

Frequency of reported dental visits and professional fluoride applications in a cohort of children followed from birth to age 3 years

Rebecca L. Slayton, DDS, PhD Michael J. Kanellis, DDS, MS

Steven M. Levy, DDS, MPH John J. Warren, DDS, MS Mahbulul Islam, BA, MS

Dr. Slayton is assistant professor and Dr. Kanellis is associate professor, Department of Pediatric Dentistry; Dr. Levy is professor, Dr. Warren is assistant professor, and Dr. Islam is statistician, Department of Preventive & Community Dentistry, The University of Iowa, Iowa City, Iowa.

Correspond with Dr. Slayton at rebecca-slayton@uiowa.edu

Abstract

Purpose: The purpose of this study is to report the prevalence of having a dental visit and/or a topical fluoride treatment at the dental visit from birth to age 36 months from an observational, longitudinal study of a cohort of children followed since birth.

Methods: Multiple questionnaires were sent to the families of children enrolled in a study of fluoride ingestion to ask parents if their child had had a dental (or dental hygiene) appointment and/or a fluoride treatment during the time interval since the previous mailed survey. Data were analyzed to determine the percentages of children who had at least one dental visit or at least one fluoride treatment by one, two or three years of age.

Results: Three hundred and forty parents completed all eleven questionnaires during the 36-month study period. Of these, 2% reported having taken their child for a dental visit by one year of age, 11% by two years of age and 31% by three years of age. Of those with a visit by three years of age, 19% received at least one fluoride treatment.

Conclusions: Despite recommendations for early dental visits, only 31% of the children in this cohort had been seen by a dentist by the time they reached their third birthday and 19% of these had received a professional fluoride treatment. (*Pediatr Dent* 24:64-68, 2002)

KEYWORDS: PREVENTION, TOPICAL FLUORIDE, YOUNG CHILDREN

Received August 6, 2001 Revision Accepted November 26, 2001

The American Academy of Pediatric Dentistry (AAPD),¹ the American Dental Association (ADA)² and Bright Futures³ recommend that children be seen for their first dental visit by 12 months of age, while the American Academy of Pediatrics recommends that a child be seen for their first dental examination at 3 years of age, based on the assumption that pediatricians are able to provide the necessary oral examinations and preventive guidance prior to age 3 years.⁴ Little is known about the extent to which families comply with any of these recommendations.

Children who are at high risk for developing caries often have multiple cavitated or abscessed teeth by 2 years of age. In the state of Iowa, Early Periodic Screening Diagnosis and Treatment (EPSDT) guidelines require that children on Medicaid be referred to a dentist by the age of 1 year.⁵ In spite of this, utilization of dental services by poor children

is low. The recent U.S. Surgeon General's report on Oral Health showed that 25% of poor children have not seen a dentist prior to entering kindergarten.⁶

The rationale for early dental visits include the facilitation of follow-up visits, assessment of the caries risk of the patient, initiation of a preventive plan and provision of anticipatory guidance to the parent.^{7,8} Caries risk factor assessment includes items such as oral hygiene, nutrition, presence of white spot or cavitated lesions and/or presence of enamel hypoplasia. Thus, early identification of risk factors can facilitate appropriate interventions, including oral hygiene instruction (OHI), self-applied and office-applied topical fluoride, radiographic evaluation and dietary counseling.

Although early dental visits are generally promoted as a means to establish healthy habits and behaviors that impact a child's future oral health, there is a paucity of controlled

studies demonstrating this.⁷ In addition, there has been no study of professional topical fluoride use in very young children who have early dental visits.

The purpose of this paper is to report the prevalence of having a dental visit and the occurrence of topical fluoride treatment at the dental visit from birth to age 36 months from an observational, longitudinal study of a cohort of children followed since birth.

Methods

Data were collected as part of the Iowa Fluoride Study – a longitudinal study of fluoride intake. A birth cohort was recruited from eight Iowa hospitals from March 1992 through February 1995⁹⁻¹¹. Questionnaires were sent when children were ages 6 weeks, and 3, 6, 9, 12, 16, 20, 24, 28, 32 and 36 months.¹¹ Beginning at 6 months of age, respondents were asked “did your child have a dental (or dental hygiene) appointment during the last 3, 4 or 6 months [interval dependent on time since previous mailed survey]?” and “did your child receive a professional (office) fluoride treatment during the last 3, 4 or 6 months?” Note that precise

numbers of dental visits or office fluoride treatments was not asked. Non-respondents were sent follow-up mailings after three weeks and, when necessary, again after six weeks.

For the current study, respondents who completed all questionnaires for year one, two or three were included in the separate analyses of visits and fluoride treatment for each year of life (to ages one, two and three). In addition, respondents who completed all eleven questionnaires were included in the analysis of visits and fluoride treatments for the three years combined. This was done so that patterns of visits and fluoride treatments could be followed in the same children over the entire 3-year period.

Data were double entered and verified. Descriptive statistics were generated and statistical tests conducted using SPSS®¹² and SAS®.¹³ To investigate factors that might contribute to the timing of the first dental visit, data were analyzed relative to the mother’s and father’s ages and levels of education, the family income at the time of the child’s birth and the birth order of the child. Chi-square analysis was used with a *P* value less than 0.05 considered to be statistically significant.

Results

There were 682 parents who completed all 5 questionnaires during the first year of the study, 504 parents completed all three questionnaires during the second year and 435 parents completed all three questionnaires during the third year. A total of 340 parents completed all 11 questionnaires during the 36 months reported on in this paper. The demographics of this group of respondents at baseline (in 1992-1995) are summarized in Table 1. In general, the subjects in this study had a relatively high socioeconomic status, with 53% having had a family income greater than \$40,000 and 9% with an income less than \$20,000. Forty-nine percent of mothers and 47% of fathers had a college degree.

For each survey interval, the number and percentage of parents who reported a dental visit and the number/percentage who reported a professional fluoride treatment for their study children were recorded. During the first year of life, each child who had a visit had only one questionnaire reporting a visit during the year. During the second year of life, the majority of children with a visit (91%) had only one questionnaire reporting a visit, while two children had two questionnaires with visits reported. During the third year of life, 73% of the children with at least one visit had only one period with a visit, 23% had two periods with visits and 4% had all three periods with visits. Fluoride treatments were very rare until 32 and 36 months, where 42 and 28% of children with a visit got a fluoride treatment, respectively.

To determine the number and percentage of respondents who had a dental visit and/or a professionally applied fluoride treatment during each year of life, data were combined for those survey times representing year of life one, two or three (Table 2). Only those 340 parents who completed all

Table 1. Characteristics of the Sample (n=340)

Variable	Percent
Mother's age	
<20 years	2
20-24 years	12
25-29 years	33
30-34 years	32
>35 years	21
Father's age	
20-24 years	5
25-29 years	30
30-34 years	33
>35 years	32
Mother's education	
Up to high school	16
Some college	35
College graduate or more	49
Father's education	
Up to high school	26
Some college	28
College graduate or more	47
Family income	
<\$20,000	9
\$20,000 - \$39,999	39
>\$40,000	53
First child	
Yes	39
No	61

Table 2. Dental Visits and Professional Fluoride Treatment

Year of life	Number of respondents who returned all (n) surveys	Dental visit		Fluoride treatment (among those with a visit)	
		#	%	#	%
1	682 (5)	13	2	0	0
2	504 (3)	55	11	2	4
3	435 (3)	115	26	27	24
1+2	450 (8)	49	11	2	4
2+3	373 (6)	116	31	22	19
1+2+3	340 (11)	106	31	20	19

11 questionnaires were included in the analysis for years 1, 2 and 3 combined. These data show that by one year of life, only 2% of respondents had taken their child for a dental visit, while by the age of three years, 31% of respondents had been to a dental visit and 19% of these children had received a professional fluoride treatment.

In the current study, demographic factors such as ages of the parents, levels of parents' education, family income and birth order were evaluated relative to the occurrence of an initial dental visit by the age of three years (referred to as an early dental visit; Table 3). There was no statistically significant association between maternal or paternal age and their child's receipt of an early dental visit. There was also no statistically significant association between the father's level of education or the child being the first born in the family. However, there was a statistically significant association between the mother's level of education and the child's early dental visit, with more educated mothers more likely to have children with early dental visits ($P=0.015$). The association between family income and early dental visits was also statistically significant but this relationship was not linear ($P=0.032$). Families with both the highest ($> \$50,000$) and lowest ($< \$20,000$) income levels were more likely to have taken their children for early dental visits (Table 3).

Discussion

The American Academy of Pediatric Dentistry, the American Dental Association and many state EPSDT programs recommend early dental visits. Their guidelines state that a child should be seen for their first dental exam within six months of their first tooth erupting or by one year of age.¹⁻³ Guidelines from the Academy of Pediatrics state that pediatricians are able to perform the necessary oral examinations on children prior to their third birthday and that they are also responsible for referring children to the dentist at earlier ages when needed.^{4,14} Part of the rationale for referring children at 3 years of age rather than 1 year of age is based on difficulties encountered by pediatricians in finding dental care for young children who subscribe to Medicaid or have limited resources.¹⁴ This difficulty is further supported by a survey of pediatric dentists which showed that only 47% of those surveyed follow the guidelines of the AAPD regarding timing of the first dental visit.¹⁵ In spite of the various guidelines, previous studies have reported that, by the time children enter kindergarten, a large percentage have never seen a dentist.¹⁶⁻¹⁸

Of the studies that have reported the actual patterns of dental visits in this young age group, all are retrospective.^{16,19-21} A number of studies have focused on limited utilization of dental services by children, but few have assessed the compliance of parents with the AAPD guidelines.^{17,18} One advantage of the current study was that parents were questioned every 3-4 months about whether or not the child had a dental visit and office topical fluoride treatment during the previous time period. This shortened time period increased the probability that the parent accurately remembered

Table 3. Factors that Influenced a Child Attending an Early Dental Visit

	No visit by age 3 years	Visit by age 3 years	P value
Mother's education	# (%)	# (%)	0.015
Up to high school	43 (80)	11 (20)	
Some college	88 (74)	31 (26)	
College degree	103 (62)	64 (38)	
Family income			0.032
<\$10,000	4 (57)	3 (43)	
\$10,000-19,999	14 (64)	8 (36)	
\$20,000-29,999	36 (72)	14 (28)	
\$30,000-39,999	56 (75)	19 (25)	
\$40,000-49,000	53 (80)	13 (20)	
\$50,000-59,000	21 (53)	19 (48)	
>\$60,000	38 (60)	26 (41)	

having taken their child to the dentist and whether or not the child received a fluoride treatment.

In the current study, a relatively small number of children reportedly received a dental exam by their first birthday (2%). This is lower than results from a recent survey which retrospectively found that 5% of kindergarten children in a southeast Iowa community reportedly had their first dental visit by age one year.¹⁹ It is also considerably lower than the findings of a study in South Australia, where 9% of parents of children aged 2 to 3 years reported that their child had had the first dental visit between 5 and 12 months of age.²⁰ It is surprising that, in a cohort of children where the parents were sent frequent questionnaires focused on diet, oral health and fluoride, so few took the initiative to make a dental appointment for their child. In addition, these parents were very diligent about responding to all questionnaires and may be presumed to be more health conscious and to place a greater value on oral health.

Therefore, it is also somewhat surprising that a majority of parents delayed the child's first dental visit to beyond 36 months of age. In addition, this cohort represents a relatively high SES population whose utilization of health care services is likely greater than the general population. Thus, it was expected that dental utilization would be relatively high in this cohort.

From birth to 1 year of age, the health care providers most responsible for the child's care are pediatricians and family practitioners. Since the American Academy of Pediatrics' guidelines recommend the first dental exam by 3 years of age,⁴ it is likely that many parents were not aware of the importance of an earlier visit.

Previous studies have reported that children from higher income families have less dental disease and higher utilization of dental services than children from low-income families.^{16,17} In addition, higher utilization was associated

with insurance. In this study, children at both ends of the income spectrum were more likely to have had a dental visit by age three than those in the middle income range. One possible explanation for this is that the families with incomes below the federal poverty level are more likely to participate in programs such as Medicaid and CHIP while the middle income families (including some referred to as the “working poor”) don’t qualify for federal or state aid and may be less likely to have access to private dental insurance.

In the current study, the higher the level of maternal education, the more likely a child was to have an early dental visit. This factor has also been shown to be an important influence on the overall oral health of the child and on their receipt of routine dental care.^{21,22} The level of paternal education followed a similar pattern, but it was not statistically significant.

Although this study had the advantage that it was prospective in nature and families had been followed longitudinally over time, there were a few limitations. First, the data were parent-reported and there was no practical method for validating the parents’ responses. This would have required obtaining the names of all dentists who saw their children and confirming the dates of the visit with those dentists, which is well beyond the scope of the study.

Second, the sample was not representative of the general population of Iowa or the United States and had a higher SES level than the general population and therefore, should not be used to make assumptions about the behavior of this larger group. Because of the demographics of the state, the sample group was primarily Caucasian.

Third, there was unavoidable attrition that occurred over time. This is a frequent problem with longitudinal studies that require responses from subjects multiple times throughout the year. The present analysis minimized the effects of attrition by conducting separate analyses including those subjects who answered all surveys in a one- or two-year period and all 11 questionnaires over the three-year period. Also, the question asked only if there had been any dental visit or office fluoride treatment in the previous study period, but did not ask specific numbers. Thus, if a child had two visits (or, less likely, two fluoride treatments) in a given four-month interval, then it would be counted as only one and would be an underestimate.

Additional longitudinal studies are warranted to better understand the factors that influence the ages at which parents take their child for the first dental visit as well as to assess the outcomes of establishing early oral health care patterns. Also, interventions to increase early dental attendance should be considered. Findings in this study suggest that the vast majority of parents do not comply with the recommendations for bringing their children for early visits to the dentist. It is not clear whether they are unaware of the guidelines or if they do not recognize the importance of establishing a dental home, receiving anticipatory guidance and preventive oral health planning for their children. It is therefore incumbent on the American Academy of Pediatric Dentistry

and its members to bring this information to the general public and to all health care providers who care for young children.

Conclusions

1. In this group of children followed since birth, very few (2%) had an initial dental visit by one year of age, increasing to 11% by two years of age and 31% by three years of age.
2. Within the first three years of life, it was uncommon for a child to have received a professional fluoride treatment as part of the dental visit. Only 19% of those with a dental visit by three years of age received a professional fluoride treatment.
3. Families with higher levels of maternal education and with family income at the highest and lowest levels were more likely to have taken their child for a dental visit prior to age three.

Acknowledgements

The authors would like to acknowledge Mary Kiritsy, Samina VanWinkle, Joan Grabin, Barb Simon, Cynthia Moore, Chuck Dufano, Julie Gilmore and Barb Broffitt for their organizational and technical assistance.

Authors’ note

The study was supported by NIH grants 2RO1-DE09551 and 2P30-DE10126.

References

1. AAPD Reference Manual 2000-2001. *Pediatr Dent* 22:18, 2000.
2. American Dental Association. American Dental Association Guidelines, <http://www.ada.org/members/ada/insite/facts/caries.html>, 2001.
3. Casamassimo P. Bright Futures in Practice: Oral Health. Arlington, VA, National Center for Education in Maternal and Child Health, 1996.
4. Recommendations for preventive pediatric health care (RE9939). *Pediatrics* 105:645, 2000, <http://www.aap.org/policy/re9939.html>.
5. Iowa State Department of Public Health. EPSDT Guidelines, <http://www.idph.state.ia.us/fch/fam.serv/epsdt.htm>, 2001.
6. Oral Health In America: A Report of the Surgeon General - Executive Summary, Rockville, MD, US Department of Health and Human Services, National Institute of Dental and Craniofacial Research, 2000.
7. Nowak AJ. Rationale for the timing of the first oral evaluation. *Pediatr Dent* 19:8-11, 1997.
8. Thomas HF. First dental visit, first birthday: A rationale and protocol for infant oral health care. *Tex Dent J* 114:15-19, 1997.
9. Levy SM, Kiritsy MC, Slager SL, Warren JJ, Kohout FJ. Patterns of fluoride dentifrice use among infants. *Pediatr Dent* 19:50-55, 1997.

10. Levy SM, Kiritsy MC, Slager SL, Warren JJ. Patterns of dietary fluoride supplement use during infancy. *J Public Health Dent* 58:228-233, 1998.
11. Levy SM, Warren JJ, Davis CS, Kirchner HL, Kanellis MJ, Wefel JS. Patterns of fluoride intake from birth to 36 months. *J Public Health Dent* 61:70-77, 2001.
12. SPSS User's Guide 7.5. 1996.
13. SAS Procedures Guide. 1999.
14. Lewis CW, Grossman DC, Domoto PK, Deyo RA. The role of the pediatrician in the oral health of children: A national survey. *Pediatrics* 106:E84, 2000.
15. Erickson PR, Thomas HF. A survey of the American Academy of Pediatric Dentistry membership: infant oral health care. *Pediatr Dent* 19:17-21, 1997.
16. Gift HC, Newman JF. Oral Health Activities of U.S. Children: Results of a national health interview survey. *JADA* 123:96-106, 1992.
17. Waldman HB. Preschool Children: Need and use of dental services. *Dent Clin North Am* 39:887-896, 1995.
18. Kanellis MJ, Damiano PC, Momany ET. Utilization of dental services by Iowa Medicaid-enrolled children younger than 6 years old. *Pediatr Dent* 19:310-314, 1997.
19. Gastmann D. Factors influencing the age of the first dental visit. The University of Iowa (Master's Thesis), 2001.
20. Wyne A, Spencer A, Szuster S. Toothbrushing practices of 2-3-year-old children and their age at first dental visit: a survey in Adelaide, South Australia. *Int J Paediatr Dent* 7:263-264, 1997.
21. Waldman HB, Perlman SP. Are we reaching very young children with needed dental services? *ASDC J Dent Child* 66:390-394, 1999.
22. Kinirons M, McCabe M. Familial and maternal factors affecting the dental health and dental attendance of preschool children. *Community Dent Health* 12:226-229, 1995.

ABSTRACT OF THE SCIENTIFIC LITERATURE



SOCIOECONOMIC AND BEHAVIORAL RISK FACTORS FOR DENTAL CARIES

The purpose of this literature review was to examine and evaluate the evidence regarding the association between the incidence and prevalence of dental caries and socioeconomic status (SES), tooth brushing and the use of the baby bottle. A Medline and EmBase literature search was completed resulting in 358 abstracts and 272 papers that were evaluated. The authors reported the following: (1) there is a strong inverse relationship between SES and the prevalence of caries in children less than 12 years of age, although the quality of the papers examined was relatively weak; (2) evidence that tooth brushing prevents caries is weak according to the literature examined; (3) the evidence is weak for the relationship between dental caries and prolonged use of the baby bottle with many of the studies being flawed. The authors concluded that tooth brushing and the recommendations about bottle use should continue until additional clear evidence is present.

Comments: The authors point out a few of what are probably many gaps in our scientific research. MM
 Address correspondence to Dr. Susan Reisine, Department of Behavioral Science and Community Health, University of Connecticut School of Dental Medicine, 263 Farmington Ave., Farmington, CT 06030-3910.

Reisine ST, Psoter W. Socioeconomic status and selected behavioral determinants as risk factors for dental caries. *J Dent Ed* 65: 1009-1016, 2001.

56 references