

# Preclinical Endodontics teaching in Brazilian Dentistry courses

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## ABSTRACT

This study aimed to achieve information concerning the teaching of Endodontics in preclinical activities in different undergraduate courses in Dentistry in Brazil, and analyzed the profile and distribution of these institutions across the country regions. This was a cross-sectional observational census study, involving 246 teaching institutions, by accessing the electronic websites of institutions, achieving public domain data. The information related to the teaching institutions were obtained from a public database, on the electronic website of the Brazilian Federal Dental Council (CFO). The following variables of interest were recorded: data on the teaching institution, distribution of disciplines related to preclinical teaching in the field of Endodontics, and workload related to the teaching of Endodontics. Data were submitted to descriptive statistical analysis. Most courses are offered in private institutions, located in the Southeast region of the country, with greater number of daytime courses presenting minimum duration of 10 semesters. Concerning the presence of information related to the curriculum of Dentistry courses in the institutions analyzed, direct access was possible to the electronic websites of 190 institutions (77.2%). The Pedagogical Project was available on the electronic website of 57 courses (23.2%). There was great diversity of organization of disciplines in the different institutions. It was observed that there is limited information available for access as public domain, which impairs a more careful analysis of the didactic models and contents addressed by the institutions. Also, the information available suggest heterogeneous approaches for the preclinical Endodontics teaching.

**Descriptors:** Endodontics. Teaching. Training. Preclinical.

## 1 INTRODUCTION

Endodontics is the dental specialty that prepares the student to diagnose pulp and periapical alterations, with combination of preventive and curative procedures. The teaching of Endodontics as a specialty in undergraduate courses assumes laboratory and clinical activities<sup>1</sup>. The process of achieving competences and skills in this field of Dentistry can be complex due to technical difficulties related to the procedures, inherent responsibilities of patient care and lack of self-confidence of students<sup>2</sup>.

The preclinical activities include simulations of real conditions and prepare to the clinical activities<sup>3</sup>. Specifically, the preclinical Endodontics addresses the initial content for student preparation. In theoretical activities, it includes preparation and obturation techniques and procedures to be performed for an effective treatment<sup>4</sup>. The techniques proper are taught in practical activities, including methods for tooth opening, root canal access area, chemical and mechanical preparation, irrigation stage, as well as obturation and sealing. During preclinical activities, the student also has contact with the instruments used, such as files and drills specific of Endodontics<sup>5</sup>.

Kamaura et al. (2003)<sup>6</sup> related the laboratory learning in Endodontics to its application in clinical activities during the undergraduate period, in the integrated teaching method. The study analyzed endodontic treatments performed by undergraduate students of the Dental School at University of São Paulo, assessing the radiographic records of treatments performed on phantoms in the laboratory and patients treated at the clinic. The results indicated that there are differences in student performance in the different tasks of Endodontics selected for the study when comparing the types of teeth and the laboratory and clinical activities.

According to Qualtrough and Dummer (2003)<sup>8</sup>, the time and priority dedicated to Endodontics teaching in the undergraduate curriculum were considerably increased in the last two decades in the United Kingdom, acknowledging the importance of this training<sup>7</sup>. However, the students still face difficulties, demanding the search for curriculum alternatives to create a more favorable environment for their training.

In Brazil, the National Curriculum Guidelines do not include guidance on preclinical Endodontics teaching. Thus, it may be inferred that different approaches may be proposed to teach this specialty across schools in the country<sup>9</sup>.

Therefore, this study aimed to achieve information regarding the teaching of Endodontics in preclinical activities, adopted by Dentistry courses in Brazil. Also, the study evaluated the profile of teaching institutions and the distribution of these courses across the country regions.

## 2 METHODOLOGY

This study was approved by the Research Board of the Dental School at the Federal University of Rio Grande do Sul (Protocol n. 32422). This was a cross-sectional observational census study, involving consultation to the websites of 246 public and private Brazilian teaching institutions, registered on the website of the Brazilian Federal Dental Council (CFO) that offer undergraduate teaching in Dentistry (accessed on April 2018). Public domain data were achieved, i.e. they are available on the electronic websites of the institutions.

After consultation to the CFO electronic website, the investigators used the internet to access the websites of the respective teaching institutions. Data were recorded on a form specifically designed for the study. The

following aspects were analyzed: a) data on the nature of the teaching institution: public, private, community; b) date of electronic website update; c) data on the course: daytime/nighttime/number of semesters; d) data on the preclinical Endodontics teaching: presence/absence of preclinical Endodontics discipline, workload, semester when it is offered; e) data on the availability of access to the pedagogical project and/or curriculum.

For the analysis, the study considered that the courses could present “Integrated Preclinical Discipline” (in which Endodontics is taught simultaneously to other areas), “Preclinical Endodontics Discipline” (when Endodontics is taught individually) and “Discipline of Endodontics” (when there were contents of laboratory or clinical Endodontics or both, not specified). The other variables analyzed were the number of semesters of each discipline; semester in which the discipline is offered; number of credits; workload and number of disciplines.

The responses were tabulated on a database grouped and presented in tables. Statistical analysis was performed on the software IBM SPSS Statistics v. 21 (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.). Data were presented as absolute or relative frequencies.

All collected and analyzed data are public domain and are not presented on databases that require permission for access. All data are presented in combination, not identifying peculiar characteristics of each institution.

### 3 RESULTS

The study evaluated 246 websites of Dentistry Courses from the five Brazilian regions. Regarding the date of update from websites from which data were collected, 8.4% had been updated between 5 and 10 years ago,

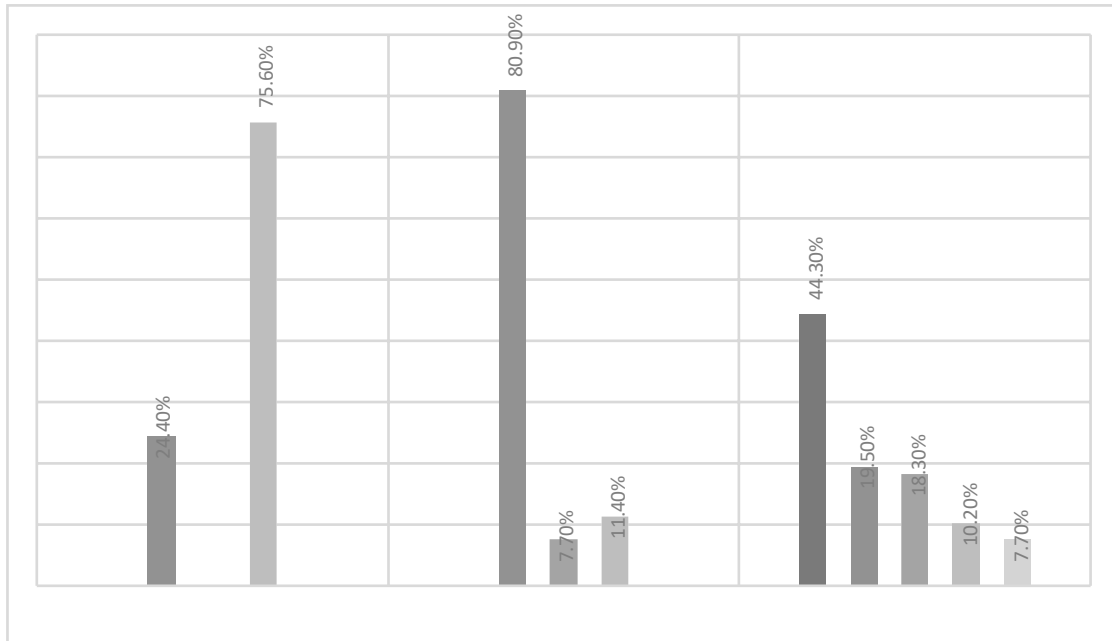
35% less than 3 years earlier, 30.9% less than 2 years earlier, and 23.6% on the last year. In 54.2% of websites it was not possible to identify the update date. The profile of institutions that offer Dentistry courses and the distribution of these courses, considering the country regions, are shown in graph 1.

The total number of semesters described for each course presented variations. There was predominance of courses lasting 10 semesters (45.9%), followed by 8 semesters (28%), with lower number of courses with 9 semesters (9.8%), 12 semesters (1.6%), and only one course with 16 semesters, corresponding to 0.4%, which is a nighttime course. The remaining (14.2%) did not report this data. Information concerning the curriculum structure of courses was found in 77.2% of websites. The Pedagogical Project was found in only 23.2% of courses.

Table 1 summarizes the data achieved, considering the variables studied. It was found that 6.09% (15/246) courses present only “Integrated Preclinical Discipline”. This discipline was offered from the first to the eighth semester. The number of credits ranged from 11 to 62, yet 47% of documents assessed did not present this information. The workload ranged from 60 to 1,015 hours. This data was not found in 11.7% of websites. It should be mentioned that counting was cumulative, i.e. if there was more than one Integrated Preclinical discipline in the course, the credits and hours were added. Moreover, since this discipline is integrated with other areas, it cannot be stated that this workload is related to the contents of Endodontics.

The “Preclinical Endodontics Discipline” is offered in 16.26% (40/246) of courses. This discipline is offered between the fourth and seventh semesters. The workload ranged from 51 to 180 hours. This workload is only related to the contents taught in the field of Endodontics.

Graph 1. Profile of Brazilian teaching institutions with Dentistry courses and distribution across the country regions (n= 246)



DT: Daytime; NT: Nighttime; NI: Not informed; SE: Southeast; S: South; NE: Northeast; N: North; CW: Central West.

Table 1. Overview of teaching of preclinical Endodontics activities in Dentistry courses in Brazil

	IPC	EPC	Endo	NI
Frequency	15 (6,09%)	40 (16,26%)	87 (35,36%)	72 (29,26%)
Distribution in the course*	1 → 8	4 → 7	3 → 10	
Number of semesters				
1 semester	4	44	34	-
2 semesters	2	5	56	-
3 semesters	5	0	12	-
4 semesters	1	0	2	-
5 semesters	1	0	0	-
> 5 semesters	2	0	0	-
Not informed	2	21	15	-

IPC = Integrated preclinical (not only Endodontics); EPC = Endodontics preclinical; Endo = Discipline of Endodontics (presents description of preclinical or clinical activities); NI = Not informed. \* Semesters in which the discipline is offered

The “Discipline of Endodontics” is offered in 35.36% of courses (87/246). The distribution of this discipline throughout the course is very heterogeneous, and can be offered from the third

to the tenth semester. In 25.3% of institutions, this discipline is offered on the fifth and sixth semesters. The number of “Disciplines of Endodontics” throughout the course ranged from

1 to 4. The workload varied from 56 to 280 hours. It cannot be stated whether this workload matches the preclinical or clinical contents of Endodontics, since this discipline may address both.

The Integrated Preclinical discipline and Endodontics Preclinical discipline are not offered on the same course in any institution analyzed. In 2 institutions (0.81%), the Integrated Preclinical discipline and Endodontics discipline are present in the same course. In 30 institutions (12.19%), both Preclinical Endodontics discipline and Endodontics discipline are offered.

#### 4 DISCUSSION

It is known that preclinical Endodontics training is fundamental, since this moment offers students the opportunity to achieve and consolidate their knowledge before performing treatments on patients<sup>2,10</sup>. Despite the significant number of undergraduate Dentistry courses in Brazil, there is lack of studies presenting information regarding the preclinical training in Endodontics, in which there may be unknown discordances. The perception of these diversities could contribute to the recognition of strategies to favor the teaching and learning process. Thus, this study was conducted to achieve information regarding the teaching of Endodontics in preclinical activities in undergraduate Dentistry courses in Brazil.

The study employed a unilateral methodology, i.e. there was active search of the researcher on the electronic address, without requesting additional information from any institution. Thus, the limitations of this study are based on two main aspects: the lack of basic information on search websites and the date of update of electronic addresses. The former is clearly observed by the small number of complete information available in

disciplines, as well as in the availability of the curriculum and pedagogical project. The latter evidences that some websites do not update their data frequently, precluding the understanding on the current reality of the course. In addition, another limitation is that many courses lack a description of each discipline in the teaching plan, thus it is not possible to interpret which content is actually addressed.

Information related on the course should be available on free access websites. The course curriculum was presented in 77.2% of websites. However, the pedagogical project is disclosed by only 23.2% of institutions. The pedagogical project is a theoretical-methodological reference that shows how the course works and the goals set for teaching, besides guiding the search for research, professional choices and the dynamics between different schools. It is a mandatory document for all institutions and is dynamic, i.e. it does not have a time for closure; rather, it is in constant construction process<sup>11</sup>. Despite the importance of the pedagogical project, the literature evidences that there is lack of knowledge of students about the regulations that guide the higher education<sup>12</sup>.

Daytime courses constituted 80.9% of the sample, while nighttime courses 7.7%. The presence of undergraduate Dentistry courses at night has become a possibility of social inclusion<sup>13</sup>. In the current world, there is a known need to combine work and study. Since the course has an extensive workload, it is interesting to offer working students the opportunity to attend college at nighttime.

There is predominance of Dentistry courses offered by private institutions (75.6%). This study found the following distribution in relation to the country regions: North (10.2%), Northeast (18.3%), Central

West (7.7%), Southeast (44.3%) and South (19.5%). There is an evident highest concentration of courses in the Southeast, followed by the South and Northeast. It is known that the concentration of dental professionals after training follows the same pattern. Three quarters of professionals are concentrated in the South and Southeast, a similar distribution as this percentage share of the major regions in the GDP<sup>14</sup>.

The National Curriculum Guidelines (DCN) state that the structure of the undergraduate Dentistry course should include three cycles: basic, pre-professional and professional. The preclinical training activities connect the initial and final cycles, and intend to approximate the basic knowledge to the clinical application. The present research revealed that most schools initiate preclinical teaching of Endodontics from the fourth semester, after the completion of basic disciplines. A different approach was reported on a study in the United Kingdom, in which preclinical Endodontics is initiated during the first clinical year in all schools that participated in the research<sup>7</sup>. A study conducted in 2015 in the Fiji Islands revealed that preclinical activity modules are mainly incorporated in the curriculum in the first two years of course<sup>15</sup>. This demonstrates a very similar approach as adopted in the Brazilian courses analyzed in this study.

The students often report the need for intense preclinical training, since the limited time in preclinical and clinical training in Endodontics may lead to low self-confidence during patient care practice, indicating student dissatisfaction and insecurity<sup>16</sup>. A study conducted in the Philippines found that the limited number of hours dedicated by most private schools should be reanalyzed, since the Dental Education Council indicates that

undergraduate courses should provide at least 4 weekly hours of preclinical endodontic teaching<sup>17</sup>.

Thus, it can be mentioned that the present results should be considered with caution, especially because many websites are not updated frequently. When present, the information was often not sufficiently accurate or detailed. Also, it is known that preclinical activities are offered along the course. However, information regarding its insertion in the curriculum, workload, number of credits and summary of the discipline is often not objectively presented.

There is no standard to characterize the offer of preclinical activities in Dentistry courses in Brazil. There are National Curriculum Guidelines about the undergraduate Dentistry course, which define the principles, foundations, conditions and procedures for the formation of dental professionals, established by the Upper Education Chamber of the Education National Council, for national application in the organization, development and evaluation of pedagogical projects of undergraduate Dentistry courses of higher education institutions<sup>9</sup>. The document addresses the basic areas required, yet does not specifically discuss the contents that should be offered in each discipline and minimum numbers to be respected, such as workload for each field, number of credits, number of semesters, among other regulations.

A study conducted in 2008 indicates that the standardization of Endodontics curriculum does not aim to provide definitive instruction and standardization of teaching methods, since innovations should be encouraged in the curriculum of Endodontics education<sup>18</sup>. However, suggestions incorporated to the DCN or consensus provided by specialist



societies could be used to offer suggestions of minimum requirements to be followed by each institution, serving as a guide to ensure a higher quality level, a more equitable teaching model, aiming at the formation of a scientifically and technically qualified professional.

## 5 CONCLUSION

The present results demonstrated that information regarding the teaching of preclinical Endodontics in Dentistry courses in Brazil is often not available in the electronic websites of institutions for public access. Consequently, it was difficult to achieve more representative information regarding the summary of disciplines, workload and number of credits. Thus, it is difficult to perform a deeper analysis of the curriculum of courses and also of the didactic models adopted. Considering the profile of institutions that offer Dentistry courses in the country, most are private, concentrated in the Southeast region of the country and offered in daytime. There is plurality in the structure of preclinical endodontic teaching in Brazil, which seems to follow the thinking and manner to address the process of teaching and learning of the specialty adopted in each school by different groups of teachers. If more information was available for public access, it would be possible to characterize the approaches adopted more accurately, to establish an exchange of experiences between institutions, aiming to contribute to the formation of undergraduate students.

## RESUMO

### O ensino de Endodontia pré-clínica nos cursos de Odontologia brasileiros

O objetivo desse estudo foi obter informações quanto ao ensino de Endodontia em atividades

pré-clínicas nos diferentes cursos de graduação em Odontologia no Brasil, além de avaliar o perfil e a distribuição por regiões do país dessas instituições. Foi realizado um estudo observacional transversal do tipo censo, envolvendo 246 instituições de ensino, por meio do acesso aos sítios eletrônicos das respectivas instituições, obtendo-se dados de domínio público. As informações relacionadas às instituições de ensino foram obtidas em base de dados pública, em sítio eletrônico do Conselho Federal de Odontologia (CFO). Foram registradas as seguintes variáveis de interesse: dados sobre a instituição de ensino, a distribuição das disciplinas relacionadas ao ensino de pré-clínica na área de Endodontia, e a carga horária e relacionada com o ensino de Endodontia. Foi realizada análise estatística descritiva dos dados obtidos. A maioria dos cursos ocorrem em instituições privadas, localizadas no Sudeste do país, com maior número de cursos diurnos e apresentando duração mínima de 10 semestres. Em relação à presença de informações relativas à estrutura curricular dos Cursos de Odontologia nas instituições avaliadas, verificou-se que foi possível acesso direto em sítios eletrônicos de 190 instituições (77,2%). O Projeto Pedagógico está disponível no sítio eletrônico de 57 cursos (23,2%). Observou-se grande diversidade de organização das disciplinas nas diferentes instituições. Constatou-se que há informações limitadas disponíveis para acesso na forma de domínio público, o que dificulta uma análise mais criteriosa acerca dos modelos didáticos e conteúdos abordados pelas instituições. Ainda, observou-se que as informações disponibilizadas sugerem que há abordagens heterogêneas para o ensino da endodontia pré-clínica.

**Descritores:** Endodontia. Ensino. Treinamento. Pré-Clínica.

## REFERÊNCIAS

1. Andriola WB, Andriola CG. Assessment of educational quality of the Faculty of Education (FACED) of the Federal University of Ceará (UFC). Ensaio: Aval Pol

- Públ Educ. 2009;17(62):153-68.
2. Seijo MOS, Ferreira EF, Sobrinho APR, Paiva SM, Martins RC. Learning Experience in Endodontics: Brazilian students' perceptions. *J Dent Educ.* 2013;77(5):648-55.
  3. European Society of Endodontology. Quality guidelines for endodontic treatment: consensus report of the European Society of Endodontology. *Int Endod J.* 2006;39(12):921-30.
  4. de Moor R, Hülsmann M, Kirkevang L-L, Tanalp J, Whitworth J. Undergraduate curriculum guidelines for endodontology. *Int Endod J.* 2013;46(12):1105-14.
  5. FO-UFRGS. Projeto Pedagógico do Currículo Diurno do Curso de Odontologia. 2014 [Cited June 10, 2015]. Available at: <http://www.ufrgs.br/odontologia/ensino/odonto/graduacao/projeto-pedagogico-do-curso-diurno/view>
  6. Kamaura D, Carvalho G, Lage-Marques J, Antoniazzi J. Avaliação do desempenho dos alunos de graduação durante a prática da técnica endodôntica. *Rev ABENO.* 2003;3(1):33-40.
  7. Qualtrough AJE, Dummer PMH. Undergraduate endodontic teaching in the United Kingdom: an update. *Int Endod J.* 2003;30(4):234-9.
  8. Mirza MB. Difficulties encountered during transition from preclinical to clinical endodontics among Salman bin Abdul Aziz University Dental students. *J Int Oral Health.* 2015;7(Suppl 1):22-7.
  9. Brasil. Conselho Nacional de Educação. Câmara de Educação Superior. Resolução CNE/CES 3/2002, de 19 de fevereiro de 2002. Institui as Diretrizes Curriculares Nacionais do Curso de Graduação em Odontologia. Seq. 1 mar 4, 2002.
  10. Tchorz JP, Brandl M, Ganter PA, Karygianni L, Polydorou O, Vach K, et al. Pre-clinical endodontic training with artificial instead of extracted human teeth: does the type of exercise have an influence on clinical endodontic outcomes? *Int Endod J.* 2015;48(9):888-93.
  11. Moimaz SAS, Fadel CB, Saliba A. Projeto pedagógico e estrutura curricular de um curso de Odontologia: análise crítica fundamentada na percepção acadêmica. *Rev ABENO.* 2010; 10(2):35-40.
  12. Ferraz MÂAL, Falcão CAM, Pereira RM de S, Pinheiro COB, Nascimento EPA do, Moura MEB. Projeto pedagógico do Curso de Odontologia: conhecimento discente. *Rev ABENO.* 2015;15(2):47-55.
  13. Filho AT, Nery ACB. Ensino superior noturno no Brasil: história, atores e políticas. *Rev Bras Pol Adm Educ.* [Cited June 11, 2018]. Available at: <http://www.seer.ufrgs.br/index.php/rbpa/article/view/19327>
  14. Moritta MC, Haddad AE, Araújo ME. Perfil atual e tendências do cirurgião-dentista brasileiro [Internet]. Perfil atual e tendências do cirurgião-dentista brasileiro. 2010 [Cited June 11, 2018]. Available at: [http://cfo.org.br/wp-content/uploads/2010/04/PERFIL\\_CD\\_BR\\_web.pdf](http://cfo.org.br/wp-content/uploads/2010/04/PERFIL_CD_BR_web.pdf)
  15. Devi AA, Abbott PV. An overview of the endodontic curriculum in Fiji from 2009 to 2013. *Austr Endod J.* 41(3):111-6.
  16. Grock C, Francisco M, Luciana L, Maria Beatriz F, Vanessa F, Lisiane B, et al. Experiências relacionadas à execução de tratamentos endodônticos de urgência e níveis de ansiedade, qualidade do sono e qualidade de vida em alunos de graduação em Odontologia [Dissertação de mestrado]. Universidade Federal do Rio Grande do Sul; 2016.
  17. Cruz EV, Jimena ME, Puzon EG, Iwaku M. Endodontic teaching in Philippine dental



- schools. Int Endod J. 2000;33(5):427-34.
18. Sonntag D, Bärwald R, Hülsmann M, Stachniss V. Pre-clinical endodontics: a survey amongst German dental schools. Int Endod J. 2008;41(10):863–8.

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