Oral Health Opinions and Practices of Pediatricians: Updated Results From a National Survey

Rocio B. Quinonez, DMD, MS, MPH; Ashley M. Kranz, PhD; Charlotte W. Lewis, MD; Lauren Barone, MPH; Suzanne Boulter, MD; Karen G. O'Connor, BS; Martha Ann Keels, DDS, PhD

From the Department of Pediatric Dentistry and Pediatrics (Dr Quinonez), Schools of Medicine and Dentistry, Department of Dental Research (Dr Kranz), School of Dentistry, University of North Carolina at Chapel Hill; Division of General Pediatrics (Dr Lewis), University of Washington and Craniofacial Center, Seattle Children's Hospital, Seattle, Wash; Division of Pediatric Practice (Dr Barone), Department of Research (Ms O'Connor), American Academy of Pediatrics, Elk Grove Village, Ill; Department of Pediatrics and Community and Family Medicine (Dr Boulter), Geisel School of Medicine at Dartmouth Medical School, Hanover, NH; and Division of Surgery (Dr Keels), Duke University, Durham, NC

The authors have no conflicts of interest to disclose.

Address correspondence to Rocio B. Quinonez, DMD, MS, MPH, Department of Pediatric Dentistry and Pediatrics, Schools of Dentistry and Medicine, University of North Carolina at Chapel Hill, Chapel Hill, NC 27599-7450 (e-mail: quinoner@dentistry.unc.edu).

Received for publication April 21, 2014; accepted July 2, 2014.

ABSTRACT

BACKGROUND: Professional guidelines and state Medicaid policies encourage pediatricians to provide oral health screening, anticipatory guidance, and fluoride varnish application to young patients. Because oral health activities are becoming more common in medical offices, the objective of this study was to assess pediatricians' attitudes and practices related to oral health and examine changes since 2008.

METHODS: As part of the 2012 Periodic Survey of Fellows, a random sample of 1638 members of the American Academy of Pediatrics was surveyed on their participation in oral health promotion activities. Univariate statistics were used to examine pediatricians' attitudes, practices, and barriers related to screening, risk assessment, counseling, and topical fluoride application among patients from birth to 3 years of age. Bivariate statistics were used to examine changes since 2008.

RESULTS: Analyses were limited to 402 pediatricians who provided preventive care (51% of all respondents). Most respondents supported providing oral health activities in medical offices, but fewer reported engaging in these activities with most patients. Significantly more respondents agreed they should apply fluoride varnish (2008, 19%; 2012, 41%), but only 7% report doing so with >75% of patients. Although significantly more respondents reported receiving oral health training, limited time, lack of training and billing remain barriers to delivering these services.

CONCLUSIONS: Pediatricians continue to have widespread support for, but less direct involvement with oral health activities in clinical practice. Existing methods of training should be examined to identify methods effective at increasing pediatricians' participation in oral health activities.

KEYWORDS: education; fluoride; oral health; pediatrician; practice; prevention

ACADEMIC PEDIATRICS 2014;14:616–623

WHAT'S NEW

National surveys have noted pediatricians' support for, but limited engagement in oral health. This study updates the progress made regarding pediatricians' oral health attitudes and practices since 2008, to help inform strategies to increase delivery of preventive oral health services.

DESPITE IMPROVEMENTS IN oral health throughout the United States, dental caries remains highly prevalent among preschool age children.[1] Since 2000, pediatricians have become more involved in early childhood oral health promotion due to: 1) a shortage of dentists who treat young children,[2] 2) recognition that young children are more likely to visit medical than dental offices,[3] 3) payment to pediatricians for fluoride varnish application from state Medicaid programs,[4] and 4) recommendations supporting the pediatricians' role in oral health promotion.[5–7] As detailed in *Bright Futures*, pediatricians should begin oral health screening by the 6-month well-child visit, conduct caries risk assessment, counsel caregivers on oral health, and apply fluoride varnish to high-risk children.[8] Pediatricians are advised to refer children to a dentist by 1 year of age or, when faced with a limited dental workforce, continue providing preventive oral health services in the medical home until a referral is possible. With the inclusion of children's dental care within the essential benefits package outlined in the Patient Protection and Affordable Care Act, pediatricians will continue to play a critical role in oral health.[9]

In 1998, the first national oral health survey of pediatricians' assessed providers' knowledge, attitudes, and professional experiences.[10] This survey found that pediatricians believed they have an important role in oral health, with 74% willing to apply fluoride varnish. At the time, only Medicaid programs in Washington and North Carolina paid for preventive oral health services in medical offices. In 2008, when 29 state Medicaid programs were reimbursing pediatricians for these services, the American Academy of Pediatrics (AAP) conducted a survey to examine similar constructs. Pediatricians continued to view oral health as within their purview, yet few performed these activities, and lack of training (41%) was reported as the most common barrier.[11]

A number of initiatives aimed at increasing pediatricians' participation in oral health have been introduced since the last survey. The AAP, funded by the American Dental Association Foundation, launched Chapter Advocate Training on Oral Health in 2008 to provide oral health education to pediatricians who became Chapter Oral Health Advocates and subsequently trained others in their states.[12] Additionally, Web-based training such as the AAP Protecting All Children's Teeth and the Society of Teachers of Family Medicine's Smiles for Life have been developed to help educate physicians and others about oral health. Smiles for Life, now endorsed by 13 medical and dental organizations, has seen its utilization increase sevenfold since 2011, with >130,000 lifetime discrete site visitors (M.B. Clark, personal communication; Smiles for Life, 2013). Furthermore, 45 state Medicaid programs currently pay physicians to apply fluoride varnish.[13] Recognizing the changing landscape of oral health promotion in medical offices, this survey sought to assess AAP fellows' attitudes and practices related to oral screening, risk assessment, counseling, topical fluoride application, and barriers to dental visits, and examine changes since 2008.

METHODS

Data on oral health promotion practices of pediatricians were collected as part of the AAP Periodic Survey of Fellows. The AAP conducts these surveys on topics of importance to pediatricians 3 to 4 times per year. Surveys are 8-page self-administered questionnaires sent to a unique random sample of nonretired US AAP members. Periodic Survey 82 was sent to 1638 AAP members between July and December 2012. Oral health assessment was 1 of 3 topics included in this survey, with questions replicated or adapted from Periodic Survey 70 which was sent to 1618 AAP members between October 2007 and March 2008.[11] For both surveys, 7 mailed contacts were made to nonrespondents; each contact included a cover letter, questionnaire, and a business reply envelope. The initial mailing included a $2 bill. For the 2012 survey, e-mails were sent to nonrespondents after the second and fourth mailing, offering the option to respond electronically.

Both surveys addressed pediatricians' attitudes, practices, and barriers related to oral health screening, risk assessment, counseling, and fluoride among patients from birth to age 3 years. Subjects were asked if they believed pediatricians should perform 11 activities related to these topics (yes vs no). Likert-type scales were used to assess the proportion of patients they provided each oral health activity (collapsed to "0% to 75% vs 76% to 100% of patients"), ability to perform each activity (collapsed to "excellent/very good" vs "good/fair/poor"), and barriers to dentist visits (collapsed to "moderate/significant barrier" vs "somewhat/not a barrier"). Subjects were asked to provide demographic information, such as: age, gender, practice location (inner city vs urban not inner city vs suburban vs rural), practice setting (solo/2-physician practice vs group/health maintenance organization vs hospital/clinic), hours per week providing patient care, and receipt of oral health training (medical school/residency/postresidency vs none). Subjects provided an estimate of the percentage of patients with public health insurance (Medicaid, State Children's Health Insurance Program, or other) within their practice that were examined as a continuous measure and then dichotomized based on the sample mean value to indicate subjects who had ≥41% of patients with public health insurance.

Analyses were performed using SPSS Statistical software, version 18.0 (SPSS Inc, Chicago, Ill).[14] Chi-squared test statistics were calculated to examine the association of respondents' oral health activities with receipt of training (vs no training) and to compare means between results from the 2008 and 2012 survey when appropriate, with statistical significance examined at the levels of $P < .05$, $P < .01$, and $P < .001$. Because Medicaid is the only insurer in most states to reimburse fluoride varnish in medical offices, we calculated chi-squared test statistics to examine differences in oral health-related activities between respondents with >41% of patients with public health insurance and respondents with <41% of patients with public health insurance. The AAP Institutional Review Board approved this study as exempt from human subject review.

RESULTS

SAMPLE CHARACTERISTICS

In 2012, 790 completed questionnaires were received for a response rate of 48%. To assess possible nonresponse bias, respondents and nonrespondents were compared on variables available from the AAP membership file. No significant differences were found for gender (57.0% female). Respondents were slightly older than nonrespondents on average (47 years vs 43 years; $P < .001$). Practice location varied significantly among respondents and nonrespondents, respectively (Northeast respondents, 22.5% vs 25.0%; Midwest, 25.2% vs 19.1%; South, 31.9% vs 36.9%; West, 20.4% vs 19.0%; $P < .05$). To ensure comparability with the 2008 Periodic Survey,[11] analyses were limited to 402 postresident pediatricians who provide preventive care (51% of all respondents; 25% [402 of 1638] adjusted response rate). On average, providers were 49 years of age and worked full time in direct patient care in group practices located in suburban communities (Table 1). On average, 41.2% of respondents' patients were publicly

Table 1. Characteristics of Post-Training Respondent Pediatricians Who Provide Preventive Care, 2008 and 2012

Variable	2008 (N = 698), % Response	2012 (N = 402), % Response
Mean age, years	46.9	49.0
Gender, percent female	54.9	57.4
Practice location		
Rural	14.6	13.4
Suburban	48.3	48.6
Urban (not inner city)	21.7	22.2
Inner city	15.4	15.9
Practice setting		
Solo/2 physician	21.1	16.8
Group/HMO	61.6	67.9
Hospital/clinic	17.3	15.3
Estimated percentage of patients who are publicly insured	37.5	41.2
Average number of hours per week in direct patient care	38.5	39.0
Received formal education in oral health*		
No training	64.3	23.6
During medical school	13.1	18.3
During residency	15.8	38.6
Post-residency	21.7	46.9
If oral health training received post-residency (n = 183), what type?		
AAP's Protecting All Children's Teeth online training	†	9.3
Smiles for Life National Oral Health Curriculum	†	8.2
State-based in-person or online oral health training	†	32.4
In-person training or communication with an AAP Chapter	†	22.4
Other	†	28.4

HMO indicates health maintenance organization; AAP, American Academy of Pediatrics.
*Responses to setting of formal education in oral health are not mutually exclusive.
†Question not asked.

insured. Most respondents (76.4%) received oral health training during medical school, residency, or postresidency. During medical school or residency, oral health training for most recipients (70.4%) consisted of <3 hours during a seminar, lecture, grand rounds, or continuity clinic. Common types of oral health training received postresidency included: state-based in-person or online training (32.8%); training via the AAP Children's Oral Health Web site and resources (27.9%); or in-person training or communication with an AAP Chapter Oral Health Advocate (22.4%).

Oral Screening and Risk Assessment

Although most respondents agreed they should conduct caries risk assessments (75.2%), only 29.4% of respondents reported performing assessments with >75% of their patients aged birth to 3 years old, hereafter referred to as routine participation, and 33.7% rated their ability to perform assessments as "very good" or "excellent" (Table 2). When asked about identifying plaque and performing caries risk assessments, respondents with training were significantly more likely to agree they should perform these activities, report routine participation, and rate their ability as "very good" or "excellent" (Table 3). Since 2008, the percent of pediatricians reporting barriers to screening and risk assessment activities declined, although most were not statistically significant (Table 4). Additionally, for approximately one-third of respondents, inadequate time during visits, lack of ability to bill for assessments or fluoride varnish, and lack of training remained as "moderate" to "significant" barriers to providing oral health assessments during well-child visits with patients ≤3 years of age (Table 4).

Parental Counseling

Nearly all respondents agreed they should counsel parents about putting a child to bed with a bottle (99.2%) and the oral health effects of sugar (97.6%) and reported their ability to do so as "very good" or "excellent" (92.6% and 91.3%, respectively); however, approximately only 75% reported routinely counseling parents on these topics (Table 2). Less than half of the respondents agreed they should ask parents about their own oral health (39.5%) and only 5.9% reported routinely providing this counseling (Table 2). Since 2008, providers reported being significantly more likely to discuss the oral health effects of sugar (2008, 63.8%; 2012, 74.9%), but less likely to routinely ask parents about their own oral health (2008, 17.5%; 2012, 5.9%) (Table 2).

Topical Fluoride Application

In 2012, almost half (41.2%) of respondents agreed that pediatricians should apply fluoride varnish, yet only 7.4% report doing so at least once with >75% of their patients (Table 2). Increases were observed in pediatricians' agreement they should apply fluoride varnish (2008, 19.2%; 2012, 41.2%) and reported engagement in the activity with >75% of patients (2008, 3.0%; 2012, 7.4%) (Table 2). However, only 7.6%; of respondents in 2008 and 18.9% in 2012 described their ability to apply varnish as "very good" or "excellent"; the percentage rating their ability highly has increased over time. In 2012, respondents were significantly more likely to report being "very good" or "excellent" at varnish application if they had received training (Table 3). Responses to questions added in 2012 indicate most respondents agreed that pediatricians

Table 2. Pediatrician Participation in Oral Health Activities, 2008 to 2012: Opinions, Activities, and Perceived Ability

	Agree They Should Perform Activity, %		Report They Perform Activity At Least Once With >75% Patients, %		Rate Ability to Perform Activity as "Very Good" or "Excellent," %	
	2008	2012	2008	2012	2008	2012
Oral screening and risk assessment						
Identify teeth with dental caries	91.4	87.3*	46.8	50	41.4	38.7
Identify plaque	64.7	65.3	†	22.9	21.3	21.3
Perform caries risk assessment	†	75.2	†	29.4	†	33.7
Parental counseling						
Inform parents on how to brush children's teeth correctly	84.9	82.5	38.5	41.6	52.5	54.2
Inform parents on the oral health effects of putting child to bed with bottle	99.2	99.2	72.5	76.1	89	92.6
Inform parents on the oral health effects of sugary food/drink	97.3	97.6	63.8	74.9***	83.4	91.3
Ask about parents' own oral health	32.5	39.5*	17.5	5.9***	18.4	17.1
Fluoride						
Apply or have your staff apply fluoride varnish	19.2	41.2***	3	7.4**	7.6	18.9***
Bill for fluoride varnish application for eligible patients	†	†	†	14.4	†	†
Assess whether fluoride supplements are needed/ what dose	†	88	†	20.5	†	†
Recommend when to begin using fluoride toothpaste	†	95.2	†	60.6	†	72.8
Ask families about fluoride status of home water supply	†	90.7	†	53.2	†	66.3

P value on chi-squared test statistic used to examine changes since 2008 is significant at level of: *$P < .05$; **$P < .01$; or ***$P < .001$.
†Question not asked.

should inquire about families' access to fluoridated drinking water (90.7%) and knowledge about when to use fluoride toothpaste (95.2%) (Table 2). However, fewer respondents reported routinely engaging in these activities (53.2% and 60.6%, respectively).

Barriers to a Dental Visit at Age 1 Year

The mean reported age pediatricians believed a healthy child should have their first dental visit was 2.1 years, with the current mean age of patients actually having their first dentist visits reported at 2.8 years. "Moderate" to "significant" barriers to dentist visits reported by respondents included parents not perceiving dental visits as necessary (49.9%) and patients' lack of dental insurance and/or inability to pay for care (76.4%). Furthermore, most respondents indicated too few dentists to see publicly insured children aged ≤3 years (73.1%) and >3 years of age (61.5%) (Table 4).

Percentage of Patients With Public Health Insurance and Pediatricians' Participation in Oral Health Activities

Among respondents aware of their patients' insurance source (n = 343), 44.3% (n = 152) had ≥41% publicly insured patients. We compared all variables listed in Table 2 and present in Table 5 variables that were statistically different for respondents with ≥41% publicly insured patients and respondents with ≤41% publicly insured patients. Compared with respondents with fewer publicly insured patients, respondents with ≥41% publicly insured patients were significantly more likely to agree pediatricians should apply varnish (52% vs 34%), report applying (15% vs 2%) and billing for varnish (24% vs 6%), and report their ability to apply varnish as "very good" or "excellent" (29% vs 11%). Respondents with ≥41% publicly insured patients were significantly less likely to routinely recommend when to begin using fluoride toothpaste (69% vs 50%).

Discussion

Consistent with previous surveys, this national survey of pediatricians found support for preventive oral health activities in medical offices. Respondents agreed they should identify caries and provide counseling on oral hygiene practices and diet. Since 2008, more pediatricians agree they should apply fluoride varnish (2008, 19%; 2012, 41%). Despite agreement that oral health activities should occur during medical visits, pediatricians' participation in these activities continues to be limited. With the recent US Preventive Services Task Force encouraging primary care medical providers to apply fluoride varnish to all children, identifying strategies to increase pediatricians' participation in oral health remains an important issue.[7]

Results of previous research have suggested that lack of training might serve as a barrier to pediatricians' engagement in oral health activities.[11,15] A 2009 survey of US medical schools reported that 59.1% of responding schools offered between 1 and 4 hours of oral health training and few addressed caries (approximately 45%) or included hands-on training (approximately 11%).[16] In a study of approximately 90 third-year medical students in Massachusetts, a half-day training session that included

Table 3. Association of Oral Health Training and Pediatricians' Participation in Oral Health Activities, 2012

	Agree They Should Perform Activity				Report They Perform Activity At Least Once With >75% of Patients				Rate Ability To Perform Activity as "Very Good" or "Excellent"			
	Oral Health Training		No Training		Oral Health Training		No Training		Oral Health Training		No Training	
	n	%	n	%	n	%	n	%	n	%	n	%
Oral screening and risk assessment												
Identify teeth with dental caries	288	88.9	89	82.0	297	50.8	92	45.7	297	41.4	92	28.3*
Identify plaque	287	69.0	89	53.0**	297	25.9	93	12.9**	296	23.7	91	13.2*
Perform caries risk assessment	281	78.7	84	63.1***	290	32.8	91	17.6	294	37.1	89	20.2**
Parental counseling												
Inform parents on how to brush children's teeth correctly	287	83.6	89	78.7	297	43.1	92	35.9	294	55.8	91	48.4
Inform parents on the oral health effects of putting child to bed with bottle	290	99.0	88	100	298	75.2	93	79.6	297	93.3	92	90.2
Inform parents on the oral health effects of sugary food/drink	288	97.9	89	96.6	295	74.2	92	76.1	295	92.2	92	88.0
Ask about parents' own oral health	281	41.6	87	33.3	298	6.4	92	3.3	287	18.1	91	13.2
Fluoride												
Apply or have your staff apply fluoride varnish	280	43.2	86	33.7	297	8.4	92	4.4	282	21.3	85	9.4*
Assess whether fluoride supplements are needed/what dose	288	89.2	84	83.3	296	21.0	92	18.5	296	60.5	89	55.1
Recommend when to begin using fluoride toothpaste	287	95.8	87	93.1	294	62.2	91	53.9	295	73.2	89	70.8
Ask families about fluoride status of home water supply	287	92.0	87	86.2	294	53.1	92	53.3	294	66.0	89	66.3

P value on chi-squared test is significant at the level of: $*P < .05$, $**P < .01$, or $***P < .001$.

Table 4. Pediatricians' Reported Moderate to Significant Barriers to Providing Oral Health Activities, Over Time

Barrier	2008, %	2012, %
Lack of ability to bill for oral health assessments	33.5	33.7
Lack of professional training	40.9	35.4
Inadequate time during health supervision visits	35	28.8*
Lack of ability to bill for fluoride varnish	46.7	33.1*
Patients' lack of dental insurance/inability to pay for care	76.3	76.4
Parents not perceiving dental visits as necessary	51.7	49.9
Other barriers		
Too few dentists to see publicly insured children ≤3 years	†	73.1
Too few dentists to see publicly insured children >3 years	†	61.5

P on chi-squared test used to examine changes since 2008 is significant at the level of: *$P < .05$.
†Question not asked in 2008.

didactic and hands-on experiences based on the Smiles for Life curriculum improved baseline oral health knowledge when assessed immediately after the training session and declined somewhat after 6 months.[17] Compared with the 2008 survey, we found that more pediatricians' reported receiving oral health training during medical school, residency, and postresidency. Despite more attention to training, 50% of respondents reported routinely identifying caries, approximately 30% reported routinely conducting oral screenings, and only 7% routinely apply fluoride varnish. Receipt of any oral health training was infrequently associated with routine performance of oral health activities; because most pediatricians report supporting oral health activities, training should focus on how to increase participation.

A meta-analysis of continuing medical education interventions indicated that the most effective interventions used multiple methods, were interactive, and focused on a small group of physicians from the same specialty.[18] A national study reported that pediatricians' engagement in oral health activities was influenced by hands-on experience, relationships with local dentists, and contact with other oral health advocates.[12] Research suggests that physician practices can be altered with decision support tools that reinforce guidelines and new skills.[19–21] Caries-risk assessment tools designed for pediatricians who attempt to identify children with caries or at high risk of developing caries might help bolster participation in and pediatricians' confidence in performing oral health activities.[22–24] Similarly, quality improvement initiatives such as the recently introduced Education and Quality Improvement in Pediatric Practice oral health module, might help increase provider participation in oral health via a quality improvement activity that also meets Maintenance of Certification Part 4 of the American Board of Pediatrics.[25]

Expanding the role of pediatric clinic ancillary staff in oral health promotion might help increase oral health activities and other preventive initiatives. Smiles for Life provides a variety of online oral health training modules specific to the roles of physicians, pediatricians, nurses, physician assistants, and midwives. Additionally, nurses and clerical staff could potentially increase practice engagement in oral health activities through process improvement methods. Because research suggests that reminders provided to physicians before visits can improve performance of preventive care services, staff could tag medical records of children eligible for fluoride varnish before visits to remind physicians.[26] Additionally, a "champion" (ie, an individual who promotes and builds support for oral health activities) might be critical for bringing about change within individual practices.[27,28]

Pediatricians who received oral health training from the AAP (Chapter Oral Health Advocates), reported that state policies and payment affected their participation in oral health activities.[12] At the state level, requirements for Medicaid payment of fluoride varnish application range from nothing in 8 states to a mandatory 90-minute continuing medical education course in North Carolina.[4,29] In Massachusetts, although few providers received oral

Table 5. Association of Percentage of Patients With Public Health Insurance and Pediatricians' Participation in Oral Health Activities, 2012 (%)

	Have <41% of Patients With Public Health Insurance (n = 191)	Have ≥41% of Patients With Public Health Insurance (n = 152)
Oral screening and risk assessment		
Reports performing caries risk assessment to >75% of patients	25.8*	37.0
Parental counseling		
Agrees pediatricians should ask about parents, oral health	29.8***	50.7
Rates ability to ask about parents, oral health as "very good" or "excellent"	12.7***	27.1
Fluoride		
Agrees pediatricians should apply fluoride varnish	34.3**	51.8
Reports applying fluoride varnish to >75% of patients	1.6***	15.7
Rates ability to apply fluoride varnish as "very good" or "excellent"	11.3***	29.1
Reports billing for fluoride varnish for >75% of patients	6.2***	24.1
Recommends when to begin using fluoride toothpaste to >75% of patients	69.0***	50.4

Only variables from Table 2 that differed significantly by percentage of publicly insured are presented here.
Chi-squared tests were used to examine differences between respondents with <41% of patients with public health insurance and ≥41% of patients with public health insurance (*$P < .05$; **$P < .01$; ***$P < .001$).

health training, those who did had significantly greater odds of higher knowledge and more positive attitudes regarding fluoride varnish application.[15] Further study of training requirements and resources utilized by states with a high percentage of eligible children receiving preventive oral health services from nondentists (eg, Iowa, North Carolina, and Washington) could help to identify successful strategies to increase pediatricians' engagement.

In most states, Medicaid is the only insurer to pay physicians for fluoride application and many programs limit these benefits to young children. Therefore, the 14.4% of respondents in the 2012 survey who reported billing for fluoride application for most eligible patients might provide a more accurate measure of engagement. We observed that 52% of respondents who had a higher percentage than the sample average number of patients with public health insurance (≥42%) reported routinely applying varnish compared with 34% of respondents with fewer publicly insured patients, suggesting, not surprisingly, that reimbursement encourages application. Although the recent US Preventive Services Task Force recommendation of universal fluoride varnish application is likely to increase fluoride varnish use, lack of reimbursement from nearly all private health insurers might remain a barrier. Engagement in other oral health promotion activities that are not generally reimbursed by Medicaid, such as counseling, were not affected by the percentage of publicly insured patients within a practice, suggesting that reimbursement for varnish alone might not improve participation in all oral health promotion activities.

Since 2008, significantly fewer respondents reported a lack of ability to bill for fluoride varnish as a "moderate/significant" barrier to providing oral health assessments during health supervision visits with patients <3 years old (2008, 46.7%; 2012, 33.1%), a time period that coincided with 29 state Medicaid programs beginning to reimburse pediatricians for fluoride application.[13] Although most state Medicaid programs pay for fluoride application, less than 10 separately pay for oral health anticipatory guidance and/or screening. Furthermore, pediatricians have reported the inability to bill for and provide these services to all patients, regardless of insurance type, as an ethical dilemma and barrier to providing care.[12] The inclusion of preventive oral health services within the Patient Protection and Affordable Care Act's essential benefits package might help to alleviate this barrier.

Participation in oral health counseling varied according to the topic addressed. From 2008 to 2012, there was an 11.1% increase in respondents who reported routinely informing parents of the oral health effects of sugary food and drink, suggesting that pediatricians might be encouraged to counsel parents if one message targets multiple diseases (eg, caries and obesity). However, <40% of respondents agreed that pediatricians should ask about parents' own oral health, possibly reflecting a lack of knowledge about the risk of vertical transmission of bacteria from mothers to children. Tools developed for use by pediatricians to assess children's caries risk include clinical and behavioral risk factors, which capture the multifactorial process of dental caries. A study of one risk assessment tool used in a population of young children enrolled in Medicaid found that physicians identified more behavioral risk factors than clinical risk factors and that physicians were more likely to recommend dental referrals for children with family history dental problems, suggesting that parental counseling might inform and enhance referrals.[24]

Dental referrals are likely to be affected by the availability of dentists in the community. Most pediatricians reported too few dentists were available to see young, publicly-insured children, a group at high risk for developing caries. Another barrier to care coordination is the discrepant recommendations from medical and dental professional associations about the timing of a first dental visit. The American Academy of Pediatric Dentistry and AAP recommend an age 1 dental visit, but the AAP acknowledges this timing depends on dentist availability.[5,6] Respondents reported the mean age that healthy children should have their first dental visit at 2.1 years, but estimated that the mean age of actual visits was 2.8 years based on the availability of current dental resources in their community. Lacking consistent recommendations, care coordination and young children's access to dental care might suffer.

This study has limitations, including possible response bias if respondents provided socially desirable responses rather than their true experience. We recognize that a 4 to 5 year time frame between surveys might not fully capture changes in training, particularly in medical schools. However, we did see an increase in oral health training throughout all settings. Additionally, our findings might have limited generalizability for pediatricians who are not members of the AAP and because of the low survey response rate, although our response rate was comparable with rates from other studies examining physicians' oral health practices, and AAP surveys have been shown to have minimal response bias.[30–32] Finally, examination of bivariate associations provide information about correlation, but do not adjust for additional factors that might help to explain outcomes.

CONCLUSION

Pediatricians support providing oral health activities in medical offices. Although the number of pediatricians who received oral health training has grown, research is needed to identify how best to train pediatricians so that they are more confident engaging in these activities and more children receive quality preventive oral health services. Additional research should examine the varying state-level training requirements and payment, which might affect pediatricians' participation.

ACKNOWLEDGMENT

The views expressed in this article are those of the authors and do not necessarily represent those of the AAP.

Financial disclosure: This study was supported by the AAP. Dr Kranz received support from an NIH NRSA T90 Training Grant (Grant NIH/NIDCR 5T90DE021986-03).

Authorship Statement: Dr Quinonez conceptualized the study and drafted the manuscript with Dr Kranz. Dr Kranz provided additional data analysis. Dr Lewis conceptualized the study, designed the data collection instruments, and reviewed the manuscript. Ms Barone designed the data collection instruments, reviewed, and revised the manuscript. Dr Boulter reviewed and revised the manuscript. Ms O'Connor designed the data collection instruments, coordinated and supervised data collection, completed the data analysis, reviewed, and revised the manuscript. Dr Keels reviewed and revised the manuscript. All authors approved the final manuscript as submitted.

REFERENCES

1. Tomar SL, Reeves AF. Changes in the oral health of US children and adolescents and dental public health infrastructure since the release of the Healthy People 2010 Objectives. *Acad Pediatr*. 2009;9:388–395.
2. Seale N, Casamassimo PS. Access to dental care for children in the United States: A survey of general practitioners. *J Am Dent Assoc*. 2003;134:1630–1640.
3. Yu SM, Bellamy HA, Kogan MD, et al. Factors that influence receipt of recommended preventive pediatric health and dental care. *Pediatrics*. 2002;110:e73–e83.
4. American Academy of Pediatrics. State Medicaid Payment for Caries Prevention Services by Non-Dental Professionals. Last updated June 2013. Available at: http://www2.aap.org/oralhealth/docs/OHReimbursementChart.pdf. Accessed September 13, 2013.
5. Section on Pediatric Dentistry and Oral Health. Preventive oral health intervention for pediatricians. *Pediatrics*. 2008;122:1387–1393.
6. American Academy of Pediatric Dentistry Council on Clinical Affairs. Guideline on infant oral health care. *Pediatr Dent*. 2012–2013;34(suppl 6 Reference Manual):132–136.
7. Moyer VA. US Preventive Services Task Force. Prevention of dental caries in children from birth through age 5 years: US preventive services task force recommendation statement. *Pediatrics*. 2014;133:1102–1111.
8. Hagan JF, Shaw JS, Duncan PM, eds. *Bright Futures: Guidelines for Health Supervision of Infants, Children, and Adolescents*. 3rd ed. Elk Grove Village, Ill: American Academy of Pediatrics; 2008.
9. Edelstein BL, Samad F, Mullin L, Booth M. Oral health provisions in U.S. health care reform. *J Am Dent Assoc*. 2010;141:1471–1479.
10. Lewis CW, Grossman DC, Domoto PK, Deyo RA. The role of pediatrician in the oral health of children. A national survey. *Pediatrics*. 2000;106:E84.
11. Lewis CW, Boutler S, Keels MA, et al. Oral health and pediatricians: results of a national survey. *Acad Pediatr*. 2009;9:457–461.
12. Lewis CW, Barone L, Quinonez RB, et al. Chapter Oral Health Advocates- COHAs: a nationwide model for pediatrician peer education and advocacy about oral health. *Int J Dent*. 2013;2013:498906.
13. Sams LD, Rozier RG, Wilder RS, Quinonez RB. Adoption and implementation of policies to support preventive dentistry initiatives for physicians: a national survey of Medicaid programs. *Am J Pub Health*. 2013;103:e83–e90.
14. SPSS Inc. *PASW Statistics for Windows, Version 18.0*. Chicago, Ill: SPSS Inc; 2009.
15. Isong IA, Silk H, Rao SR, et al. Provision of fluoride varnish to Medicaid-enrolled children by physicians: the Massachusetts experience. *Health Serv Res*. 2011;46:1843–1862.
16. Ferullo A, Silk H, Savageau JA. Teaching oral health in US medical schools: results of a national survey. *Acad Med*. 2011;86:226–230.
17. Silk H, Stille SO, Baldor R, Joseph E. Implementation of STFM's "Smiles for Life" oral health curriculum in a medical school interclerkship. *Fam Med*. 2009;41:487–491.
18. Mansouri M, Lockyer J. A meta-analysis of continuing medical education effectiveness. *J Contin Educ Health Prof*. 2007;27:6–15.
19. Okelo SO, Butz AM, Sharma R, et al. Interventions to modify health care provider adherence to asthma guidelines: a systematic review. *Pediatrics*. 2013;132:517–534.
20. Davis DA, Thomson MA, Oxman AD, Haynes RB. Changing physician performance. A systematic review of the effect of continuing medical education strategies. *JAMA*. 1995;274:700–705.
21. Douglass JM, Douglass AB, Silk HJ. Infant oral health education for pediatric and family practice residents. *Pediatr Dent*. 2005;27:284–291.
22. American Academy of Pediatric Dentistry. Guideline on Caries-risk Assessment and Management for Infants, Children, and Adolescents. Available at: http://www.aapd.org/media/Policies_Guidelines/G_CariesRiskAssessment.pdf. Accessed September 13, 2013.
23. American Academy of Pediatrics. Oral health risk assessment tool. Available at: http://www2.aap.org/oralhealth/docs/RiskAssessmentTool.pdf. Accessed September 13, 2013.
24. Long CM, Quinonez RB, Beil HA, et al. Pediatricians' assessments of caries risk and need for a dental evaluation in preschool aged children. *BMC Pediatrics*. 2012;12:49–56.
25. Ballweg R, Braun P, Clark M, et al. *Education and Quality Improvement in Pediatric Practice (EQIPP): oral health in primary care. American Academy of Pediatrics*. Available at: http://eqipp.aap.org/home/home; 2013. Accessed September 13, 2013.
26. Balas EA, Weingarten S, Garb CT, et al. Improving preventive care by prompting physicians. *Arch Intern Med*. 2000;160:301–308.
27. Shaw EK, Howard J, West DR, et al. The role of the champion in primary care change effort: from the State Networks of Colorado Ambulatory Practices and Partners (SNOCAP). *J Am Board Fam Med*. 2012;25:676–685.
28. Rogers B, McCurdy LE, Slavin K, et al. Children's Environmental Health Faculty Champions Initiative: a successful model for integrating environmental health into pediatric health care. *Environ Health Perspect*. 2009;117:850–855.
29. Rozier RG, Sutton BK, Bawden JW, et al. Prevention of early childhood caries in North Carolina medical practices: implications for research and practice. *J Dent Educ*. 2003;67:876–885.
30. Ismail AI, Nainar SM, Sohn W. Children's first dental visit: attitudes and practices of US pediatricians and family physicians. *Pediatr Dent*. 2003;25:425–430.
31. Alves RT, Ribeiro RA, Costa LR, et al. Oral care during pregnancy: attitudes of Brazilian public health professionals. *Int J Environ Res Public Health*. 2012;9:3454–3464.
32. Cull WL, O'Connor KG, Sharp S, Tang SF. Response rates and response bias for 50 surveys of pediatricians. *Health Serv Res*. 2005;40:213–226.