Knowledge, Attitudes, and Behaviors of Federal Service and Civilian Dentists Concerning Minimal Intervention Dentistry

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ABSTRACT  Background: Although minimal intervention dentistry (MID) is on the increase, little is known about the patterns of knowledge, attitudes, and behaviors of dentists in the United States. Methods: Federal service and civilian dentists who were active members of the American Dental Association (N = 1,500) received a pretested questionnaire about their knowledge, attitudes, and behaviors concerning MID. Descriptive statistics and bivariate analyses were conducted to assess dentist personal and practice characteristics associated with the knowledge, attitudes, and behaviors. Results: Federal service dentists reported more knowledge of MID than civilian dentists (Cochrane Mantel Haenszel Ridit Scores), p < 0.0043, with similar attitudes toward fluoride (p = 0.11), and decisions regarding monitoring or restoring enamel caries (p = 0.22). Federal service dentists remineralized noncavitated carious lesions more (p < 0.0001) and had lower composite scores, indicating more MID tendency (Wilcoxon p < 0.0001). Conclusion: Federal service dentists reported more knowledge and clinical practices regarding minimal intervention dentistry compared to civilian dentists.

INTRODUCTION  A trend has emerged toward more evidence-based dental practice involving the use of validated and reliable evidence of effectiveness. Dentistry has benefited from new technologies, the development of adhesive restorative materials, and more comprehensive knowledge of cariology. As a result, caries prevention and early detection have become important parts of dental practice.

Minimal intervention dentistry (MID) is a treatment philosophy based on a refined model of dental care that consists of accurate caries diagnosis; classification of the caries severity using radiographs and other tools; assessment of individual caries risk; arresting active lesions; remineralizing and monitoring cavitated arrested lesions; placement of restorations in teeth with cavitated lesions using minimal cavity designs; and assessing disease management. Its most important principle is to delay operative intervention “until the disease is controlled and operative intervention has become essential because of cavitation, patient discomfort, unacceptable form or function, or poor esthetics.” MID is sometimes called preservative dentistry, conservative dentistry, or minimally invasive dentistry.

Because of MID’s emphasis on prevention, restorative treatment includes nonoperative procedures for remineralization of early lesions. Dentists are slowly transitioning from a surgical model to a medical model of caries control. The medical model recognizes the importance of treating the source of the infection rather than the outcome of the infection, a carious lesion. The heart of the medical model is the ability to identify those who are at high risk for caries. Restorative treatments such as atraumatic restorative treatment (ART), bonded restorations, sealants, use of adhesives and fluoride-containing restorative materials, and repair of restorations highlight the paradigm shift to the medical model of caries management. Many of the clinical practices involving MID once only used in children, such as application of fluoride varnish and placement of sealants, are now being used for adults. Fiset and Gembowski found that dentists were more likely to try innovative procedures on adult patients (e.g., chlorhexidine and fluoride varnish) if a dental associate had also tried it. Decision making in dentistry is complex. The decisions that dentists make are often based on their knowledge from training experiences and a combination of personal, patient, and practice factors.

A few studies have evaluated dimensions of MID in terms of diagnosis, prevention, risk assessment, or treatment preferences. These studies focused on general dental practitioners in clinical practice in Australia, North America, Europe, and South America. Despite these trends toward more conservative treatment, little is known about federal and civilian dentists’ familiarity with these new concepts. Sundberg and others suggested that public service dentists in Sweden tended to be more conservative than private practitioners were.
in their restorative treatment thresholds. No such study exists for the United States.

The purpose of this article is to describe knowledge, attitudes, and behaviors of United States dentists concerning MID and to consider how these vary among federal and civilian provider groups and on the basis of practitioner characteristics.

METHODS
This was an observational, cross-sectional study of federal service and civilian dentists, using a pretested questionnaire in booklet form with 51 requested responses. The University of Iowa Institutional Review Board (IRB) approved this study in September 2005. The survey was pretested by eight faculty members from the Department of Family Dentistry and six faculty members from the Department of Operative Dentistry at the College of Dentistry, University of Iowa during August 2005. Minor changes for clarity were made to the questionnaire following pretesting.

Nine-hundred federal service dentists and 600 civilian dentists were selected using stratified random sampling of current members of the American Dental Association (ADA) in August 2005. Federal service dentists included were members of the United States Air Force, Army, Navy, and Public Health Service (PHS). An equal number of dentists \( n = 225 \) was selected from each federal service. Eligible civilian dentists were nonfederal service ADA member dentists from all states, territories, and regions of the United States.

A cover letter, signed by the principal investigator and the research chairperson, was mailed to potential participants in early November 2005, along with the questionnaire. Inclusion criteria included being an ADA member, with a DMD/DDS only, or Advanced Education in General Dentistry/General Practice Residency (AEGD/GPR), Dental Public Health or Operative Dentistry training. Exclusion criteria included being a non-ADA member, a retired ADA member, federal dentist in the Veterans Administration or Civil Service, or dental specialist recognized by the ADA, other than Dental Public Health. Dentists with multiple specialties that included Dental Public Health and Dental Public Health administrators were included in the study.

The cover letter included the components required by the IRB to ensure that respondents understood that research participation was voluntary and any reports filed would not include identifiable information. Thus, formal written consent was not required; return of the completed questionnaire constituted the subject’s consent. Also included in the first mailing was a nonparticipation postcard. The original mailing also included a preaddressed, postage-paid, return envelope. In January 2006, 10 weeks after the first mailing, a second mailing containing a duplicate questionnaire, return envelope, postcard, and cover letter, was mailed to those who had returned neither the questionnaire nor the nonparticipation postcard.

The questionnaire was divided into four sections: (1) personal and practice characteristics, (2) two subquestions on knowledge, (3) two questions on attitudes (attitudes concerning MID in selected practice settings and general attitudes about MID), and (4) two questions on behaviors (clinical decision-making behavior and practice behavior) concerning MID. Most questions were closed ended. Four were open-ended questions.

Statistical analyses included descriptive statistics and bivariate analyses. Descriptive summary statistics included percentages, means, medians, and standard deviations, with respect to both outcome and potential explanatory variables. Associations among potential explanatory variables were also explored, because many variables had interrelationships. Identical statistical methods were used to compare the federal service subgroups, using the same sequence of univariate and bivariate analyses to assess variable relationships.

The bivariate analyses were conducted for three general purposes: (1) to make comparisons between federal and civilian respondents, (2) to make comparisons among federal service subgroups in an analogous manner, and (3) to consider associations between each variable and each of the other explanatory variables. Standard \( \chi^2 \) tests of homogeneity or Fisher exact tests, if needed, were used to evaluate possible relationships among pairs of nominal categorical variables. Ordinal scores, which comprised the majority of the outcome variables, were compared among groups using the Cochrane-Mantel Haenszel test (CMH). The CMH is a mean score test that uses integer scores to denote the set of possible responses. An alternative approach to integer scoring called Ridit analysis was also used to assess the differences in the pattern of ordinal responses in subgroups by comparing them to the overall distribution of scores, which is used as a reference group.

Spearman rank correlations were used to assess associations between a quantitative response and ordinal response or between two quantitative responses, for example, age and a composite score. Multivariate analysis of variance (MANOVA), to test parameters of several dependent variables being fit to the same effects, was used to compare federal service and civilian dentists in terms of the set of percentages describing the age distribution of their patient population groups, using the Wilks-\( \Delta \) statistic. Statistical significance was set at \( p \leq 0.05 \).
RESULTS
The overall response rate for this study was 41.7%, with 512 questionnaires and 113 nonparticipation postcards returned. Three questionnaires were excluded because three dentists completed questionnaires from each mailing. Forty-four dentists who completed questionnaires were excluded because they were specialists trained in areas other than Dental Public Health or Operative Dentistry. Therefore, in all, 465 (327 civilian, 138 federal) respondent questionnaires were used for analysis, for an effective response rate of 31.0%. Figure 1 presents the effective response rates by provider group.

Eighty-one percent of respondents were male (85% for civilian versus 73% for federal, \( p = 0.0036 \)). The mean age of respondents was 45.6 years (range 26 to 75 years). Federal service dentists were younger (mean 37.6 versus 49.1 for civilian, \( p < 0.0001 \)). The PHS (49.1) and Navy (41.6) had older mean ages than did the Air Force (31.7) and Army (32.1) (\( p < 0.0001 \)). The mean number of years since graduation was 19.2 years (civilian dentists 22.8 years versus federal 10.6 years).

The mean number of years in practice was 17.2 years (federal service mean 8.8 years versus 20.6 years for civilian dentists, \( p < 0.0001 \)). Army dentists had the lowest mean years of practice at 3.8 years, followed by the Air Force at 4.1 years, Navy at 13.6 years, and PHS at 16.9 years (\( p < 0.0001 \)).

More than half the dentists responding to this survey completed postgraduate training (58.1%). Approximately 75% of federal dentists completed postgraduate training whereas 51% of civilian dentists (\( p < 0.0001 \)) completed training. No significant differences were noted among the federal service subgroups (\( p = 0.2480 \)). About 76% of the respondents reported earning 20 or more continuing education credits per year. There were no significant differences found between percentages of federal service and civilian dentists or among federal service subgroups.

Almost 65% of respondents reported devoting 76–100% of their total work time per week to direct patient care. There were no significant differences between federal service and civilian dentists (\( p = 0.6164 \)), but Public Health Service dentists were involved in direct patient care less than the other services (\( p < 0.0001 \)).

Figure 2 shows the overall mean percentages of patients in different age categories. The data provided strong evidence that the profile of the patient populations as specified by these age groups differed significantly by provider status (federal versus civilian). Federal service dentists had substantially fewer patients 0–15 years of age (\( p < 0.0001 \)), more patients 19–37 years of age (\( p < 0.0001 \)), and fewer patients 60 years and above compared to civilian dentists. Generally, federal service dentists were significantly younger, graduated from dental school later, and have fewer years of practice.

Knowledge, Attitudes, and Behaviors
The assessment of knowledge of MID consisted of two subquestions: “How much do you know about atraumatic restorative treatment (ART)?” and “How much do you know about minimal intervention dentistry (MID)?”, which was the key question for knowledge. The largest percentage of respondents selected “some” for both knowledge of atraumatic restorative treatment (ART) (36.6%), and knowledge of minimal intervention dentistry (37.2%) (Table I). Respondents selected “none” more often for ART (13.0%) than for MID (10.2%). More respondents selected “much” (41.5%) more often than “little” (21.4%) for the question about knowledge of MID.

Figure 3 presents the key variables for knowledge, attitudes, and behaviors.

Respondents selected responses to four separate aspects of MID for attitudes. The composite variable summed the scores (from 1 = strongly agree to 4 = strongly disagree) for each of the four subquestions of attitudes. The key question for attitudes was, “What is your attitude toward fluoride is an effective remineralizing agent for adult patients?” Table II shows that most respondents agreed or strongly agreed that fluoride was an effective remineralizing agent (96.7%). Two respondents (0.4%) strongly disagreed. The majority of respondents agreed individually with each of the other three attitude subquestions, with overall agreement (agree and strongly agree) of 60.4% for “G. V. Black’s extension for prevention is still relevant in certain clinical situations,” 91.8% for “the use of adhesive restorative materials reduces the size of restorations,” and 63.5% for “there is adequate time to conduct a caries risk assessment for every patient.”

There were four subquestions (a–d) concerning clinical decision-making behaviors. Because subquestions b (white-spot lesion) and c (stained composite) were written in the opposite direction to subquestions a (carious anterior tooth) and d (enamel proximal lesion), subquestions b and c were “reversed” so that the stem was changed and the score of “1 = always or most of the time” became “4 = never or rarely,” a score of “2 = often”
became “3 = sometimes,” a score of “3 = sometimes” became “2 = often,” and a score of “4 = never or rarely” became “1 = always or most of the time.” Therefore, the white spot lesion subquestion is effectively changed to “monitor and not restore,” and the stained composite subquestion is changed to “monitor and not replace.” The results are shown in Table III, and these four components were used to create the composite variable.

Lower composite scores were more consistent with MID principles (Table III). Composite scores ranged from 4 to 14 (mean of 7.6, standard deviation of 2.0, and median of 7.0). More respondents received a composite score of 7 (23.6%) or 8 (18.2%) than any other score. Less than 1% received the highest score of 14 (0.4%).

The results for each of the 15 subquestions of practice behaviors related to MID performed on adult patients are presented separately in Table IV. The subquestion with the greatest percentage of dentists selecting “always or most of the time” was the use of topical fluoride (41.9%). The subquestion with the most missing responses was the question on ART; 95 dentists (20.4%) did not answer this subquestion, and a few who did, placed a question mark next to the term. The practice behavior composite variable summed the scores from 1 = strongly agree to 4 = strongly disagree for each of 13 subquestions; subquestions “m” and “o” were excluded from the composite score because of the many missing responses. The composite scores ranged from 18 to 52 (mean = 36.0, standard deviation = 5.6, and median = 36.0). The lowest score of 18 meant that the respondent selected “always or most of the time” for most subquestions. A score of 52 indicated that the respondent selected “never or rarely” for all 13 subquestions. A score of 26 translated to an average of “2” (agree), and a score of 39 to an average of “3” (disagree) for each subquestion.

**DISCUSSION**

This study used a questionnaire mailed to 1,500 federal service and civilian dentists, selected by stratified randomization among members of the American Dental Association. It included United States dentists with DMD/DDS only, AEGD/GPR training, and dentists trained in Dental Public Health or Operative Dentistry.

The response rate was low after two mailings, and response rates were much lower among the federal service dentists. The use of a postcard indicating that dentists were going to receive a questionnaire, shortening the questionnaire, use of incentives, and an additional contact either by mail or by telephone might have improved the response rate. In addition, formal endorsement by the ADA, Air Force, Army, Navy, and PHS might have helped. Selection of a nonholiday period to send the questionnaire might have made a positive impact on the response rate.

The results revealed that most respondents stated they had at least some knowledge of MID (only 15.9% federal
service and 23.7% civilian reported little or none). Federal service dentists generally knew more about minimal intervention dentistry than did civilian dentists (50.0% of federal dentists reporting “very much” or “much” knowledge of MID compared to 37.8% for civilian dentists). Bivariate analyses showed that gender played a role in MID practices among federal service dentists, as female dentists reported more MID practices than male dentists did. The MID practice of remineralizing noncavitated carious lesions was more common among federal service groups than it was for civilian dentists.

Age, years of practice, and years since graduation were important factors for the key variables, knowledge, attitudes, clinical decision-making behavior, and practice behavior and composite scores for behaviors. As age, years of practice, or years since graduation increased, MID decreased. Higher composite scores were associated with less MID. Percentages of patient populations (19–37, 38–59, and 60 years and older) were significantly different between federal and civilian dentists and among federal service respondents. Civilian dentists had greater percentages of patients 0–15 and 60 years and older, while federal service dentists had percentages of patients 19–37. Federal service dentists also had higher percentages of patients 38–59 years old compared to civilian dentists.

### TABLE III. Clinical Decision-Making Behaviors

<table>
<thead>
<tr>
<th>Subquestion</th>
<th>Valid N</th>
<th>1 = Always or Most of the Time (%)</th>
<th>2 = Often (%)</th>
<th>3 = Sometimes (%)</th>
<th>4 = Never or Rarely (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Restore and not extract a central incisor in HCR patient with limited finances</td>
<td>449</td>
<td>253 (56.4)</td>
<td>119 (26.5)</td>
<td>57 (12.7)</td>
<td>20 (4.4)</td>
</tr>
<tr>
<td>(b) Monitor and not restore a vital lower molar with a white spot lesion in LCR patient</td>
<td>452</td>
<td>316 (70.0)</td>
<td>77 (17.0)</td>
<td>20 (4.4)</td>
<td>39 (8.6)</td>
</tr>
<tr>
<td>(c) Monitor and not replace an anterior facial composite in LCR patient for whom esthetics is not a concern</td>
<td>451</td>
<td>302 (67.1)</td>
<td>120 (26.7)</td>
<td>20 (4.4)</td>
<td>8 (1.8)</td>
</tr>
<tr>
<td>(d) Monitor and not restore a proximal carious lesion in a HCR patient with limited finances</td>
<td>451</td>
<td>64 (14.2)</td>
<td>74 (16.4)</td>
<td>125 (27.8)</td>
<td>187 (41.6)</td>
</tr>
</tbody>
</table>

N = number of responses; HCR, high caries risk; LCR, low caries risk. *This wording and, therefore, the percent distribution of responses are reversed from the original wording.

### TABLE II. Fluoride Is an Effective Remineralizing Agent, as an Indicator of Attitudes Concerning Minimal Intervention Dentistry

<table>
<thead>
<tr>
<th>Group</th>
<th>Overall</th>
<th>Federal</th>
<th>Civilian</th>
<th>Air Force</th>
<th>Army</th>
<th>Navy</th>
<th>PHS</th>
</tr>
</thead>
<tbody>
<tr>
<td>N (%)</td>
<td>461</td>
<td>137</td>
<td>324</td>
<td>39</td>
<td>42</td>
<td>25</td>
<td>31</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>298</td>
<td>96</td>
<td>202</td>
<td>31</td>
<td>24</td>
<td>18</td>
<td>23</td>
</tr>
<tr>
<td>Agree</td>
<td>146</td>
<td>37</td>
<td>109</td>
<td>8</td>
<td>20</td>
<td>16</td>
<td>6</td>
</tr>
<tr>
<td>Disagree</td>
<td>15</td>
<td>4</td>
<td>11</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

N = number of responses.

### TABLE IV. Practice Behaviors Related to MID

<table>
<thead>
<tr>
<th>Question No.</th>
<th>Wording: How Often Do You Perform the Following Procedures?</th>
<th>Missing</th>
<th>Valid n</th>
<th>1 = Always or Most of the Time (%)</th>
<th>2 = Often (%)</th>
<th>3 = Sometimes (%)</th>
<th>4 = Never or Rarely (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20a</td>
<td>Caries Risk Assessment</td>
<td>35</td>
<td>430</td>
<td>145 (33.7)</td>
<td>109 (25.4)</td>
<td>103 (24.0)</td>
<td>73 (17.0)</td>
</tr>
<tr>
<td>20b</td>
<td>Microbial Testing</td>
<td>34</td>
<td>431</td>
<td>0 (0.0)</td>
<td>5 (1.2)</td>
<td>32 (7.4)</td>
<td>394 (91.4)</td>
</tr>
<tr>
<td>20c</td>
<td>Remineralize with CPP/ACP</td>
<td>43</td>
<td>432</td>
<td>2 (0.05)</td>
<td>15 (3.6)</td>
<td>55 (13.0)</td>
<td>350 (82.9)</td>
</tr>
<tr>
<td>20d</td>
<td>Remineralize Noncavitated Lesions</td>
<td>43</td>
<td>412</td>
<td>57 (13.5)</td>
<td>113 (26.8)</td>
<td>136 (32.2)</td>
<td>116 (27.5)</td>
</tr>
<tr>
<td>20e</td>
<td>Topical Fluoride Application</td>
<td>33</td>
<td>432</td>
<td>181 (41.9)</td>
<td>164 (38.0)</td>
<td>76 (17.6)</td>
<td>11 (2.6)</td>
</tr>
<tr>
<td>20f</td>
<td>Prescribe Chlorhexidine</td>
<td>33</td>
<td>432</td>
<td>30 (6.9)</td>
<td>112 (25.9)</td>
<td>164 (38.0)</td>
<td>126 (29.2)</td>
</tr>
<tr>
<td>20g</td>
<td>Prescribe 5,000 ppm Fluoride Dentifrice</td>
<td>32</td>
<td>433</td>
<td>87 (20.1)</td>
<td>197 (45.5)</td>
<td>116 (26.8)</td>
<td>33 (7.6)</td>
</tr>
<tr>
<td>20h</td>
<td>Seal Amalgams</td>
<td>34</td>
<td>431</td>
<td>58 (13.5)</td>
<td>109 (25.03)</td>
<td>134 (31.1)</td>
<td>130 (30.2)</td>
</tr>
<tr>
<td>20i</td>
<td>Seal Composites</td>
<td>32</td>
<td>423</td>
<td>83 (19.2)</td>
<td>143 (33.0)</td>
<td>139 (32.1)</td>
<td>68 (15.7)</td>
</tr>
<tr>
<td>20j</td>
<td>Repair Restorations</td>
<td>31</td>
<td>424</td>
<td>26 (6.0)</td>
<td>131 (30.2)</td>
<td>203 (46.8)</td>
<td>74 (17.1)</td>
</tr>
<tr>
<td>20k</td>
<td>Slot and Tunnel Preps</td>
<td>34</td>
<td>422</td>
<td>36 (8.4)</td>
<td>107 (23.8)</td>
<td>163 (37.8)</td>
<td>125 (29.0)</td>
</tr>
<tr>
<td>20l</td>
<td>Redo Restorations</td>
<td>42</td>
<td>423</td>
<td>21 (5.0)</td>
<td>172 (40.7)</td>
<td>207 (48.9)</td>
<td>23 (5.4)</td>
</tr>
<tr>
<td>20m</td>
<td>Sandwich Technique</td>
<td>84</td>
<td>381</td>
<td>32 (8.4)</td>
<td>93 (24.4)</td>
<td>131 (34.4)</td>
<td>125 (32.8)</td>
</tr>
<tr>
<td>20n</td>
<td>Restore with Glass Ionomer</td>
<td>41</td>
<td>424</td>
<td>17 (4.0)</td>
<td>99 (23.4)</td>
<td>175 (41.3)</td>
<td>133 (31.4)</td>
</tr>
<tr>
<td>20o</td>
<td>Atraumatic Restorative Treatment</td>
<td>95</td>
<td>370</td>
<td>15 (4.1)</td>
<td>65 (17.6)</td>
<td>161 (43.5)</td>
<td>129 (34.9)</td>
</tr>
</tbody>
</table>
The most important difference among the federal service groups was reported for remineralizing noncavitated carious lesions. Federal service dentists had lower composite scores for clinical decision-making behaviors and practice behaviors, indicating more MID tendency.

The four federal service groups (Air Force, Army, Navy, and PHS) reported similar responses for three of the key outcome areas: knowledge, attitudes, and decisions regarding monitoring or restoring enamel caries in a high-risk patient. The most important difference among the federal service groups was reported for remineralizing noncavitated carious lesions. Air Force dentists reported this practice substantially more often than the other services. Air Force respondents had the lowest composite scores (most MID) and the Public Health Service had the highest composite scores (least MID). However, these results were only suggestive of statistical significance.

Overwhelmingly, dentists in both federal service and civilian sectors believed that fluoride was an effective remineralizing agent, probably because information on fluoride’s effectiveness in caries prevention has been readily available to dentists for decades. Both United States federal service and civilian dentists were using procedures related to MID, but a greater percentage of federal service dentists used them more than civilian dentists did. Federal service dentists might have more MID training or continuing education courses about MID. Also, reimbursement for preventive procedures is not a consideration for federal service dentists as it might be for civilian dentists.

There was low use overall (<10%) of microbial testing, chlorhexidine rinse, and CPP/ACP. There were substantial differences between federal service and civilian dentists for use of caries risk assessment, prescribing a prescription fluoride dentifrice, sealing amalgam, and composite restorations, repairing restorations, use of minimal cavity preparation designs, and restoring with glass ionomer, all used more by federal service dentists. Federal service dentists might have more training for these procedures and are not constrained by reimbursement by third party payers, as are civilian dentists.

This was the first study of its kind to survey United States dentists about their knowledge, attitudes, and behaviors concerning minimal intervention dentistry. Stratified random sampling using the American Dental Association’s database of United States federal service dentists from four services, the Air Force, Army, Navy, and PHS were targeted. However, because of the low federal service response rate, a more generalizable, comprehensive view of federal dentists, perhaps particularly those in active duty dental practice did not occur.

A limitation was the inability to investigate nonresponse bias. With initial projections of a response rate of 60% or higher, assessment of nonresponse bias by gathering limited demographic information among nonrespondents was not included. Caution is needed in concluding that factors are not significantly related, given the lower power expected to be associated with the low response rate.

Civilian dentists had a larger mean percentage of their patient population 0–18 years of age (30.9%). This study did not investigate responses for children; it limited questions to the adult population. Additional research is warranted to determine whether federal service and civilian dentists’ responses would be similar for pediatric patient populations.

Because this study surveyed predominantly United States trained dentists, these results might not be applicable to other parts of the world. There is need for comparative studies internationally.

There was no separate category for 0% or 100% in questions pertaining to the percentage of patients in five age categories and the percentage of time involved in direct patient care. This means that those without patients in these age categories or solely patients in a particular age category were grouped with those respondents who were close to 0% or close to 100%. A separate category for 0% and 100% might allow improved stratification on this variable.

Future studies might consider limiting the questions to knowledge and attitudes or behaviors, but not all three at the same time. Concentrating on one or two areas would have allowed even greater focus. Other considerations might be to include categories for dentists not participating in clinical practice (state and local public health administrators) and nonfederal dentists employed on federal installations, as well as sending the questionnaires to dentists in the Veteran’s Administration.

This study found differences in knowledge and behaviors between federal service and civilian dentists and among federal service subgroups. All respondents reported similar attitudes regarding fluoride as an effective remineralizing agent, but that there was little knowledge/use of other MID concepts. Differences were also found in personal and professional characteristics related to minimal intervention dentistry.

This study was important as a first step in providing information on federal service and civilian dentists’ familiarity with MID, and to offer insight on future directions to take in this area. These differences in knowledge and behaviors highlight the need for future studies in this area. Further acceptance by practicing dentists, third party payers, and educational institutions will encourage greater use of these procedures in the future. Future studies are needed to determine whether MID concepts are taught during predoctoral dental training, postdoctoral dental training, or dental continuing education courses, as curriculum changes in all of these training programs might influence clinical practices.

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REFERENCES