Practice Patterns of General Dentists Treating Children in Kentucky: Implications for Access to Care

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Abstract: Purpose: The purpose of this study was to determine the impact of general dentists on access to care for children in Kentucky by assessing the extent to which they provide care for children. Methods: A 41-question survey was mailed to all 1,774 general dentists practicing in Kentucky. It had 6 sections: (1) demographic data; (2) dental school education; (3) knowledge of national guidelines for the age 1 visit; (4) treatment of children; (5) clinical practices and desirability of additional education; and (6) participation in public insurance. Results: The response rate was 33%, with a final sample size of 486. Ninety-four percent of respondents reported treating children younger than 12-years-old; however, 74% of children treated were between the ages of 7 and 14, with only 11% being younger than 3 years old. Children 3-years-old and younger and those on public insurance were represented in low numbers. Conclusions: While most general dentists reported treating children, few provided care for children 3-years-old or younger. Also, general dentists did not treat children with extensive numbers of carious lesions, and rarely performed pediatric restorative procedures such as pulpotomies and stainless steel crowns. (Pediatr Dent 2012;34:220-5) Received July 16, 2010 | Last Revision September 13, 2010 | Accepted September 26, 2010

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Despite advances in public health and personal preventive measures, as well as the public's increasing perception of the desirability of a healthy, attractive smile, dental caries continues to be the nation's most common childhood disease1 It is the most prevalent unmet health need for U.S. children.2 Dental caries affects approximately 59% of 5- to 17-year-olds. The prevalence of dental caries among 2- to 5-year-olds is 28%.3 The Surgeon General's report Oral Health in America characterized dental caries in children as being a "silent epidemic." The report also documented the profound and significant disparities in oral health that exist among America's children, with children from low-income and minority families having poorer oral health, as well as poorer access to oral health care. Eighty percent of dental caries in children is found in approximately 20% to 25% of children, who are predominately from low-income and minority families.5

The problem of access to care for children is a significant challenge for the profession of dentistry. Multiple barriers to ensuring access to care for children have been identified, including the: number and distribution of dentists^{6,7}; ethnicity of dentists⁸; education of dentists^{9,10}; and attitudes of dentists in refusing to care for children with publicly funded dental insurance. All of these barriers to care for children exist in Kentucky. The oral health of Kentucky's children has been characterized as that of a third world country and derided as "Kentucky's cavity." ¹³

Kentucky has 1,014,800 children younger than 18-years-old, with 288,100 being younger than 5-years-old. Forty-five percent of Kentucky's children (457,000 children) live in families that are at 200% of the federal poverty level or less; compared with 39% nationally. Thirty percent of Kentuckians live in Appalachian counties; this area contains some of the poorest populations in the nation.

There are 1,774 practicing general dentists in Kentucky and 77 pediatric dentists.^{17,18} Most pediatric dentists practice in the 3 major urban areas of the state. Ninety of Kentucky's 120 counties have a dentist-to-population ratio lower than the national average.¹⁹ Forty-seven percent of 2- to 5-year-old Kentucky children have experienced dental caries, and 43% have untreated caries, with 31% having been characterized as severe early child-hood caries (S-ECC).²⁰ Only 24% of Kentucky's dentists are active Medicaid/Kentucky Children's Health Insurance Program (KCHIP) providers, meaning they bill more than \$10,000 per quarter.²¹ Fewer than 1 in 3 Medicaid/KCHIP-enrolled children in Kentucky received dental services in a recent year.¹⁹

Identifying the practice patterns of general dentists in Kentucky, including their knowledge and attitudes in caring for children, is basic to understanding access to care for children. General dentists are the primary providers for dental care for children. While the dental workforce is only one of the barriers affecting access to care for children, it is an important one if access to care for children is to be improved. In a 2003 national survey, Seale and Casamassimo found a significant relationship between the care general dentists provided for children and their educational experience in dental school.²²

A major goal of this study was to determine to what extent the clinical care of children in Kentucky was related to general dentists' formal dental education and to what extent that experience and the services they provided had on children accessing care. Additionally, the study had the purpose of determining general dentists' interest in further training in children's dentistry. A determination of

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the number of general practitioners who care for children with publicly financed dental insurance, as well as the magnitude of such reimbursed care in their practices, was also an intention of the study.

Methods

A 41-question survey was developed based on a 2003 national survey conducted by Seale and Casamassimo.²² The names and addresses of all licensed general dentists practicing in Kentucky were obtained from the Kentucky Board of Dentistry. The survey instrument, along with a cover letter explaining the purpose of the project, was mailed to these individuals. Each survey was assigned a tracking number to enable the investigators to determine who would need a follow-up postcard sent requesting completion and return of the survey. A postcard requesting return of the survey was mailed 2 weeks after the first mailing to nonrespondents.

A series of questions were asked addressing commonly performed procedures in children in the areas of prevention, behavior management, and treatment. Three questions were asked relative to each procedure: how often do you perform the procedure in your practice; how did you learn to perform the procedure during your dental school education; and what is your interest in obtaining additional training in these areas? There were six components of the survey: (1) demographic data; (2) dental school experience in learning to care for children; (3) knowledge of national guidelines for the age 1 dental visit; (4) treatment of children in practice; (5) clinical practices and desirability of continuing education; and (6) participation in public insurance funding.

Data were collected via a paper survey. Data from the surveys were entered into an Excel database and were sampled to verify data entry. The Excel database was imported into a SAS dataset for analysis. Continuous variables were summarized with descriptive statistics (N, mean, standard deviation), and categorical variables were described with percentages. Comparisons of education levels for categorical variables were made using chisquare tests of independence. A significance level of 0.05 was used for all statistical tests. All analyses were performed using SAS 9.2 (SAS Institute Inc, Cary, NC).

Results

The written survey was mailed to all 1,774 general dentists practicing in Kentucky. Five hundred and sixty five surveys were completed and returned for a response rate of 33%. Seventy-two of the returned surveys were excluded, as 42 individuals were no longer in practice and 30 did not treat children younger than 12-years-old. The final sample size was 486.

Demographic. Most respondents (53%) graduated from dental school between 1971 and 1990. Among respondents, 216 (44%) graduated from the University of Louisville, Louisville, Ky, and 237 (49%) graduated from the University of Kentucky, Lexington, Ky, with 31 (6%) having graduated from a dental school outside of Kentucky. Thirty-three percent of Kentucky general dentists had received formal education in addition to dental school: 11% had completed a general practice residency; 8% had completed an advanced education in general dentistry; and 14% indicated they had completed some other form of additional training.

Preventive Procedure	Frequency of performance of this procedure in practice (%)			Format of dental school education (%)			Opinion regarding further training (%)		
	Very often/ often	Sometimes	Rarely/ never	Didactic/ clinical	Didactic/ laboratory only	None	Very desirable/ desirable	Somewhat	Not desirable
Topical fluoride application	76	6	17	89	8	1	30	21	47
Examination of infants	· 10	14	75	39	30	29 ·	34	30	36
Examination of 1- to 3-year-olds	41	37	17	55	28	14	42	26	29
Permanent sealants	79	10	9	83	9	7	36	16	46

Behavior management procedure	Frequency of performance of this procedure in practice (%)			Format of dental school education (%)			Opinion regarding further training (%)		
	Very often/ often	Sometimes	Rarely/ never	Didactic/ clinical	Didactic/ laboratory only	None	Very desirable/ desirable	Somewhat	Not desirable
Tell-show-do	89	7	3	82	11	4	44	19	35
Voice control	65	24	9	78	14	5	42	21	36
Parent(s) present during treatment	59	27	14	32	14	48	32	23	42
Parent(s) not present during treatment	26	43	30	68	15	13	35	21	41
Hands-over mouth exercise	1.	2	96	41	28	29	14	13	71
Immobilization device	1	4	95	28	37	32	14	16	67
Nitrous oxide	37	23	38	71	17	-11	41	19	37
Oral sedation	1	5	91	11	36	51	45	17	37 37

Caring for children. Nearly all (94%) of the respondents reported treating children younger than 12-years-old. Reasons given by the 6% who did not treat children included "my practice is not geared to children," and "I don't enjoy treating children." Seventy-seven percent of the respondents reported that children 12-years-old and younger constituted less than 25% of their practice in the preceding 12 months. Seventy-four percent of the children treated by the respondents in Kentucky were between 7 and 14-years-old. Only 11% of dentists reported treating children younger than 3-years-old. Kentucky dentists reported that: 33% of their child patients seen in the past 12 months were caries free; 14% of children examined in the that time period had extensive carious lesions (more than 6 teeth affected); 23% had 3 to 6 teeth involved with caries; and 30% had 1 to 2 lesions.

Prevention. The preventive dentistry practice of general dentists, their educational experience in the predoctoral curriculum, and their interest in further training varies, depending on the preventive procedure (Table 1). The overwhelming percentage of general dentists often or very/often perform fluoride treatments (83%) and fissure sealants (91%) on permanent molars, and almost all had didactic and clinical experiences in the preventive dentistry procedures of topical fluorides (89%) and fissure sealants (83%) in their dental education.

Only 10% often/very often perform infant oral examinations and provide anticipatory guidance; an additional 14% do so sometimes. Thirty-nine percent had clinical experience in providing anticipatory guidance associated with the infant oral examination in dental school, and an additional 30% were exposed to it didactically. The frequency that infant oral examinations were being performed depended on the education the dentist had received. Those who had didactic and clinical training were more likely to perform the examination than those with didactic exposure only or no training (15% vs 7% vs 2%; P<.05).

Forty-one percent often/very often examine 1- to 3-year-old patients; an additional 37% do so sometimes. Fifty-five percent recalled receiving clinical experience in doing so in their predoctoral curriculum. Those respondents who received didactic and clinical training in examining 1- to 3-year-olds were more likely to perform the examinations on this age group than those who only received didactic instruction or those who received no training (50% vs 32% vs 33%; $P \le .001$). Among dentists who often/very often examined children from 1- to 3years-old, nearly half of them (48%) desired additional training.

Behavior management. The behavior management practices of general dentists, their training during formal dental education, and their interest in further training are reported in Table 2. Eighty-nine percent of general dentists reported using tell-show-do (behavior shaping) often/very often and 65% reported using voice control often/very often, with an additional 24% using it sometimes. Most had both didactic and clinical experiences in the behavior management techniques of tell-showdo (82%) and voice control (78%). Fifty-nine percent reported having the parent in the operatory with the child during treatment often/very often. Ninety-five percent rarely/never use an immobilization device, and 67% had no desire to learn more about it. Thirty-seven percent often/very often use nitrous oxide as a management tool and 23% do so sometimes; 88% had some type of formal education on the use of nitrous oxide. Only 1% use oral sedation often or very often; 91% never do. Forty-five percent did think that additional training in sedation was desirable.

Treatment procedures. The current treatment practices of general dentists, their training during formal dental education, and their desire for additional training are reported in Table 3. Only 9% of general dentists performed restorations on 1- to 3-year-olds. Fewer than half (45%) recalled having clinical training on performing restorations in 1- to 3-year-olds. There was a statistically significant association between the form of education and the frequency with which respondents performed restorations on 1- to 3-year-olds. Those who received didactic and clinical training (45%) were more likely to perform restorations on 1- to 3-year-olds than those who received didactic training only (23%) or no training (15%; 13% vs 6% vs 3%; P≤.001). Of the individuals who sometimes perform restorations on 1- to 3-yearolds, over half of them (56%) desired additional training ($P \le .001$).

Most general dentists (54%) perform Class II amalgam restorations on primary teeth; however, 44% rarely or never do. An overwhelming majority (87%) performs Class II composite restorations on primary teeth; 13% rarely do. These data are potentially misleading, as they likely reflect a choice of the biomaterial used in restoring a Class II restoration. It can be assumed that all general dentists who treat children perform Class II restorations. Almost all of the respondents recalled having didactic and clinical training on primary 2-surface amalgams (92%), with fewer (55%) having had such training in the use of primary 2-surface composites. This is due to the relatively recent transition in dental practice from using amalgam to composites. Only 15% reported often or very often placing stainless

Operative procedure	Frequency of performance of this procedure in practice (%)			Format of dental school education (%)			Opinion regarding further training (%)		
	Very often/ often	Sometimes	Rarely/ never	Didactic/ clinical	Didactic/ laboratory only	None	Very desirable/ desirable	Somewhat	Not desirable
Restorations on 1- to 3-year-olds	9	23	68	45	29	24	34	22	41
Primary tooth 2-surface amalgams	33	21	44	92	6	<1	28	18	51
Primary tooth 2-surface composites	57	30	13	55	13	29	39	21	37
Stainless steel crowns	15	30	55	88	9	<1	39	23	33
Primary tooth indirect pulp cap	16	44	39	69	21	8	40	27	31
Formocresol pulpotomy	25	34	41	87	10	2	40	22	35

steel crowns, although 88% reported having had clinical experience in placing stainless steel crowns in dental school. This finding counters the observed practice of dentists tending to perform procedures they were taught in dental school. It is potentially explained by the fact that the adaptation and placement of a stainless steel crown is uniquely different than other commonly utilized clinical procedures. Additionally, stainless steel crowns can be challenging to adapt to mutilated teeth. Thirty-nine percent of respondents believed additional training in the use of stainless steel crowns was desirable; however, 33% did not find it desirable and 23% only somewhat so.

Formocresol pulpotomies were performed by 25% of the respondents often or very often, with an additional 34% doing so sometimes; however, essentially all (87%) had received clinical experience in dental school. Dentists' practices, in contrast to their dental school training with formocresol pulpotomies, follow that of stainless steel crowns in that they were trained to perform but do not do so. Pulpotomies and stainless steel crowns are frequently linked in practice, thus providing a potential explanation for sharing this finding.

National guidelines. Seventy-one percent of respondents were aware of the American Dental Association and American Academy of Pediatric Dentistry Guidelines recommending a first visit to the dentist by 12-months-old, yet 44% did not agree with the recommendation. When asked "at what age do you believe a child should have their first dental visit?" the most common response was 3-years-old and the median was 2-years-old.

Publicly financed dental insurance. Table 4 reports respondent's data concerning children in their practices with publicly financed insurance. Forty-one percent of those accepting Medicaid/KCHIP never treat very young children (6 months to 3 years). Seventy-eight percent, however, often/very often care for 4- to 6-year-olds, and 87% often/very often care for 6- to 15-year-olds. Eighty-five percent of those accepting Medicaid/KCHIP treat children with 1 to 2 carious teeth often; 83% treat children with 3 to 6 carious teeth often; and 64% treat children with more than 6 carious teeth often. Six percent of the respondents who treat children with Medicaid/K-CHIP insurance estimate that over half of their gross practice revenues are attributable to caring for these children; 67% estimate that less than 25% of their gross practice revenues are from this population.

When asked about barriers to caring for children with public insurance funding, the most common reasons were: the child's behavior (62%); funding levels (54%); and current level of training (57%).

		Tribate and the second					
Circumstance	Frequency (%)						
200	Very often/ often	Sometimes	Rarely/ never				
5-month to 3-year-olds	29	29	41				
1- to 6-year-olds	78	16	4				
5- to 15-year-olds	87	10	2				
Mild caries (1-2 teeth)	85	12	3				
Moderate caries (3-6 teeth)	83	13	3				
Severe caries (>6 teeth)	64	21	14				

Discussion

This study was modeled after a 2003 study by Seale and Casamassimo in which they conducted a random sample of general practitioners in the United States. The results of this study of general dentists in Kentucky demonstrated close comparability to those found in the 2003 study. Ninety-one percent and 11% of general dentists nationally and 94% and 10% of Kentucky dentists, respectively, treat children younger than 12-years-old and younger than 3-years-old. Seale and Casamassimo reported that 39% of the children seen in the last 12 months were caries free, and 12% of children had extensive carious lesions. In this study, Kentucky dentists reported that 33% of the children seen were caries free, with 14% having extensive lesions. While the national data indicate that infant oral examinations were performed often/very often by 21% of dentists, in Kentucky the percentage was lower at 10%.

Topical fluoride treatments were performed by 84% of dentists nationally and by 83% of Kentucky dentists. Ninety-one percent of Kentucky dentists place sealants, whereas 79% of the national sample did; however, this could reflect the time difference between the 2 studies as the use of sealants continued to increase through time. Both studies were comparable in the behavior management procedures employed, with tell/show/do being used in both almost 90% of the time and voice control being used 60% to 65% of the time. Of interest was that both groups of dentists used immobilization rarely (less that 1-2% of the time). Stainless steel crowns were used often or very often 17% of the time nationally and 15% of the time in Kentucky.

The finding that most Kentucky dentists were treating children younger than 12-years-old is positive; however, the profile of the children being cared for in practice is not a positive finding. General dentists are overwhelmingly treating older children. Less than 10% reported providing treatment regularly to infants and toddlers and less than 15% provided treatment to children of any age with severe levels of dental caries (more than 6 teeth affected). Again, this was consistent with the national data reported by Seale and Casamassimo. Only 14% of dental schools provide students with clinical experience in the treatment of the very young (birth- to 2-year-old). Only one fourth of U.S. predoctoral programs provide clinical experience in conducting infant oral examinations.

Dentists generally perform the procedures they were taught in dental school. There are, however, a relatively minimal number of curriculum hours devoted to children's dentistry in the typical dental curriculum. The national average number of clock hours is 177 inclusive of didactic and clinical education.9 In 2002, the House of Delegates of the American Dental Association recommended that the Commission on Dental Accreditation (CODA) evaluate the amount of time devoted to children's dentistry in the curriculum, suggesting that the current amount could have a negative affect on access to care.22 Unfortunately, there is no evidence that this issue has been addressed by CODA or by the leadership of dental education. Additionally, many dental schools have inadequate numbers of faculty members in pediatric dentistry, as well as insufficient numbers of children for student dentists to treat.10 Many of the children who are cared for in dental school clinics are older and have minimal restorative needs. All of these circumstances have an adverse effect on the ability of student dentists to gain competency managing children's behavior, providing comprehensive restorative care, as well as caring for infants and toddlers.

In the national study, only 17% and 15%, respectively, of dentists nationally and in Kentucky often or very often placed stainless steel crowns on children's teeth. The utilization of stainless steel crowns for moderately to severely decayed teeth in children is a standard of care. Specialists in children's dentistry consider the placement of stainless steel crowns a common aspect of a practice that cares for many children, particularly children with extensive involvement with dental caries.

In 2003, most dentists nationally (53%) were aware of the American Dental Association and American Academy of Pediatric Dentistry's recommendation for an age 1 visit for children; however, in 2009, 71% of Kentucky dentists were aware of the recommendation. The difference is likely due the time difference between the 2 studies, as there has been increasing publicity of the recommendation over the last several years. It is notable that a significant number of dentists nationally (60%) and in Kentucky (44%) did not support the recommendation. The failure of dentists to incorporate the infant oral examination in their practices is consistent with the lack of support for this national recommendation. Both groups believed that 3-years-old is the most appropriate time for the child's initial dental visit. The goal of the recommendation for the age I visit is to provide preventive care, such as topical fluoride therapy, and anticipatory guidance for parents regarding healthy dietary and oral hygiene habits.

The lack of dentists' support for this early intervention is problematic because it has negative implications for preventing early childhood caries (ECC), which affects 27% of children nationally and 47% of children in Kentucky. High-risk dietary practices are commonly established by 12 months.²³ Preventive care and anticipatory guidance for parents must be provided in infancy if ECC is to be prevented. Savage found that the children seen by age 1 for their first dental visit were more likely to have subsequent preventive visits and less restorative or emergency visits than those who had their first dental visit by 2- or 3-years-old.²⁴

A number of circumstances, identified in this study and others, converge to perpetuate the existence of ECC—affecting 47% of Kentucky's children—and lack of access to care for its treatment. To prevent caries in young children, preventive strategies such as fluoride therapy and anticipatory guidance must be implemented early, soon after the eruption of the primary dentition begins. Yet, 75% of Kentucky dentists rarely or never perform infant oral examinations, and the majority has little interest in further training in doing so. Treatment is required once dental caries is initiated in the young child, yet most dentists do not treat children younger than 3-years-old. Young children are frequently uncooperative patients and require behavior management skills that are beyond the repertoire of the typical general dentist, as documented in this study.

The behavior management tools used by Kentucky general dentists were essentially limited to tell/show/do and voice control, with some utilizing nitrous oxide analgesia. Children with ECC, particularly those with S-ECC (31% of Kentucky 2- to 5-year-olds) require advanced behavior management techniques such as immobilization, sedation, or general anesthesia—skills typically only found in the office of a pediatric dentist. Taken together, these circumstances suggest the difficulty the profession of dentistry faces in dealing with access to care for young children.

If dentists are unable to be educated and motivated to provide early preventive care and anticipatory guidance, the responsibility will default to other health professionals, such as pediatricians and family physicians. Given the prevalence of ECC in children from economically disadvantaged families,

another potential resource for early prevention is the federally-funded Women, Infant, and Children (WIC) program. This would be an appropriate resource, as dental caries is a dietobacterial disease and nutrition is the focus of the WIC program.

This study identified that a problem exists in Kentucky for young children with dental disease accessing appropriate dental care; the problem is not dissimilar from that identified in Seale and Casamassimo's national study. Significant experience must be gained for dentists to become both competent and comfortable offering the clinical services typically required in providing comprehensive care for young children. Not only must knowledge and skills be taught, but an attitude must be fostered in student dentists such that they understand the importance of providing early preventive care for infants and toddlers and anticipatory guidance for parents.

Continuing dental educational programs that address the instructional and attitudinal deficiencies of dentists in practice must be developed. While the respondents to this survey generally indicated an interest in additional training in children's dentistry, few formal continuing dental education courses in children's dentistry are offered. Directors of continuing education indicate that the reason that this is true is because courses in children's dentistry are poorly attended. The Access to Baby and Child Dentistry (ABCD) program in Washington has been successful in improving access to preventive and restorative dental care for children from birth to 6-years-old with publicly financed dental insurance. The program emphasizes the age 1 dental visit.25 The ABCD program focuses on education of the whole dental team. Dentists receive training in the various procedures required to care for young children, and other members of the dental team receive training in communication

Since 2002, the California Dental Association, through its Foundation, has developed and funded a Pediatric Oral Health Access Program.²⁶ The educational program is provided free of charge to general dentists who practice in underserved areas, treat uninsured patients, and/or currently accept publicly funded dental insurance programs. Since 2002, 70,000 children have received care by dentists who have participated in the program.

and culturally appropriate follow-up with families.

Economically disadvantaged children bear a disproportionate burden of dental disease. In Kentucky, only 1 out of 3 children whose dental care is financed by public dental insurance receives dental services in a given year.¹⁹ In part, this is due to dentists' failure to participate in the Medicaid and KCHIP publicly funded dental insurance programs. 12 It has been suggested that streamlining administrative processes and increasing reimbursement rates may increase dentist participation in public insurance programs. Several states have made the effort to minimize administrative hurdles and raise reimbursement rates for their Medicaid/KCHIP programs. Unfortunately, evidence suggests that an increase in professional fees appears to only marginally improve dentists' participation in Medicaid/KCHIP.²⁷ Kentucky Medicaid reimburses at 84% of the fair market value for services, yet only 24% of Kentucky dentists participate in Medicaid/KCHIP^{21,28}

Both nationally and in Kentucky, the "silent epidemic" of dental caries is likely to continue unabated, with parents being unable to gain access to appropriate dental care for their children unless:

1. significant changes in the predoctoral dental curriculum result in an increased emphasis on the care of children, particularly infants and young children;

- there is an increase in the opportunity for substantive continuing dental education to train practicing dentists in the skills needed to treat young children; and
- dentists' attitudes and commitments to participate in public insurance programs change.

The several issues affecting access to oral health care for children in Kentucky could be positively influenced by initiatives on the part of the 2 state dental schools to enhance their respective curricula by providing the opportunity for more clinical experiences in the care of infants and young children.

Conclusions

Based on this study's results, the following conclusions can be made:

- The results of this study, focused on Kentucky dentists, were comparable to those of an earlier study of general dentists nationally.
- While most general dentists respondents treated children, few provided care for children 3-years-old or younger. The lack of a repertoire of advanced behavior management skills compromises their ability to do so.
- General dentists who treated children did not treat children with extensive numbers of carious lesions and rarely performed pulpotomies or placed stainless steel crowns, procedures commonly required for children with extensive caries experience.
- 4. This study confirmed the results of Seale and Casamassimo—that, in general, dentists tend to perform in practice those procedures on children with which they developed clinical experience in their formal dental education.
- 5. Most Kentucky general dentists were aware of the American Dental Association and American Academy of Pediatric Dentistry's guidelines for the age 1 visit. A significant number, however, did not agree with an age 1 visit, and were not incorporating early preventive dental care for infants and toddlers in their practices. The failure to do so suggests that the profession's ability to have an effect on preventing early childhood caries is seriously compromised.

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