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Factors associated with absences from orthodontic treatment at a dental specialty center

Emilio Prado Fonseca [1]
José Pascoal da Silva Junior [2]
Silvia Amélia Scudeler Vedovello [3]
Luciane Zanin Souza [3]
Antonio Carlos Pereira [1]
Marcelo de Castro Meneghim [1]

Abstract *The aim of this study was to identify the factors associated with the users failing to keep orthodontic treatment appointments (absences), in three regional dental specialty centers (CEO-R) located in the State of Ceará. Methodology: This was a cross-sectional epidemiological study with secondary data source of 3 CEO-R, from which 237 medical records of complete orthodontic treatments were examined, with 8.283 appointments and 2.665 (32.17%) missing appointments. Data collection was standardized by an electronic questionnaire. . Factors associated with users missing appointments were calculated by means of absence rates and thematic maps were constructed based on distributions of the geographical pattern of occurrence. To evaluate the association between the outcome variable (absence from treatment) and the independent variables (sex, age, breakage of appliance, change of professional, income and place of user's residence) multiple logistic regression analysis was used with $p \leq 0.05$. Results: There were high absence rates for both city headquarters and non-headquarter CEO-Rs. The variable change of professional showed statistical significance, in relation to the number of absences. Conclusion: The highest number of absences was associated with change of professional.*

Key words *Absenteism, Epidemiology, Orthodontics, Oral health, Dental health service*

[1] Programa de Pós-Graduação em Odontologia, Faculdade de Odontologia de Piracicaba, UNICAMP. Av. Limeira 901, Areião. 13414-018 Piracicaba SP Brasil. emiliopraddo@ig.com.br
[2] Centro de Especialidades Odontológicas, Consórcio Público de Saúde da Microrregião de Russas. Russas CE Brasil.
[3] Programa de Pós-Graduação em Ortodontia, Fundação Hermínio Ometto-Uniararas. Araras SP Brasil.

Introduction

Secondary care consists of health units that offer specialized referral services, both to municipalities with which they have agreements, and to the municipality itself by means of the Primary Health Care (PHC)[1,3]. The national oral health policy (Política Nacional de Saúde Bucal - PNSB) launched in 2004, among other initiatives, promotes encouragement of the offer of specialized procedures, through the implementation of the Dental Specialty Centers (Centro de Especialidades Odontológicas - CEO)[1], by means of partnerships between states, municipalities and the federal government[1]. Secondary dental care in Brazil is a topic under recent discussion in the scientific literature, and poses a great challenge to the management of the oral health care system[4-6].

As from the Ministerial Ordinance No. 718/SAS of 2010, the CEOs were authorized to include orthodontic/orthopedic appliances[2] in the specialized care provided. Ceará, according to its policy of secondary care regionalization, has implemented Regional Dental Specialty Centers (CEO-R) since 2009, with the aim of increasing the offer of further specialties to the interior areas of the state[7]. This organization adopted the model of a public health consortium, as a form of management, combining the state and municipalities of each health region as members of a consortium[8,9]. This is how the regionalization of this specialized care started, and the orthodontic/orthopedic treatment began to be offered in the interior areas of the state[10,11].

Studies that have analyzed the absences from specialized referral treatments in oral health, have shown that the main causes for the low rate of taking advantage of consultations - that is failure to turn up for treatment - was related to the distance between the municipality of origin and treatment center, and the high cost of transport[4]. Other studies have reported that the probable reasons for users' absence from specialized consultations are: not having been able to identify the place of consultation; not having sufficient financial resources for traveling to the place, and the traveling time for this purpose[4,12-14].

The reasons that lead to users failing to keep appointments for specialized orthodontic consultations are not clear, but this fact presupposes the need for continued supervision of an adequate operational structure associated with resolution and integrality of care, in addition to involving unnecessary costs to the system, and making it difficult for new users to gain access to specialized treatment, consequently generating waiting lists (users waiting in line)[4,14,15].

Therefore, the aim of this study was to identify the factors associated with the users failing to keep orthodontic treatment appointments (absences), in three regional dental specialty centers (CEO-R) located in the State of Ceará.

Methodology

This was a cross-sectional, observational epidemiological study with the source of data extracted from record charts of patients who concluded orthodontic treatment at three CEO-Rs in the state of Ceará: Baturité, Russas and Ubajara. This study was submitted to the Research Ethics Committee and approved.

At the beginning of 2014, the state of Ceará had 18 CEO-Rs, and for the selection of the CEO-Rs of the study, the following inclusion criteria were adopted: the minimum time of three years of implementation of the CEO-R; in addition to having the same type of management, physical infrastructure and type of treatment (orthodontic). A previous prior study was conducted in the CEO-R Russas, to correct possible methodological failures. Data collection from the record charts was standardized by means of an electronic questionnaire, ordered in a sequential form of each unit researched, and fed according to their reading, to allow revision of the data, if necessary.

The reference for orthodontic treatment was established by means of a programmed consortium agreement (PPC) ("programação pactuada consorciada - PPC") between the members of the consortium (consisting of the state and municipalities comprising the region): each municipality had the right to a specific number of vacancies for the specialty, which took into consideration the population of the municipality and its existent human resources.

Appointments for users' first consultation were made by the municipal regulation centers, by means of external references issued by primary care. The return consultations were made at the CEO itself, or by the municipal regulation center. The system used for making appointments was the Regulation System (SISREG) - the online information system made available by DATASUS for management and operation of the Regulation Centers.

The factors associated with users' failure to appear for orthodontic treatment (absences)

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were analyzed in the following manner: first the rate of absences for each municipality was calculated by means of the calculation: total number of absences of each municipality divided by the total number of consultations of each municipality, then multiplied by one hundred. In order to describe the geographic pattern of the occurrence, thematic maps were constructed, based on the distributions[16,17]. The maps were constructed by municipalities and by CEO-R in a specific computer program, with standardization of the legend in five ranks[16,17]. The radii were also traced, one of 25 km and the other of 50 Km, relative to the geographic localization of the address of the headquarters of the CEO=Rs[18]. For construction of the maps, an electronic cartographic database and a specific computer program made available by IBGE were used[19,20].

To evaluate the associations between the outcome variable (absence from treatment) and the independent variables (sex, age, breakage of appliance, change of professional, income and place of user's residence) multiple logistic regression analysis was used with $p \leq 0.05$. All analyses were performed with the statistical program SAS (SAS Institute Inc., Cary, NC, USA, Release 9.2, 2008).

Results

In the studied period 237 record charts of completed orthodontic treatments were examined in 20 municipalities. In this period, 8, 283 consultations and a total of 2,665 (32.17%) absences occurred. Table 1 shows the number of consultations, absences per municipality, relative percentage and rate of absences of each municipality in relation to the number of consultations. The municipalities of Russas (headquarters of a CEO-R) and Morada Nova were those who performed the largest number of consultations and had the lowest absence rates in comparison with the other municipalities. The municipality of Carnaubal did not refer patients for orthodontic treatment.

The prevalence values were high for both headquarter and non-headquarter municipalities. Distribution of the rate of absences between the CEO-Rs and between municipalities was

Table 1. Frequencies and absence rates in municipalities belonging to the study, Ceará, 2015.

Municipality	Absences				
	Consultations	n	%	Rate	Distance**
Araçoiaba	644	249	9.34	38.66	16
Aratuba	237	86	3.23	36.30	37
Baturité*	470	180	6.75	38.30	-
Capistrano	286	93	3.49	32.51	23
Carnaubal	-	-	-	-	44
Croatá	100	46	1.73	46.00	85
Guaraciaba Do Norte	129	46	1.73	35.65	47
Guaramiranga	37	25	0.94	67.56	14
Ibiapina	171	57	2.14	33.30	8
Itapiúna	446	155	5.82	34.75	34
Jaguaretama	205	85	3.19	41.50	132
Jaguaruana	586	114	4.28	19.45	28
Morada Nova	1.260	330	12.38	26.20	54
Mulungu	91	24	0.9	26.37	20
Pacoti	127	66	2.48	52.00	20
Palhano	193	51	1.91	26.42	33
Russas*	1.978	472	17.71	23.86	-
São Benedito	232	110	4.13	47.40	23
Tianguá	374	154	5.78	41.17	16
Ubajara*	464	228	8.56	49.13	-
Viçosa do Ceará	253	94	3.53	37.15	46
Total	8.283	2.665	100	32.17	-

* Municipalities headquarters of CEO-R. ** Approximate distances (in kilometers) of the municipalities to the headquarters of CEO-R.

heterogeneous, and also presented significant values for both headquarter municipalities and those outside of the headquarters. In relation to headquarter municipalities, that of Ubajara presented the highest rate of absences. The rate of absences pondered by the number of consultations allowed identification of the municipalities with the lower frequencies of absences and those that had high rates, when compared with the municipalities with high frequencies of absences. Furthermore, the Municipalities of Pacoti and Guaramiranga - located at low distances from the headquarter municipality of the CEO-R (Baturité) - showed the highest absence rates. Whereas, the Municipality of Jaguaruana showed the lowest rate of absences among the municipalities and made referrals to the CEO-R Russas (Table 1).

Figure 1 shows that the municipalities of the CEO-R headquarters Baturité and Ubajara also presented high absence rates. The CEO-Rs of Ubajara and Russas have municipalities localized at over 50 Km from the headquarters in their areas of coverage. The CEO-R of Russas has the largest territorial extension, while the CEO-Rs of Baturité had the smallest territorial extension. The municipality of Jaguaretama is the furthest distance - 132 kilometers - from the headquarters (Russas) to which it belongs. However, the municipalities of Mulungu and Pacoti that are located approximately twenty kilometers from the CEO-R headquarters (Baturité) presented absence rates of 26.37 and 52, respectively. (Figure 1).

By regression it was possible to associate the change of professional with the highest number of absences. That is to say, when the change of professional occurred, there was an *odds ratio* of around 2 times more chances of absences occurring (Table 2).

Discussion

The change of operator contributed significantly to prolongation of the time of orthodontic treatment with a fixed appliance[21]. Patients, who for some reason, were treated by more than one professional, were compromised with respect to the duration of treatment[21]. The change of professional probably demotivated continuity of the treatment and increased the number of absences. In another direction, the study demonstrated that the lack of motivation was significantly associated with discontinuation of orthodontic treatment, and that parents played a fundamental role in motivation, during the course of orthodontic treatment of children and adolescents[22].

The change of professional was a statistically significant factor. In this sense it was an important variable to consider, because when this

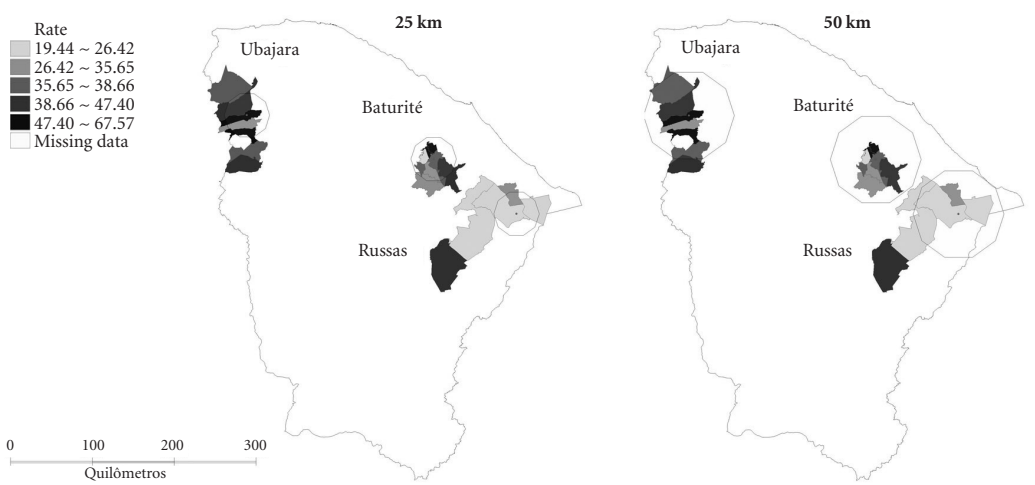

Figure 1. Spatial distribution of the absences rate and radii of territorial coverage from the headquarters of CEO-R, Ceará, 2015.

Table 2. Association between number of absences of users from orthodontic treatment at CEO-R and contextual factors, Ceará, Brazil, 2015.

Variables		Coefficient	Standard-Error	Z	p-value	Odds ratio	IC 95%
	Intercept	**-0.5121**	**0.4467**	**-**	**-**	**-**	**-**
Sex							
Male		-	-	-	-	1	-
Female		-0.3672	0.2860	-1.2843	0.1990	0.6926	0.40-1.21
Age							
<14		0.4202	0.3600	1.1671	0.2432	1.5222	0.75-3.08
>14		-	-	-	-	1	-
Change of Professional							
No		-	-	-	-	1	-
Yes		0.6841	0.3006	2.2757	0.0229*	1.9820	1.10-3.57
Broken Appliance							
No		-	-	-	-	1	-
Yes		-0.4539	0.3440	-1.3194	0.1870	0.6351	0.32-1.25
Income							
< 1 minimum wage		-0.1110	0.2911	-0.3813	0.7029	0.8949	0.51-1.58
> 1 minimum wage		-	-	-	-	1	-
City							
Headquarters		-	-	-	-	1	-
Non-Headquarters		0.1024	0.2855	0.3585	0.7200	1.1078	0.63-1.94

* Statistical significance below 0.05.

occurs, the case needs to be restudied, because professionals quite often use different mechanics and appliances to arrive at the same conclusion[21]. The construction of a tie between patient and professional is very important, and it should be maintained during dental care[21,22]. A change of professional may interrupt the patient/professional tie, and may cause problems in the sphere of civil responsibility, in filling out the patient record charts, re-starting treatment and abandonment of treatment[21,26]. For Rodrigues et al. listening to and communication with the patient and/or guardian must go through all the stage of health production, and are factors for successful dental practice[25].

The absence of correctly filled out record charts makes it difficult for another professional to continue with this work[23]. This finding was in agreement with that of Vasquez et al.[5] who observed that the precariousness of record charts makes it difficult to perform correct planning of the services. The lack of standardization in record charts may make it difficult not only to analyze epidemiological data for improved working of the system, but may also cause disruption if auditing or civil and criminal processes were required [23,27]. None of the record charts examined showed any information whatever about the mother's or family educational level. Absence of this information may be pointed out as a limitation for future epidemiological studies that use the record charts of patients attended by the CEO-Rs of Ceará, as data sources.

Analysis of the question "absence from" (or failure to turn up for an appointment for) a specialized public treatment is complex when compared international studies by reason of the different study designs, methodologies adopted, types of statistical analyses and the environment in which the research was developed (public/private)[28-30]. A study conducted in the United Arab Emirates pointed out that the main factors related to absences from dental treatments were the age, income and education of patients[15]. In this direction, the authors affirm that the person most harmed by the absence ends up being the patients themselves, with increase in treatment time, reduction in efficiency and in visualizing the benefit of treatment[15]. The cost-effectiveness ratio is an important concept in modern health care, and

prolonged treatment time may be harmful to the "economic feasibility" of a practice or country's health system[22]. The study of Beckwith et al.[29] showed that the absence represented 17.6 percent of the variation in the duration of orthodontic treatment, and that each absence was associated with a little over 1 month of additional treatment time. A study in Brazil[30] significantly correlated orthodontic treatment time with the number of absences and showed this represented 4.14% over the total treatment time in adults.

Decentralization and regionalization are presuppositions that rule reorientation of the model in oral health care[1]. However, large gaps continue to be observed, mainly in urban agglomerations by reason of the problems of integrating equipment and services[31]. In Florianópolis the distribution of the CEOs complied with geodemographic criteria, but came up against questions such as insufficient number of vacancies offered, decisions based on policy and not technical issues, lack of work protocols, logistics/ transport, different practices and/or conducts among the CEOs[31]. In this study, the authors identified variation in the area of coverage of the CEO-Rs, since two CEO-Rs had municipalities with a radius of cover larger than fifty kilometers. This fact could explain the prevalence values of the rates of absence from orthodontic treatments. Where there is a trend for implementing services in more populated municipalities, there would consequently be greater facility for referring users to specialized services. An alternative may be to dismember the CEO-Rs with large territorial extensions into microregions. As this was a cross-sectional epidemiological study, the authors point out that the relationship of causality between the dependent and independent variables, and the use of secondary data were points of limitation. Moreover, the failure to turn up for (absence from) a specialized consultation offered by the CEO-Rs may constitute a multifactorial event

Conclusion

The highest number of absences were associated with change of professional**.** Given the complexity of the public sector, incorporation of the qualified hearing of the managers, workers and users would be important for the planning and implementation of actions for coping with the problem, in order to improve the resolution of public orthodontic treatment.

Collaborations

EP Fonseca participated in the conception, analysis, data interpretation and in writing the article. JPS Júnior and SAS Vedovello participated in the conception, data collection, analysis and interpretation of data, and final approval of the manuscript. LZ Souza and AC Pereira participated in the conception, analysis, data interpretation, relevant critical review of the intellectual content and final approval of the manuscript. MC Meneghim participated in the conception, analysis, data interpretation, relevant critical review of the intellectual content and final approval.

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