<td>4644</td>
<td>4013</td>
<td>24549</td>
</tr>
<tr>
<td><strong>Cuiabá, MT</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permanent teeth with one root canal</td>
<td>599</td>
<td>816</td>
<td>1108</td>
<td>1027</td>
<td>904</td>
<td>906</td>
<td>5360</td>
</tr>
<tr>
<td>Permanent teeth with two root canals</td>
<td>474</td>
<td>717</td>
<td>748</td>
<td>789</td>
<td>709</td>
<td>656</td>
<td>4093</td>
</tr>
<tr>
<td>Permanent teeth with three or more root canals</td>
<td>596</td>
<td>992</td>
<td>1405</td>
<td>1322</td>
<td>1606</td>
<td>1273</td>
<td>7194</td>
</tr>
<tr>
<td><strong>Goiânia, GO</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permanent teeth with one root canal</td>
<td>2455</td>
<td>2635</td>
<td>2355</td>
<td>2121</td>
<td>1070</td>
<td>818</td>
<td>11455</td>
</tr>
<tr>
<td>Permanent teeth with two root canals</td>
<td>2286</td>
<td>2614</td>
<td>2086</td>
<td>2608</td>
<td>1123</td>
<td>715</td>
<td>11432</td>
</tr>
<tr>
<td>Permanent teeth with three or more root canals</td>
<td>2782</td>
<td>2961</td>
<td>2593</td>
<td>3459</td>
<td>1612</td>
<td>1040</td>
<td>14447</td>
</tr>
</tbody>
</table>

Source: Brazilian Ministry of Health – SUS Outpatient Information System.
Table 2. Total number of endodontic treatments performed from 2011 to 2016 in the Federal District and in state capitals in the Center-West of Brazil and the treatment-population ratio.

<table>
<thead>
<tr>
<th>State capital</th>
<th>Population*</th>
<th>Number of endodontic treatments</th>
<th>Number of treatments/population**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brasília</td>
<td>2,977,216</td>
<td>18,518</td>
<td>0.006a</td>
</tr>
<tr>
<td>Campo Grande</td>
<td>863,982</td>
<td>54,666</td>
<td>0.063c</td>
</tr>
<tr>
<td>Cuiabá</td>
<td>585,367</td>
<td>16,647</td>
<td>0.028b</td>
</tr>
<tr>
<td>Goiânia</td>
<td>1,448,639</td>
<td>37,334</td>
<td>0.026b</td>
</tr>
</tbody>
</table>

** Different lowercase letters indicate statistically significant differences.

Figure 1. Endodontic treatments per dental groups in the Center-West of Brazil from 2011 to 2016. *Different lowercase letters indicate statistically significant differences.

4 DISCUSSION

This study shows that the Brazilian public oral health care can no longer be defined on a strictly mutilating basis. The number of endodontic treatments observed in the four analyzed cities shows that there is currently a higher level of concern and public investment in dental care in the Center-West of Brazil, laying the foundation for a paradigm shift in dental practice, in particular the shift from tooth extraction to tooth conservation. However, this result should be interpreted with caution, as dental care provided in capital cities may not be representative of these practices in smaller towns.15,16

Our results also show that the provision of endodontics is different between the analyzed capital cities. Because the four cities have quite different population sizes, we calculated the endodontic treatment-population ratio to allow a
comparison between the cities. In doing so, we observed that Brasilia, despite having the largest population, had the lowest rate of endodontic treatment per inhabitant. This may reflect either less investment in this particular dental specialty in the capital of Brazil or a lower need for endodontic treatment by the population. Neither hypothesis can be confirmed in this study, but they indicate the need for further research.

It was also observed that teeth with three or more root canals had significantly more endodontic interventions than teeth with one or two root canals. Three or more root canals are often present in molars, and their anatomy is more susceptible to caries development, which is probably the main indication for endodontic treatment in these teeth. Such a development needs special attention from public managers to implement actions aimed at caries prevention or early interventions, when the carious process has not yet affected the pulp.

In this study, we used DATASUS as the information source because it is easy to access and can effectively provide data and information on health. DATASUS is based on secondary data sets, produced for several purposes, and is therefore susceptible to errors in typing and recording, possible underreporting, and inconsistency in data collection. However, as DATASUS is an official federal database and, by law, all municipalities in the country are required to submit health-related information to this database, its importance cannot be underestimated. This information system may have increased reliability if these data are evaluated against epidemiological data, which may also help answer some of the questions raised in this study.

The results of this study suggest a concern in the provision of dental care in the public health system of the surveyed cities in a more conservative and specialized way, considering the number of endodontic treatments performed in the different capitals. These data are in agreement with the common sense that describes public dental care in Brazil as mutilating and of poor quality.

The Resolution of the Brazilian National Council of Education of 2002 established the national curriculum guidelines for undergraduate courses in Dentistry aiming at the promotion, prevention, recovery and rehabilitation of oral health, with emphasis on the SUS. However, in addition to engaging students in the SUS health-care services and procedures by using different strategies, such as extramural activities, it is also important to prepare them for critical thinking that challenges the status quo. To this end, higher education institutions should be attentive to the changes in the model of dental care offered by the SUS, so that newly graduate dentists can be in line with the epidemiological profile of the population as well as with public health policies that will require their attention. The strategies applied to vocational training should promote a generalist and humanist understanding of society, not only contributing to but also strengthening the paradigm shift in dental care.

5 CONCLUSION

The analysis of the provision of endodontics in specialized public centers for dental care in the Federal District and in state capitals in the Center-West of Brazil demonstrates a paradigm shift in dental practice, in particular the shift from tooth extraction to tooth conservation. Campo Grande had the highest rate and Brasilia the lowest rate of endodontic treatments, which were more commonly performed in teeth with three or more root canals. The academic boards of dental schools should therefore be attentive to the changes in the model of public dental care in

Brazil so that their focus can be redirected by such changes, as this type of assistance is influential in determining the profile of human resources that will enter the health-care market.

ABSTRACT
Produção endodôntica no atendimento público odontológico do Centro-Oeste do Brasil

Pouco se sabe sobre o atendimento público odontológico no Centro-Oeste do Brasil, ainda menos sobre sua produção endodôntica. Esta produção é realizada principalmente nos Centros de Especialidades Odontológicas (CEO), referência pública para tratamento endodôntico, acessível na base de dados DATASUS. Foi objetivo deste estudo explorar a produção endodôntica nas capitais dos estados da Região Centro-Oeste e do Distrito Federal do Brasil. Este estudo retrospectivo transversal analisou a produção endodôntica destes municípios de janeiro de 2011 a dezembro de 2016. Os dados foram obtidos consultando as bases do Ministério da Saúde (DATASUS) e do Instituto Brasileiro de Geografia e Estatística (IBGE). Os valores foram comparados por análise de variância e os testes de Kolmogorov-Smirnov e Levene seguidos pelo teste post hoc de Tukey. O nível de significância foi definido em p<0,05. Dentre as cidades analisadas, Campo Grande teve a maior produção endodôntica por habitante, seguida de Cuiabá e Goiânia com produções similares, e Brasília. Os dentes com três ou mais canais radiculares apresentaram maior incidência de tratamento endodôntico comparados a dentes com um ou dois canais radiculares. A produção endodôntica dos CEO das capitais dos estados da Região Centro-Oeste e do Distrito Federal do Brasil foi proporcionalmente maior em Campo Grande e menor em Brasília. O tratamento endodôntico foi realizado preferencialmente nos dentes com três ou mais canais radiculares. As instituições de ensino devem estar atentas às mudanças para que seus egressos sejam formados em consonância com o perfil epidemiológico da população bem como com as políticas públicas de saúde.


REFERENCES

Correspondence to:
Thiago Machado Pereira
e-mail: thiangomachado@hotmail.co.uk
Av. Manoel José de Arruda, 3100 Jardim Europa 78065-900 Cuiabá/MT Brazil