

Pediatric Dentist Experiences with Caregiver Radiograph and Imaging Refusal

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Abstract

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Purpose: This study investigated pediatric dentists' experiences with caregiver radiograph and imaging refusal and how dentists manage it in clinic.

Methods: American Academy of Pediatric Dentistry (AAPD) members were recruited by email from October 2024 to November 2024 to complete an online Research Electronic Data Capture (REDCap) survey on experiences with caregivers who refuse radiographs (intraoral, extraoral, and bitewing) and cone beam computed tomography (CBCT) imaging; bitewing radiograph refusal management; lead shielding practices; and provider and practice characteristics. Bivariate analyses were completed using the Chi-square test to identify practice-level characteristics associated with refusal ($\alpha=0.05$).

Results: Of the 8,342 invited participants, 695 completed the survey (8.3%). Substantial percentages of responding pediatric dentists reported radiograph and CBCT refusal to be a big or medium-sized problem (intraoral=23.2%; extraoral=12.1%; bitewing=21.7%; CBCT=9.0%). Pediatric dentists in private practice were significantly more likely to report radiograph refusal as a big problem than those in community health center/public health clinic or hospital/university settings (P -values<.05); there were no differences in CBCT refusal by setting (P =.85). Pediatric dentists practicing in clinics with >50% Medicaid-enrolled children reported having significantly fewer caregivers who refused radiographs (P -values<.05); there was no difference in CBCT refusal by % Medicaid (P =.42). Dentists believed caregivers who refused immunizations and those who refused fluoride were most likely to refuse bitewing radiographs. Most dentists (81.0%) used lead shielding, for whom the most common reason was that it increased caregiver acceptance of radiographs (73.6%).

Conclusions: Radiograph and CBCT imaging refusal are significant clinical challenges, which highlights the importance of developing chairside strategies that pediatric dentists can use to help caregivers make decisions about radiographs and imaging for their children.

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I. INTRODUCTION

Radiographs and dental imaging are important components of comprehensive dental care for patients of all ages, aiding in the detection, monitoring, and treatment of dental caries, periodontal disease, malocclusions, and craniofacial pathologies.¹⁻³ However, while there are benefits to dental radiographs and imaging, there are also associated risks.³ Exposure to ionizing radiation increases the risk of adverse health effects.⁴ DNA sequence variations can occur in somatic cells and result in radiation-induced neoplasm. The radiation doses associated with the main imaging modalities used in dental practices range from low-dose intraoral digital radiographs to higher-dose imaging procedures, including cone beam computed tomography (CBCT). Typical effective doses of ionizing radiation associated with these modalities in dentistry are generally low especially compared with other medical diagnostic imaging.⁴ Examples of effective doses from radiographic examinations are the following: PSP posterior bitewings with rectangular collimation (5 μ Sv), CCD sensor full mouth series with rectangular collimation (20 μ Sv), and panoramic (20 μ Sv).⁵ These doses can be compared with medical CT scans of the head (2mSv), chest (7mSv), and abdomen and pelvis (20mSv).⁵

Pediatric patients are more susceptible than adults to the effects of radiation exposure because of higher organ radiosensitivity and longer expected lifespan, which can result in a greater likelihood of cumulative DNA damage.^{3,6-8} The risks associated with the use of ionizing radiation in dentistry is generally low with new dental radiograph technology. There is no evidence of radiation-induced heritable disease in humans, thus, the risk of radiation-induced heritable effects is practically nonexistent with diagnostic imaging.⁹ Current

clinical practice guidelines in dentistry developed by professional societies and organizations, such as the American Dental Association (ADA), U.S. Food and Drug Administration (FDA), and American Academy of Pediatric Dentistry (AAPD), indicate that the prescription of radiographs should take place after reviewing of the patient's medical and dental history, completion of a clinical examination, and assessment of the patient's caries risk.^{1,3,5,10} General indications for dental radiographs include but are not limited to: new patients being evaluated for dental disease, recall patients for various clinical situations, monitoring growth and development, and assessing skeletal relationships.³ Dental radiographs and imaging play a vital role in detecting conditions such as caries, developmental anomalies, and pathology that may not be visible through clinical examination alone. Delayed imaging can lead to undiagnosed conditions, potentially necessitating more invasive treatment.

Once radiographs are prescribed, it is incumbent upon the clinician to limit the patient's radiation exposure by following the radiology concept of ALARA – as low as (is) reasonably achievable.^{1,3,5} Patient radiation doses can be minimized with the use of digital radiographic equipment and rectangular collimation, as well as ordering CBCT imaging only when lower exposure options will not yield the needed diagnostic information.⁴ Thyroid collars and abdominal (gonadal) shielding are no longer recommended by the American Academy of Oral and Maxillofacial Radiology (AAOMR) and ADA because of their potential to introduce artifacts, which can potentially lead to radiographs being re-taken and additional radiation exposure for the patient.^{4,9,11}

Most caregivers accept radiographs as part of their child's dental examination, some caregivers may question the need for radiographs or even refuse to have them taken during dental visits. In 2023, a cross-sectional study evaluated caregivers' perspectives on dental radiography for children. A survey was administered to 396 caregivers to determine caregiver knowledge, attitudes, and behaviors regarding dental radiographs in children. According to the survey results, 75.9% of caregivers wanted the dentist to explain why radiographs were needed, and 61.5% of caregivers stated that they demand protective shielding for their children when dental radiographs are taken.¹² However, some have anxiety about radiation exposure for themselves or family members – especially their children.⁵ Radiograph refusal poses challenges for pediatric dentists, who must balance caregiver concerns with the need to take radiographs and imaging to provide comprehensive dental care. To date, the topic of caregiver refusal and dental radiographs has received little attention, there is growing literature on the topic of caregiver hesitancy for other dental treatments, including topical fluoride.¹³

This study aimed to explore pediatric dentists' experiences with caregiver refusal of radiographs and imaging, as well as how they manage these situations in practice. We hypothesized that pediatric dentists' provider and practice characteristics would be associated with the provider-reported prevalence of caregiver refusal of radiographs and CBCT imaging.

II. METHODS

Study Design, Setting & Participants

This cross-sectional survey-based study focused on American Academy of Pediatric Dentistry (AAPD) members. Participants were recruited via email, using addresses of members obtained through the AAPD Research & Policy Center. To be included in the study, participants were required to have a valid email address, practice at least one day per week, and have a patient pool comprised of least 50% children under the age of 18 years. A consent form was included on the survey's landing page and completion of the survey constituted informed consent. Participation was voluntary, and all survey questions were optional. Participants had the option to stop the survey at any time. There was no incentive provided. The study was approved by the University of Washington's Institutional Review Board and classified as exempt (IRB ID: STUDY00005790).

Survey Development and Data Collection

The study team developed a 30-item web-based Research Electronic Data Capture (REDCap) survey based on items adapted from previous surveys used to examine caregiver refusal towards topical fluoride and vaccines.¹³ It was pre-tested with several dentists who were not part of the study before being finalized (Appendix). The relevant survey items were on radiograph (intraoral, extraoral, and bitewing) and CBCT imaging refusal, experiences and approaches to managing bitewing radiograph refusal, practices and motivations for lead shielding, and provider and practice characteristics. Survey data were collected from October 2024 to November 2024.

Variables

Provider and Practice Characteristics

The survey included four provider characteristics: gender (woman, man, non-binary/third gender, prefer to self-describe), race (categories: American Indian Or Alaska Native, Asian, Black Or African American, Native Hawaiian Or Other Pacific Islander, White, Other), Hispanic/ Latino ethnicity (yes/no), and experience level in pediatric dentistry (trainee [dental student, resident, fellow], general dentist, 1 to 5 years post-residency, 6 to 10 years post-residency, 11 years or more post-residency, other). Four practice characteristics were included: practice setting (community health center or public health clinic, private practice, university or hospital), AAPD practice region (northcentral, northeastern, southeastern, southwestern, western), self-reported percent of practice patients insured by Medicaid (0%, 1-50%, more than 51%), and whether the practice was located in an area with fluoridated water (yes, no, I am unsure). The states included in each AAPD region can be found at the following website:

<https://www.aapd.org/about/state-and-district-chapters/district-chapters/>.

Experiences With Radiograph and Imaging Refusal

Provider experiences with intraoral radiographs and CBCT imaging refusal were assessed with the following items: “in your main clinical practice setting, how problematic is parent refusal of intraoral radiographs [defined as bitewing, periapical, and/or occlusal radiographs]? (a big problem, a medium-sized problem, a small problem, not a problem at

all)”, “in your main clinical practice setting, how problematic is parent refusal of extraoral radiographs [defined as pano and/or lateral ceph]? (a big problem, a medium-sized problem, a small problem, not a problem at all)”, “do you prescribe cone beam CT imaging? (yes/no)”, “in your main clinical practice setting, how problematic is parent refusal of cone beam CT imaging? (a big problem, a medium-sized problem, a small problem, not a problem at all)”.

Experiences with Bitewing Radiograph Refusal

Provider experiences with bitewing radiograph refusal were assessed with the following items: “in your main clinical practice setting, how problematic is parent refusal of bitewing radiographs? (a big problem, a medium-sized problem, a small problem, not a problem at all)”, “over the years, I think parent refusal of bitewing radiographs has... (gotten worse (more parents are refusing), stayed about the same, gotten better (fewer parents are refusing))”, “when you encounter parents who refuse bitewing radiographs, how comfortable are you talking to parents about changing their mind about bitewing radiographs? (extremely comfortable, somewhat comfortable, somewhat uncomfortable, and extremely uncomfortable)”. Providers were also asked, “which of the following types of parents are likely to reuse bitewing radiographs?” and were provided a checklist. The checklist included high income, low income, publicly insured (Medicaid), privately insured, uninsured, White race, non-White race, Hispanic, non-Hispanic, parents who refuse immunizations, parents who refuse fluoride, child has special health care needs, child has caries, child is caries free, child is in primary dentition, child is in mixed dentition, child is in the permanent dentition.

Approaches to Management of Bitewing Radiograph Refusal

Provider approaches to managing bitewing radiograph refusal were assessed with the following items: “how often do you try convincing parents who refuse bitewing radiographs to accept them? (never, rarely, sometimes, often, always)”, “when encountering parents who refuse bitewing radiographs, which of the following strategies do you use? (checklist options: I explain that bitewing radiographs are a requirement for the child to continue being seen at my office, I explain that bitewing radiographs are important for screening for diseases like dental caries and periodontal disease, I explain that bitewing radiographs are important for diagnosing diseases like dental caries and periodontal disease, I explain that bitewing radiographs are helpful in monitoring diseases like dental caries and periodontal disease, I explain that bitewing radiographs are helpful in developing accurate treatment plans, I explain that bitewing radiographs are helpful in facilitating early treatment (e.g., allowing for fillings instead of crowns), none, other)”, and “which of the following do you do when parents refuse bitewing radiographs? (I have them sign a waiver, I document in the child's chart, I postpone care until the parents agree to radiographs, I dismiss the family from my practice, none of the above, other)”.

Provider Practices and Motivations for Lead Shielding

Provider practices and motivations for lead shielding were assessed with the following items: “in your main clinical practice setting, do you currently use lead shielding for radiographs? (yes/ no/ sometimes)”, “if you are using lead shielding in practice, why? (checklist options: my state/hospital/organization still requires it, I feel more comfortable

with it, my staff feel more comfortable with it, parents are more accepting of radiographs when shielding is used, there is no harm in continuing to use lead shielding, other”.

Statistical Analysis

Descriptive statistics and frequencies were generated to describe the study population, reported as counts and percentages. Bivariate associations between each of the four radiograph and CBCT refusal measures (intraoral, extraoral, bitewing, and CBCT) and provider and practice characteristics were tested using the Chi-square test ($\alpha = 0.05$). All analyses were conducted using Stata version 15.0 statistical software.

III. RESULTS

Provider and Practice Characteristics

A total of 8,342 participants were invited to complete the survey. After excluding surveys from individuals who reported practicing less than one day per week or having a patient pool with less than 50% children under 18 years of age, the final sample size was 695, resulting in a survey response rate of 8.3%.

Almost all of the study participants were pediatric dentists (91.5%). The remaining 8.5% of respondents (general dentist, other, fellow, resident, dental student) were classified as “other”. Most respondents were women (60.8%), white (72.5%), non-Hispanic (89.8%), and completed pediatric dentistry residency training 11 or more years ago (60.9%). Participants reported practicing in following AAPD regions: Northcentral (21.9%), Northeast (28.8%), Southeast (16.7%), Southwest (13.6%), and West (19.0%). Providers most commonly worked in a private practice setting (80.8%), followed by a university or hospital setting (13.4%) or a community health center or public health clinic (5.8%). Three-in-four participants reported accepting publicly-insured children, and the majority (77.5%) practiced in an area with community water fluoridation. (Table 1)

Experiences with radiograph and imaging refusal

Intraoral Radiographs

Respondents reported that intraoral radiograph refusal was a big problem, a medium-sized problem, a small problem, or not a problem – 4.6%, 18.6%, 64.7%, and 12.1% respectively.

Experience in pediatric dentistry was not significantly associated with perceptions of radiograph refusal being a problem ($P=0.9$). Pediatric dentists in private practice were

significantly more likely to report intraoral radiograph refusal as a big problem than those in community health center or hospital settings ($P<0.001$). Providers' practice region was not significantly associated with perceptions of intraoral radiograph refusal being a problem ($P=0.7$). Pediatric dentists practicing in clinics with more than 51% of Medicaid-enrolled children reported significantly lower rates of problems with intraoral radiograph refusal ($P<0.001$). (Table 2)

Extraoral Radiographs

Respondents reported that extraoral radiograph refusal was a big problem, a medium-sized problem, a small problem, or not a problem – 2.4%, 9.7%, 55.6%, and 32.3% respectively. Experience in pediatric dentistry was not significantly associated with perceptions of radiograph refusal being a problem ($P=0.3$). Pediatric dentists in private practice were significantly more likely to report extraoral radiograph refusal as a big problem than those in community health center or hospital settings ($P<0.001$). Providers' practice region was not significantly associated with perceptions of intraoral radiograph refusal being a problem ($P=0.1$). Pediatric dentists practicing in clinics with more than 51% of Medicaid-enrolled children reported significantly lower rates of problems with intraoral radiograph refusal ($P<0.001$). (Table 3)

CBCT Imaging

Respondents reported that CBCT imaging refusal was a big problem, a medium-sized problem, a small problem, or not a problem – 5.0%, 4.0%, 36.0%, and 55.0% respectively.

There were no significant differences in perceived CBCT imaging refusal based on the providers' experience level, practice setting, practice region or Medicaid patient percentage (P=0.4). (Table 4)

Bitewing Radiographs

Respondents reported that bitewing radiograph refusal was a big problem, a medium-sized problem, a small problem, or not a problem – 5.0%, 16.7%, 63.7%, and 14.6% respectively. Experience in pediatric dentistry was not significantly associated with perceptions of radiograph refusal being a problem (P=0.8). Pediatric dentists in private practice were significantly more likely to report bitewing radiograph refusal as a big problem than those in community health center or hospital settings (P<0.001). Providers practice region did not significantly impact bitewing radiograph refusal (P=0.1). Pediatric dentists practicing in clinics with more than 51% of Medicaid-enrolled children reported significantly lower rates of problems with bitewing radiograph refusal (P<0.001). (Table 5)

Approaches to Managing Bitewing Radiograph Refusal

Respondents reported believing that high-income families were more likely to refuse bitewing radiographs (55.5%), compared to low-income families (24.3%). Bitewing refusal was reported as most common in patients who were privately insured (48.3%), white (52.8%), non-Hispanic (11.5%), caries-free (32.5%), and in the primary dentition (35.4%). Providers perceived that parents who refused bitewing radiographs were more likely to refuse fluoride treatments (72.2%) and immunizations (65.8%). (Figure 1)

Most providers reported that they were either extremely (76.5%) or somewhat (20.3%) comfortable with discussing bitewing refusal with parents (Table 6). For parents that refused radiographs, the majority of providers always (33.2%) or often (38.9%) tried to convince parents to accept them. The most common strategies used were educating parents about the importance of diagnosing diseases (88.5%), developing an accurate treatment plan (80.8%), and facilitating early treatment (e.g., fillings instead of crowns) (75.8%). If parents refused radiographs, providers most frequently documented this in the patient's chart (87.9%), had parents sign a waiver (38.3%), or dismissed the family from the practice (22.7%). (Table 6) Other reasons providers cited for refusal included: finances (e.g. not covered by insurance, required co-pay, parents only wanting services covered by insurance) and family medical history (e.g. cancer, thyroid disease). Providers also noted refusal by caregivers of home-schooled children . (Data not shown in tables/figures)

Provider Practices and Motivations for Lead Shielding

A sizeable number of providers (81.0%) reported using lead shielding when taking radiographs in their practice. The most common reason for using lead shielding was that parents were more accepting of radiographs when shielding was used (73.6%). Providers also frequently reported using lead shielding because it was required by their state, hospital, or organization (40.1%), the office staff were more comfortable using it (38.4%), and there was no harm in continuing the practice (38.0%). (Figure 2)

IV. DISCUSSION

In this study, we investigated pediatric dentists' experiences with caregiver radiograph and imaging refusal and explored how they manage these clinical challenges. The results supported our hypothesis that pediatric dentists' provider and practice characteristics would be associated with the provider-reported prevalence of caregiver refusal of radiographs and CBCT imaging. We found a significant association between perceived radiograph refusal and practice setting, with private practice being the most reported setting. No significant differences were observed for CBCT imaging refusal.

Practice Setting

We found a significant association between perceived radiograph refusal and practice setting, with private practice being the most frequently reported setting. Low-income children, who primarily receive dental care in community health centers or public health clinic settings, have higher rates of untreated caries compared to children from higher-income households.¹⁴ Approximately 60% of children aged 6 to 9 years from lower-income households have had cavities in their primary or permanent teeth, compared to 40% of children from higher-income households.¹⁴ Additionally, untreated cavities are nearly three times more common in children aged 2 to 5 years living in low-income households (18%) than in those from higher-income households (7%).¹⁴

We found that providers perceive that caregivers of children with caries were less likely to decline radiographs, compared to a child that is caries free. This may be influenced by the presence of visible disease and/or caregiver knowledge and

expectations. Therefore, interventions aimed at reducing radiograph refusal may need to be tailored to specific practice settings, with a particular focus on addressing the concerns of caregivers in private practice—especially when the child shows no visible signs of disease.

Perceived Attributes of Bitewing Radiograph Refusing Caregivers

Providers perceived that parents who refused fluoride treatments (72.2%) and immunizations (65.8%) had a high rate of bitewing radiograph refusal. To our knowledge, no other studies have reported this finding. However, we do know that caregivers that refuse topical fluoride tend to refuse immunizations and the COVID-19 vaccines.^{13,15} Fluoridation, long a topic of controversy, has been in the news recently after a recent report on fluoride and neurodevelopment issued by the US Department of Health and Human Service’s National Toxicology Program and the subsequent federal ruling that the US Environmental Protection Agency must take action regarding fluoride in drinking water.^{16,17} Caregivers’ attitudes towards fluoride, immunizations, and radiographs may be rooted in fears about long-term health impacts, and given the recent attention to these topics in the media it would not be surprising if providers begin to encounter even more vaccine, fluoride, and radiograph hesitancy. Targeted educational efforts emphasizing the safety and necessity of all three interventions may help mitigate refusal.

Comfort in Addressing Bitewing Refusal in Clinic and Approaches in Management

When faced with caregiver refusal of bitewing radiographs, most pediatric dental providers reported that they actively attempted to address the concerns. Specifically, 33.2% stated they always tried to persuade caregivers to accept radiographs, while 38.9% said they often did so. The most commonly used strategies included educating caregivers about the importance of diagnosing disease (88.5%), developing an accurate treatment plan (80.8%), and facilitating early intervention, such as opting for fillings instead of crowns (75.8%). In response to continued refusal, providers most frequently documented the refusal in the patient's chart (87.9%). Other common actions included having caregivers sign a waiver (38.3%) or, less commonly, dismissing the family from the practice (22.7%). These findings highlight the critical role of effective, dentist-led communication in managing clinical challenges such as radiograph refusal. Building rapport through clear, empathetic, and tailored communication helps foster trust and improve caregiver adherence to recommended treatment, ultimately supporting better oral health outcomes for pediatric patients.¹⁸

Protective Shielding

In 2024, the ADA updated their recommendations to enhance radiograph safety, which included discontinuing the use of lead abdominal aprons and thyroid shields.⁹ The AAOMR and ADA guidelines state that lead aprons and thyroid shields are not recommended for dental x-rays, regardless of age, because the shields do not reduce internal scatter and may obscure anatomy, potentially requiring retakes that increase

radiation exposure.^{4,11} Due to advancements in x-ray technology, most radiation exposure results from internal scattered radiation and shielding provides negligible protection to patients.⁹

In the present study many providers (81.3%) reported continued use of lead shielding when taking radiographs. The most common reason for using lead shielding was that parents were more accepting of radiographs when shielding was used (72.4%). This demonstrates that in some circumstances caregiver preferences may impact provider practice more than professional guidelines. It is also important to note that a high percentage (40%) reported that their state or hospital still requires shielding. Accordingly, the 2024 revision of the AAPD's Best Practice: Prescribing Dental Radiographs for Infants, Children, Adolescents, and Individuals with Special Health Care Needs includes an addendum stating that despite support for the AAOMR guideline, practitioners should follow local, state, and federal rules regarding radiation safety requirements.³ Because the updated guidance is still relatively new, there is opportunity to improve consistency in application through targeted education to healthcare entities and state dental boards. For example, some US hospitals have launched "Abandon the Shield" radiation campaigns.¹⁹

Limitations

As with all survey-based research, this study is subject to limitations related to question design, sampling, and response bias. We also encountered a low response rate of 8.3%. While response rates for AAPD surveys have historically ranged from approximately 9% to 39%, depending on factors such as topic, distribution method, and

target population, our findings reflect a degree of survey fatigue among the audience. This low response rate makes it difficult to determine whether our results accurately represent the experiences of pediatric dentists nationwide.

Additionally, the sample was disproportionately composed of white and female respondents, which may not fully reflect the demographic makeup of pediatric dentists in the U.S. Future studies should prioritize recruiting a larger and more diverse sample to improve generalizability. Another limitation is that our survey did not ask which providers actively prescribe CBCT imaging. As a result, it is unclear whether all respondents had experience with CBCT in their clinical settings. This may have led to an overestimation in the proportion of providers reporting “no problem” with caregiver refusal, potentially skewing the data.

V. CONCLUSIONS

1. Pediatric dentists in private practice and those treating low numbers of Medicaid-enrolled patients were significantly more likely to report radiograph refusal as a big problem than those in community or hospital settings.
2. Pediatric dentists reported that caregivers who refuse immunizations and fluoride are also likely to refuse bitewing radiographs.
3. At the time of the survey, most respondents reported continued use of lead shielding during radiographic examination.

VI. TABLES

Table 1 – Provider and Practice Characteristics of Respondents of a National Survey to Understand Caregiver Radiograph and Imaging Refusal Administered to Members of the American Academy of Pediatric Dentistry (N=695)

Providers' Demographic Characteristics, Training, and Practice		Frequency of responses n (%)	Total (N)
Provider Characteristics	Gender		
	Woman	421 (60.8%)	693
	Man	267 (38.5%)	
	Non-binary/Third gender & Prefer to self-describe	5 (0.7%)	
	Race		
	American Indian or Alaska Native	3 (0.4%)	691
	Asian	108 (15.7%)	
	Black or African American	29 (4.2%)	
	Native Hawaiian or other Pacific Islander	3 (0.4%)	
	White	501 (72.5%)	
	Other	47 (6.8%)	
	Hispanic, Latino, or of Spanish origin		
	Yes	70 (10.2%)	689
	No	619 (89.8%)	
	Experience Level in Pediatric Dentistry	(0.0%)	
	Pediatric Dentist	636 (91.5%)	695
	Other (dental student, resident, fellow, general dentist, other)	59 (8.5%)	
	Experience Level as a Pediatric Dentist		
	1 to 5 years post-residency	144 (22.7%)	635
	6 to 10 years post-residency	104 (16.4%)	
11 years or more post-residency	387 (60.9%)		
Practice Characteristics	Clinical Practice Setting		
	Community health center or public health clinic	40 (5.8%)	693
	Private practice	560 (80.8%)	
	University or hospital	93 (13.4%)	
	Practice Region		
	Northcentral	122 (21.9%)	558
	Northeastern	161 (28.8%)	
	Southeastern	93 (16.7%)	
	Southwestern	76 (13.6%)	
	Western	106 (19.0%)	
	Percentage of Patients in Practice Insured by Medicaid		
	0%	174 (25.2%)	691
	1-50%	266 (38.5%)	
	More than 51%	251 (36.3%)	

Currently Practice in an Area with Fluoridated Tap Water		
Yes	537 (77.5%)	693
No	148 (21.4%)	
I am unsure	8 (1.1%)	

Table 2 - Provider and Practice Characteristics of Respondents of a National Survey to Understand Caregiver Intraoral Radiograph Refusal Administered to Members of the American Academy of Pediatric Dentistry (N=695)

Providers' Characteristics and Experiences		A big problem n (%)	A medium- sized problem n (%)	A small problem n (%)	No problem n (%)	p- value
Total number and percentage of providers, N=695		32 (4.6%)	129 (18.6%)	449 (64.7%)	84 (12.1%)	
Experience in pediatric dentistry	1 to 5 years post-residency	10 (6.9%)	27 (18.8%)	92 (63.9%)	15 (10.4%)	0.916
	6 to 10 years post-residency	5 (4.8%)	21 (20.2%)	65 (62.5%)	13 (12.5%)	
	11 years or more post- residency	17 (4.4%)	70 (18.1%)	257 (66.4%)	43 (11.1%)	
Practice setting	Community health center or public health clinic	1 (2.6%)	5 (12.8%)	23 (59%)	10 (25.6%)	0.000
	Private practice	29 (5.2%)	114 (20.4%)	366 (65.4%)	51(9.1%)	
	University or hospital	2 (2.2%)	10 (10.9%)	58 (63%)	22 (23.9%)	
Region	Northcentral	5 (4.1%)	21 (17.4%)	76 (62.8%)	19 (15.7%)	0.784
	Northeastern	4 (3.4%)	22 (19%)	79 (68.1%)	11 (9.5%)	
	Southeastern	2 (2.2%)	18 (19.4%)	63 (67.7%)	10 (10.8%)	
	Southwestern	3 (3.9%)	15 (19.7%)	54 (71.1%)	4 (5.3%)	
	Western	9 (6%)	28 (18.5%)	97 (64.2%)	17 (11.3%)	
Medicaid percentage	0%	11 (6.3%)	44 (25.3%)	107 (61.5%)	12 (6.9%)	0.000
	1-50%	16 (6%)	52 (19.5%)	179 (67.3%)	19 (7.1%)	
	More than 51%	5 (2%)	33 (13.1%)	160 (63.7%)	53 (21.1%)	

Table 3 - Provider and Practice Characteristics of Respondents of a National Survey to Understand Caregiver Extraoral Radiograph Refusal Administered to Members of the American Academy of Pediatric Dentistry (N=695)

Providers' Characteristics and Experiences		A big problem n/N (%)	A medium-sized problem n/N (%)	A small problem n/N (%)	No problem n/N (%)	p-value
Total number and percentage of providers, N=695		17 (2.4%)	67 (9.7%)	386 (55.6%)	224 (32.3%)	
Experience in pediatric dentistry	1 to 5 years post-residency	6 (4.2%)	11 (7.6%)	77 (53.5%)	50 (34.7%)	0.397
	6 to 10 years post-residency	1(1%)	7(6.7%)	63(60.6%)	33 (31.7%)	
	11 years or more post-residency	10 (2.6%)	44 (11.4%)	216(55.8%)	117 (30.2%)	
Practice setting	Community health center or public health clinic	1 (2.6%)	0 (0%)	17 (43.6%)	21 (53.8%)	0.007
	Private practice	15 (2.7%)	63 (11.2%)	318 (56.8%)	164 (29.3%)	
	University or hospital	1(1.1%)	4 (4.3%)	49 (53.3%)	38(41.3%)	
Region	Northcentral	2 (1.7%)	10 (8.3%)	60 (49.6%)	49 (40.5%)	0.179
	Northeastern	2(1.7%)	14 (12.1%)	71 (61.2%)	29 (25%)	
	Southeastern	2 (2.2%)	7 (7.5%)	61 (65.6%)	23/ (24.7%)	
	Southwestern	3 (3.9%)	9 (11.8%)	48 (63.2%)	16 (21.1%)	
	Western	2 (1.3%)	17 (11.3%)	81 (53.6%)	51 (33.8%)	
Medicaid percentage	0%	9 (5.2%)	24 (13.8%)	96 (55.2%)	45 (25.8%)	0.000
	1-50%	7 (2.6%)	31 (11.7%)	152 (57.1%)	76 (28.6%)	
	More than 51%	1 (0.4%)	12 (4.8%)	135 (53.8%)	103(41%)	

Table 4 - Provider and Practice Characteristics of Respondents of a National Survey to Understand Caregiver CBCT Imaging Refusal Administered to Members of the American Academy of Pediatric Dentistry (N=695)

Providers' Characteristics and Experiences		A big problem n/N (%)	A medium- sized problem n/N (%)	A small problem n/N (%)	No problem n/N (%)	p- value
Total number and percentage of providers, N=695		5 (5.0%)	4 (4.0%)	36 (36.0%)	55 (55.0%)	
Experience in pediatric dentistry	1 to 5 years post-residency	0 (0%)	0 (0%)	4 (44.4%)	5(55.6%)	0.861
	6 to 10 years post-residency	0 (0%)	1 (14.3%)	2 (28.6%)	4 (57.1%)	
	11 years or more post-residency	4 (5.6%)	3 (4.2%)	26 (36.6%)	38 (53.6%)	
Practice setting	Community health center or public health clinic	0 (0%)	0 (0%)	2 (33.3%)	4 (66.7%)	0.854
	Private practice	4 (6.6%)	3 (4.9%)	24 (39.3%)	30 (49.2%)	
	University or hospital	1 (3%)	1 (3%)	10 (30.3%)	21 (63.6%)	
Region	Northcentral	1 (4%)	1 (4%)	8 (32%)	15 (60%)	0.634
	Northeastern	0 (0%)	3 (17.6%)	6 (35.3%)	8 (47.1%)	
	Southeastern	0 (0%)	0 (0%)	3 (42.9%)	4 (57.1%)	
	Southwestern	1 (7.1%)	0 (0%)	6 (42.9%)	7 (50%)	
	Western	1 (8.3%)	0 (0%)	6(50%)	5 (41.7%)	
Medicaid percentage	0%	3 (11.1%)	2 (7.4%)	9 (33.3%)	13 (48.2%)	0.422
	1-50%	2 (5.4%)	1 (2.7%)	15 (40.5%)	19 (51.4%)	
	More than 51%	0 (0%)	1 (2.8%)	12 (33.3%)	23 (63.9%)	

Table 5 - Provider and Practice Characteristics of Respondents of a National Survey to Understand Caregiver Bitewing Radiograph Refusal Administered to Members of the American Academy of Pediatric Dentistry (N=695)

Providers' Characteristics and Experiences		A big problem n/N (%)	A medium-sized problem n/N (%)	A small problem n/N (%)	No problem n/N (%)	p-value
Total number and percentage of providers, N=695		35 (5.0%)	116 (16.7%)	442 (63.7%)	101 (14.6%)	
Experience in pediatric dentistry	1 to 5 years post-residency	10 (6.9%)	25 (17.4%)	92 (63.9%)	17 (11.8%)	0.810
	6 to 10 years post-residency	7 (6.8%)	20 (19.2%)	62 (59.6%)	15 (14.4%)	
	11 years or more post-residency	17 (4.4%)	63 (16.3%)	254 (65.6%)	53 (13.7%)	
Practice setting	Community health center or public health clinic	0 (0%)	4 (10.3%)	23 (59%)	12 (30.7%)	0.000
	Private practice	34 (6.1%)	103 (18.4%)	362 (64.6%)	61 (10.9%)	
	University or hospital	1 (1.1%)	9 (9.8%)	55 (59.8%)	27 (29.3%)	
Region	Northcentral	6 (5%)	13 (10.7%)	79 (65.3%)	23 (19%)	0.106
	Northeastern	3 (2.6%)	26 (22.4%)	75 (64.7%)	12 (10.3%)	
	Southeastern	2 (2.2%)	11 (11.8%)	69 (74.2%)	11 (11.8%)	
	Southwestern	4 (5.3%)	14 (18.4%)	53 (69.7%)	5 (6.6%)	
	Western	10 (6.6%)	27 (17.9%)	94 (62.3%)	20 (13.2%)	
Medicaid percentage	0%	12 (6.9%)	37 (21.3%)	109 (62.6%)	16 (9.2%)	0.000
	1-50%	16 (6%)	51 (19.2%)	173 (65%)	26 (9.8%)	
	More than 51%	7 (2.8%)	28 (11.2%)	157 (62.5%)	59 (23.5%)	

Figure 1 – Provider and Practice Characteristics of Respondents of a National Survey to Understand Caregiver Perceived Caregiver and Child Characteristics Associated with Bitewing Radiograph Refusal Administered to Members of the American Academy of Pediatric Dentistry (N=695)

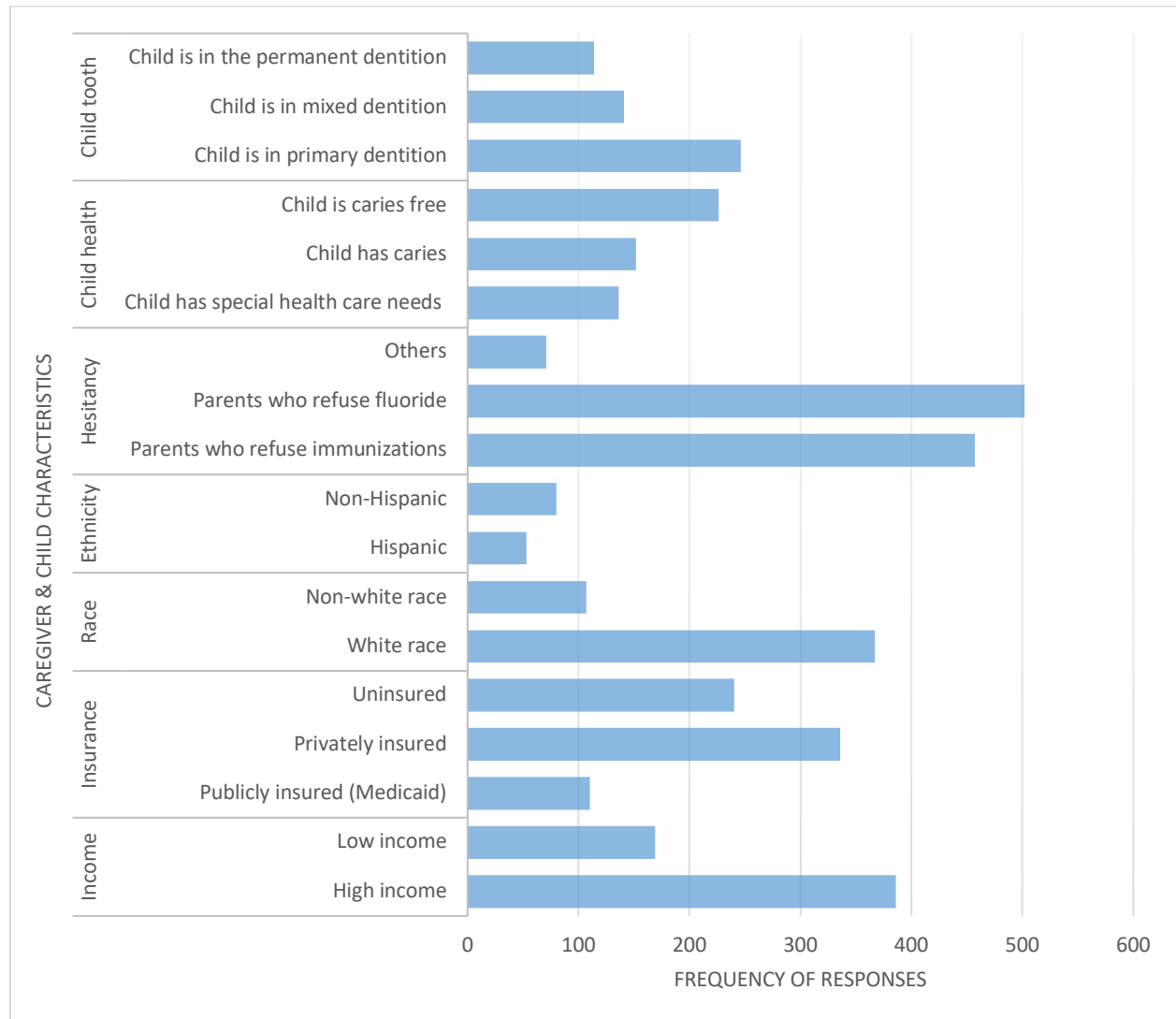
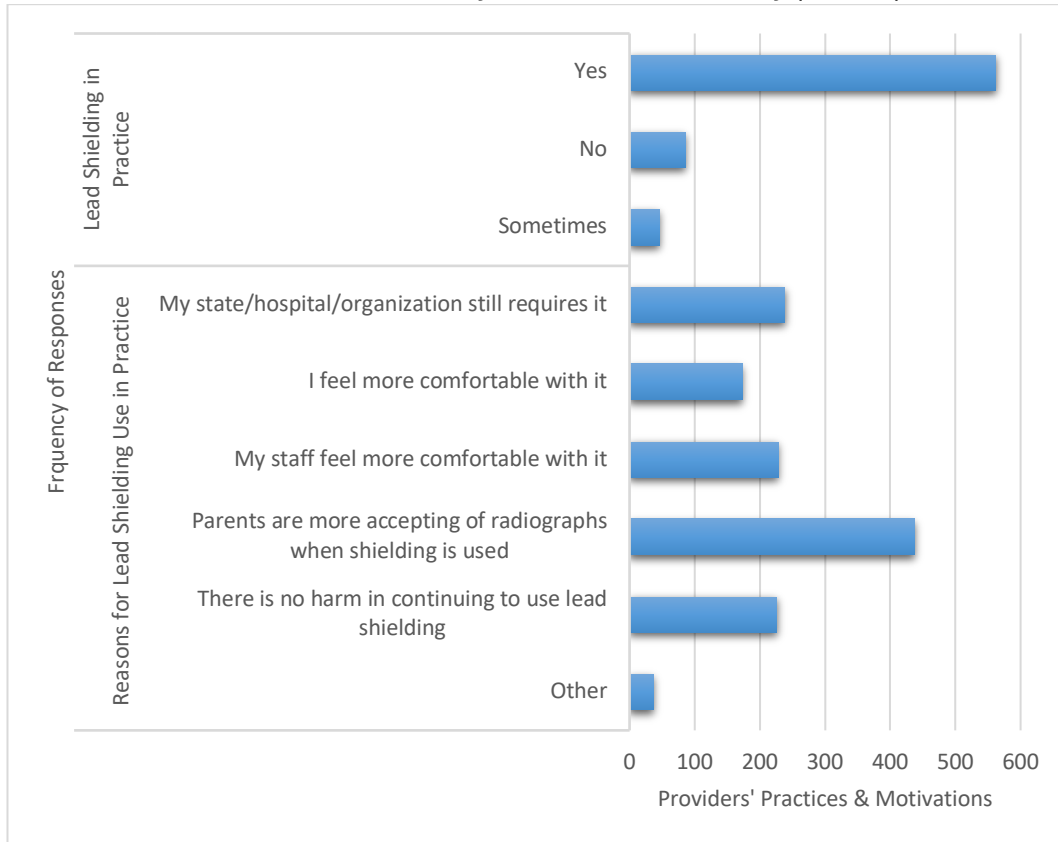


Table 6 - Provider and Practice Characteristics of Respondents of a National Survey to Understand Provider Experiences and Approaches to Management of Radiograph Hesitancy Administered to Members of the American Academy of Pediatric Dentistry (N=695)

Provider Experiences and Management on the Radiographic Hesitancy		Frequency of responses n (%)	Total (N)
Provider comfort level when discussing Bitewing hesitancy with parent	Extremely comfortable	530 (76.5%)	693
	Somewhat comfortable	141 (20.3%)	
	Somewhat uncomfortable	20 (2.9%)	
	Extremely uncomfortable	2 (0.3%)	
Frequency of providers convincing parents to accept radiographs	Never	7 (1.0%)	693
	Rarely	38 (5.5%)	
	Sometimes	148 (21.4%)	
	Often	270 (38.9%)	
	Always	230 (33.2%)	
Strategies used to convince parents to accept radiographs <i>(check all that apply)</i>	I explain that bitewing radiographs are a requirement for the child to continue being seen at my office	239 (34.8%)	687
	I explain that bitewing radiographs are important for screening for diseases like dental caries and periodontal disease	457 (66.5%)	
	I explain that bitewing radiographs are important for diagnosing diseases like dental caries and periodontal disease	608 (88.5%)	
	I explain that bitewing radiographs are helpful in monitoring diseases like dental caries and periodontal disease	446 (64.9%)	
	I explain that bitewing radiographs are helpful in developing accurate treatment plans	555 (80.8%)	
	I explain that bitewing radiographs are helpful in facilitating early treatment (e.g., allowing for fillings instead of crowns)	521 (75.8%)	
	None	3 (0.4%)	
	Other	66 (9.6%)	
Provider care decision after Bitewing refusal <i>(check all that apply)</i>	I have them sign a waiver	266 (38.3%)	695
	I document in the child's chart	611 (87.9%)	
	I postpone care until the parents agree to radiographs	134 (19.3%)	
	I dismiss the family from my practice	158 (22.7%)	
	None of the above	4 (0.6%)	
	Other	111 (16.0%)	

Table 8 - Provider and Practice Characteristics of Respondents of a National Survey to Understand Providers' Practices and Motivations for Lead Shielding Use Administered to Members of the American Academy of Pediatric Dentistry (N=694)



VII. APPENDIX

Page 1

AAPD Dentist Survey

Please complete the survey below.

Thank you!

What is your experience level in pediatric dentistry?

- Trainee (dental student, resident, fellow, other)
- 1 to 5 years post-residency
- 6 to 10 years post-residency
- 11 years or more post-residency
- General dentist
- Other: _____

Do you currently practice dentistry at least one day per week?

- Yes
- No

Is your patient pool at least 50% children under age 18 years?

- Yes
- No

Which of the following best describes your main clinical practice setting?

- University or hospital
- Community health center or public health clinic
- Private practice
- Other: _____

The next 4 questions are about topical fluoride, defined as fluoride varnish or other forms of fluoride treatment (e.g., fluoride gel, fluoride foam) provided during preventive dental visits.

In your main clinical practice setting, how problematic is parent refusal of topical fluoride?

- A big problem
- A medium-sized problem
- A small problem
- Not a problem at all

Over the years, I think parent refusal of topical fluoride has

- Gotten worse (more parents are refusing)
- Stayed about the same
- Gotten better (fewer parents are refusing)

Which of the following types of parents are likely to refuse topical fluoride? Check all that apply.

- High income
- Low income
- Publicly insured (Medicaid)
- Privately insured
- Uninsured
- White race
- Non-white race
- Hispanic
- Non-Hispanic
- Child has special health care needs
- Child has caries
- Child is caries free
- Child is in the primary dentition
- Child is in the mixed dentition
- Child is in the permanent dentition
- Parents who refuse immunizations
- Parents who refuse radiographs
- Other: _____

When you encounter parents who refuses topical fluoride, how comfortable are you talking to the parents about changing their mind about topical fluoride?

- Extremely comfortable
- Somewhat comfortable
- Somewhat uncomfortable
- Extremely uncomfortable

The next 3 questions are about radiographs and imaging in dentistry.

In your main clinical practice setting, how problematic is parent refusal of intraoral radiographs (defined as bitewing, periapical, and/or occlusal radiographs)?

- A big problem
- A medium-sized problem
- A small problem
- Not a problem at all

In your main clinical practice setting, how problematic is parent refusal of extraoral radiographs (defined as pano and/or lateral cep)?

- A big problem
- A medium-sized problem
- A small problem
- Not a problem at all

Do you prescribe cone beam CT imaging?

- Yes
- No

In your main clinical practice setting, how problematic is parent refusal of cone beam CT imaging?

- A big problem
- A medium-sized problem
- A small problem
- Not a problem at all

The next 4 questions are about bitewing radiographs, defined as diagnostic images taken during preventive dental visits used to help diagnose dental caries and periodontal disease.

In your main clinical practice setting, how problematic is parent refusal of bitewing radiographs?

- A big problem
- A medium-sized problem
- A small problem
- Not a problem at all

Over the years, I think parent refusal of bitewing radiographs has...

- Gotten worse (more parents are refusing)
- Stayed about the same
- Gotten better (fewer parents are refusing)

Which of the following types of parents are likely to refuse bitewing radiographs? Check all that apply.

- High income
- Low income
- Publicly insured (Medicaid)
- Privately insured
- Uninsured
- White race
- Non-white race
- Hispanic
- Non-Hispanic
- Child has special health care needs
- Child has caries
- Child is caries free
- Child is in the primary dentition
- Child is in the mixed dentition
- Child is in the permanent dentition
- Parents who refuse immunizations
- Parents who refuse fluoride
- Other: _____

When you encounter parents who refuse bitewing radiographs, how comfortable are you talking to parents about changing their mind about bitewing radiographs?

- Extremely comfortable
- Somewhat comfortable
- Somewhat uncomfortable
- Extremely uncomfortable

Next we have 3 questions about what you do when parents refuse bitewing radiographs.

How often do you try convincing parents who refuse bitewing radiographs to accept them?

- Never
- Rarely
- Sometimes
- Often
- Always

When encountering parents who refuse bitewing radiographs, which of the following strategies do you use? Check all that apply.

- I explain that bitewing radiographs are a requirement for the child to continue being seen at my office
- I explain that bitewing radiographs are important for screening for diseases like dental caries and periodontal disease
- I explain that bitewing radiographs are important for diagnosing diseases like dental caries and periodontal disease
- I explain that bitewing radiographs are helpful in monitoring diseases like dental caries and periodontal disease
- I explain that bitewing radiographs are helpful in developing accurate treatment plans
- I explain that bitewing radiographs are helpful in facilitating early treatment (e.g., allowing for fillings instead of crowns)
- None of the above
- Other: _____

Which of the following do you do when parents refuse bitewing radiographs? Check all that apply.

- I have them sign a waiver
- I document in the child's chart
- I postpone care until the parents agree to radiographs
- I dismiss the family from my practice
- None of the above
- Other: _____

Next we have a question about lead shielding (defined as a thyroid collar and/or lead apron).

In your main clinical practice setting, do you currently use lead shielding for radiographs?

- Yes
- No
- Sometimes

If you are using lead shielding in practice, why? Check all that apply.

- My state/hospital/organization still requires it
- I feel more comfortable with it
- My staff feel more comfortable with it
- Parents are more accepting of radiographs when shielding is used
- There is no harm in continuing to use lead shielding
- Other: _____

Next we have questions about vaccines for adolescents (defined as children ages 9 to 17 years).

In your main clinical practice setting, do you currently treat adolescent patients?

- Yes
- No

Some types of human papillomavirus (HPV) can cause mouth and throat cancers. The HPV vaccine can protect against some of these types. Based on this information, please answer the following questions:

Have you ever discussed HPV vaccination with any of your adolescent patients or their caregivers?

- Yes
- No

If you received training and were allowed to by law, would you be willing to administer the HPV vaccine to interested adolescent patients?

- Yes
 No

What are reasons you would not be willing to administer the HPV vaccine? Check all that apply.

- I am not comfortable discussing HPV with my patients or their parents
 I do not think parents want their child's dentist to administer vaccines
 I do not think the HPV vaccine is safe
 I think the HPV vaccine is too controversial
 Offering HPV vaccination might negatively affect my business
 It would be difficult to get reimbursed for vaccination
 Administering the HPV vaccine is not part of the practice of dentistry
 I have religious reasons about vaccines
 I have liability or legal concerns about vaccines
 Other: _____

Finally, we have some questions about your sociodemographic information.

What is your gender?

- Woman
 Man
 Non-binary/ third gender
 Prefer to self-describe: _____

What is your race? Please check all that apply.

- American Indian or Alaska Native
 Asian
 Black or African American
 Native Hawaiian or other Pacific Islander
 White
 Other: _____

Do you consider yourself to be Hispanic, Latino, or of Spanish origin?

- Yes
 No

What percentage of patients in your practice are insured by Medicaid?

- 0%
 1-25%
 26-50%
 51-75%
 More than 75%

Do you currently practice in an area where the tap water (drinking water) is fluoridated?

- Yes
 No
 I am not sure

I am interested in receiving more information on working with parents who refuse fluoride or radiographs and/or would like to receive study results.

Please check all that apply:

- Receive more information
- Receive study results

What is your phone number?

What is your name?

What is your email address?

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