

# Treatment approaches and antibiotic use for emergency dental treatment in Turkey

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**Abstract:** The purpose of this study was to gather information about Turkish general dental practitioners' treatment approaches towards endodontic emergencies, antibiotic-prescribing habits, and their participation in lifelong learning programs. Questionnaires were given to dentists who attended the 16th National Congress organized by the Turkish Dental Association. From 1,400 questionnaires distributed, 589 (43%) were deemed usable in this study. This survey dealt with questions that were subdivided into two main topics: dental emergency treatment approaches, and antibiotic prescription and information on lifelong learning program participation. The statistical analysis was conducted with a  $\chi^2$  test at a significance level of  $P < 0.05$ . For irreversible pulpitis cases in vital teeth, most of the dental practitioners (65.3%) preferred single-visit root canal treatments. For teeth presenting a periapical lesion, the preferred treatment approach was root canal treatment (91.5%). The rate of prescription of analgesics and antibiotics was 21.7% in untreated acute apical periodontitis cases and 41% in acute apical abscess cases. Frequently prescribed antibiotics were amoxicillin-clavulanate (61.8%) and amoxicillin (46.5%). There was a tendency for practitioners to attend congresses as their years of professional practice increased ( $P < 0.0001$ ). There have been discrepancies between taught and observed practice. Educational initiatives are needed to prevent inappropriate prescription of antibiotics.

**Keywords:** antibiotic prescription, endodontic emergency, survey, Turkey

## Introduction

Management of dental emergencies is primarily based on root canal treatment or extraction of teeth.<sup>1</sup> Irreversible pulpitis, characterized by acute and intense pain, is considered to be one of the most frequent dental emergencies for patients.<sup>2</sup> Important features of irreversible pulpitis consist of spontaneous attacks of pain ranging from a few seconds to several hours, the pain elicited by hot or cold applications. Also, in acute and chronic apical periodontitis and localized swelling cases, pulpal circulation is compromised.<sup>3</sup> Thus, antibiotics have no effective usefulness.<sup>4</sup>

The prescription of systemic antibiotics as a means of relieving pain in endodontic emergencies has received considerable attention.<sup>4,5</sup> The use of antibiotics as an adjunct in the management of orofacial infections is an important treatment option when clinically indicated. However, systemic antibiotic prescribing may be associated with unfavorable side effects ranging from the possibility of allergic reactions to the development of resistant strains of microbes.<sup>6</sup>

In developed countries, surveys about general dental practitioners' prescribing habits have raised awareness of the quality of prescriptions.<sup>7</sup> Whilst some surveys have emphasized that dental prescriptions do not follow clinical guidelines,<sup>6</sup> other authors

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have concluded that there is a lack of scientific information about appropriate and efficient prescription.<sup>2</sup> Moreover, changes in the dental pharmacotherapeutic field have been so rapid in recent years that the constant updating of dental practitioners' knowledge about new drugs, drug interactions, and useful therapeutic trends is necessary.<sup>8</sup> This is only possible with the help of continuing education programs, attending conferences, and reading various dental journals and dental magazines to gain appropriate knowledge on the use of drugs and their pharmacokinetics. Clinicians who do not participate in continuing dental education following graduation may be less acquainted with recent advances. Thus, lifelong learning in the subject following graduation is highly recommended.

The primary aim of this study was to gather information about endodontic emergency treatment approaches as well as prescribing habits of Turkish general dental practitioners. General dental practitioners' participation in lifelong learning programs and endodontic congresses was also investigated.

## Materials and methods

Information was obtained by a questionnaire given to 1,400 dental practitioners at the 16th National Congress organized by the Turkish Dental Association (Figure 1). Respondents were not asked for their names, nor for any identification or marks on forms, in order to guarantee anonymity. The participants were asked to check all areas of the questionnaire that applied, so it was possible to have multiple responses for each question, and the emergency portion of the questionnaire was included in this survey.

This survey dealt with questions that were subdivided into two main topics: endodontic emergency treatment approaches and information about lifelong learning program participation.

1. Emergency treatment: number of appointments for root canal treatment in vital and nonvital teeth with or without periapical lesions, emergency intervention approaches in the treatment of acute apical abscess, irreversible pulpitis and acute apical periodontitis cases, antibiotic prescribing habits and frequently used antibiotics
2. Information about lifelong learning: participation in postgraduate education seminars and endodontic congresses.

In order to make a more detailed comparison of the data, the sample was further divided according to years of professional practice, as follows: up to 5 years, 6–10 years, 11–15 years, 16–20 years, and more than 20 years.

The data were analyzed using Number Cruncher Statistical System software 2007 (NCSS, Kaysville, UT, USA).

The statistical analysis was conducted with a  $\chi^2$  test at a significance level of  $P < 0.05$ .

## Results

Of the 1,400 questionnaires distributed, 602 replies were received, of which 13 were returned. In all, 589 questionnaires (43%) were analyzed in this study.

### Emergency treatment

For irreversible pulpitis cases in vital teeth, most of the dental practitioners (65.3%) preferred single-visit root canal treatments. The practitioners who had been working for 16–20 years performed one-visit root canal treatment in ratios significantly higher than the other groups ( $P < 0.05$ ). Nearly all of the dental practitioners (96.9%) preferred multiple-visit endodontic treatment for teeth with necrotic pulps and/or periapical lesions (Table 1). The percentage of single-visit root canal treatments decreased as the number of root canals increased (one canal, 54.3%; two canals, 43.3%; three canals, 24.4%; four canals, 21.1%).

As shown in Table 2, 52.3% of the respondents used intracanal medication in addition to pulpectomy procedures in cases of irreversible pulpitis with normal periradicular tissue, whereas 27.5% stated that they did not use any intracanal medication between visits. The rate of prescription of analgesics and antibiotics following pulpectomy was 20.4%. Seven percent of the respondents reported that they prescribed analgesics only, and 6.1% prescribed antibiotics in addition to analgesics in cases of irreversible pulpitis.

In cases with acute apical periodontitis, 37.2% of all respondents prescribed analgesics and antibiotics following pulpectomy, and 34.5% used antiseptic intracanal medication in addition to pulpectomy (Table 2). The rate of dental practitioners who had been working for over 20 years to use antiseptic intracanal medicament was significantly lower than the younger practitioners ( $P < 0.05$ ). The rate of prescription of analgesics and antibiotics in untreated acute apical periodontitis cases was 21.7%.

For teeth presenting a periapical lesion, the preferred treatment approach was root canal treatment (91.5%) regardless of years of professional activity (Table 3). Nearly 5% of all respondents stated that they perform apical resection in conjunction with a root canal treatment, whereas 0.2% reported that they perform apical resection only. The rate of referrals to endodontists was only 0.8%.

In cases with acute apical abscesses, prescription of antibiotics was 41%. However, if there was drainage, then this rate rose to 44.6%. Eleven percent reported prescribing

**This survey deals with questions about your treatment approaches for endodontic emergency cases**

**Duration of professional activity:**

- <5 years
- 5–10 years
- 10–15 years
- 16–20 years
- >20 years

**For root canal treatment in vital teeth, how long do you usually take to treat your patients?**

- Single visit
- Multiple visits

**For root canal treatment in nonvital teeth, how long do you usually take to treat your patients?**

- Single visit
- Multiple visits

**Which of the following situations do you treat in one visit, two visits, three or more visits?**

- |                       |         |          |               |
|-----------------------|---------|----------|---------------|
| A One canal           | 1 visit | 2 visits | 3/more visits |
| B Two canals          | 1 visit | 2 visits | 3/more visits |
| C Three canals        | 1 visit | 2 visits | 3/more visits |
| D Four or more canals | 1 visit | 2 visits | 3/more visits |

**If two or more than two visits are normally required, do you use some medications between appointments?**

- Yes
- No

**Which of the following is your emergency treatment approach for pulpitis cases?**

- Analgesics
- Analgesics + antibiotics
- Pulpectomy
- Pulpectomy + intracanal medication
- Pulpectomy + analgesics + antibiotics

**Which of the following is your emergency treatment approach for acute apical periodontitis cases**

- Analgesics
- Analgesics + antibiotics
- Pulpectomy
- Pulpectomy + intracanal medication
- Pulpectomy + analgesics + antibiotics

**Which of the following is your emergency treatment approach for acute apical abscess cases?**

- Antibiotics only
- Antibiotics if no drainage
- Drainage + antibiotics
- Other (please specify)

**Which of the following is your treatment approach for tooth presenting a periapical lesion?**

- Extraction
- Root canal treatment
- Root canal treatment + apical resection
- Apical resection
- Refer to an endodontist

**Which antibiotic do you prescribe most often for therapeutic reasons (not prophylaxis)?**

- Penicillin G
- Amoxicillin
- Amoxicillin + clavulanate (Augmentin®)
- Ampicillin
- Erythromycin
- Clindamycin
- Clarithromycin
- Metronidazole
- Other (please specify)

**Figure 1** (Continued)

Figure 1 (Continued)

<p><b>Are you participating in continuing dental education programs?</b></p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p> <p><b>Have you ever been to an endodontic congress?</b></p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p>
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Figure 1 Antibiotic and emergency endodontic treatment survey given to general dental practitioners.

only antibiotics in acute apical abscess cases without doing any invasive treatment. Frequently prescribed antibiotics were amoxicillin–clavulanate (61.8%), amoxicillin (46.5%), clindamycin (26.8%), and metronidazole (19.7%) (Table 4).

### Lifelong learning

Of the 589 respondents, 480 (81.5%) stated that they participated in postgraduate education seminars and 191 (32.4%) in endodontic congresses. There was a tendency for practitioners to attend congresses as their years of professional practice increased ( $P < 0.0001$ ).

### Discussion

This study investigated Turkish general dental practitioners' endodontic emergency treatment approaches, antibiotic-prescribing habits, and participation in postgraduate education seminars and endodontic congresses. Questionnaires were given to 1,400 dentists who attended the 16th National Congress organized by the Turkish Dental Association. The response rate was 43%. Annual national congresses organized by the Turkish Dental Association are major events that representatives and members of all dental chambers throughout Turkey attend. Thus, the information obtained may be representative of the general dental population throughout Turkey.<sup>9</sup>

According to the results of our survey, 6.1% of all respondents prescribed antibiotics for untreated irreversible pulpitis cases. This result was relatively lower than the 40% in Spain<sup>3</sup>

and 16.76% in the US,<sup>5</sup> but higher than the 4.3% in Belgium.<sup>7</sup> Antibiotics were prescribed without any local treatment in 21.7% of acute apical periodontitis cases and in 11.4% of acute apical abscesses. For periapical abscesses, this rate was relatively lower than it was in Belgium (59.0%).<sup>7</sup> Nonsurgical root canal therapy with analgesics is indicated in these cases, not antibiotics.<sup>5</sup> With regard to irreversible pulpitis, acute apical periodontitis, and periapical abscesses with no systemic involvement, the respondents were overprescribing antibiotics for conditions where local treatment would suffice. The only scenarios that would be acceptable for prescribing antibiotics are those in which the patient is immunocompromised and/or there is a systemic involvement. Otherwise, it would be inappropriate to prescribe antibiotics for medicolegal reasons or because of insufficient training.<sup>3,5</sup>

It is taught in universities and dental seminars that there is no evidence to support the use of antibiotics for relieving pain in irreversible pulpitis cases. However, one in every five general dental practitioners prescribed antibiotics either before or after treatment. There is a common public misconception regarding the use of antibiotics, insofar as they can cease odontogenic pain. Thus, patients demand antibiotherapy from their dental practitioners, meaning that prescribing does not solely depend on their oral health status. Moreover, the low cost of antibiotics and analgesics and the availability of these drugs to the public with or without a prescription cause general dental practitioners to prescribe more and more antibiotics to patients whether they are necessary or not. Patients presenting at dental surgeries also need to be educated about the importance of restricting the use of antibiotics to only cases of severe infection. Unfortunately, dental patients not only pressure their dentist to get an antibiotic prescription, they also self-medicate. Self-medication was found to be high in some developing countries<sup>10</sup> and even in some developed countries.<sup>11</sup> Considering the breadth of medicine available without a prescription and the problems that can arise with unnecessary medication use, mandatory continuous education programs that target pharmacists and their assistants may play an important role in ensuring medicines are used appropriately.<sup>10</sup>

**Table 1** Appointments for root canal treatment in vital and nonvital teeth with periapical lesions

Years of professional activity	0–5	6–11	11–15	16–20	>20	P-value
For vital teeth						
Single visit	60.1%	61%	64%	80.5%	66.4%	0.023
Multiple visits	39.9%	39%	36%	19.5%	33.6%	
For nonvital teeth/with periapical lesions						
Single visit	1.8%	4%	2.2%	6.1%	2.9%	
Multiple visits	98.2%	96%	97.8%	93.9%	97.1%	

**Table 2** Emergency treatment approaches for teeth presenting pulpitis or acute apical periodontitis

Years of professional activity	0–5	6–11	11–15	16–20	>20	P-value
Emergency treatment approach for teeth presenting pulpitis						
Analgesics	9.5%	3.9%	9%	4.8%	2.8%	
Analgesics + antibiotics	3.6%	8.8%	3.4%	10.7%	9.7%	
Pulpectomy	27.2%	30.4%	30.3%	27.4%	24.8%	
Pulpectomy + intracanal medicament	59.2%	50%	66.3%	39.3%	44.8%	0.001
Pulpectomy + analgesics + antibiotics	13.0%	22.5%	12.4%	31.0%	26.2%	0.001
Emergency treatment approach for teeth presenting acute apical periodontitis						
Analgesics		6.9%	7.9%	7.1%	4.8%	
Analgesics + antibiotics	17.8%	18.6%	18%	25%	29%	
Pulpectomy	4.2%	8.8%	0	6%	3.4%	0.048
Pulpectomy + intracanal medicament	47.3%	32.4%	42.7%	20.2%	24.1%	0.0001
Pulpectomy + analgesics + antibiotics	28.4%	38.2%	40.4%	44%	41.4%	

In the present study, amoxicillin–clavulanate was the most frequently prescribed antibiotic. This result differed from the findings of Lee et al<sup>12</sup> (3.1%) and Mainjot et al<sup>7</sup> (22.1%). The prescription rate of amoxicillin (46.5%) in Turkey was similar to the results in Spain (44.3%),<sup>3</sup> whereas prescription of clindamycin (26.8%) was higher than it is in Belgium (13.9%)<sup>7</sup> and Spain (3.7%). In recent years, the prescription of amoxicillin and clavulanic acid surpassed that of amoxicillin alone.<sup>6</sup> However, the use of broad-spectrum antibiotics, like amoxicillin and clavulanic acid, is questionable, because its broad spectrum is more than is required for endodontic needs<sup>5</sup> and the use of greater-spectrum antibiotics may be accompanied by an increase in the rates of resistance of respiratory germs.<sup>6</sup> Inappropriate prescription leads to selection of resistant strains, which is potentially damaging and may contribute to the global antimicrobial resistance problem. If indicated, selected antibiotics with a spectrum of action as narrow as possible should be prescribed. Dental practitioners should decide not only which antibiotic to use, but whether to use one at all.<sup>5</sup>

**Table 3** Treatment approach for a tooth presenting a periapical lesion

Years of professional activity	0–5	6–11	11–15	16–20	>20	P-value
Preferred treatment approach for a tooth presenting a periapical lesion						
Extraction	3.6%	1.0%	2.2%	3.6%	1.4%	
RCT	90.5%	94.1%	92.1%	88.1%	92.4%	
RCT + apical resection	4.1%	3.9%	4.5%	7.1%	3.4%	
Apical resection	0	0	0	0	0.70%	
Refer to an endodontist	1.8%	1%	1.1%	1.2%	2.1%	0.775

**Abbreviation:** RCT, root canal treatment.

This study also investigated the number of appointments that general dental practitioners choose to treat endodontic emergencies. Multiple appointments may be chosen as a result of the complexity of the procedure, the fatigue of the patient, or the operator, or the need to use calcium hydroxide intracanal medication between appointments.<sup>13</sup> According to the results of studies conducted in the US,<sup>14</sup> the UK,<sup>15</sup> Portugal,<sup>16</sup> Belgium,<sup>17</sup> and in developing countries like Sudan,<sup>18</sup> general dental practitioners mostly preferred multiple-visit root canal treatments. The percentage of single-visit root canal treatments decreased as the number of root canals increased. This might have been due to the complexity of the root canal systems in multirouted teeth and/or lack of material and equipment. However, the general dental practitioners of the present survey reported little difference in the number of appointments when completing an endodontic treatment in a tooth with one or more root canals. This finding was also in accordance with the results of Slaus and Bottenberg.<sup>19</sup>

Another criterion for the number of appointments required for treatment is the formation of apical periodontitis. One-visit root canal treatment is not encouraged for necrotic pulps.<sup>20</sup> According to our results, most of the general dental practitioners preferred single-visit endodontic treatment for

**Table 4** Most frequently prescribed antibiotics

Antibiotics	Response
Amoxicillin + clavulanate	61.8%
Amoxicillin	46.5%
Clindamycin	26.8%
Metronidazole	19.7%
Ampicillin	13.2%
Penicillin G	7.1%
Erythromycin	6.5%
Clarithromycin	4.9%

vital cases and multiple-visit endodontic treatment for teeth with necrotic pulps and/or periapical lesions. There appears to be a consensus on the routine use of intracanal medicaments in preclinical endodontic teaching amongst dental schools in Turkey. Calcium hydroxide is the main material of choice for interappointment dressing. Even though it does not eliminate the whole spectrum of microorganisms found in a root canal, conventional endodontic therapy with calcium hydroxide results in the reduction of pathogenic species associated with pulp necrosis.<sup>21</sup>

The attendance of general dental practitioners at continuing-education courses for modern endodontic techniques was also investigated in this survey. Continuing education programs help general dental practitioners improve and broaden their knowledge and competence. These programs are mainly provided by such entities as universities, dental associations, and companies. Online continuing education is also available through the Internet.<sup>22,23</sup> Mandatory continuing education is a requirement for relicensure of dentists in the US.<sup>24</sup> Although the Turkish Dental Association's regulations require dentists to take a specific number of continuing-education credits a year, there is no enforcement in Turkey as there is in France.<sup>25</sup> Interestingly, newly graduated practitioners failed to attend these programs compared to practitioners who have been working for more than 5 years ( $P < 0.0001$ ). The goal for the future is to overcome shortcomings and to disseminate well-acknowledged quality guidelines for general dental practice. Further research is needed to assess whether changes improve the standard of root canal treatment and the prescribing habits of Turkish general dental practitioners.

## Conclusion

Within the limitations of this study, it can be stated that there have been discrepancies between taught and observed practice. The respondents were overprescribing antibiotics for conditions where local treatment would suffice. Educational initiatives and continuous refreshment of knowledge may prevent unnecessary prescription in endodontic emergency treatments.

## Disclosure

The authors report no conflicts of interest in this work.

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