Patients’ Values Related to Treatment Options for Teeth with Apical Periodontitis

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Abstract

Introduction: This study aimed to explore patients’ values when selecting treatment for a tooth with apical periodontitis (AP), namely retention via root canal treatment (RCT) and extraction without replacement or replacement with implant-supported crowns or fixed or removable partial prostheses. Methods: Through 2 surveys of patients (800 university patients and 200 community patients, response rate = 43%) and dentists (498 Ontario endodontists, periodontists, prosthodontists, oral and maxillofacial surgeons, response rate = 40% and 1983 Ontario general dentists, response rate = 15%), the importance of values that might be considered important to patients when selecting treatment options for a tooth with AP were recorded. Chi-square and Kendall’s tau tests were used to respectively compare the importance rating frequency by each surveyed group and its correlation to their demographic variables (P ≤ .05). Results: Patients considered communication and trust (94%), tooth retention (90%), esthetic outcome (84% regardless of location), cost (83%), longevity (83%), and preoperative pain (81%) as the most important decision values. Dentists overrated the importance of patients’ previous experience with the treatment options (94% vs 72%), dental insurance (90% vs 70%), and intraoperative pain (79% vs 60%) while underestimating the importance of maintenance cost (60% vs 79%). Conclusions: Dentists should respect patients’ views about esthetic outcome, longevity, and cost associated with treatment options for a tooth with AP. In particular, this survey highlights the value of communication and trust between patient and dentist and preservation of the natural tooth through RCT over implant-supported crown replacement when planning treatment for a tooth with AP. (J Endod 2016;42:365–370)

Key Words

Apical periodontitis, dentist-patient relations, patient preference, personal autonomy, principle-based ethics, shared decision making

The respect of patient autonomy in clinical decision making (1) is the principal concept supporting the advancement of patient-centered practices in health care delivery (2). Indeed, in contemporary society, many patients favor active participation in discussions about treatments that may improve their state of health (3). Although the same concepts hold true for dental health in general and for the periaikiphal health of teeth (2), studies on patient participation in clinical decision making for the highly prevalent disease of apical periodontitis (AP) (4) are scarce.

We recently reported on the preferences of dentists (5) and patients (6) in regard to 2 contrasting treatment options for teeth with AP: tooth retention via root canal treatment (RCT) or extraction with or without replacement. A survey of Ontario dentists (5) indicated that the chief options for management of teeth with AP were RCT and replacement with an implant-supported crown (ISC). Although surveyed dentists mostly preferred RCT for teeth with primary AP, they more often favored ISC for root-filled teeth with post-treatment AP. Specific preferences varied among dentists engaged in general practice and those engaged in various specialty practices (5). A survey of dental patients in the Greater Toronto Area (6) indicated that preference for RCT was often associated with valuing general dental health. For treatment decisions specifically regarding teeth with AP, patients favored a participatory role implying preference for exerting their autonomy in this decision-making juncture (2).

To select from among different treatment options, patients are expected to relate individual values. Health care providers may encourage patient-centered care by communicating possible values to assist patients in bringing their values to the forefront. To this end, the values that patients consider when making a decision between the options of RCT or ISC have not been explored. The objective of this study was to highlight the specific values that patients relate to decision making when considering defined treatment options for a tooth with AP. We sought to capture the patients’ perspectives on such values as well as those of dentists.
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Materials and Methods
Preliminary Qualitative Study
To inform the theoretic framework of this study, a series of semi-structured, qualitative interviews with 5 convenience groups of dental professionals (general dentists, endodontists, periodontists, prosthodontists, and dental assistants/receptionists [3 members each]) was conducted. Participants represented private practice and university environments, included both females and males, and varied in age and practice experience. They were asked to suggest values that, in their view, might be important to patients when considering treatment options for a tooth with AP. The interview sessions were recorded and transcribed. Direct quotes from participants were recorded to ensure validity and reliability. Qualitative data analyses performed using the “framework” approach (7) included familiarization (overview of the transcripts), identification of a thematic framework (organization of themes arising from the interview process), indexation and charting (coding and arranging the data by themes), and mapping and interpretation (identifying a structure and patterns of the data). The findings of the preliminary study were used in preparation of the present cross-sectional quantitative surveys regarding the following:

1. Patients’ perspectives on values they consider important in selecting a treatment for AP
2. Dentists’ perspectives on values that patients consider important in selecting a treatment for AP

Main Surveys
This research comprised additional modules of 2 previous cross-sectional surveys approved by the University of Toronto Research Ethics Board (protocol #23191) whose detailed methodology was reported elsewhere (5, 6). In brief, 1000 patients (800 University of Toronto Faculty of Dentistry patients and 200 private practice patients) (6), 498 Ontario specialists (endodontists, periodontists, prosthodontists, and oral and maxillofacial surgeons), and 1983 Ontario general dentists (5) were requested to participate in separate surveys aiming to understand preferences for the treatment of teeth with AP. In addition to the questionnaires reported previously (5, 6), a separate domain was included in both surveys with a list of values that might be considered important to patients when they select treatment for a tooth with AP. Based on the preliminary qualitative study outlined earlier, 16 values were listed in the patients’ survey (6) (Table 1) and 14 values in the dentists’ survey (5) (Table 2). Both surveys shared 13 of these values with only minor modification in layperson language to make it suitable for the patients’ survey. Participants were asked to score the importance of each value on a Likert-type 4-point scale, separately for an anterior and a posterior tooth, as follows:

1. Very important
2. Important
3. Somewhat important
4. Not important

Additionally, using an open-ended question, the participants were asked to list, in order of importance, any other values they thought were important to patients selecting treatment.

Data Analysis
Patients’ responses were generally consistent for anterior and posterior teeth, suggesting that the represented values applied universally to all teeth with AP. This finding supported the collapsing of data to simplify interpretation. Data from the Likert-type importance scales in both surveys were analyzed using a weighted kappa on 4 Likert categories, and the results were not much different from the binary analysis of “very

### TABLE 1. Patient Survey: Frequency of Values Selected as “Important” or “Very Important”

<table>
<thead>
<tr>
<th>Values in scenario</th>
<th>Anterior tooth (n = 425)*</th>
<th>Posterior tooth (n = 406)*</th>
<th>Any tooth (n = 425)*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>1. Communication with and trust in your dentist</td>
<td>397</td>
<td>93</td>
<td>381</td>
</tr>
<tr>
<td>2. Retaining your own natural tooth</td>
<td>379</td>
<td>89</td>
<td>342</td>
</tr>
<tr>
<td>3. Esthetic outcome of the treatment</td>
<td>395</td>
<td>84</td>
<td>288</td>
</tr>
<tr>
<td>4. Longevity of treatment (ie, how long it would take until you need to redo the treatment)</td>
<td>347</td>
<td>82</td>
<td>288</td>
</tr>
<tr>
<td>5. Out-of-pocket expense to cover the cost of treatment</td>
<td>345</td>
<td>81</td>
<td>337</td>
</tr>
<tr>
<td>6. Level of pain before seeing a dentist</td>
<td>330</td>
<td>78</td>
<td>323</td>
</tr>
<tr>
<td>7. Cost of maintenance after treatment</td>
<td>329</td>
<td>77</td>
<td>312</td>
</tr>
<tr>
<td>8. Insurance coverage to cover the cost of treatment</td>
<td>293</td>
<td>69</td>
<td>289</td>
</tr>
<tr>
<td>9. Previous experience related to the treatment options specified above</td>
<td>291</td>
<td>68</td>
<td>277</td>
</tr>
<tr>
<td>10. Need for surgery to receive the treatment</td>
<td>286</td>
<td>67</td>
<td>270</td>
</tr>
<tr>
<td>11. Chance of having pain after treatment</td>
<td>258</td>
<td>61</td>
<td>249</td>
</tr>
<tr>
<td>12. Chance of having pain during treatment</td>
<td>246</td>
<td>58</td>
<td>238</td>
</tr>
<tr>
<td>13. How long it takes to complete the treatment</td>
<td>240</td>
<td>56</td>
<td>229</td>
</tr>
<tr>
<td>14. Number of treatment sessions required</td>
<td>221</td>
<td>52</td>
<td>213</td>
</tr>
<tr>
<td>15. Time off work required to attend treatment session(s)</td>
<td>223</td>
<td>52</td>
<td>216</td>
</tr>
<tr>
<td>16. Relatives’ or friends’ previous experience related to the treatment options specified earlier</td>
<td>149</td>
<td>35</td>
<td>147</td>
</tr>
</tbody>
</table>

Cl: confidence interval.

Scenario: “Consider that you have an infection in one of your teeth, which cannot be left unaddressed. Your dentist has discussed different treatment options (retaining the tooth with root canal treatment or replacing the tooth with a bridge, removable plate, dental implant, or pulling out with no replacement). You need to select among the above options. Please indicate which factors are important and how important they are to you in making your selection.”

*Valid percentage accounting for the missing responses.
important/important” or “somewhat important/not important.” Hence, for the simplicity of interpretation, the frequency of each value being rated “very important/important” was determined separately for anterior and posterior teeth within each participant group (patients and dentists), and Cohen’s kappa was used within each group to evaluate agreement between responses for anterior and posterior teeth. A kappa coefficient ($k$) > 0.6 was regarded as good agreement. The frequency of each of the shared 13 values being rated as “very important/important” by each group was compared with chi-square tests. Furthermore, Kendall’s tau ($\tau$) was used within each group to measure the correlation between the importance rating of the values and several demographic variables pertaining to responding patients (age, sex, marital status, immigration status, education, employment status, annual family income, income source, and method of payment for dental care) and responding dentists (age, gender, professional registration, years of practice, practice status, location, and percentage of coverage by public insurance). For interpretation of the impact on treatment selection, a value was considered as “determining” the selection of treatment when more than 75% of respondents rated it “important/very important.” A value was considered as “contributing” to the selection of treatment when 50%–75% of respondents rated it “important/very important.”

### Results

The response rates and demographics of participants in both surveys were previously reported in detail (5, 6). The patients’ survey generated 434 of 1000 (43%) responses. The mailed survey of dental specialists generated 198 of 498 (40%) responses, and the Web-based survey of general practitioners generated 302 of 1983 (15%) responses for a total of 500 responding dentists. Between-group Comparisons

Collapsed importance ratings for anterior and posterior teeth of the 13 values captured in both surveys are compared in Table 3 and graphically plotted in Figure 1. There was between-group consistency in regard to 5 of 13 top-ranked and 3 of 13 bottom-ranked values. Generally, dentists rated the majority of the investigated values significantly higher than patients ($P < .0001$). Notably, they rated several of these values much higher, including patients’ previous experience with the treatment options (94% vs 72%), insurance coverage of treatment cost (90% vs 70%), and probability of pain during treatment (79% vs 60%). On the other hand, dentists rated the cost of maintenance after treatment much lower than patients (60% vs 79%). After collapsing the patients’ rating for anterior and posterior teeth, 7 of 16 values were interpreted as “determining” and 8 of 16 as “contributing” to the selection of treatment (Table 3). Similarly, based on the dentists’ rating, 9 of 14 values were interpreted as “determining” and 4 of 14 as “contributing” to the selection of treatment (Table 3).

### Discussion

Health care professionals, including dentists, are expected to provide good care for their patients (8) while respecting the individual patient’s autonomy to impact treatment decisions and thus to make specific preferences (9). This survey study was designed to explore patients’ values related to treatment preferences for a tooth with AP by capturing the perspectives of patients and dentists. The survey study methodology, including the response rate, potentials for

### Table 2. Dentist Survey: Frequency (n and %) of Value Selected as “Important” or “Very Important”

<table>
<thead>
<tr>
<th>Values in scenario</th>
<th>Anterior tooth (n = 485)*</th>
<th>Posterior tooth (n = 486)*</th>
<th>All tooth (n = 486)*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Communication and trust between patient and dentist</td>
<td>481</td>
<td>99</td>
<td>480</td>
</tr>
<tr>
<td>Aesthetic outcome of the treatment</td>
<td>464</td>
<td>96</td>
<td>190</td>
</tr>
<tr>
<td>Out-of-pocket expense to cover the cost of treatment</td>
<td>428</td>
<td>88</td>
<td>455</td>
</tr>
<tr>
<td>Patient’s previous experience related to different treatment options</td>
<td>444</td>
<td>92</td>
<td>450</td>
</tr>
</tbody>
</table>

CI, confidence interval.

Scenario: “Patients are asked to choose among the treatment options listed previously. How important do you believe the following factors are to the PATIENTS in making their decision?”

*Valid percentage accounting for the missing responses.
some selection and volunteer bias, and the external validity, were all previously discussed in detail (5, 6). The following values were identified as “determining” treatment preferences for a tooth with AP: communication/trust, retention of the natural tooth, esthetic outcome, projected longevity after treatment, cost (ie, out-of-pocket expense for treatment and post-treatment maintenance), and preoperative pain.

Communication with and trust in the dentist was ranked as the most important value. Effective communication between patient and dentist not only entails explanation of the cause of disease, treatment options with respective benefits and risks, cost, and time frames (10), but it also provides reassurance, understanding, and empathy; the latter might influence how patients perceive information about treatment, allay misconceptions that they might have, and even decrease dental fear (11–13). Although this value emerged as the most important, its presentation in the survey could not provide an indication on how good communication/trust, or the lack thereof, would impact on the patient’s treatment preferences.

Retaining the natural tooth was ranked as the second important value. Although expected, the patients’ articulating this value substantiated the concept that preservation of the natural tooth through RCT should be given precedence in treatment planning over extraction...
and replacement with an ISC (14). In another previously reported domain of this survey of the same patients’ cohort (6), “good to excellent” self-rated oral health and having functional dentition were identified as predictors of patients’ preference for retention of teeth with AP. Because the majority of the surveyed patients indicated they had functional dentition (>85%) and good/excellent oral health (>71%) (6), the very high rating of the value of tooth retention within this cohort was not surprising.

Esthetic outcome was ranked as the third important value. As expected, some patients applied this value differently for anterior and posterior teeth; however, the impact of this distinction on the patients’ rating was not significant. Esthetics is an increasingly important value in modern society (15). Indeed, the emergence and development of the area of esthetic dentistry in the past 2 decades is the direct response to increasing patient demand (16).

Longevity of the treatment provided was ranked as the fourth important value. Perhaps, some patients may hope not to undergo additional treatment for as long as possible, whereas others may expect that the treatment received will last “forever.” In both cases, patients are likely aware that positive dental treatment outcomes may not last, and they may be concerned about recurrent pain, costs, and additional time they will have to invest in the future to resolve any emerged issues. Hence, patients’ expectations of the longevity of provided treatment affect their final satisfaction with treatment outcomes (17), and they appear to be an essential prerequisite to achieving successful patient-reported outcomes (18), specifically in today’s context of patient-centered dentistry, which emphasizes patients’ active engagement in shared decision making (2).

Out-of-pocket expense for treatment and, to a lesser extent, cost for post-treatment maintenance were ranked, respectively, as the fourth (shared ranking with longevity) and sixth important value. Because dentistry is regarded as a discretionary service, its practice reflects market principles, and both dentists and patients are sensitive to cost considerations, often offering and accepting treatment alternatives differentiated primarily by cost (19). Although the need for maintenance not only increases the overall costs but also increases the associated morbidity (20, 21), patients assigned less importance to the cost of maintenance, possibly because they understood that maintenance would be less costly than the treatment or because they did not expect costly maintenance to be required. Patients also assigned less importance to dental insurance coverage (70%). Although insurance plans increase dental care use by reducing financial barriers (22, 23), we reported previously that this consideration per se did not significantly impact patients’ preference of RCT for a tooth with AP over extraction (6) nor did it impact the patients’ preferred level of participation in the decision-making process (2).

Preoperative level of pain ranked as the fifth important value. However, pain expected during and after treatment was ranked less important (60% and 62%, respectively). Studies have highlighted the importance of perception and recall of painful experiences (24), the impact of pain on cognitive processes (25), and the impact of patients’ pain on health professionals’ treatment decisions (26). Existing pain has also been shown to lead patients to question their ability to endure future painful dental treatments and their preference for consolidating future painful dental treatments in 1 session (27). As with communication/trust, it remained unclear how low or high levels of pain would impact the patient’s selection of treatment. It could be speculated that a high level of pain might incline the patient toward extraction of the tooth to eliminate the pain, but the survey did not explore such relationships.

Time (number of treatment sessions, time attending treatment, and time off work) was ranked low by the surveyed patients (53%–59%). This does not seem consistent with the importance of time in contemporary society (28), as was also emphasized in our preliminary qualitative study (29). We expected the patients to rank this value higher by considering it an “indirect” cost burden because of lost income, need to arrange for transportation or child care, and so on. Apparently, they might have assigned greater importance to direct cost for treatment and maintenance than to related indirect costs. Previous experiences with the treatment options specified in the survey, either personal (70%) or those of relatives and friends (37%), also ranked low by the surveyed patients. Similarly, in a Norwegian survey exploring the patients’ decision-making process leading to extraction of permanent teeth (30), the influence of family, friends, or colleagues on the decision to extract teeth was low.

Surveyed dentists’ responses (Table 2) appeared to corroborate most of the values that emerged from the patients’ survey; however, the relative importance of most of these values differed significantly from that of the patients (Table 3). Notably, dentists assigned considerably higher importance to patients’ previous experiences with listed treatment options (94%) and to the risk of experiencing pain during treatment (79%). Similarly, the dentists assigned higher importance to patients having insurance to cover the cost of treatment (90% vs 70%). On the other hand, dentists did not assign importance to several other values that patients bring to the forefront when they consider treatment options for teeth with AP. For example, only 39% of dentists ranked the esthetic outcome “very important/important” for a posterior tooth compared with 73% of patients. Dentists also under-rated the importance of the cost of maintenance after treatment (60% vs 79%).

Dentists are expected to help patients conceptualize the process of weighing risks versus benefits by sharing unbiased treatment recommendations and to ensure that patients’ preferences are based on fact and not misconception (31). Dentists’ disregard for patients’ perspectives may lead to patient dissatisfaction or noncompliance and hence to unfavorable clinical and economic consequences (32). The discrepancies observed in this survey between values identified by patients and dentists suggest that dentists should not make assumptions regarding what is most or least important when discussing treatment options with individual patients regarding teeth with AP. Rather, dentists should encourage patients to express their own values and bring those to the forefront in the clinical decision-making juncture (2). Dentists may consider using the list of values addressed in this study as reference for treatment planning discussions with patients in regard to teeth with AP. Asking patients to reflect on listed considerations will help them express their individual values so that treatment priorities can be developed accordingly. In this manner, patient autonomy is most likely to be respected, resulting in collaborative treatment planning decisions. As highlighted in this research, besides treatment-specific factors, dentists should highlight the following values during consultation regarding treatment options for a tooth with AP:

1. Discuss confidence and mutual trust as part and parcel of treatment options.
2. Highlight retention of the natural tooth as a value that merits consideration. Clearly, for patients who hold this value as a priority, RCT should be preferred over extraction and replacement.
3. Discuss the expected esthetic outcome as it relates to specific treatment options. In many instances, especially in which esthetics is a prime concern, achieving satisfactory esthetics is challenging when a single tooth is replaced with an ISC (33).
4. Project expected longevity after treatment and long-term need for maintenance. Longevity can be projected based on survival studies (34, 35) while taking into account specific features of each case.
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In general, studies have shown comparable survival rates for teeth that received RCT and for implant-supported single crowns (36).

5. Specify out-of-pocket cost of treatment and long-term maintenance. Generally, costs associated with RCT and restoration are lower than those associated with implants (37).

6. Explain the ways in which existing pain and pain during or after treatment will be addressed.

Conclusion

Within the limitations of this study, we highlighted several values that individual patients might bring to the forefront in making a treatment decision for a tooth with AP. As suggested by surveyed patients, these values include (in order of their relative importance) the following: communication and trust between patient and dentist, retention of the natural tooth, esthetic outcome, projected longevity after treatment, out-of-pocket cost, and preoperative pain. Dentists might perceive some of these values relatively less or more important than expressed by patients; therefore, when discussing different treatment options for teeth with AP, dentists might consider providing patients with a list of pertinent values to consider to encourage the patients to express individual values as part of exercising their autonomy to select treatment.

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