Opinions of dental professionals from a large American insurance system on outcome of non-surgical root canal treatment

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ABSTRACT: Purpose: To assess the opinions of dental professionals working within the Delta Dental insurance system regarding the predictability of initial endodontic treatment, expected long-term outcome and the importance of placing a coronal coverage after completion of treatment. **Methods:** An eight-item questionnaire was distributed among participants attending a continuing education course. The questionnaire included four items on practice profile and demographics and four multiple-choice questions regarding participants' opinions on endodontic treatment outcome. **Results:** 51% of participants responded that the expected retention rate of teeth 5-10 years after endodontic treatment was more than 90%. Sixty-eight percent of participants responded that the need for additional treatment was expected to occur within the first 3 years after initial endodontic treatment. 87% of participants responded that placing coronal coverage after completion of endodontic treatment was very important for long-term tooth retention. Ninety-three percent of participants responded that overall, endodontic treatment was a predictable procedure with long-term tooth retention rate. Statistically significant associations were found between (1) year of experience and expected rate of retention ($P< 0.01$); (2) participants' years of experience and their responses regarding the need for additional treatment ($P< 0.05$); and (3) their opinions that endodontic treatment was a predictable procedure with long-term tooth retention rate ($P< 0.05$). (*Am J Dent* 2008;21:21-24).

CLINICAL SIGNIFICANCE: Prognosticating endodontic treatment outcome is essential for appropriate case selection and treatment decision-making. Opinions and perceptions of clinicians may determine whether the natural dentition will be retained or replaced by an artificial device.

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Introduction

Accurate assessment of endodontic treatment outcome by the clinician is essential for appropriate treatment decision-making. Often, treatment expectations can influence the operator's case selection and choice of treatment.[1] This may determine whether patients will retain their natural dentition or the affected tooth be replaced by an artificial device.

Comprehensive analysis of clinical studies has shown that root canal treatment that follows sound principles of practice can yield a favorable outcome with healing rates well above 90%.[1] Patients also reported improved quality of life as well as satisfaction with their decision to have endodontic treatment rather than extraction.[2] Recent studies, analyzing large cohorts of patients in the USA, assessed the retention rate of endodontically treated teeth and found that nonsurgical endodontic treatment had excellent long-term prognosis.[3,4] Lazarski *et al*,[3] assessing 44,613 insured dental patients in the State of Washington, found that about 94% of the teeth remained functional 3.5 years after initial endodontic treatment. Salehrabi & Rotstein[4] assessed the prognosis and outcome of treatment in 1,462,936 teeth of 1,126,288 insured patients from 50 states across the USA reporting that 97% of the teeth were retained in the oral cavity at least 8 years after initial nonsurgical endodontic treatment. The combined incidence of untoward events such as retreatments, apical surgeries, and extraction was 3% and occurred mostly within 3 years of completion of treatment.[4] In addition, analysis of the extracted teeth showed that 85% had no full coronal coverage and a significant difference was found between covered and non-covered teeth.[4]

Studies[5-7] have reported the opinions of dentists regarding the restoration of endodontically treated teeth. However, data on clinicians' opinions about endodontic treatment outcome and tooth retention rate is limited. Recently, Rotstein *et al*[8] assessed the opinions of oral health care professionals regarding the predictability of initial endodontic treatment, expected long-term outcome and the importance of placing a coronal coverage after completion of treatment. Most clinicians participating in the study considered endodontic treatment to be a predictable procedure with long-term tooth retention rate.[8] However, comprehensive information about opinions of oral health care professionals that participated in this study from a large dental insurance system regarding non-surgical endodontic treatment outcome, compared to actual treatment outcome data recorded by the same insurance system is lacking.

This study assessed the opinions of oral health care professionals working within the Delta Dental insurance system regarding the predictability of initial non-surgical endodontic treatment, expected long-term outcome and the importance of placing a coronal coverage after completion of treatment.

Materials and Methods

An eight-item questionnaire was distributed among a convenience sample of dental professionals working within the Delta Dental system who attended an endodontic update continuing education course at the University of Southern California, School of Dentistry. The questionnaire included four items on practice profile and demographics and four multiple-choice questions regarding participants' opinions on endodontic treatment outcome (Fig. 1). Course participants included mostly general dentists as well as a few specialists. A total of 450 survey questionnaires were distributed and attendees received the surveys in their course registration materials. Completion of the survey signified the individuals' voluntary consent to participate in the study. Participants also

1. Please indicate your profession. If you are a specialist, indicate your specialty:
   a. Dentist- General Practitioner
   b. Endodontist
   c. Oral Surgeon
   d. Orthodontist
   e. Pedodontist
   f. Periodontist
   g. Prosthodontist
   h. Other, please specify: _____
2. Please specify your age:
   a. Less than 35
   b. 35 – 44
   c. 45 – 54
   d. 55 – 64
   e. 65 +
3. Years of professional experience:
   a. 0 – 5 years
   b. 6 – 10 years
   c. 11 – 15 years
   d. 16 – 20 years
   e. More than 20 years
4. Practiced hours per week:
   a. Less than 10 hours
   b. 10 – 20 hours
   c. 21 – 30 hours
   d. 31 – 40 hours
   e. More than 40 hours
5. In your opinion, the expected retention rate of teeth 5 - 10 years after endodontic treatment (excluding retreatments and apical surgeries) is:
   a. More than 90%
   b. 70% - 80%
   c. Less than 60%
6. If initial endodontic treatment did not solve the condition and the tooth required additional treatment such as retreatment, apical surgery or extraction, when would you expect it to occur more frequently?
   a. Within the first 3 years after endodontic treatment
   b. 4 - 6 years after endodontic treatment
   c. More than 6 years after endodontic treatment
7. Placing coronal coverage after completion of endodontic treatment in premolars and molars is:
   a. Not important for long-term tooth retention
   b. Somewhat important for long-term tooth retention
   c. Very important for long-term tooth retention
8. Overall, is endodontic treatment a predictable procedure with long-term tooth retention rate?
   a. Yes
   b. No
   c. I don't have an opinion

Fig. 1. Questions used in the survey questionnaire.

received instructions to complete the surveys and return them to a designated area. Survey questionnaires were anonymous.

Data obtained from the returned questionnaires were entered and analyzed using SPSS (vers. 13.0[a]) statistical software. Associations between years of experience and expected tooth retention rate, the need for additional treatment, role of coronal coverage, and the overall predictability of endodontic treatment were analyzed. Nonparametric statistics were applied to detect significant differences among nominal and ordinal data and the strength of those relationships where ordinal data were available for both variables. Differences among the groups were statistically analyzed using the Pearson Chi-square test at the $P< 0.05$ level of significance. Differences among mean ranks for responses were analyzed using the Kruskal-Wallis test and the differences between two responses were established by using the Mann-Whitney test at the $P< 0.05$ level of significance.

Results

Frequency of responses is reported as a percentage of the total number of respondents for each question. Of the 450 questionnaires distributed, 261 were returned, yielding a response rate of 58%. The majority of participants were general practitioners (95.4%) and the rest were specialists, mainly endodontists. Most participants (81.5%) were between 35-64 years old, had more than 10 years of professional experience (80%) and practiced more than 20 hours per week (91%).

Of the participants, 51.3% responded that the expected retention rate of teeth 5-10 years after endodontic treatment was more than 90%, 41.8% responded that such retention rate was between 70-80%, and 6.9% indicated it was less than 60% (Fig. 2A). The majority of participants (68.6%) responded that the

Table 1. Association between years of experience of participants and their responses regarding expected retention rate of teeth 5-10 years after non-surgical endodontic treatment.

Years of experience	Retention rate			Total
	>90%	70-80%	< 60%	
0-5	9	6	0	15
6-10	9	15	1	25
11-15	16	27	3	46
16-20	24	17	2	43
>20	76	44	12	132
Total	134	109	18	261

Table 2. Association between years of experience of participants and their responses regarding expected time of need for additional treatment.

Years of experience	Need for additional treatment			Total
	Within 3 years	4-6 years	> 6 years	
0-5	14	1	0	15
6-10	20	4	1	25
11-15	28	15	3	46
16-20	31	7	5	43
>20	86	24	22	132
Total	179	51	31	261

Table 3. Association between years of experience of participants and their responses regarding the importance of placement of coronal coverage in premolars and molars.

Years of experience	Coronal coverage			Total
	Not important	Somewhat important	Very important	
0-5	0	2	13	15
6-10	1	4	20	25
11-15	2	2	42	46
16-20	1	3	39	43
>20	2	16	114	132
Total	6	27	228	261

Table 4. Association between years of experience of participants and their responses regarding overall predictability of non-surgical endodontic treatment. Data show actual number of responses.

Years of experience	Treatment is predictable			Total
	Yes	No	No opinion	
0-5	14	0	1	15
6-10	21	3	1	25
11-15	39	3	4	46
16-20	41	1	1	43
>20	129	2	1	132
Total	244	9	8	261

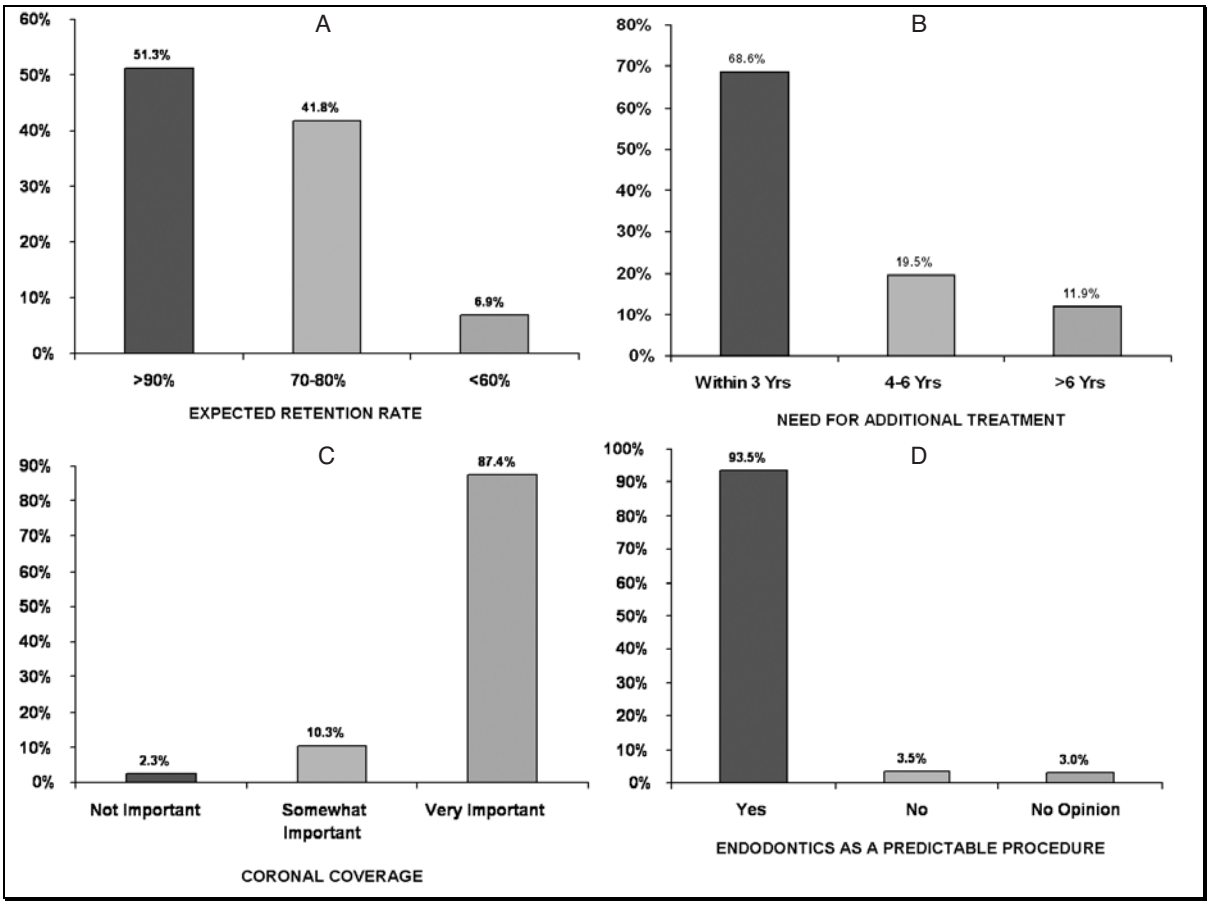

Fig. 2. Percent distribution of participants' responses regarding: **A**. Expected retention rate of teeth 5-10 years after non-surgical endodontic treatment; **B**. Expected time of need for additional treatment; **C.** Importance of placement of coronal coverage in premolars and molars; **D.** Overall predictability of non-surgical endodontic treatment.

need for additional treatment, such as retreatment, apical surgery or extraction, was expected to occur within the first 3 years after endodontic treatment if initial treatment had failed (Fig. 2B). The majority of participants (87.4%) responded that placing coronal coverage after completion of endodontic treatment in premolars and molars was very important for long-term tooth retention (Fig. 2C), while most participants (93.5%) responded that overall, endodontic treatment was a predictable procedure with a long-term tooth retention rate (Fig. 2D).

Respondents with more experience indicated that the expected retention rate of teeth was more than 90% (Table 1). Statistically significant associations were found between years of experience and expected rate of retention ($P < 0.01$).

Respondents with more experience indicated that if the tooth required additional treatment it would occur within the first 3 years (Table 2). Statistically significant associations were found between years of experience and expected need for additional treatment ($P < 0.05$).

A positive trend was found between the professionals' years of experience and their opinion regarding the importance of coronal coverage (Table 3). However, this was not statistically significant.

Respondents with more experience indicated that overall, endodontic treatment was a predictable procedure with long-term tooth retention rate (Table 4). Statistically significant associations were found between years of experience and professionals' opinion regarding predictability of endodontic treatment ($P < 0.05$).

Discussion

The opinions of Delta Dental oral health care professionals participating in this study are comparable to those reported in another study of oral health care professionals.[8] Some of their expectations were also in alignment with data reported in the literature.[5,9]

The opinions of the participants regarding the expected retention rate of teeth 5-10 years after endodontic treatment were divided mainly between 70-80% and more than 90%. More than half of the participants responded that the expected retention rate was more than 90%, while about 42% expected it to be between 70-80%. Although a long-term follow-up study of retention rate in patient population treated within the Delta Dental system indicated a high retention rate of 97% after 8 years, it appears that many practitioners had a different opinion. This further emphasizes the need for dissemination of up-to-date data among the practitioners enabling a more comprehensive assessment of their treatment outcome.

Previous endodontic outcome studies published in the literature varied considerably in design, treatment protocols and methodology as well as in recall rates and duration of the observation periods.[1] Criteria such as healing, functionality and tooth retention were frequently used interchangeably, causing some inconsistencies in the interpretation of the results. Therefore measurement of loss of a root canal treated tooth over time may be more informative and consistent rather than using terms such as "success" or "failure" that require calibration among

investigators and consensus about definition of terms.[4,8,16]

The majority of participants expected the need for additional treatment (*e.g*. retreatment, apical surgery, or extraction) to occur within the first 3 years after completion of initial endodontic treatment. This perception is in accordance with previously reported data.[8,9] An 8-year follow-up treatment outcome study of a large Delta Dental patient population showed that most endodontic clinical failures requiring additional intervention were recognized already within the first 3 years.[8] Another study[9] reported that the majority of endodontically-treated cases that failed to heal were recognized within 2 years after completion of endodontic treatment. This may be very useful to the clinician to better assess the progress of endodontically treated cases and to establish reasonable expectations for a successful outcome once this 2-3 year critical period is over.

The majority of the survey participants responded that placing coronal coverage after completion of endodontic treatment was very important for long-term tooth retention. This notion is in agreement with data reported in other studies.[3,4,8,10,11] Lazarski *et al*[3] reported that non-restored teeth were a significant factor in failures following endodontic treatment. Salehrabi & Rotstein[4] found that most teeth extracted after initial endodontic treatment had no full coronal coverage. Aquilino & Caplan[10] found that endodontically treated teeth without full coronal coverage were lost at a rate six times greater than fully covered teeth. In addition, Vire[11] reported that about 60% of extractions of endodontically treated teeth occurred due to either restorative or prosthetic failure and coronal fractures. Therefore, the quality of both the root canal treatment and the restoration plays an important role in long-term endodontic treatment outcomes.[12-15]

Participants expecting the long-term tooth retention rate to be more than 90% were in alignment with the findings of recent large cohort epidemiological studies.[3,4] These studies reported 94% and 97% retention rates respectively. On the other hand, the present study found that more than 40% of the participants responding expected the retention rate to be less than 80%. These findings are similar to those reported in another study[9] and further emphasize the need for better dissemination of information and to more consistency in criteria used to report long-term endodontic treatment outcome.

A significant finding in the present study was that almost all participants (92%) thought that, overall, endodontic treatment was a predictable procedure with long-term tooth retention rate. This may reflect current perceptions that endodontic treatment provides excellent service to patients by preserving the natural dentition for prolonged periods of time. This is also well supported by evidence documented in the literature.[1-4,15-18]

Extrapolation of the results of this study to other oral health care professionals either in California, the United States or in other countries should be done with caution. Firstly, the return rate of the completed questionnaires was just below 60%. This may present a non-response bias compromising the integrity of the data obtained from the survey.[19-21]

However, if the non-response is not due to questionnaire design or to any particular variable measured within the sample (*e.g*. gender, age, location), then the non-respondents could be considered to be "missing at random".[21,22] They can then be ignored and the respondents can be used as a representative sample of the population.[22] Secondly, our participants comprised a limited group of professionals, those who attended the specific continuing education course. This can only be partially compared to either other practicing dentists within the insurance system or to dentists practicing outside the system. Therefore, more studies using samples from larger populations are required to further assess the opinions of oral health care professionals regarding the predictability and long-term outcome of endodontic treatment.

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