

General Dentists' Use of Isolation Techniques during Root Canal Treatment: From the National Dental Practice-based Research Network

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Abstract

Introduction: A preliminary study done by a National Dental Practice-Based Research Network precursor observed that 44% of general dentists (GDs) reported always using a rubber dam (RD) during root canal treatment (RCT). This full-scale study quantified the use of all isolation techniques, including RD use. **Methods:** Network practitioners completed a questionnaire about isolation techniques used during RCT. Network enrollment questionnaire data provided practitioner characteristics. **Results:** One thousand four hundred ninety of 1716 eligible GDs participated (87%); 697 (47%) reported always using an RD. This percentage varied by tooth type. These GDs were more likely to always use an RD, do not own a private practice, perform less than 10 RCTs/month, and have postgraduate training. **Conclusions:** Most GDs do not use an RD all the time. Ironically, RDs are used more frequently by GDs who do not perform molar RCT. RD use varies with tooth type and certain dentist, practice, and patient characteristics. (*J Endod* 2015;41:1219–1225)

Key Words

Dentistry, health services research, isolation, practice-based research, rubber dam

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Opinions and assertions contained herein are those of the authors and are not to be construed as necessarily representing the views of the respective organizations or the National Institutes of Health. The informed consent of all human subjects who participated in this investigation was obtained after the nature of the procedures had been explained fully.

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Rubber dam (RD) use during nonsurgical root canal treatment (RCT) procedures is considered the standard of care by some practitioners, including the American Association of Endodontists (1, 2). This is because of its function as a barrier to prevent oral pathogens from entering the accessed tooth and preventing instruments and medicaments from being swallowed or inhaled (1). A recent population-based study found that the survival probability of initial RCT after 3.43 years was significantly greater when an RD was used although the magnitude of the difference was only about 2% (90.3% with an RD and 88.8% without an RD) (3). Literature from the past 5 decades reveals that RD use during RCTs varies by year of publication and country in which the study was conducted (4–18). Of studies conducted in the United States, the prevalence of always using an RD was about 7% in 1967, 62% in 1989, 58% in 2008, and 60% in 2014 (5, 19–21).

A previous study conducted by the former regional Dental Practice-Based Research Network (DPBRN) determined that 44% of general dentists (GDs) reported always using an RD for RCT procedures (22). The study also found that the most common alternative isolation methods were cotton rolls and gauze squares. A study of English GDs also reported cotton rolls as an alternative to an RD and found 29% of GDs used cotton rolls alone or with napkins and sponges, whereas 37% used an RD (8). The English study found no correlation between the use of an RD and the dentists' age group, sex, or university of qualification. The former DPBRN study also reported the use of Isolite as a method for achieving isolation. Isolite (Innerlite Inc, Santa Barbara, CA) is a rubberlike mouthpiece that simultaneously provides light, suction, retraction, and aspiration prevention (<http://www.isolitesystems.com>). Of the GDs who reported using Isolite, 32% used it instead of an RD, 16% used it in conjunction with an RD, and 52% may have either used it as the solitary or adjunctive method of isolation (22). Although no published clinical studies have reported its efficacy for isolation in RCT, Isolite has been shown to be as effective as cotton roll isolation when placing dental sealants (23).

The tooth type in which the RCT is performed has also been examined as a factor when dentists decide to use an RD. A 2007 study reported that 27% of anterior, 32% of premolar, and 40% of molar RCTs were always performed with an RD (17). A similar survey was completed by dental students in Wales; students were more likely to use RDs in molars (92%) and premolars (94%) compared with anterior teeth (88%) at 1 school but more likely to use RDs in anterior (86%) and premolar teeth (86%) compared with molar teeth (81%) at another (24). A 2014 review of the Taiwan National Health Insurance Program reported that 10.3% of anterior, 15% of premolar, and 18.4% of molar RCTs were performed with an RD (3).

The previous PBRN study only comprised 3 questions that were nested within a much larger survey. However, it did provide a strong justification to conduct a full-scale study devoted exclusively to the topic of isolation techniques. The current study used a new, comprehensive survey with different questions aimed at discovering the clinical factors related to isolation method selection. The objectives are to (1) quantify the use of all isolation techniques during RCTs, including RD use, and (2) determine if specific dentist, practice, patient, and clinical characteristics are significantly associated with their use.

Methods

The national DPBRN (“network”) is a consortium of dental practices and dental organizations focused on improving the scientific basis for clinical decision making (25). Many details about the network are available at its website (<http://nationaldentalpbrn.org/>).

Enrollment Questionnaire

Before the study, the applicable institutional review boards approved the study; all participants provided informed consent after receiving a full explanation of the nature of the procedures. As part of the enrollment process, practitioners complete an enrollment questionnaire (<http://nationaldentalpbrn.org/enrollment.php>). The dentist, practice, and patient population characteristics from this questionnaire that were tested for their association with the use of certain isolation techniques are listed in Table 1 as are certain clinical characteristics that were taken from the isolation techniques questionnaire. Questionnaire items from the enrollment questionnaire, which had documented test/retest reliability, were taken from previous work in a practice-based study of dental care and a PBRN that ultimately led to the National DPBRN (26).

Content of the Isolation Techniques Questionnaire

After confirming that the respondent was still a GD and that he or she does at least 1 RCT each month (as compared with the “do at least some RCTs” criterion taken from the enrollment questionnaire), the respondent was then asked for the number of RCTs performed and referred each month, separately for anterior, premolar, and molar teeth and for teeth with subgingival caries. Additionally, the questionnaire asked for the frequency of use of isolation methods for each of these circumstances. A copy of the full questionnaire is publicly available (“Isolation Techniques...” section at <http://nationaldentalpbrn.org/study-results.php>).

Administration of the Isolation Techniques Questionnaire

By January 31, 2014, more than 5000 persons had completed an enrollment questionnaire. A total of 1876 of these were invited to complete the isolation techniques questionnaire because they were a GD, currently practicing/seeing patients in the United States, performing at least some RCTs, and at least “limited” or “full” network participants. Preprinted invitation letters were mailed to eligible practitioners, inviting them to participate and informing them they would receive an e-mail with a link to the electronic version of the questionnaire. At the time of the e-mail, the practitioners were given the option to request a paper version of the survey.

Practitioners were asked to complete the questionnaire within 2 weeks. A reminder letter was sent after the second and fourth weeks to those who had not completed the questionnaire. After 6 weeks, e-mail and postal reminders were sent with a printed version of the questionnaire. After 8 weeks, a final postal questionnaire attempt was made with a letter encouraging the dentist to complete the questionnaire online. If a response was not received within 2 weeks, these dentists were considered nonrespondents and were contacted by a regional coordinator to ensure that the network communications had been received and that the dentist was not interested in participating. Data collection was closed after 12 weeks from the original e-mail invitation. Practitioners or their business entities were remunerated \$50 for completing the questionnaire if they confirmed at the end of the survey that they would like remuneration. Data were collected from February 2014 to July 2014.

To document the test/retest reliability of these questionnaire items, a total of 43 respondents did the same questionnaire twice online. The mean (standard deviation [SD]) time between the test and retest was 15.5 (3.0) days. The agreement between time 1 and time 2 was quantified using a mean weighted kappa score, which was 0.62, with an interquartile range (IQR) of 0.46 to 0.79.

Statistical Methods

The outcomes of interest were the frequency of use of different types of isolation techniques by tooth type. The characteristics listed in Table 1 as well as the frequency of treated and referred patients specific for tooth type functioned as independent variables. For characteristics that were categorical, 2-way frequency tables (with counts and percentages) were created, and the significance of differences was ascertained using a chi-square test. When the characteristic was numeric, either *t* tests (with means and SDs) or nonparametric alternative (number RCT performed, referred), Wilcoxon rank sum tests (with medians and IQR) were generated. The Spearman rank correlation was used to ascertain relation among numeric variables. Independent associations with consistent use of RDs when performing RCTs were ascertained with logistic regression. Full tables of results and details of these associations are publicly available (“Isolation Techniques...” section at <http://nationaldentalpbrn.org/study-results.php>). All analyses were performed using SAS software (SAS, Cary, NC) (27).

Results

Of the 1876 dentists invited to participate, 24 were determined to be ineligible before beginning the questionnaire (no longer a GD, no longer in active practice, no longer do any RCTs, or deceased). An additional 136 were determined to be ineligible once completing the questionnaire (3 responded on the questionnaire that they no longer were a GD and 133 did not do at least 1 RCT each month). This left a total of 1716 eligible persons; 1500 responded for a response rate of 88% (1500/1716). Of the 1500 respondents, 12 were incomplete (9 logged in only and 3 completed less than half the survey).

There were few differences between those who participated in the survey and those who did not. Those who reported that they practiced with either the Health Partners or Permanente Dental Associates groups (2 large group practices in the network, <https://www.healthpartners.com/public> and <http://www.pda-dental.com/>) participated at higher rates (97%) compared with 87% in private practice and 81% in all other practice types ($P < .001$). GDs who were members of a dental organization (eg, the American Dental Association) participated at higher rates than nonmembers (88% vs 81%, $P = .002$). These differences remained significant in adjusted, logistic regression analysis. There were no differences in participation with regard to dentists’ sex, race, age, years since graduation from dental school, rural/urban practice location, and whether or not the GD had additional training or selected patient characteristics.

Virtually, all of the 1490 practitioners perform RCT on anterior ($n = 1,485$, 99.7%) and premolar teeth ($n = 1,432$, 96.1%), 67% ($n = 1,004$) perform RCT on molars, 70% ($n = 1,043$) on teeth with subgingival caries, and 3% ($n = 53$) performed RCT solely on anterior teeth. The mean and median number of RCTs performed a month was 10.6 (SD = 10.1) and 8 (IQR = 4–13), respectively. The mean and median number of RCTs referred each month was 6.4 (SD = 9.4) and 4 (IQR = 2–8), respectively. In general, the more RCTs performed per month, the fewer referred ($r = -0.18$, $P < .001$). Compared with practitioners who did not perform RCT on molars, those who did RCT on molars performed more RCTs each month (mean = 13.4 vs 4.8, $P < .001$).

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