



Use of restorative procedures by allied dental health professionals in Minnesota

Jennifer J. Post, RDH, MDH; Jill L. Stoltenberg, RDH, MA

Access to dental care for underserved communities has been a growing concern nationally and in Minnesota. Although the poverty rate in Minnesota (11.2 percent) is less than that of the United States (14.9 percent),¹ the effects are no less severe. Findings from the Third Grade Oral Health Basic Screening Survey conducted in 2010 indicated that 55 percent of Minnesota third-graders had a history of caries.² This is not statistically different from the U.S. baseline average (54 percent); however, both percentages fall short of the recommended Healthy People 2020 target of 49 percent.³

In 2003, the Minnesota state legislature revised the Dental Practice Act to allow allied dental personnel (registered dental assistants [RDAs] and registered dental hygienists [RDHs]) to expand their scope of practice to include placement of restorative materials (that is, amalgam, glass ionomer, resin-based composite and stainless steel crowns). Placement of resin-based composite restorations was limited to Class I and Class V restorations in the enamel.⁴ Allied dental professionals certified in restorative functions (RFs) are required to perform these functions under the direct supervision of a licensed dentist. This means that a dentist is in the office, personally diagnoses the condition to be treated and authorizes the procedure.⁵ At the time of our study, 387 allied dental personnel in Minnesota were certified to perform RFs.⁶

The concept of expanding the functions of RDAs and RDHs is not new. Studies from the 1960s and 1970s indicated that both reversible and irreversible restorative procedures could be performed by these practitioners effectively, efficiently and at a cost benefit.⁷⁻¹⁷ In the 1980s, evaluations of the expanded functions of RDAs and RDHs from two demonstration projects in private general practice confirmed there were no meaningful differences in overall dental quality of restorations when

ABSTRACT

Background. In 2003, the Minnesota legislature revised the Dental Practice Act to include restorative procedures in the scope of practice for registered dental assistants (RDAs) and registered dental hygienists (RDHs). The authors examined these practitioners' characteristics and made comparisons on the basis of their use of restorative function (RF) training and their practices' locations. They also examined practice type, models of implementation and perceived outcomes.

Methods. The authors mailed a survey to all RF-certified RDAs and RDHs in Minnesota (N = 387). They used descriptive statistics to summarize the data and *t* tests and Fisher exact tests ($P < .0001$) to make comparisons between groups.

Results. The authors received 243 surveys (63 percent). Less than one-half (38 percent) of the RF-certified practitioners performed RFs. Of these, 29 percent were RDHs and 71 percent were RDAs. These practitioners performed RFs most often by working with a dentist or when time allowed. They perceived increased access to dental care and an increase in the number of patients treated to be outcomes of performing RFs.

Conclusions. The results of this survey indicated use of restorative procedures varied greatly by practitioner type. The perceptions of those who performed RFs indicated they had a positive effect on dental practice.

Practical Implications. The addition of RF-certified personnel to the dental team has the potential to increase the number of patients seen in practice and the job satisfaction of team members.

Key Words. Access to care; productivity; dental assistants; dental auxiliaries; practice management; dental economics; rural health; dental hygienists; dental public health; dental team.

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Ms. Post is an adjunct assistant professor, Department of Primary Care, School of Dentistry, University of Minnesota, Minneapolis.

Ms. Stoltenberg is an associate professor, Department of Primary Care, School of Dentistry, University of Minnesota, 9-372 Moos HST, 515 Delaware St. S.E., Minneapolis, Minn. 55455, e-mail stol001@umn.edu. Address correspondence to Ms. Stoltenberg.

compared with those placed by dentists.¹⁸⁻²⁰ In 2012, Worley and colleagues²¹ found similar results for practitioners certified in RFs in Minnesota. A study of the delegation of procedures in dental practices in Colorado revealed that as the rate of delegation increased, dental practices had more patients and higher net incomes.^{22,23} Dentists in solo general practices realized the largest gains in productivity and revenue, with increases as great as 104 percent.²² Such findings demonstrate the potential that expanding the functions of the current dental workforce can have on the opportunity for more patients to be treated at a dental practice. Increased productivity may allow dentists to meet the growing demand for dental care due to Medicaid reform and implementation of the Affordable Care Act.

We conducted a study to examine the characteristics of practitioners certified to perform RFs and compare them on the basis of use of their RF training and practice location. We also examined practice type, models of implementation and perceived outcomes.

METHODS

We developed an 18-item survey to gather information from Minnesota RDHs and RDAs who were certified in RFs. In January 2012, we obtained a listing of all RF-certified RDAs and RDHs in Minnesota ($N = 387$) from the Minnesota Board of Dentistry. We sent a survey to the entire sample (230 RDHs and 157 RDAs with the RF credential in Minnesota) by mail the following month. After two months, we sent nonresponders a second copy of the survey.

The institutional review board at the University of Minnesota, Minneapolis, approved the study. Survey items included questions regarding practitioner demographics, current practice information, perceived patient demographic information and RF skill usage patterns. We considered completion and return of the survey to be practitioners' consenting to participate in the study.

Statistical analysis. We used descriptive statistics to summarize the data. We calculated means and standard deviations for continuous measures. We used *t* tests and Fisher exact tests to compare the characteristics of two groups of participants: those who performed RFs and those who did not. We compared participants' characteristics and perceived outcomes on the basis of practice locations for those who reported performing RFs. We considered *P* values less than .05 to be statistically significant.

RESULTS

We received 243 surveys (63 percent) and analyzed them. The mean (standard deviation [SD]) age of participants was 37 (11.9) years, with a range of 22 through 67 years. Sixty-two percent of participants were RDHs and 38 percent were RDAs. Most of the participants (52 percent) had a bachelor's degree, 37 percent had an associate

degree, and 11 percent held a graduate (master's or doctoral) degree. Overall, more participants practiced in the Minneapolis/St. Paul seven-county metropolitan area (57 percent) than in greater (out-state) Minnesota (43 percent). Sixty percent of the participants worked in dental practices with one or two dentists. Only 93 (38 percent) of the participants surveyed reported performing RFs.

Table 1 shows a comparison of participants' characteristics on the basis of whether they performed RFs. Significant differences between the two groups included education attained, primary work position and type of RF course taken ($P < .0001$). Most of those performing RFs had an associate degree (68 percent) and earned their RF credential by means of a continuing dental education course (87 percent). Seventy-one percent of those who performed RFs were RDAs, whereas only 29 percent were RDHs ($P < .0001$). The two participant groups did not differ significantly in practice location, but participants who performed RFs were older ($P = .0008$). Respondents were in early middle age and equally distributed between the Minneapolis/St. Paul seven-county metropolitan area and greater (out-state) Minnesota.

Seventy-five percent of those who performed RFs were employed in a general dentistry practice (Figure 1). Eleven percent worked in a pediatric dentistry practice, and 9 percent practiced in a community clinic setting. Fifty-nine percent of those who performed RFs worked in a solo private practice with a fee-for-service business model (data not shown).

Table 2 (page 1047) presents the baseline characteristics of participants who performed RFs, according to practice location. There were no significant differences in the ages, number of hours worked per week or primary work positions of those practicing in the Minneapolis/St. Paul seven-county metropolitan area compared with those practicing in greater (out-state) Minnesota. A larger number of respondents with an associate degree practiced in greater (out-state) Minnesota, whereas respondents with a bachelor's degree were more likely to practice in the metropolitan area ($P = .0246$).

Participants reported using various methods to implement RFs in practice (Figure 2, page 1048). RDAs and RDHs performed RFs most often by working with a dentist or when time allowed. RDHs were more likely than RDAs to perform RFs when an RF column was included in the schedule.

Table 3 (page 1049) provides a comparison of the outcome measures of RFs, according to practice location. Participants indicated that they placed all restorative materials (amalgam, glass ionomer, resin-based composite and stainless steel crowns) with similar frequency. Those practicing in greater (out-state) Minnesota reported treating a statistically higher percentage of patients

ABBREVIATION KEY. RDA: Registered dental assistant. RDH: Registered dental hygienist. RF: Restorative function.

TABLE 1

Participants' baseline characteristics (N = 243).			
CHARACTERISTIC	PARTICIPANTS WHO PERFORMED RFs* (N = 93)	PARTICIPANTS WHO DID NOT PERFORM RFs (N = 150)	P VALUE†
Age, Mean (Standard Deviation) Years	40.3 (10.9)	35.0 (12.1)	.0008
Education Attained, No. (%)‡			
Associate degree	54 (68)	30 (21)	< .0001
Bachelor's degree	16 (20)	101 (69)	
Master's/Doctoral degree	9 (11)	15 (10)	
Primary Work Position, No. (%)			
Registered dental assistant	66 (71)	27 (18)	< .0001
Registered dental hygienist	27 (29)	123 (82)	
Practice Location, No. (%)			
Minneapolis/St. Paul seven-county metropolitan area	46 (49)	92 (61)	.0834
Greater (out-state) Minnesota	47 (51)	58 (39)	
Type of RF Course Taken, No. (%)			
Continuing dental education	81 (87)	64 (43)	< .0001
Undergraduate	12 (13)	86 (57)	

* RFs: Restorative functions.
† P values were derived from a two-group t test for age and Fisher exact tests for the categorical measures.
‡ Percentages are based on 79 respondents who performed RFs and 146 who did not perform RFs.

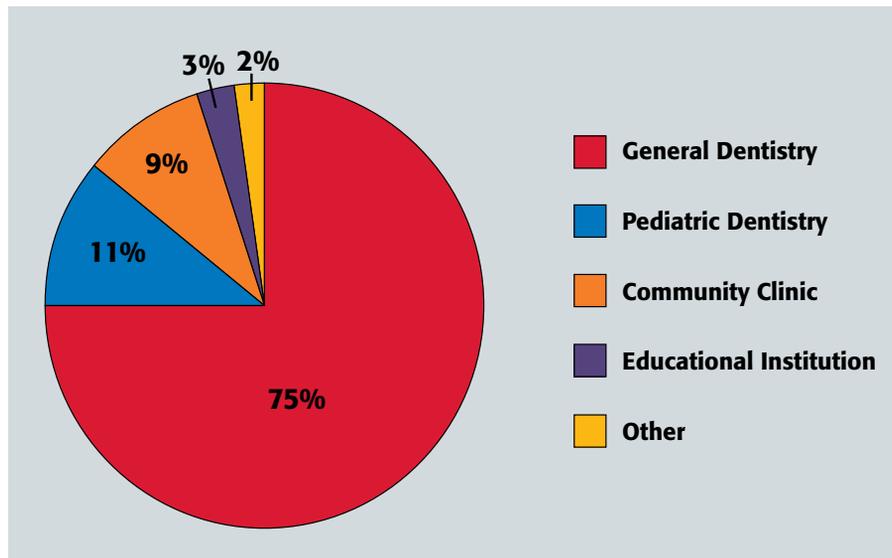


Figure 1. Percentage distribution of restorative function-certified practitioners, according to practice type (n = 93).

1 through 12 years of age (37.4 percent) than did those practicing in the Minneapolis/St. Paul seven-county metropolitan area (24.4 percent) ($P = .0121$). However, those practicing in the metropolitan area reported treating a higher percentage of adults 26 through 65 years of age (35.2 percent) than did those practicing in greater (out-state) Minnesota (25.3 percent) ($P = .0250$). Respondents estimated they treated patients in the middle and lower income levels with similar frequency. Patients in the highest income bracket composed the smallest percentage of patients treated by practitioners certified in RFs.

in the United States has been the improvement of oral health while reducing the economic burden of providing such care. Minnesota is no exception.^{24,25} Modifying the Minnesota Dental Practice Act to include RFs was an effort to meet these goals. We designed our study to examine the extent to which restorative procedures were being used by allied dental professionals (RDAs and RDHs); their characteristics, including practice type, location and models for use; and their perceptions of outcomes.

The results indicated that less than one-half (38 percent)

We asked participants to indicate perceived outcomes related to the effect of RFs on their practice and personal career. We gave them a list of 11 possible outcomes and asked them to mark all that applied. As indicated in Table 3, the top four outcomes identified by respondents, whether urban or rural, were ■ working with a dentist who values RF skills (85-91 percent); ■ increased job satisfaction (76-83 percent); ■ increased practice efficiency (79-80 percent); ■ increased access to dental care as a result of the ability of the practice to provide care for more patients (62-72 percent).

A smaller percentage of respondents (39 percent) identified an increase in salary or a perceived change in the financial production of the office (32 percent). Thirty percent of the respondents thought the dentist for whom they worked would like to add additional staff members who would be able to perform RFs. Few respondents thought the office had modified restorative products or procedures as a result of RF training (data not shown).

DISCUSSION

A significant aspect of the health care policy debate

of the participants who were certified to perform RFs were implementing their skills in clinical practice. Of these, 71 percent were RDAs and 29 percent were RDHs. The high percentage of RDHs in the study sample (61 percent) clearly affected the overall utilization rate (38 percent). Most RDHs were certified in RF because it was a component of their dental hygiene curriculum before licensure. Recent graduates seeking employment may be more likely to focus on developing their primary skill sets (traditional dental hygiene functions) in a conventional dental practice model. If the dentist is not aware of the additional skills of a new graduate or is primarily interested in implementing the traditional skills of the graduate, opportunities for using RFs may not exist. In addition, people who have taken an RF course as part of their required dental hygiene curriculum may not possess the same degree of motivation for implementing the skill set as do practitioners who independently sought out an RF course to advance their skill set. RDHs have had a low rate of expanded function use, owing in large part to their schedules of patients and billable services.²⁶⁻²⁹ As a result, the incentive for dentists to consider alternative practice models for RDHs may not be as great.

In contrast, RDAs who participated in the study obtained their RF training through a continuing education course rather than as part of their standard curriculum. Seeking out a continuing education course almost certainly ensured that the person had determined a need for these skills in practice and possessed a desire to perform such skills. In addition, the entire dental team may have discussed the advantages of such training, allowing for immediate acceptance and use after the person was certified.

The traditional practice model in dentistry facilitates use of RDAs with expanded functions. Most often, RDAs work side by side with a dentist, providing increased

efficiency and productivity on the part of the dentist and an opportunity for flexibility regarding who performs certain tasks or procedures. The results of our study indicated that RFs were most likely to be implemented when a practitioner certified in RFs was working with a dentist or when time allowed for this function (Figure 2). Of all the members of the dental team, RDAs have the greatest proximity to the dentist and ability to switch roles from assistant to care provider. When RFs are delegated to and performed by RDAs, these practitioners can become increasingly valuable members of the dental team and be associated with improved efficiency and increased production, which can enhance job satisfaction. Study results confirm dentists' preference to delegate expanded functions to RDAs.^{27,29} When dentists delegate expanded duties to RDAs, they do so at a high rate.^{23,26-29}

Employing allied dental professionals with expanded skill sets such as RFs has the potential to make dental practices more productive and efficient.^{7-16,22,23} Dentists are able to see more patients, including people from underserved populations, in their communities. Dentists in solo general practices may realize the largest benefits by implementing RFs in their practices.^{22,23} Larger group

TABLE 2

Baseline characteristics of study respondents using RFs,* according to practice location (n = 93).

CHARACTERISTIC	PARTICIPANTS PERFORMING RFS IN THE MINNEAPOLIS/ST. PAUL SEVEN-COUNTY METROPOLITAN AREA (N = 46)	PARTICIPANTS PERFORMING RFS IN GREATER (OUT-STATE) MINNESOTA (N = 47)	P VALUE†
Age, Mean (Standard Deviation) Years*	40.2 (10.6)	40.4 (11.2)	.9229
Education Attained, No. (%)‡			
Associate degree	21 (54)	33 (83)	.0246
Bachelor's degree	11 (28)	5 (13)	
Master's/Doctoral degree	7 (18)	2 (5)	
Primary Work Position, No. (%)			
Registered dental assistant	33 (72)	33 (70)	.9999
Registered dental hygienist	13 (28)	14 (30)	
Hours Worked per Week, No. (%)§			
1-10	17 (38)	22 (47)	.8088
11-20	5 (11)	4 (9)	
21-30	7 (16)	5 (11)	
31-40	16 (36)	16 (34)	
Type of RF Course Taken			
Continuing dental education	37 (80)	44 (94)	.0700
Undergraduate	9 (20)	3 (6)	

* RFs: Restorative functions.
† P values were derived from a two-group t test for age and Fisher exact tests for the categorical measures.
‡ Percentages are based on 39 participants in the Minneapolis/St. Paul seven-county metropolitan area and 40 in greater (out-state) Minnesota.
§ Percentages are based on 45 participants in the Minneapolis/St. Paul seven-county metropolitan area and 47 in greater (out-state) Minnesota.

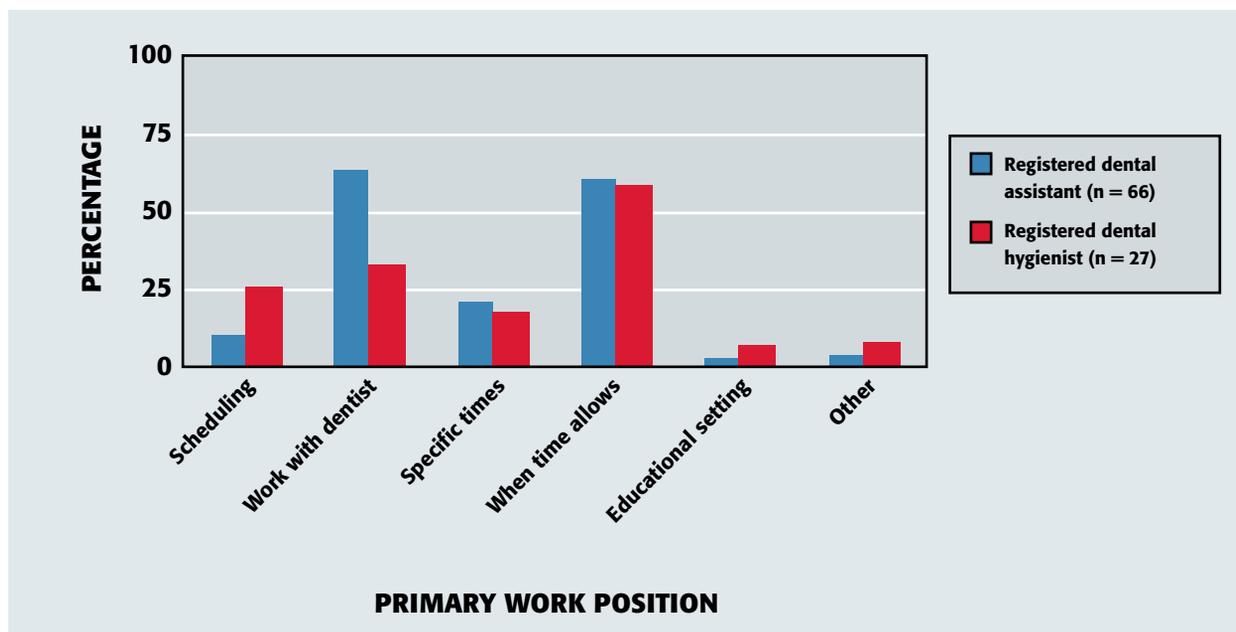


Figure 2. Comparison of restorative function (RF) use models, according to primary work position (n = 93). Scheduling: Separate RF column in the schedule; patients scheduled according to amount of time needed for the procedure. Work with dentist: No separate RF column for scheduling; dentist prepares the tooth, the RF-certified practitioner places the restoration; the dentist and the RF-certified practitioner work together. Specific times: RF-certified practitioner scheduled for specific days and times. When time allows: RFs performed as time allows. Educational setting: RFs performed in an educational setting only. Other: RFs performed in a manner other than the identified practice models.

practices, however, may have an easier time than solo practices implementing RFs because of available space, additional staff members and various scheduling models in their offices to aid efficiency.²³

The results of our study indicate that regardless of practice location, most of those who perform RFs perceived an improvement in the ability of their practices to treat more patients. Therefore, access to care may have increased. However, these perceptions also may reflect a bias on the part of participants to create a positive perception of their effect on practice. Unfortunately, the results did not identify clearly whether the underserved segments of the population benefited from changes to the Minnesota Dental Practice Act. This is a limitation of our study. State reimbursement rates for people enrolled in Medicaid remain low, and the average dentist may not be able to afford to care for this population.³⁰ Although fee schedules in general dentistry do not vary on the basis of service provider, services provided by those with reduced educational and wage costs generally lead to higher profit margins for the practice. Such profits provide opportunities to offset the cost of treating patients enrolled in low reimbursement plans such as Medicaid.

An increase in the number of allied dental professionals who have the ability to practice at a higher level of care has the potential to decrease the amount of time each patient spends with a dentist. This approach can provide more opportunities for dentists to devote time to complex care while allied dental professionals attend

to patients in need of less complicated procedures. This model of care has been tested in the medical field through implementation of physician assistants and nurse practitioners with success.^{31,32}

RF training has associated costs (money, time and effort) for participants and taxpayers. Continuing education courses generally are less costly than courses offered for college credit. Perhaps even more significant than the financial investment is the time and effort devoted to this endeavor on the part of the students and faculty. Unused training is never a wise investment for the person, taxpayers or other stakeholders. Interest in obtaining the RF credential, however, continues to grow. Continuing education courses are available and generally are filled to capacity (Marie A. Baudek, MEd, director, Continuing Dental Education, School of Dentistry, University of Minnesota, e-mail communication, Feb. 12, 2013). One could speculate that certification and use of practitioners certified in RFs will continue as long as perceptions are positive and dentists are willing and able to add more RF personnel to their practices.

The results of our study revealed that practitioners who performed RFs were located in practices across Minnesota. This is advantageous because dental professional shortage areas exist in both rural and urban areas. With the growing need for dentists in greater (out-state) Minnesota,^{33,34} efforts to provide additional opportunities and incentives for providing RF training to people who are practicing or plan to practice in such locations

should be considered.

The primary reason identified by participants for not providing RFs was lack of delegation by the dentist. Respondents perceived that dentists preferred to perform RFs themselves. Perceptions such as these may not reflect the true reasons for not performing RFs. Inclusion of dentists' perceptions of RF implementation and performance by allied dental professionals would have been a useful addition to the results of this study. However, research findings indicated a preference by dentists for performing procedures themselves rather than delegating to another member of the team.³⁵ This may be related to the complexity of the procedure or other factors.²⁹ Study results also have found that dentists' ages affect their willingness to delegate. Younger dentists were far more likely to delegate than were older dentists.^{36,37} Participation in expanded functions training also positively affects dentists' attitudes toward the use of allied dental personnel with such skills.³⁷ Additional education of dentists and all team members may facilitate knowledge and understanding of alternative practice models such as RFs and lead to wider popularity and implementation in practice. Efforts to provide opportunities for those dentists who have implemented RFs in practice to discuss various successful practice models with other dentists may be useful for those contemplating such a change.

CONCLUSIONS

The results of our study of RDHs and RDAs who were certified in RFs in Minnesota revealed that restorative procedures were being performed primarily by RDAs in a traditional practice model in both rural and urban locations throughout the state. Although most practition-

ers certified in RFs were employed in general dentistry practices, a limited number also were employed by pediatric dentistry practices and community clinics and educational institutions. Allied dental professionals using RF training perceived the dental practices in which they worked as more productive and providing greater access to care for patients as a result of their RF certification. These employees also reported increased job satisfaction.

Future studies are needed to address the knowledge, attitudes and perceptions of dentists regarding RFs. In addition, further research should be conducted with those who are RF certified to identify the most effective practice models and techniques for incorporating these skills into practice. An examination of the effect of personnel certified in RFs located specifically in Health Professional Shortage Areas also would be of value. ■

TABLE 3

RF* outcomes measures, according to practice location (n = 93).			
OUTCOME	RESPONDENTS PERFORMING RFs IN THE MINNEAPOLIS/ST. PAUL SEVEN-COUNTY METROPOLITAN AREA (N = 46)	RESPONDENTS PERFORMING RFs IN GREATER (OUT-STATE) MINNESOTA (N = 47)	P VALUE†
Ranking of Restoration Type, According to Placement Frequency,‡ Mean (SD§)			
Amalgam	2.8 (1.3)	2.9 (1.2)	.6301
Glass ionomer	2.5 (0.9)	2.5 (1.0)	.9513
Resin-based composite	2.8 (1.0)	2.9 (0.8)	.5691
Stainless steel crown	2.1 (1.4)	1.7 (1.0)	.1491
Estimated Average Percentage of Patients Receiving RF Care, According to Age Group, Mean (SD) Years			
1-12	24.4 (20.5)	37.4 (26.1)	.0121
13-25	28.4 (16.6)	25.0 (13.8)	.3033
26-65	35.2 (22.5)	25.3 (17.3)	.0250
> 65	12.0 (16.6)	12.3 (10.6)	.9279
Estimated Average Percentage of Patients Receiving RF Care, According to Income, Mean (SD) \$			
< 30,000	40.5 (36.9)	44.6 (24.5)	.5748
30,000-100,000	45.9 (32.1)	47.8 (24.6)	.7754
≥ 100,000	13.6 (18.1)	7.6 (8.3)	.0686
Top Four Perceived Effects of RFs on Practice and Personal Career, No. (%)			
Dentist values my ability to perform RF	39 (85)	43 (91)	.3545
Increased job satisfaction	35 (76)	39 (83)	.4502
Increased practice efficiency	37 (80)	37 (79)	.9999
Increased access to dental care and number of patients treated	33 (72)	29 (62)	.3804
* RF: Restorative function.			
† P values are from a Wilcoxon rank sum test for "Ranking of Restoration," two group t tests for the estimated percentage and Fisher exact tests for the categorical measures.			
‡ Four-point scale (1 = least frequent, 4 = most frequent).			
§ SD: Standard deviation.			

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