

# Antibiotic prescription behavior of specialists in endodontics

Samuel Henrique Câmara **DE-BEM**<sup>1</sup>

Juliane **NHATA**<sup>1</sup>

Luciana Cavali **SANTELO**<sup>1</sup>

Rayana Longo **BIGHETTI**<sup>1</sup>

Antonio Miranda da **CRUZ FILHO**<sup>2</sup>

## ABSTRACT

**Introduction:** The present study proposed to determine the antibiotic prescription behavior of endodontic specialists regarding antibiotic administration timing, indication and first choice options. **Methodology:** A four-question questionnaire was delivered to 105 endodontists in São Paulo state, Brazil. The results were statistically analyzed. **Results:** Within the interviewed specialists, 48.5% were male and 51.5% female. Amoxicillin was the first choice antibiotic for 84.7% of professionals. For a scenario of penicillin allergic patients, 47.6% would prescribe clindamycin and

42.8% azithromycin. The great majority (79%) indicates antibiotics administration for a period of 5 to 7 days. Close to one third of interviewed individuals inadequately indicated antibiotic therapy. **Conclusion:** The majority of professionals were able to correctly select the antibiotic for non-allergic and penicillin allergic patients, as well as regarding the administration timing. On the other hand, there are still professionals inappropriately applying antibiotic therapies, favoring bacterial resistance.

**Keywords:** Antibiotic therapy. Endodontics. Bacterial resistance.

**How to cite this article:** De-Bem SHC, Nhata J, Santello LC, Bighetti RL, Cruz-Filho AM. Antibiotic prescription behavior of specialists in endodontics. *Dental Press Endod.* 2011 Oct-Dec;1(3):88-93.

» The authors report no commercial, proprietary, or financial interest in the products or companies described in this article.

<sup>1</sup>MSc student, Department of Restorative Dentistry, Ribeirão Preto School of Dentistry, University of São Paulo (FORP-USP), Brazil.

<sup>2</sup>Associate Professor, Endodontics, Ribeirão Preto School of Dentistry, University of São Paulo (FORP-USP), Brazil.

Received: November 25, 2011 / Accepted: November 28, 2011.

Contact address: Antonio Miranda da Cruz Filho  
Avenida do Café s/n – 14.040-904 – Monte Alegre, Ribeirão Preto/SP – Brazil  
E-mail: cruz@forp.usp.br

## Introduction

The discovery of the first antibiotic in 1928 by Alexander Fleming, a Scottish bacteriologist, besides revolutionizing medical conduct front infectious scenarios, served as base for studies directed to antibacterial agents.

With antibiotic production in large industrial scale starting from the 40's, several medication options were marketed. This fact might have helped health professionals regarding antibiotic therapy, but in relation to dentists, it led to difficulties during antibiotic selection and prescription.<sup>1</sup>

The lack of knowledge and information in relation to medication therapies by dentists is a result initially of a dental training deficiency. When performing surgical interventions, in which most of times there is a need for analgesic and/or anti-inflammatory or even antibiotic prescriptions, dentists face a very doubtful situation concerning the medication choices.<sup>2</sup>

The results of these difficulties contributed for an unchanged prescription behavior in Dentistry for more than 25 years.<sup>1</sup>

Antibiotic therapy limits infectious process development, creating favorable conditions of organisms to eliminate bacterial or fungic contingent by means of their immunologic defense mechanisms.<sup>3,4</sup> Although medication therapeutics is cooperative to clinical intervention and thus not always employed, its consistent and judicious employment is essential for a conscious and ethical practice in Dentistry.<sup>2</sup>

When prescribing a medication, the dentist has the legal responsibility to know the pharmacological aspects of employed drugs and to critically evaluate the therapeutic results.<sup>5</sup> Moreover, dentists should have absolute control of each case, evaluating patients' overall health and balancing the real necessity for an antibiotic therapy. Antibiotic administration in endodontics is indicated only in situations of periradicular acute abscesses, presence of symptomatology and/or persistent exudate, and for bacterial endocarditis prevention.<sup>3</sup>

The administration of antibiotics for infections of low relevance or for simple inflammatory processes might strongly contribute for the worldwide bacterial resistance problem.<sup>6</sup> Moreover, nondiscriminatory prescription has been contributing to greater incidence of collateral reactions and side effects.<sup>7,8</sup>

The aim of the present study was to evaluate the antibiotic prescription behavior of specialists in endodontics, regarding different endodontic pathologies and specific patient's characteristics.

## Materials and Methods

One hundred and five endodontists from São Paulo State were interviewed through a questionnaire composed by 4 multiple-choice questions (Fig 1).

At the end of data collection, the results were ordered in tables and quantified in percentage to identify the most prescribed antibiotic for patients with no history of allergy and for penicillin allergic patients, and the antibiotic therapy administration timing and indication.

## Results

From the total of 105 interviewed professionals, 48.5% were male subjects and 51.5% female. More than half of the individuals (60%) aged between 25

<b>Name:</b> _____	<b>Gender:</b> _____
<b>Specialty:</b> _____	
<b>Time as specialist:</b> _____	<b>State:</b> _____
<u>USE OF ANTIBIOTICS IN ENDODONTICS</u>	
<b>1. Which antibiotic of choice for patients with no allergy history?</b>	
a)	Amoxicillin.
b)	Amoxicillin + clavulanic acid.
c)	Clindamycin.
d)	Azitromycin.
e)	Metronidazole.
f)	Other _____
<b>2. For how many days do you prescribe antibiotics?</b> _____	
<b>3. Which antibiotic do you prescribe for penicillin allergic patients?</b>	
a)	Clindamycin.
b)	Azitromycin.
c)	Metronidazole.
d)	Cephalosporin.
e)	Lincomycin.
<b>4. In which of the following scenarios do you prescribe antibiotic therapy?</b>	
<b>Mark all items that apply.</b>	
a)	Irreversible pulpitis, moderate / severe pain.
b)	Necrotic pulp without swelling, no pain / light pain.
c)	Necrotic pulp without swelling, moderate / severe pain.
d)	Necrotic pulp with swelling, no pain / light pain.
e)	Necrotic pulp with swelling, moderate / severe pain.
f)	Necrotic pulp with fistula, no pain / light pain.

Figure 1. Questionnaire applied to endodontists.

and 30 years, 28.5% aged between 35 and 45 years, and 11.5% with age greater than 45 years.

Regarding time in the specialty, the interviewed individuals were distributed into three groups: Less than 5 years (55.24%), from 5 to 20 years (40%) and over 20 years (4.76%) (Fig 2). The mean time in the specialty was 7 years, being 36 years the highest observed time for a professional in the endodontic specialty.

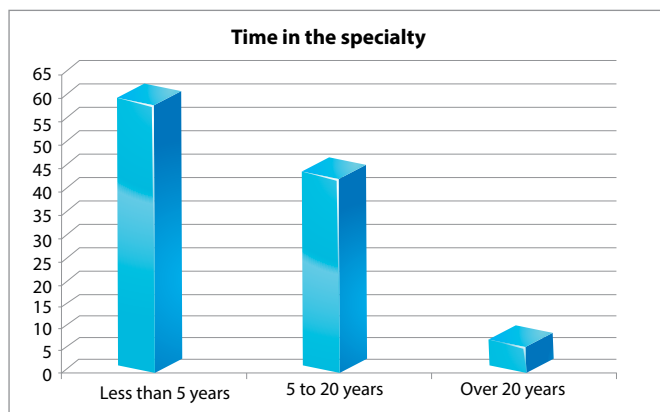
The administration timing of antibiotics varied from 2 to 10 days. However, the great majority of specialists (79%) prescribe antibiotic therapy for 5 to 7 days (Table 1).

Amoxicillin was the choice antibiotic within 84.7% of interviewed specialists for the treatment of patients with no history of allergic reaction. The association of amoxicillin and clavulanic acid, a penicillinase enzyme inhibitor, was reported by 9.5% of professionals. The indication of azithromycin, cephalosporin, metronidazole and others were reported in 5.8% (Table 2).

For penicillin allergic patients, the first antibiotic choice was clindamycin (47.6%), followed by azithromycin (42.8%), cephalosporin (7.8%), metronidazole (0.9%) and erythromycin (0.9%). None of the interviewed individuals opted for lincomycin (Table 3).

Table 4 brings the percentage of professionals according to their antibiotic therapy indication for different pathologies related to periapical and pulp tissues. The prescription of antibiotics for irreversible pulpitis with moderate to severe symptomatology was indicated by 5.7% of the interviewed endodontists. For the pulp necrosis with no swelling and light

to no pain, or moderate to severe pain, antibiotic was indicated by 2.8% and 29.5% of endodontists, respectively. Fifty point four percent and 93.3% of the interviewed professionals indicated antibiotic therapy for pulp necrosis with swelling and light to no pain, or moderate to severe pain, respectively. Eight percent of the interviewed individuals did not indicate antibiotic therapy for any of the described scenarios. Antibiotic therapy was indicated by 31.4% of the professionals for pulp necrosis with the presence of fistula and light to no symptomatology (Table 4).



**Figure 2.** Distribution of interviewed individuals according to their time in the specialty.

**Table 1.** Prescription timing of antibiotic administration.

Timing (days)	%
2-4	11.4
5-7	79
8-10	9.6

**Table 2.** Antibiotic of choice for patients with no allergy history.

Antibiotic	%
Amoxicillin	84.7
Amoxicillin + clavulanic acid	9.5
Others	5.8

**Table 3.** Antibiotic of choice for penicillin allergic patients.

Antibiotic	%
Clindamycin	47.6
Azithromycin	42.8
Cephalosporin	7.8
Metronidazole	0.9
Eritromycin	0.9

**Table 4.** Scenarios when antibiotic were prescribed.

Scenarios	Antibiotic prescription (%)
Irreversible pulpitis, moderate / severe pain	5.7
Pulp necrosis with no swelling, light / no pain	2.8
Pulp necrosis with no swelling, moderate / severe pain	29.5
Pulp necrosis with swelling, light / no pain	50.4
Pulp necrosis with swelling, moderate / severe pain	93.3
Pulp necrosis with fistula, light / no pain	31.4
None of the mentioned scenarios	8.0

The amount of professionals that prescribed antibiotics for the irreversible pulpitis scenario (5.7%) belongs to the less than 5 years in the specialty group. The interrelation between the interviewed individuals indicating antibiotic therapy for chronic processes (34.2%) (pulp necrosis without swelling and light to no pain, or pulp necrosis with fistula and light to no pain), and the time in the specialty revealed that 66.8% belong to the less than 5 year in the specialty group. The remaining professionals are distributed within the two other groups, between 5 to 20 years group (30.5%) and the over 20 years group (2.7%).

## Discussion

The antibiotic therapy is a strong ally for dentists facing treatment of oral infectious processes. Antimicrobials aid the defense of organisms promoting a decrease or stabilization on invasive bacteria or fungi quantities. However, it is important to highlight that every treatment is directly related to an adequate diagnosis and planning of actions, being the medication therapy only an adjunct and never a substitute for the localized action of health care providers.<sup>9</sup>

The time for antibiotic therapy administration is determinant for the therapeutic success. The most important dentist decision is not related to which type of antimicrobial will be used, but to which specific scenarios they should be prescribed.<sup>10</sup> The indication for antimicrobials should be clearly evaluated, like the presence of persistent infections or in systemically compromised patients, the presence of fever on the last 24 hours, trismus, swelling, malaise in healthy patients, lymphadenopathy and/or immunocompromised patients such recently transplanted, HIV positive and under chemotherapy patients.<sup>1</sup>

Studies have been conducted in the United States<sup>1</sup> and Spain<sup>6,11</sup> to evaluate the knowledge and behavior of dental professionals about antibiotics prescription. The present study interviewed 105 endodontists at São Paulo State based on questionnaires proposed in previous researches.

The results revealed the mean prescription timing of the present study was between 5 to 7 days. According to Pallash,<sup>13</sup> endodontic infections present fast onset and short duration, lasting from 2 and 7 days at most. Antibiotic therapy should be sustained only during the infection signs and symptoms persistence<sup>12</sup> and

should be stopped as long as the clinical evidences are solved. Antibiotic prescription timing of 5 to 7 days is the most appropriate for the majority of infections,<sup>11</sup> once it is initiated right after signs and symptoms onset. The maintenance of prolonged antibiotic therapy leads to selection of drug resistant microorganisms and increases bacterial tolerance of oral flora to colonization by unusual microorganisms.<sup>13</sup>

Within the interviewed individuals, the first choice medication for penicillin non-allergic patients was amoxicillin alone (84.7%) or associated to clavulanic acid (9.5%). This medication is highly efficient against anaerobic microorganisms,<sup>14</sup> and due to its broad action spectrum it is indicated for dentoalveolar abscesses, where the presence of different microorganism species is observed.<sup>15</sup> The association of amoxicillin and clavulanic acid (9.5%) is a very viable alternative for infections with presence of beta-lactamase producing bacteria.<sup>14</sup>

Penicillin VK is the first option antibiotic for oral infections in North-America, being amoxicillin the second option.<sup>1</sup> In a study conducted in Norway,<sup>16</sup> penicillin VK was often prescribed by dentists, followed by metronidazole, erythromycin, amoxicillin and others. However, penicillin VK presents some disadvantages in relation to amoxicillin as this last is well tolerated and better absorbed by the gastrointestinal tract.<sup>6</sup>

The interviewed professionals opted for clindamycin (47.6%) as the antibiotic of choice for penicillin allergic patients. This is a lincomycin derived antibiotic with broad spectrum of action; it is well absorbed by oral route; it is bacteriostatic or bactericide; and it is characteristic for penetrating into macrophages and leucocytes, which favors high concentrations of this drug in dental abscesses.<sup>1,17,18</sup> Previous studies revealed clindamycin as dentists preferred drug for patients presenting hypersensitivity to penicillin.<sup>1,6,11</sup> Azithromycin was the second option (42.8%) within the interviewed individuals. This is a macrolide-derived drug, from erythromycin, which presents similar action spectrum as penicillin. Besides its greater action spectrum over larger number of microorganism species, azithromycin presents greater capacity of tissue penetration than erythromycin.<sup>19</sup>

Question 4 from the questionnaire (Fig 1) listed different diagnosed scenarios related to pulp and periapical pathologies in which endodontists should

choose those requiring antibiotic therapy. After clinical diagnosis, the medication therapy to be adopted should take into consideration especially the general health status of patients. Although the presented scenarios in question 4 did not bring clinical particularities or medical history, the distinction between acute/chronic and between inflammatory/infectious inflammatory situations was very clear.

For the scenario of irreversible pulpitis, 5.7% of endodontists prescribed antibiotics. For pulp pathologies in general (acute or chronic) there are still not infection evidences and pulp tissue is vital; thus antibiotic prescription is unnecessary. Although this is an apparently simple and obvious scenario, many dentists indicated antibiotic therapy for these particular situations.<sup>1,6,20,21</sup>

Antibiotic therapy was indicated for the necrotic pulp with no swelling and light to no pain and pulp necrosis with fistula and light to no pain by 2.8 and 31.4% of endodontists, respectively. Antibiotic therapy is contraindicated for infections at chronic phases. According to Al-Haroni e Skaug,<sup>17</sup> the majority of infections, either acute or chronic, can be successfully treated by eliminating the infection source, by disinfecting root canals, draining abscesses or extracting teeth, with no need for antibiotic, with exception of evident systemic compromise.

In relation to inadequate antibiotic prescriptions, the results detected in the present study showed a relationship between time in the specialty of professionals and adequate use of antibiotic therapy. Professionals

indicating antibiotic for irreversible pulpitis were from the less than 5 years in specialty group. The majority of professionals (66.8%) prescribing medication for chronic scenarios of pulp necrosis were also from this group. The professional experience might be an important factor for these situations.

It was noted the great majority of interviewed specialists correctly adopts antibiotic therapy front endodontic infections, although still one third of them inadvertently prescribes antibiotics. The bacterial resistance is highlighted as a consequence of this practice, besides the possible occurrence of adverse side effect reactions for patients.<sup>22</sup>

Indiscriminate use of antimicrobials is recently a worldwide concern. In Brazil, the government adopted new guidelines for antimicrobial prescriptions starting in 2010, in order to face this problem and to police antibiotic market with no prescription. The necessity of single-copy prescriptions, being a copy for the patient and the original retained at the pharmacy, is within this new guideline. It is however pertinent for health care providers to seek for constant recycling of their knowledge and to carefully reflect front possible antibiotic therapy indications.

## Conclusion

The majority of interviewed specialists correctly prescribe antibiotics. However, there are still professionals that inadvertently apply antibiotic therapy. This fact favors bacterial resistance and also exposes patients unnecessarily to adverse side effects of medications.

## References

1. Yingling NM, Byrne BE, Hartwell GR. Antibiotic use members of the American Association of Endodontics in the year 2000: report of a national survey. *J Endod.* 2002;28(5):396-404.
2. Garbin CAS, Garbin AJI, Rovida TAS, Moroso TT, Dossi AP. Conhecimento sobre prescrição medicamentosa entre alunos de Odontologia: o que os futuros profissionais sabem? *Rev Odontol UNESP.* 2007;36(4):323-9.
3. Soares RG, Salles AA, Iraia LED, Limongi O. Antibioticoterapia sistêmica em endodontia: quando empregar? *Stomatos.* 2005;11(21):33-40.
4. Andrade ED. *Terapêutica medicamentosa em Odontologia.* 2ª ed. São Paulo: Artes Médicas; 2006.
5. Castilho LS, Paixão HH, Perini E. Prescription of drugs of systemic use by dentists. *Rev Saúde Pública.* 1999;33(3):287-94.
6. Rodríguez-Núñez A, Cisneros-Carvalho R, Velasco-Ortega E, Llamas-Carreras JM, Torres-Lagares D, Segura-Egea JJ. Antibiotic use by members of the Spanish Endodontic Society. *J Endod.* 2009;35(9):1198-203. Epub 2009 Jul 22.
7. Nicolini P, Nascimento JW, Greco KV, Menezes FC. Fatores relacionados à prescrição médica de antibióticos em farmácia pública da região Oeste da cidade de São Paulo. *Ciênc Saúde Colet.* 2008;13(Supl):689-96.
8. Mainjot A, D'Hoore W, Vanheusden A, Van Nieuwenhuysen JP. Antibiotic prescribing in dental practice Belgium. *Int Endod J.* 2009;42(12):1112-7.
9. Harrison JW, Svec TA. The beginning of the end of the antibiotic era? Part II. Proposed solutions to antibiotic abuse. *Quintessence Int.* 1998;29(4):223-9.
10. Harrison JW, Svec TA. The beginning of the end of the antibiotic era? Part I. The problem: abuse of the "miracle drugs". *Quintessence Int.* 1998;29(3):151-62.
11. Pallasch TJ. Antibiotics in Endodontics. *Dent Clin North Am.* 1979;41(3):455-79.
12. Segura-Egea JJ, Velasco-Ortega E, Torres-Lagares D, Velasco-Ponferrada MC, Monsalve-Guil L, Llamas-Carreras JM. Pattern of antibiotic prescription in the management of endodontic infections amongst Spanish oral surgeons. *Int Endod J.* 2010;43(4):342-50.
13. Pallasch TJ. Pharmacokinetic principles of antimicrobial therapy. *Periodontology* 2000. 1996;10:5-11.
14. Salako NO, Rotimi VO, Adib SM, Al-Mutawa S. Pattern of antibiotic prescription in the management of oral diseases among dentists in Kuwait. *J Dent.* 2004;32(7):503-9.
15. Kuriyama T, Williams DW, Yanagisawa M, Iwahara K, Shimizu C, Nakagawa K, et al. Antimicrobial susceptibility of 800 anaerobic isolates from patients with dentoalveolar infection to 13 oral antibiotics. *Oral Microbiol Immunol.* 2007;22(4):285-8.
16. Duarte MAH, Vale IS, Garcia RB. Antibioticoterapia em Endodontia. *Rev Assoc Paul Cir Dent.* 1999;53(1):59-62.
17. Al-Haroni M, Skaug N. Incidence of antibiotic prescribing in dental practice in Norway and its contribution to national consumption. *J Antimicrob Chemother.* 2007;59(6):1161-6. Epub 2007 Apr 19.
18. Roda RP, Bagán JV, Bielsa JMS, Pastor EC. Antibiotic use in dental practice. A review. *Med Oral Patol Oral Cir Bucal.* 2007;12(3):E186-92.
19. Lodi KB, Carvalho LF, Koga-Ito CY, Carvalho VA, Rocha RF. Rational use of antimicrobials in dentistry during pregnancy. *Med Oral Patol Oral Cir Bucal.* 2009;14(1):E15-9.
20. Bahal N, Nahata MC. The new macrolide antibiotics: azithromycin, clarithromycin, dirithromycin, and roxithromycin. *Ann Pharmacother.* 1992;26(1):46-55.
21. Dorn SO, Moodnik RM, Feldman MJ, Borden BG. Treatment of the endodontic emergency: a report based on a questionnaire. Part I. *J Endod.* 1977; 3(4):94-100.
22. Whitten BH, Gardiner DL, Jeanson BG, Lemon RR. Current trends in Endodontic treatment: report of a national survey. *J Am Dent Assoc.* 1996;127(9):1333-41.
23. Longman LP, Preston AJ, Martin MV, Wilson NH. Endodontics in the adult patient: the role of antibiotics. *J Dent.* 2000;28(8):539-48.