Published in final edited form as:

J Public Health Dent. 2013 ; 73(4): 271–279. doi:10.1111/jphd.12018.

Periodicity of dental recall visits for young children first seen in community health centers

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Abstract

Objectives—To study whether young children who had their first dental visit (FDV) at a Federally Qualified Health Center (FQHC) are likely to return within 12 months for a second dental episode.

Methods—200 Medicaid-enrolled children who were less than 6-years-old were randomly selected from five Iowa FQHCs. Dental charts were abstracted and all Medicaid claims data, regardless of provider, were followed for 36 months. Medical and dental Medicaid claims data were also appended to the data set, along with relevant data from the child's birth certificate. Multivariable logistic regression, using backward elimination, was used to determine variables that predicted whether a child returned for his or her dental recall visit with one year of the initial dental episode.

Results—56.5% of these children returned within one year. The number of children in the household demonstrated a positive impact for children returning for a second dental episode. However, an increase in the frequency of medical well-child visits at the FQHC prior to the FDV had a negative influence. There was an inverse association between dental caries at the FDV and likelihood of returning for the second visit; however, it was not statistically significant. Age at FDV did not make a difference in regard to returning for a second episode within the allotted time period.

Conclusions—There has been a recent emphasis for children to visit a dentist by age 1. We should not overlook the importance of diligently working with higher risk families to instill the importance of regular, periodic preventive dental care.

Keywords

dental episodes; dental recall; well-child visits; Federally Qualified Health Centers; community health centers; dental utilization

Introduction

Dental caries remains the most prevalent chronic disease among children (1). Despite the attention to access to oral health care, prevalence of dental caries in primary teeth among 2- to 11- year-old U.S. children has increased (2).

There are four Healthy People 2020 oral health objectives (OH-1.1, 2.1, 7, and 8) concerning dental utilization and preventive dental care, highlighting the importance of early care among those from lower income families (3). In addition, organizations such as the

American Academy of Pediatric Dentistry (AAPD) and the American Dental Association have called for early childhood dental visits to stem the prevalence of oral disease and to establish a dental home (4). In particular, the AAPD issued guidelines about the periodicity of dental examinations with 6 months as the usual default recall schedule unless "... indicated by individual patient's risk status/susceptibility to disease." (4) Generally, the six month recall examination, while debated within the profession, remains the de facto accepted norm by most of the profession and the public (5-7). There are situations, however, when children should be evaluated more frequently, especially when they have white spot lesions and/or have other "high risk behaviors" (8). Conversely, the National Institute of Health and Clinical Excellence (NICE), which conducts evidence-based guidance for the National Health Service (United Kingdom), puts an upper limit of 12 months for dental recall visits for children less than 18 years (9). Adjustments are made at each recall visit based on the patient's caries risk and ability to maintain oral health.

Due to the higher perceived caries risk for children from lower socioeconomic families, there have been repeated attempts to have states implement periodicity schedules for children covered by the Early, Periodic, Screening, Diagnosis, and Treatment (EPSDT) program (10). For instance, Iowa adopted a periodicity schedule that starts at 12 months, again at 24 months, and then every 6 months, thereafter (11). Despite the aforementioned guidelines about the periodicity of dental recall visits for children, little is known, however, about the frequency with which Medicaid-enrolled children seek dental care following an initial episode of care.

Community health centers, a major component of safety net clinics, are patient-directed centers that have a special interest in providing comprehensive primary health care and dental services to low-income populations and other underserved groups (12). Community health centers, of which a large proportion are grant-supported Federally Qualified Health Centers (FQHC), provided approximately 10 million dental visits in 2011 (13).

This study describes the periodicity of dental recall visits during a 36-month period for young children who received their first comprehensive dental visit at a FQHC. The goal was to evaluate how successful the FQHCs were in having Medicaid children return for regular dental care, and to assess what influences the likelihood of a child returning for the next episode of care. Furthermore, we test the relationship between several child and household demographic variables and health characteristics with the likelihood of children returning for their second dental episode within 12 months of the initial comprehensive oral examination.

Methods

This study was a retrospective cohort design of young children who were followed for a minimum of 36 months after their first dental visit (FDV). Statewide (Iowa) eligibility files were used to identify children who were Medicaid-enrolled within two months of birth, continuously Medicaid-enrolled (i.e., no greater than 2 month enrollment gaps) throughout the study period, and less than 6 years old as of calendar year 2006. The sampling frame was further defined by identifying children who had an initial comprehensive dental examination (CDT code D0150) at one of Iowa's FQHCs between 2002 and 2006 and had no previous

Medicaid claims submitted from other dental providers in the state. While there were nine FQHCs that had a dental clinic at the time of the study, only five had the minimum number of eligible children (n=40) who met all of the aforementioned criteria and we thus included in these analyses. Based on an agreement with the state's primary care association at the onset of this study, none of the centers are identified in the results.

A randomly generated list of children, based on Medicaid identifying code, was developed from a list of Medicaid enrolled children at each FQHC who met the aforementioned eligibility criteria. The first 40 children per FQHC whose FDV in the dental chart coincided with the Medicaid claims data were included in the analysis. In all, 200 children were included in the study. Then, demographic variables, types of dental services and their associated dates of service, number of dental visits, and whether the treatment plan was completed, were abstracted from the dental chart. A complete list of variables recorded during the first dental episode can be found elsewhere (14). The abstracting process for all dental visits and services was repeated for each subsequent episode, with date of the periodic oral examination serving as the commencement date for the next dental episode. Since an analysis of the statewide Medicaid claims data showed that several children went elsewhere (i.e., private practice) for subsequent dental episodes, we appended these additional dental services and the corresponding dates that were submitted by non-FQHC dentists to the original data base.

A new dental episode was defined when there was a treatment gap – most commonly six months – between two consecutive dental visits. However, the investigators established the following guidelines for determining whether a new dental episode occurred or it was a continuation of the current episode. If the gap between two consecutive visits was between 1-5 months, a new episode was started only when either there was a periodic oral examination billing code or a provider change took place. However, when there was a transition from FQHC to non-FQHC dentist and it occurred less than 3 months after a referral was documented in the dental chart, then the FQHC visit and subsequent referral visit were considered as the same episode. If the patient sought dental care at a non-FQHC provider without a referral from the FQHC - or - if the child received care 3 or more months later from a non-FQHC provider, then this was considered a separate episode. Episodes were documented through calendar year 2009. For consistency among study participants, however, we only present findings for the 36 months following the date of the first dental examination.

Similarly, potential predictor variables from the household Medicaid enrollment and medical claims files were added for each child. These variables included: a) number of well-child visits of the subjects prior to the FDV; b) number of well-child visits and dental visits of other Medicaid-enrolled children in the household during the 12 months prior to the FDV; c) number of medical visits and dental visits of Medicaid-enrolled adults in the household during the 12 months prior to the FDV; and d) whether the child had a well-child visit at age 12 months, regardless of medical location. Finally, the child's birth certificate (n=187) provided several other potential explanatory variables such as mother's age at child's birth, number of prenatal visits, and whether the mother used tobacco products during pregnancy. Basic descriptive findings are provided about the periodicity of dental episodes during a 36-

month period. Detailed analysis for this study is limited to whether or not the child returned within 12 months of the first dental visit. This second dental episode is sometimes referred to as the first dental recall visit.

The investigators regressed whether or not the child returned for the second dental episode within 12 or fewer months after the end of the initial episode on several predictor variables. Originally, we ran a preliminary backward elimination regression with those children who had complete data (i.e., those 187 who had birth certificate information). Since none of the demographic and maternal characteristics demonstrated a statistically significant relationship with whether or not the child returned for the second episode within 12 months of the FDV, we eliminated birth certificate variables from the final regression model. Thus, all 200 children were included in the final logistic regression model, which used a backward elimination method that included all the remaining unadjusted variables. SAS version 9.3 was used for all statistical analyses.

The University of Iowa Institutional Review Board granted human subjects approval for this project.

Results

Second and subsequent episodes within 36 months of first dental visit

The mean age at FDV for this cohort was 25.6 months. Of the 200 children, 168 (84%) returned for a second episode during the 36-month data collection period. Seventy-six children had three or more periodic oral exams subsequent to their first dental visit (Table 1), ranging between 20% of children in Center C to 52% of children in Center E. Distributions of subjects by gender, race, need for translation services, and mother's educational level at the time of child's birth remained consistent among children who sought services at the first through sixth episode of dental care. For instance, the percentage of non-Hispanic whites in the original sample (39%) was comparable to that of returning children for the second or third episode (37% in each episode).

Of the 168 returning children, 115 only sought dental care at the FQHC during the study period; whereas, 53 eventually sought care from at least one non-FQHC dentist. Among these 53, 26 children sought non-FQHC care following their first dental episode, another 11 children started receiving care at a non-FQHC following the second episode, and 7 after the third episode. There were also 9 children who moved back and forth between the FQHC and other dentists sometime during this time period.

Table 2 displays the mean, median, and modes of the time intervals in months between each episode of care and its subsequent episode. The greatest gap between episodes is between the initial two episodes. Also, Figure 1 illustrates the gap time period, in months, between the completion of initial episode and commencement of the second dental episode. The most frequent gap time for those returning for the second dental episode was six months. Twenty one children were referred to a dental specialist – primarily a pediatric dentist -- sometime during the first six episodes.

Second dental episode within 12 months of first dental visit

One hundred thirteen children (56.5%) returned for their second episode within 12 months of the FDV. The outcome variable, whether or not the child returned for a second dental episode within 12 months of the FDV, was regressed against several variables, including demographics of child and mother, number of pregnancy visits for this child and tobacco use during pregnancy, family size and previous health care visits prior to the child's first dental visit, age at first dental visit, and the center where the child was seen for his or her first dental visit (Table 3). None of the child's demographic variables, including gender, race, and need to translator, were statistically significant for the unadjusted analysis. Likewise, maternal and pregnancy variables were not statistically significant when compared to whether or not the child returned for a second episode within 12 months of the first episode. Family size was statistically significant ($p=0.031$), with a greater percentage of children returning for a second episode within 12 months as the number of children in the household increased. Of the remaining health and dental care visit characteristics, only whether the child had any well-child visits at the FQHC before the first dental visit ($p=0.0005$) and whether or not the child had a well-child visit at age 12 months ($p=0.015$) were statistically significant. Furthermore, whether or not the child had dental caries at the first episode was marginally associated with the outcome variable ($P=0.078$). Lastly, one FQHC (center C) had a significantly lower proportion of children who returned for the second episode of care within 12 months.

The final logistic regression model shows that there is a negative relationship between children who had one or more well-child visits at the same FQHC and whether they returned for a second dental episode within 12 months. That is, children who had at least one well-child visit at the FQHC were 0.33 times as likely to return for a second dental episode within 12 months when compared to those who had no well-child visits at the center, controlling for other variables in the model (Table 4). The model also shows that the likelihood of returning for a recall dental visit within 12 months was improved by 1.32 times with each additional child in the household (up to 3 or more children).

Discussion

In this study slightly more than one-half of this population returned for a second episode within 12 months of the first dental visit (FDV) and 16% did not return for a second episode within 36 months of the FDV. There was more variability in time between episodes for many of those with few episodes; whereas, those with multiple episodes were more likely to have fairly regular periodic oral examinations. Unadjusted regression results demonstrated statistically significant relationships between the dependent variable, having a second dental episode within 12 months of the initial episode, and with the following explanatory variables: number of children in household at the time of the FDV; well-child visits at the respective FQHC prior to the child's FDV; whether the child had a medical well-child visit at 12 months of age, regardless whether or not it occurred at the FQHC or elsewhere; and which center they received their FDV. Also there was an inverse association between dependent variable and whether or not the child had dental caries at the previous episode; however, it was not statistically significant at $\alpha=0.05$. Neither child's demographic nor

maternal characteristics were statistically significant to whether or not the child received the subsequent dental episode within this 12 month period. When controlling for other variables, those children who had at least one medical well-child visit at the same FQHC as the first dental visit (n=55) were less likely to return for their second episodes within 12 months than children who either received all of their well-child visits elsewhere (n=128) or had no well-child visits prior to their first dental episode (n=17). There was an increase in the likelihood that the child returned within 12 months with each additional child in the household, capping at 3 or more children in the household.

More than 90% of these children were placed on recall as documented in the dental chart at the FQHC. However, there were differences among centers in the percentage of children who returned after the first episode. Possible reasons for FQHC variation concerning recall visits include: poor recall system; new patients are priority for the facility; recall left entirely to patient; transient population; and possible turnover of dentists and appointment schedulers during this time period. In addition, there was no uniform policy among these FQHCs concerning broken appointments. Likewise, there was inconsistency with documentation of broken appointments in the record keeping system, which probably is attributable to the number of individuals who can enter broken appointment information within the dental chart.

The marginal findings about the number of children in the household, on the surface, may be somewhat counterintuitive. It is understandable that there may be several pragmatic and convenience issues associated with larger families bringing all children together for their recall visits (15). When 'batch' appointments are successful, families have the major convenience of not having to individual scheduling separate recall appointments for each child. On the other hand, clinics that primarily serve uninsured and Medicaid patients must constantly balance patient convenience with a higher probability for broken appointments (16). It might also result from the parents learning how to navigate the system for locating a dentist who accepts Medicaid and understanding the benefits of preventive dental care.

There are few studies that use individual chart and dental claims data concerning dental utilization for children, especially those on public insurance in the United States (17-18). Dental utilization research has primarily used either cross-sectional, self-reported surveys or just Medicaid dental claims (19-23); thus, there is little empirical evidence about dental recall visits. This study is among the first to use the dental charts of Medicaid-enrolled children who first started dental care at FQHCs and linking the dental treatment longitudinally with claims data, regardless of where subsequent treatment took place.

There was not a significant association between age at the first comprehensive dental visit and likelihood of having subsequent dental visit within one year. There is a possibility that the profession has placed such an emphasis on the importance of early first dental visits that parents, particularly those from lower income households, may not understand the need for regular periodic oral evaluations thereafter. Furthermore, families may perceive an initial comprehensive dental visit more valuable than quick recall exams. This present finding emphasizes the importance of having medical providers remind families that regular rather than episodic dental care is an essential component for maintaining optimal oral health (24).

This finding seems somewhat contrary to a North Carolina study in which young children who had an early first preventive dental visit were more likely to have subsequent preventive visits (25). Nevertheless, the comparison should be made with caution, as definition of preventive dental visit in the North Carolina study may not be equivalent to that of dental episode in this study.

Likewise, in the unadjusted regression analysis, the 12 month medical well-child visit was associated with the parent or guardian returning with this child for a second dental episode. However, slightly more than one-quarter of the children were medically seen for this well-child visit. Yet, this may have been a pivotal time for physicians to reinforce the importance of oral health and visiting the dentist. Moreover, based on the current results, having more medical visits at FQHCs, before the first dental visit, had an inverse association with continuity of dental care. This finding is counterintuitive, especially since our previous findings showed that number of medical well-child visits at FQHCs had a positive impact on early first dental visit at FQHCs (14). This may be attributed to the fact that many of subsequent dental episodes occurred outside FQHCs; thus, it is possible that parents who took their children frequently to FQHCs for medical visits faced some difficulties in scheduling and maintaining regular dental appointments. This emphasizes the importance of continuity of dental visits at the same places where children receive medical care. Once again, such findings serve as a reminder that the profession needs to be more vigilant in educating primary care physicians about the importance of reinforcing with families the importance of regular preventive dental care. Similarly, we also should take the opportunity to reinforce to parents the importance of well-child visits when children are seen for each dental visit.

Outside of limited cross-sectional survey data, little is known about differences among racial/ethnic groups in regard to dental recall intervals. However, our findings are contrary to findings from the 2005 California Health Interview Survey, which found that “Latino and African American children in Medicaid are more likely than white children in Medicaid to have longer intervals between visits”(26). Without some intensive longitudinal research, researchers and policymakers rely on an individual’s memory to discern whether there are periodicity differences for many potential explanatory variables, including race and/or ethnicity. Thus, it seems reasonable to conduct research that provides dental procedures and dates of those procedures over a fixed time period. If there are differences, then dentists must consider how to modify their recall protocols for groups who should be targeted for more intense follow-up. Unfortunately, even when a racial/ethnicity category exists in a dental claims database, this variable may not be recorded completely or it may be determined by someone other than the patient/family.

Medical research has acknowledged the prevalence of patient dropouts and broken appointments, including the higher rates for children (27-28). With the exception of research concerning dental anxiety, literature about dental appointment patterns of children is limited to Norwegian studies (29-30). American dentists have empirically held that children should be introduced to the dental environment in a non-threatening manner, postponing any potentially traumatic procedures until the child has acclimated. A paucity of literature exists that demonstrates the effect of restorative treatment at the first dental visit upon subsequent

future dental visits (31). Our finding on the association of dental caries experience at the first dental episode and whether or not the child returned for a second dental episode within 12 months was marginal ($P=0.082$ at multivariable level). Since only 21 of 200 children had dental caries at the initial dental visit, these findings should be confirmed in larger studies with sufficient statistical power.

There are limitations to this study, including the aforementioned relative sample size. Second, this group of Medicaid-enrolled children who received their dental services at a FQHC may or may not be similar to those who seek care from the private sector. Further research is warranted to determine whether periodicity patterns are comparable. Third, data blending from both FQHCs and other Medicaid dental providers precluded any analysis about the completion of treatment planning for the non-FQHC providers because only service specific billing information is available for this group. However, the reality is that provider switching occurs; thus, it should be documented. Fourth, household variables, including number of children in the household, only represents information at the time of the child's first dental visit. Thus, these numbers may undercount if additional live births occur subsequent to this subject's first dental visit. Fifth, the number of dental radiographs was sparse during the first two dental episodes. Thus, there is a possibility that underreporting of dental disease may exist for this population. Sixth, since there was only one pediatric dentist among all of the providers in this study, there may have been some reluctance to record non-frank dental caries because of the practicality of having to address treatment on a young child. We are currently investigating whether there is a dramatic increase in recorded caries experience as the child develops, regardless of the frequency of preventive dental services.

The profession's emphasis to increase dental utilization rates and preventive dental services for young children is due, in major part, to the dental home concept (32). There have been great strides in initiating earlier dental visits for young children; however, there are still considerable hurdles that must be overcome to increase the annual dental utilization rates for younger children. A recent survey of Kentucky dentists indicated that only 11% treat children younger than 3-years-old (33). The same article implied that continuing education courses about children's dentistry were poorly attended, indicating that such courses are a low priority among general dentists. Thus, the availability of dentists at FQHCs who are comfortable in working with young children, especially those with special needs or management problems may still be a challenge. The National Network of Oral Health Access (NNOHA) is a diverse network of FQHC dental directors and safety-net oral health providers and has placed great emphasis during the past few years to improve oral examination measures for younger children (34), providing various mechanisms for educating FQHC dentists about the preventive and treatment needs of child patients. Furthermore, it assists FQHCs in improvement of their health information technology. Such recent advances in information technology will provide a better system for tracking of children's dental appointments and may facilitate implementation of similar research studies in future.

Professional preventive dental care will have its biggest impact on higher risk individuals when such patients are seen on a regular basis. We must not overlook the importance of educating such families about the need for regular, periodic preventive dental care.

Acknowledgments

The authors wish to thank the staffs from the participating health centers for their efforts in retrieving dental charts and Bhagyashree Pendharkar for data collection and entry. In addition, we thank the Iowa Department of Human Services for access to Medicaid eligibility files for sample selection. This project was funded by the National Institute of Dental and Craniofacial Research (5RC 1 DE020303).

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Figure 1.
Time, in months, between the end of episode 1 and start of episode 2 (n=168)

Table 1

Selected demographics for children who had first dental visit at 5 Iowa community health centers (dental episodes 1 through 6)

Variables	Episode 1	Episode 2	Episode 3	Episode 4	Episode 5	Episode 6
Children seen in dental episode	200	168	127	76	39	16
Mean age (months) at start of episode	25.6	38.6	46.1	50.3	53.3	57.2
Females (%)	49%	49%	51%	51%	46%	56%
White, non-Hispanic (%)	39%	37%	37%	36%	33%	37%
Required translator (%)	26%	24%	25%	28%	33%	25%
Mother's education level						
< 9 th grade	19%	18%	15%	16%	21%	19%
9-11 th grade	35%	37%	37%	39%	39%	37%
12 th grade	31%	30%	32%	30%	21%	31%
More than high school	14%	15%	15%	15%	18%	12%

Table 2

Gaps (months) between dental episodes (E_n) for 200 young children who were first seen in a FQHC, Iowa

Gap	N	Mean (sd)	Median	Mode	Range
Between first and second episodes of dental care	168	11.7(7.4)	8.5	6.2	0.6-35.7
Between second and third episodes of dental care	127	9.3(4.9)	7.1	6.0	2.5-26.6
Between third and fourth episodes of dental care	76	8.5(4.0)	7.0	6.2	1.3-22.2
Between fourth and fifth episodes of dental care	39	6.2(2.4)	6.2	6.2	1.1-13.4
Between fifth and sixth episodes of dental care	16	6.0(2.5)	6.2	6.0	1.0-11.2

Table 3

Unadjusted odds ratio for variables included as predictors for whether child returned for second dental episode (E₂) within 12 months after completion of first dental episode (E₁), N=200

Characteristics		N	Percent having E ₂ within 12 months after E ₁	OR (95% CI)	p-value
Demographic	Gender				
	Female	98	53.1	0.75 (0.43, 1.33)	0.337
	Male (Ref)	102	59.8		
	Race/Ethnicity				
	Mixed or other minorities	13	52.6	1.00(0.46,2.16) 1.42 (0.74, 2.71) 1.80 (0.50, 6.49)	0.99 40.29 20.366
	White, Hispanic	72	61.1		
	African-American	38	66.7		
	White, non-Hispanic (Ref)	78	52.6		
	Required translator services				
	Yes	52	50.0	0.70 (0.37, 1.32)	0.273
	No (Ref)	148	58.8		
Mother	Age at child's birth *	-	-	1.01 (0.96, 1.06)	0.795
	Education at time of child's birth *			0.02 (0.75, 1.39)	0.876
	< 9 th grade	36	55.6		
	9-11 th grade	65	53.8		
	12 th grade	58	63.8		
	More than high school	26	50.0		
	Marital status at time of child's birth *			0.96 (0.53, 1.77)	0.917
	Married	67	56.7		
	Single (Ref)	120	57.5		
Pregnancy/Delivery	Total number of prenatal care visits *	-	-	1.02 (0.94, 1.11)	0.581
	Tobacco use during pregnancy *			1.14(0.58,2.23)	0.706
	Yes	47	59.6		
	No (Ref)	140	56.4		
Family size	Number of people In household under 21 at time of FDV			1.35 (1.03, 1.78)	0.031
	0	45	48.9		
	1	62	50.0		
	2	54	61.1		
	3 or more	39	69.2		
Health care and dental care visits	Well-child visits (WCV) at FQHC before first dental visit ⁺			0.31(0.17,0.61)	0.0005
	Yes	55	36.4		
	No (Ref)	144	64.1		
	Well-adult visits by family at FQHC prior to FDV ⁺			0.92 (0.42, 1.99)	0.839
	Yes	31	54.8		
	No (Ref)	169	65.8		
	WCV by other children in household at FQHC before child's first dental visit ⁺			0.79 (0.43, 1.45)	0.445
	Yes	61	52.3		
	No (Ref)	139	58.3		
	Dental visits by adults at FQHC before child's first dental visit ⁺			1.59 (0.52, 4.84)	0.410
	Yes	15	66.7		
	No (Ref)	185	55.7		
	Dental visits by other children in household at FQHC before child's first			0.91 (0.46, 1.81)	0.798
		42	54.8		
		158	57.0		

Characteristics		N	Percent having E ₂ within 12 months after E ₁	OR (95% CI)	p-value
	dental visit ⁺ Yes No (Ref)				
	Age at FDV	-	-	1.01 (0.99, 1.03)	0.371
	Dental caries at FDV Yes No (Ref)	21 179	38.1 58.7	0.43 (0.17, 1.10)	0.078
	WCV at age 12 months, regardless of location Yes No (Ref)	57 143	70.2 51.0	2.26(1.17,4.34)	0.015
Center	Federally Qualified Health Center				
	A	40	65.0	0.89 (0.35, 2.26)	0.813
	B	40	60.0	0.72 (0.29, 1.80)	0.486
	C	40	37.5	0.29(0.11,0.72)	0.008
	D	40	52.5	0.53 (0.21, 1.32)	0.173
	E (Ref)	40	67.5		

FDV = First Dental Visit

*
from child's birth certificate

⁺
During previous year

Table 4

Multivariable logistic regression model, using backward elimination method, predicting whether child returned for second dental episode (E_2) within 12 months after completion of first dental episode (E_1), N=200

Variable	OR (95% CI)	P-value
Dental caries at FDV Yes No (Ref)	0.43(0.16,1.11)	0.082
Well child visits (WCV) at FQHC before first dental visit Yes No (Ref)	0.33 (0.17, 0.64)	0.001
Number of people in household under 21 at time of FDV 0 1 2 3 or more	1.32 (1.00, 1.75)	0.052