



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.

# Urgencies and emergencies in orthodontics during the coronavirus disease 2019 pandemic: Brazilian orthodontists' experience

Paula Cotrin,<sup>a</sup> Renan Morais Peloso,<sup>a</sup> Nubia Inocencya Pavesi Pini,<sup>b</sup> Renata Cristina Oliveira,<sup>a</sup> Ricardo Cesar Gobbi de Oliveira,<sup>a</sup> Fabricio Pinelli Valarelli,<sup>a</sup> and Karina Maria Salvatore Freitas<sup>a</sup>  
*Maringá, Paraná, Brazil*

**Introduction:** The present study aimed to evaluate the most common urgencies and emergencies in orthodontics during the coronavirus disease 2019 (COVID-19) pandemic and to assess how orthodontists in Brazil were dealing with patients and challenges. **Methods:** Early in 2020, as the COVID-19 pandemic spread around the world, routine dental care was suspended in many countries, and only patients needing urgent or emergency care could be seen. During this period, orthodontists in Brazil were invited to participate in an anonymous online survey. Over 48 hours (May 1-3, 2020), 395 orthodontists (specialists, MScs, and PhDs) responded. They answered questions regarding dental office and appointments during the pandemic, the type of urgency or emergency care provided, the type of appliance and urgencies, etc. The level of concern about the impact of the pandemic on patients' orthodontic treatments and the financial impact on the dental office was also evaluated. Descriptive statistics were performed with percentages, and responses were compared between specialists, MScs, and PhDs, using chi-square tests. **Results:** Specialists were the majority of respondents. Most orthodontists were handling only emergencies or urgencies. The most frequent urgencies were bracket breakage, archwire breakage, and breakage of molar tubes and/or bands. Stainless steel fixed appliances were the most common type of appliance related to unscheduled appointments. The majority of patients got in touch with the orthodontist using the professional WhatsApp messenger (WhatsApp Inc, Menlo Park, Calif). Orthodontists were more concerned with the financial impact of the pandemic than with the orthodontic treatment itself. **Conclusions:** Breakage of brackets, archwires, or tubes and/or bands were the most common causes of urgency and/or emergency appointments during the pandemic. The level of concern about the financial impact of the stay-at-home orders and the COVID-19 pandemic was significantly greater for specialists and MScs than for PhDs. (*Am J Orthod Dentofacial Orthop* 2020;158:661-7)

During orthodontic treatment (which usually lasts between 2 and 3 years), patients are required to wear a variety of removable and fixed appliances, and about 85% of patients experience some kind of urgency during their treatment period.<sup>1</sup>

Emergencies generally involve risk of death and urgencies do not.<sup>2</sup> However, in dentistry, any dental problem that requires immediate treatment to save a tooth, stop ongoing tissue bleeding, or alleviate severe pain is considered a dental emergency. Orthodontic emergencies are rare, but orthodontic urgencies—problems arising from orthodontic appliances or accessories, in which a timely additional appointment is required—are not uncommon.<sup>3</sup> In Brazil, according to the Code of Consumer Protection and Defense, the dentist is considered a supplier of services and has the obligation to be well-prepared to offer a service to the patient. Orthodontists are responsible (regardless of the existence of guilt) for compensating any damage caused to the consumer related to poor service or insufficient or inadequate information on the provision and risks of these services.<sup>4</sup>

<sup>a</sup>Department of Orthodontics, UNINGÁ University Center, Maringá, Paraná, Brazil.

<sup>b</sup>Department of Prosthetic Dentistry, UNINGÁ University Center, Maringá, Paraná, Brazil.

All authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest, and none were reported.

Address correspondence to: Karina Maria Salvatore Freitas, Department of Orthodontics, UNINGÁ University Center, Rod PR 317, 6114, 87035-510, Maringá, Paraná, Brazil; e-mail, [kmsf@uol.com.br](mailto:kmsf@uol.com.br).

Submitted, May 2020; revised and accepted, June 2020.

0889-5406/\$36.00

© 2020 by the American Association of Orthodontists. All rights reserved.

<https://doi.org/10.1016/j.ajodo.2020.06.028>

With the pandemic caused by the coronavirus disease 2019 (COVID-19) outbreak in the world, specific guidelines are constantly published and updated by the World Health Organization, National Institutes of Health, National Ministries of Health, and national councils for each professional area. Routine dental care was suspended in many countries as governments sought to halt the spread of COVID-19.<sup>5,6</sup> In Brazil, the Federal Council of Dentistry presented guidelines for evaluating dental urgency and emergency during the coronavirus pandemic.<sup>7</sup> Dentists were advised to manage urgencies and emergencies only; however, the professional can decide to maintain the opening of dental offices or to care only for patients with urgencies or emergencies.

In orthodontics, urgencies—such as breakage of appliances, brackets, or tubes—are not life-threatening, but it is advised to resolve them quickly or to avoid prolonging the treatment time, decreasing the patient motivation, and losing the patients' confidence in the orthodontist.<sup>3</sup> Appropriate handling of orthodontic urgencies will provide relief from pain and distress for the patient.<sup>8,9</sup>

All dental professionals are feeling a moral duty to reduce routine care for fear of spreading the COVID-19 disease among patients, their families, and community, but are concerned about the financial consequences.<sup>5</sup>

The objective of this survey was to evaluate the most common orthodontic urgencies and emergencies during the initial months of the coronavirus pandemic in Brazil and to assess how orthodontists are dealing with patients and the challenges of the current scenario.

## MATERIAL AND METHODS

This study was approved by the Ethics Research Committee of the UNINGÁ University Center (protocol no. 4.002.200) and all subjects signed informed consent to participate in the survey.

Sample size calculation was performed with a confidence interval of 95% and a margin of error of 5%. Considering that the population of orthodontists in Brazil is approximately 28,000,<sup>10</sup> conducting a questionnaire would require at least 379 subjects and/or answers.

A Google Forms questionnaire was sent to about 1000 orthodontists from Brazil, most of whom graduated from 4 universities in various cities, through WhatsApp Messenger App (WhatsApp, Inc, Menlo Park, Calif). The orthodontists were not identified.

The questionnaire was constructed on the basis of what we intended to report, but this was not a validated questionnaire because we did not intend to evaluate a health condition or quality of life. We administered a

survey, with several questions that allowed us to evaluate the most common urgencies and/or emergencies in orthodontic practice during the coronavirus pandemic, to assess how orthodontists are dealing with patients and how are they concerned with the orthodontic treatment of their patients and with the financial impact of the pandemic in their dental offices.

Questions involved personal information as age, sex, degree of orthodontic graduation, and time of experience with orthodontics. Questions regarding the dental office and appointments during the pandemic, type of emergency care provided, type of appliance related to the emergencies, and others were included in the survey. The levels of concern about the impact of the pandemic on patients' orthodontic treatments and regarding the financial impact on the dental office were evaluated with a 0-10 point numerical rating scale.<sup>11,12</sup>

The respondents answered the questions regarding only their solo practices.

The questions and potential responses are listed below:

1. How old are you? ( ) 20-40 years ( )  $\geq 41$  years
2. Sex: ( ) Male ( ) Female
3. What is your degree of orthodontic graduation? ( ) Specialist ( ) Master (MSc) ( ) Doctor (PhD)
4. How long have you been working with orthodontics? ( )  $\leq 5$  years ( ) From 5 to 10 years ( ) From 11 to 20 years ( )  $\geq 21$  years
5. How were the appointments in your dental office during quarantine? ( ) Routine care appointments were maintained. ( ) Only emergency or urgency care was scheduled. ( ) Dental office closed; no orthodontic care provided.
6. What types of appliance have caused the most emergency and/or urgency appointments? Select all the alternatives that apply: [ ] Stainless steel fixed appliances [ ] Esthetic fixed appliances (sapphire or porcelain and/or ceramic) [ ] Self-ligating fixed appliances [ ] Removable retention appliances [ ] Fixed retentions [ ] Removable orthopedic appliances [ ] Fixed functional appliances [ ] Fixed expansion appliances [ ] Orthodontic accessories [ ] Aligners
7. What were the most frequent urgencies and/or emergencies you handled in your office during this period? Select all the alternatives that apply: [ ] Brackets' breakage [ ] Breakage of molar tubes and/or bands [ ] Metallic ligatures causing injuries [ ] Breakage of archwires or causing injuries [ ] Loss of elastic ligatures [ ] Breakage of removable appliances or aligners [ ] Breakage of fixed expansion or fixed functional appliances [ ] Breakage of fixed

- retention  Emergencies related to poor oral hygiene  Emergencies related to tooth movement
8. Have you had emergencies related to orthodontic accessories?  Yes  No
  9. If so, what type of accessories?  Intermaxillary elastics  Mini-implants  Miniplates  Kobayashis  Extraoral appliances  Others
  10. How did your patient get in touch to schedule the emergency care? Select all the alternatives that apply:  Through the professional office page on social networks.  Through the office's commercial telephone.  Through messages to the office WhatsApp.  Through my personal pages on social networks.  Through my personal phone and/or WhatsApp.
  11. During the stay-at-home order period, did you dismiss your staff?  Yes, they took a vacation.  Yes, but they were at home-office.  No, they continued to work routinely in the dental office.  Staff suspended from activities with government assistance.
  12. Did you provide emergency care accompanied by your staff?  Yes  No
  13. How concerned are you about the impact of the pandemic on your patients' orthodontic treatments? (0 indicates not concerned and 10 indicates extremely concerned)  0  1  2  3  4  5  6  7  8  9  10
  14. How concerned are you about the financial impact of the pandemic on your dental practice? (0 indicates not concerned and 10 indicates extremely concerned)  0  1  2  3  4  5  6  7  8  9  10

The questionnaire was available for responses for 48 hours (May 1-3, 2020). Responses were obtained and tabulated in Excel, for statistical analysis.

### Statistical analysis

Descriptive statistics were performed with percentages. Comparisons of specialists  $\times$  MScs  $\times$  PhDs and females  $\times$  males were performed with chi-square tests, 1-way analysis of variance, and Tukey tests and independent *t* tests.

Statistical analysis was performed with Statistica software (version 10.0; Statsoft, Tulsa, Okla), and results were considered significant at  $P < 0.05$ .

## RESULTS

Over 48 hours (May 1-3, 2020), 395 orthodontists answered the questionnaire (262 female [66.3%] and 133 male [33.7%]); 54.4% were aged 20-40 years and 45.6% were aged  $\geq 41$  years.

In addition, 66.3% were specialists, 18.0% were MSc, and 15.7% were PhDs. Regarding their experience with orthodontics, 28.4% had  $< 5$  years, 18.2% had 5-10 years, 35.7% had 10-20 years, and 17.7% had  $> 20$  years.

Most orthodontists (66.8%) are handling only emergencies and/or urgencies, 19% maintained the routine orthodontic appointments, and 14.2% closed the dental offices and are not working since the quarantine was recommended.

Regarding the type of appliances that caused most urgencies in orthodontics, 74.7% of the orthodontists mentioned urgencies related to preadjusted stainless steel fixed appliances, followed by esthetic fixed appliances (29.6%), orthodontic accessories (16.7%), fixed retentions (15.9%), fixed expansion appliances (15.4%), and self-ligating appliances (13.7%). Removable retainers and orthopedic removable appliances, fixed functional appliances, and aligners were mentioned by  $< 10\%$  of the orthodontists (Fig 1).

The most frequent urgency that resulted in patients requesting additional orthodontic care was bracket breakage (67.6%), followed by archwire breakage causing injury (60.5%), and breakage of molar tubes and/or bands (44.1%). The other urgencies were mentioned by  $< 20\%$  of the orthodontists and included the following: metallic ligature causing injuries (19.1%), loss of elastic ligatures (15.8%), breakage of fixed retention (15.3%), breakage of fixed expansion appliances (13.1%), poor oral hygiene problems (12.8%), breakage of removable appliances or aligners (8.7%), and urgencies related to tooth movement (6.8%) (Fig 2). Only 31.3% reported urgencies related to orthodontic accessories.

The majority of patients got in touch using the professional WhatsApp messenger (83.8%). Other ways in which patients came into contact to schedule additional urgent appointments were personal WhatsApp, telephone, or dental office webpage.

Almost half of the orthodontists (47.6%) gave their employees a vacation, 27.8% of the staff was at home-office, 12.7% were suspended from their activities by government assistance, and 11.9% continued to work in the dental offices routinely. Only 31.1% of the orthodontists provided emergency care accompanied by their staff.

The mean level of concern of orthodontists related to the impact of the pandemic in the orthodontic treatment of their patients was 7.70 (standard deviation, 2.22). The mean level of concern about the financial impact of the pandemic on the dental office was 8.94 (standard deviation, 1.63).

More specialists maintained routine orthodontic care during the pandemic related to the MScs and PhDs. The level of concern of the orthodontists regarding the

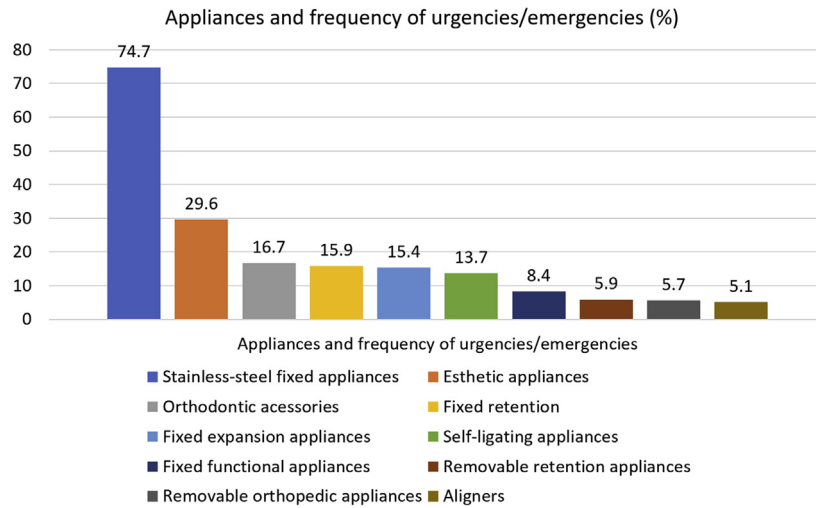


Fig 1. Type of appliance and frequency of urgency or emergency.

orthodontic treatment of their patients was similar among specialists, MScs, and PhDs. However, the level of concern about the financial impact of the pandemic was significantly greater for specialists and MScs than for PhDs.

**DISCUSSION**

It is known that effective management of orthodontic appliance problems should minimize disruption to the

normal course of treatment and prevent future problems from occurring.<sup>13</sup> In the current worldwide situation, stay-at-home orders have been proposed in several countries, and orthodontists were prevented from performing face-to-face conventional orthodontic care. However, some urgencies can cause a significant delay in treatment progress, besides somehow injuring the patient. In a recently published article, patients' greatest concern was the delay in the end of orthodontic treatment.<sup>14</sup>

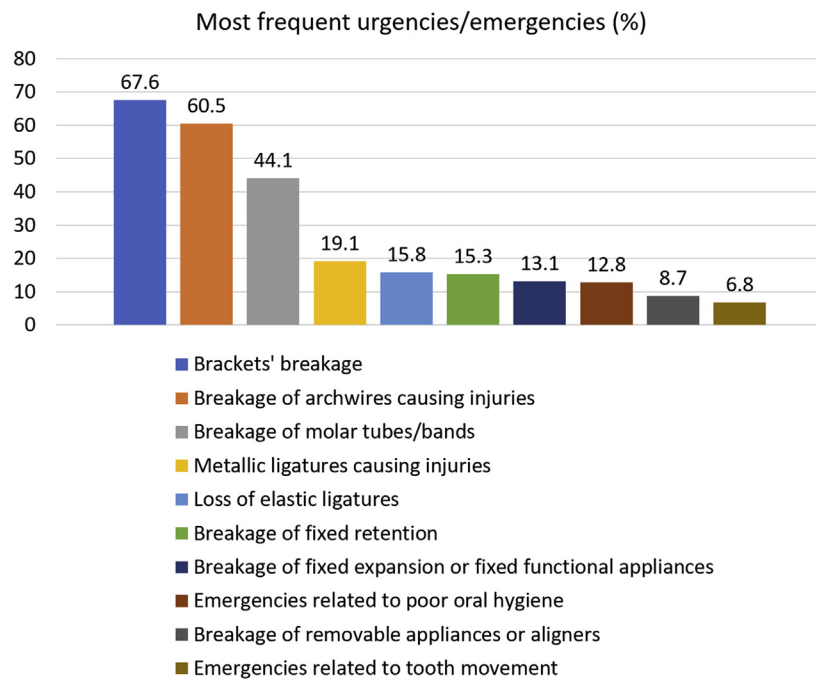


Fig 2. Most frequent urgencies and emergencies.

There were more female than male respondents, reflecting the proportion of registered orthodontics specialists in Brazil.<sup>10</sup> The percentage of female orthodontists continued to rise, reflecting the recent trend in postgraduate education.<sup>15</sup> In addition, women are more willing to participate in researches.<sup>16-18</sup>

Most participants were aged 21-40 years. Because the questionnaire was sent through WhatsApp, the youngest respondents represented the majority of participants. In addition, several studies that included a survey of dental professionals showed the same age pattern of respondents.<sup>19-21</sup>

Most respondents who were specialists were younger and had <10 years of practice, whereas MScs and PhDs were older and more experienced. Obtaining MSc and PhD degrees takes on average 5-6 years in Brazil, plus 3 years to previously obtain a specialist degree. Thus, because obtaining the degrees is time-consuming, the more educated the orthodontist, the older they will be.

Most orthodontists were handling only emergencies and/or urgencies. A systematic review showed that some knowledge gaps existed among dental professionals regarding emerging infections that affect the respiratory tract.<sup>22</sup> Amid so much information, some dental professionals followed the stay-at-home recommendations of their cities and/or states, delaying nonurgent care, others considered dentistry as an essential activity and continued their care normally, and some only provided care which could not be delayed.

Preadjusted stainless steel fixed appliances were responsible for most of the urgencies reported by orthodontists, followed by esthetic fixed appliances (Fig 1). Preadjusted appliances are by far the most popular fixed appliances during the past 3 decades,<sup>23</sup> and stainless steel brackets remained the most common worldwide, followed by ceramic brackets.<sup>15,24</sup> Keim et al<sup>15</sup> showed that overall, 63% of the clinicians use some kind of self-ligating system, and <20% use esthetic brackets. Thus, the appliances that caused the emergencies followed the trends of the most used appliances. Some types of active orthodontic mechanics, active expanders, and functional appliances need closer and frequent monitoring because they can cause problems with continuous unsupervised use. However, in the present survey, they were not reported by orthodontists as frequent urgencies. Maybe because, when the survey was carried out, stay-at-home orders had been recommended for <2 months, so some specific orthodontic urgencies, related to tooth movement and some active appliances without supervision, did not have enough time to occur.

Unfortunately, orthodontic appliance breakage does occur, despite the clinicians giving clear and concise

instructions to the patients and their parents.<sup>8,9</sup> The most frequent orthodontic urgency found was bracket breakage (Fig 2), which is also the most reported in the orthodontic literature.<sup>25,26</sup> Archwires that needed to be retied or replaced were also reported (Fig 2). Jones et al<sup>25</sup> reported that only 13% of the total urgencies were related to archwire problems. This finding may be due to the study being a University-based survey, and the patient access to the urgency service was not as easy as talking directly to the dental office team. Moreover, certain teeth have a greater predilection for failure than others, with potential reasons including increased masticatory loading, poor oral hygiene, and inappropriate diet.<sup>8,9,27</sup>

WhatsApp messages were the most common way of communication between the patient and the dental team (83.8%). Recent studies showed that smartphones provided fast and clear access to electronically mailed digital images and allowed professionals free mobility, not restricted by the constraints of a desktop personal computer. In this context, it is important to consider remote monitoring and *teleorthodontics* concepts and applications, such as the remote provision of orthodontic care, advice, or treatment using information technology.<sup>28</sup> Many of the urgencies reported by the orthodontists in this survey could be solved with remote consultations without the need of a scheduled urgency appointment, by teleorthodontics.<sup>28</sup> However, in Brazil, this type of attendance was not approved by the Federal Council of Dentistry when the survey was performed. This regulation of the distance dental practice, mediated by technologies, in Brazil was approved on June 4, 2020.<sup>29</sup>

Brazilian orthodontists were more concerned with the financial impact of the pandemic on the dental office (8.94) than in relation to orthodontic treatment of their patients (7.70). It must be argued that financial worry overrides the concern with the treatment itself because the nature of the orthodontic treatment allows spaced appointments, and also because urgency appointments are allowed. Furthermore, we are facing a health and economic crisis of unprecedented proportions, because pandemics often result in global recessions.<sup>30</sup> The paralysis of the economic activities in a developing country such as Brazil has devastating effects that will cause a long-lasting recession. Unlike developed countries, such as the United States, where dentists have had significant government assistance, like paycheck protection program and loan forgiveness, here in Brazil, we do not. Upon our restart, our dental offices are reflecting the financial recession that all business offices in Brazil have been showing. Thus, it was expected that the financial impact of the pandemic would be of great concern to orthodontists and dentists in Brazil. Because of the measures enacted to stop the spread of this pandemic, a sharp decrease in

consumer and business spending until the end of 2020 is expected.<sup>31</sup> In addition, the orthodontists' financial concern relies on the fear of not receiving payment from patients and the overhead costs to provide a safer working environment to the patients, staff, and themselves. This outcome will potentially reduce the orthodontist profit margin even further.<sup>32</sup> Recent surveys showed similar results, indicating that dentists fear economic losses and nonpayment of salaries to their employees, expecting a financial loss of >70% amid the COVID-19 outbreak.<sup>33-35</sup> However, in developed countries where professionals have government assistance and the economy is strong, the concerns of orthodontists are probably different from those found in the present survey.

Finally, orthodontists, who had PhD degrees were less concerned with financial impact than specialists and MScs. PhD respondents were older, most likely with an already consolidated career, including financial reserve, in addition to possibly having another job as a university professor, or teaching in continuing education courses, each of which guarantees a continuous income during the crisis.<sup>36</sup>

The main objective of this survey was to identify the most common orthodontic urgencies that orthodontists faced during the early stage of the COVID-19 pandemic. Many patients will need urgency orthodontic conventional care,<sup>14</sup> but some of these urgencies certainly can be avoided with high-quality remote care, and orthodontists should be able to provide it to their patients.<sup>37</sup>

## CONCLUSIONS

Breakage of brackets, archwires, or tubes and/or bands were the most common causes of urgency and/or emergency appointments during the early stage of the pandemic. The level of concern of orthodontists regarding the orthodontic treatment of their patients was similar among specialists, MScs, and PhDs. The level of concern about the financial impact of the COVID-19 pandemic was significantly greater for specialists and MScs than for PhDs.

## REFERENCES

- Bilder L, Hazan-Molina H, Aizenbud D. Medical emergencies in a dental office: inhalation and ingestion of orthodontic objects. *J Am Dent Assoc* 2011;142:45-52.
- Broadbent JM, Thomson WM. The readiness of New Zealand general dental practitioners for medical emergencies. *N Z Dent J* 2001;97:82-6.
- Caprioglio A, Pizzetti GB, Zecca PA, Fastuca R, Maino G, Nanda R. Management of orthodontic emergencies during 2019-NCOV. *Prog Orthod* 2020;21:10.
- Stafuzza TC, Carrara CF, Oliveira FV, Santos CF, Oliveira TM. Evaluation of the dentists' knowledge on medical urgency and emergency. *Braz Oral Res* 2014;28:1-5.
- Coulthard P. Dentistry and coronavirus (COVID-19) - moral decision-making. *Br Dent J* 2020;228:503-5.
- Spagnuolo G, De Vito D, Rengo S, Tatullo M. COVID-19 outbreak: an overview on dentistry. *Int J Environ Res Public Health* 2020;17:2094.
- Federal Council of Dentistry. CFO presents guidelines for assessing dental urgency and emergency against coronavirus. Available at: <http://website.cfo.org.br/cfo-apresenta-orientacoes-para-avaliar-urgencia-e-emergencia-odontologica-frente-ao-coronavirus/>. Accessed April 26, 2020.
- Dowsing P, Murray A, Sandler J. Emergencies in orthodontics. Part 1: management of general orthodontic problems as well as common problems with fixed appliances. *Dent Update* 2015;42:131-4: 137-140.
- Dowsing P, Murray A, Sandler J. Emergencies in orthodontics. Part 2: management of removable appliances, functional appliances and other adjuncts to orthodontic treatment. *Dent Update* 2015;42:221-4: 227-228.
- Federal Council of Dentistry. General number of specialist dental surgeons. Available at: <http://website.cfo.org.br/estatisticas/quantidade-geral-de-cirurgioes-dentistas-especialistas/>. Accessed May 3 2020.
- Dixon S, Poole CD, Odeyemi I, Retsa P, Chambers C, Currie CJ. Deriving health state utilities for the numerical pain rating scale. *Health Qual Life Outcomes* 2011;9:96.
- Johnson C. Measuring pain. Visual analog scale versus numeric pain scale: what is the difference? *J Chiropr Med* 2005;4:43-4.
- Popat H, Rogers S, Eckhardt C, Knox J. Management of the casual orthodontic patient. *Orthod Update* 2010;3:9-13.
- Cotrin P, Peloso RM, Oliveira RC, de Oliveira RCG, Pini NIP, Valarelli FP, et al. Impact of coronavirus pandemic in appointments and anxiety/concerns of patients regarding orthodontic treatment. *Orthod Craniofac Res* 2020: Epub.
- Keim RG, Gottlieb EL, Vogels DS 3rd, Vogels PB. 2014 JCO study of orthodontic diagnosis and treatment procedures, part 1: results and trends. *J Clin Orthod* 2014;48:607-30.
- Qiu J, Shen B, Zhao M, Wang Z, Xie B, Xu Y. A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic: implications and policy recommendations. *Gen Psychiatr* 2020;33:e100213.
- Tosun H, Kaya B. Effect of maxillary incisors, lower lip, and gingival display relationship on smile attractiveness. *Am J Orthod Dentofacial Orthop* 2020;157:340-7.
- Lasance SJ, Papageorgiou SN, Eliades T, Patcas R. Post-orthodontic retention: how much do people deciding on a future orthodontic treatment know and what do they expect? A questionnaire-based survey. *Eur J Orthod* 2020;42:86-92.
- Ioi H, Kang S, Shimomura T, Kim SS, Park SB, Son WS, et al. Effects of buccal corridors on smile esthetics in Japanese and Korean orthodontists and orthodontic patients. *Am J Orthod Dentofacial Orthop* 2012;142:459-65.
- Pithon MM, Bastos GW, Miranda NS, Sampaio T, Ribeiro TP, Nascimento LES, et al. Esthetic perception of black spaces between maxillary central incisors by different age groups. *Am J Orthod Dentofacial Orthop* 2013;143:371-5. Available at: <http://www.in.gov.br/web/dou/-/resolucao-n-226-de-4-de-junho-de-2020-260295994>. Accessed June 10 2020.
- Nomura S, Freitas KMS, Silva PPCD, Valarelli FP, Caçado RH, Freitas MR, et al. Evaluation of the attractiveness of different gingival zeniths in smile esthetics. *Dental Press J Orthod* 2018;23:47-57.
- Gambhir RS, Pannu PR, Nanda T, Arora G, Kaur A. Knowledge and awareness Regarding swine-influenza A (H1N1) virus infection

- among dental professionals in India - a systematic review. *J Clin Diagn Res* 2016;10:ZE10-3.
23. O'Connor BM. Contemporary trends in orthodontic practice: a national survey. *Am J Orthod Dentofacial Orthop* 1993;103:163-70.
  24. Rampon FB, Nóbrega C, Bretos JL, Arsati F, Jakob S, Jimenez-Pellegrin MC. Profile of the orthodontist practicing in the state of Sao Paulo—part 2. *Dental Press J Orthod* 2013;18:32.e1-6.
  25. Jones K, Popat H, Johnson IG. Dental students' experiences of treating orthodontic emergencies - a qualitative assessment of student reflections. *Eur J Dent Educ* 2016;20:156-60.
  26. Gyawali R, Pokharel PR, Giri J. Emergency appointments in orthodontics. *APOS Trends Orthod* 2019;9:40-3.
  27. Linklater RA, Gordon PH. Bond failure patterns in vivo. *Am J Orthod Dentofacial Orthop* 2003;123:534-9.
  28. Hansa I, Semaan SJ, Vaid NR, Ferguson DJ. Remote monitoring and "Tele-orthodontics": concept, scope and applications. *Semin Orthod* 2018;24:470-81.
  29. Federal Council of Dentistry. Resolution CFO 226-2020. Brasília: FCD Federal Council of Dentistry, 2020 4 June. Report No. 226-2020. Available at: <http://www.in.gov.br/web/dou/-/resolucao-n-226-de-4-de-junho-de-2020-260295994>. Accessed June 10, 2020.
  30. Açıköz Ö, Günay A. The early impact of the COVID-19 pandemic on the global and Turkish economy. *Turk J Med Sci* 2020;50(SI-1):520-6.
  31. Craven M, Liu L, Wilson M, Mysore M. COVID-19: implications for business. Available at: <https://www.mckinsey.com/business-functions/risk/our-insights/covid-19-implications-for-business>. Accessed May 3, 2020.
  32. Ferneini EM. The financial impact of COVID-19 on our practice. *J Oral Maxillofac Surg* 2020;78:1047-8.
  33. Farooq I, Ali S. COVID-19 outbreak and its monetary implications for dental practices, hospitals and healthcare workers. *Postgrad Med J* 2020: Epub.
  34. Woodrow M. Live updates: coronavirus and dentistry. Available at: <https://bda.org/advice/Coronavirus/Pages/latest-updates.aspx>. Accessed May 3, 2020.
  35. Harkins P. Some Utah dentists are closing because of coronavirus. Others don't think they can. Available at: <https://www.sltrib.com/news/2020/03/17/some-utah-dentists-are/>. Accessed May 3, 2020.
  36. Riani JD, Golgher AB. Educational indicators made from IBGE databases. Introduction to the demographics of education. *IBGE; 2015*. p. 89-128.
  37. Duffy S, Lee TH. In-person health care as option B. *N Engl J Med* 2018;378:104-6.