The Dynamics of Toothache Pain and Dental Services Utilization: 24-Month Incidence

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Abstract

Objectives: *The aims of this study were twofold: (1) to describe patterns of change in reported toothache pain, and (2) to examine the impact of toothache pain on dental care utilization and vice versa.* ***Methods:*** *Data from the Florida Dental Care Study (FDCS), a longitudinal study of oral health and dental service utilization conducted in north Florida, were used to measure self-reported toothache pain among dentate adults at baseline and four subsequent times during a 24-month period. Only persons 45 years of age or older with at least one remaining natural tooth at baseline were eligible. A total of 873 subjects participated, 764 of whom participated through 24 months. The analysis is focused on modeling transitions in the reported experience of toothache pain during intervals of six months.* ***Results:*** *At the time of the baseline interview, 11.5 percent of subjects reported current toothache pain. During subsequent six-monthly interviews, from 13.4 percent to 21.6 percent of subjects reported having experienced toothache pain during the prior six-month interval. Among those with no toothache pain at baseline (n=772), 31.2 percent experienced toothache pain at some time during the 24-month study period. The six-month incidence probability reflects the likelihood of developing toothache pain by estimating the conditional probability of reporting a toothache in a later interval given that this problem was not reported in the earlier one (for consecutive pairs of intervals). Overall, the six-month incidence probability for toothache pain in this study was .11. Significantly higher 24-month incidence was observed for African-American subjects, those with less formal education, those in poorer financial circumstances, and problem-oriented dental attenders.* ***Conclusions:*** *In this diverse sample of adults, toothache pain occurs frequently and is quite variable over time. Toothache occurs in conjunction with various forms of self-reported oral disease (e.g., abscess, cavities) or tissue damage (e.g., loose tooth, broken tooth, bleeding gums). Subjects who experience toothache are slightly more likely than others to utilize dental services in the time period proximate to the toothache pain. [J Public Health Dent 2003;63(4): 227-34]*

Key Words: toothache, tooth diseases, dental care, longitudinal studies.

Dental pain is a key predictor of dental care utilization—in particular, use other than regularly scheduled check-ups (1,2). The literature, however, contains surprisingly little analysis of the precise mechanisms by which the experience of pain is (sometimes) translated into service use. In fact, much of the research on dental or orofacial pain and pain management has been conducted in pain clinics (3), whose patients are often atypical because they have been through a multistage referral process. Few studies have examined the experience of dental pain by community-dwelling subjects, and fewer still have focused on the impact of pain on decisions to seek dental care.

Dental pain refers to a class of several conditions, which together occur quite frequently (4). Data from the 1989 National Health Interview Survey indicate that 15 percent of adults experience toothache, oral sores, jaw joint pain, face pain, or burning mouth in a six-month period (5). Comparable rates have been reported in the United Kingdom (6,7) and Canada (8). While there are inconsistencies in focus (incidence versus prevalence) and time frames (episodes, six-month periods, annual periods), it seems clear that dental pain is a fairly common occurrence. Furthermore, it is believed that dental pain in general and toothache pain specifically are important predictors of dental care use (3,8-11); however, the specific linkages have not been documented thoroughly. For example, no studies have examined the relative impact of chronic pain versus acute episodic pain on dental care utilization (12,13). Analyses that have assessed the occurrence and impact of dental pain over an extended period of time are frequently limited to the specific case of temporomandibular joint disorders (14).

The current study describes the dynamic characteristics of self-reported toothache pain in a longitudinal study of community-dwelling adults. The aims of the study were twofold: (1) to describe patterns of change in reported toothache pain, and (2) to examine the impact of toothache pain on dental care utilization and vice versa. To accomplish these objectives, data were taken from the Florida Dental Care Study (FDCS), a longitudinal study of oral health and dental service utilization conducted in north Florida.

Methods

Sampling and Interview Methods. One goal of the FDCS sampling design was to ensure the inclusion of adequate numbers of subjects at hypothesized risk for oral health decrements, specifically blacks, residents of rural areas, and those with low incomes, so

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disproportionate selection for these groups took place. The sample was also limited to persons who were aged 45 years or older and who had at least one tooth at baseline. The achieved baseline sample was compared to the county populations of interest in terms of age, race, sex, and income using Census data, and found to be generally representative. Detailed information regarding sampling methodology and each stage of selection has been provided elsewhere (15).

Although the study began with a panel of 873 participants, one subject did not provide information on a large number of items, reducing the effective sample size at baseline to 872. By 24 months, 764 subjects remained in the study. To evaluate bias deriving from sample attrition, we compared selected characteristics of subjects who participated for later (24-month) interviews with those who were lost to the panel at some earlier point. For example, at baseline 47 percent of the subjects reported having seen a dentist within the prior six months. Had the baseline sample been made up only of persons who ultimately participated for the 24-month interview, the figure would have been 48 percent. Similarly, the mean (SD) number of teeth present at baseline among the 24-month participants was 21.0 (SD=7.2). For those not participating at 24 months, it was 20.5 (SD=8.0). No differences were observed with respect to the age, race, sex, or area of residence characteristics of retained subjects compared to those lost to the study after baseline, but prior to the 24-month point. Thus, while attrition may have had some impact (by definition), questions regarding this issue have been examined in detail (16-18) and the effects of attrition have been found to be minimal in the FDCS data.

Questionnaire content, reliability, and validity have been assessed and the findings reported in previous papers (19-21). The specific wording of all items can be found at the Internet site listed in the acknowledgments section of this paper. The baseline in-person interviews (and clinical examination) were followed by telephone interviews at six, 12, and 18 months post-baseline. At 24 months after baseline, the interview was again conducted in person and was immediately followed by a second clinical examination. In the present paper, analysis is focused on self reports of toothache pain, dental visits, and key demographic attributes.

Description of Variables. This analysis is based on the self-reports of toothache pain that were collected at baseline and during each post-baseline interview. Toothache pain was measured at baseline by asking subjects about "any dental problems you have today."

22a. Do you have a toothache or painful tooth?

1. Yes [How long have you had this problem]?
___ days ___ weeks
___ months ___ years
2. No

In all post-baseline interviews, subjects were asked if they had experienced toothache pain in the previous six months using a similar question format. The measure was treated as dichotomous and coded 1 if pain was reported in a given interval and coded 0 otherwise.

In the current study, utilization was measured by asking respondents whether or not they visited a dentist in the prior six-month period. For those who answered affirmatively, we queried details about the reason for the visit and about procedures that took place during the visit. We also queried information on the duration of the toothache pain, and can relate the visits and pain in the temporal interval. We could not determine whether pain preceded a visit or simply occurred in the same six-month interview as the visit. Furthermore, some subjects may have completed a regularly scheduled check-up during an interval in which they also experienced toothache pain.

Data Analysis. Descriptive statistics include the univariate distribution of the patterns of toothache pain reports during the 24-month study period, and an assessment of bivariate associations between toothache pain and selected predictor variables. Four separate probabilities are used to examine incident toothache pain. Study incidence was the probability of reporting toothache pain during the 24-month study period given that toothache pain was not reported at baseline. Joint occurrence or co-occurrence was determined by estimating the probability that toothache pain occurred during the same six-month interval in which specific oral disease or tissue damage was reported. Co-occurrence was based on the 3,284 intervals experienced by the 873 study subjects. The six-month incidence probability was the conditional probability of reporting a toothache in the later adjacent interval, given that one was not reported in the previous six-month period. Similarly, the six-month recovery probability was the conditional probability of reporting no toothache in the later adjacent interval given that toothache pain was reported in the earlier one. Additionally, the mean number of intervals in which toothache pain was reported was used to provide an estimate of toothache pain duration during the observation period. The chi-square statistic and Mantel-Haenszel chi-square trend test were used to determine statistical significance for bivariate comparisons when variables were nominal or ordinal, respectively. *F*-tests were used to determine statistical significance for differences in mean number of intervals experiencing toothache pain.

Discrete-time proportional hazards models were used to examine the influence of predictor variables on the probability of developing toothache pain (22,23). The dependent variable in these models reflects incident toothache pain among those subjects who had not reported toothache pain for one or more observation intervals. In these models, we permit subjects to experience trajectories of oral health that include multiple periods of toothache pain (i.e., respondents were permitted to reenter the risk group for incident toothache pain if they previously experienced pain and subsequently recovered). The general estimation equation (GEE) was used to account for lack of independence among multiple observations contributed by the same subject by adjusting the standard errors of the parameter estimates using the observed correlation structure in the data (24-26).

In addition to standard measures of prevalence and incidence, we used three measures to convey the likelihood that a change occurred in reported toothache pain. These measures were based on 2,473 pairs of consecutive six-month observation intervals experienced by the 873 study subjects. The transition probability conveys the likelihood that the experi-

ence of a toothache (versus no report thereof) changed from one interval to the next. The probability of onset is the conditional probability of reporting a toothache in the later interval given that none was reported in the previous six-month period. Similarly, for each measure, the probability of recovery is the conditional probability of reporting no toothache in the later interval, given that the problem was reported in the earlier one.

As noted previously, the sample was designed to ensure the inclusion of adequate numbers of subjects at hypothesized risk for oral health decrements, specifically blacks, residents of rural areas, persons aged 45 years or older, and those with low incomes, so such individuals were disproportionately included. As a consequence of the disproportionate selection, those groups are overrepresented in the sample. Hence, for all analytic purposes, subjects were weighted using sampling proportions to reflect the populations in the counties studied and to minimize the variance inflation that can result from sample design effects (15). Except for the discussion of sample attrition over the 24-month period of the study, all results reported here are based on weighted data. Analyses were conducted using SAS, Version 6.0 (27).

Results

Toothache pain was found to be a relatively common oral health problem in the study sample. At baseline, 11.5 percent of subjects reported current toothache pain. During subsequent follow-up interviews, the percent of subjects who experienced toothache pain during the previous six months ranged from 13.4 percent to 21.6 percent. Among those with no toothache pain at baseline (n=772), 31.2 percent experienced toothache pain at some time during the 24-month study period. Among those with toothache pain at baseline (n=100), 76.6 percent reported at least one subsequent experience of toothache pain over the follow-up period.

A clearer view of toothache pain incidence can be obtained by examining interval-to-interval transition probabilities. The onset probability for toothache pain was .11. By contrast, the average six-month recovery probability for toothache pain was quite high at .52. In fact, among the subjects who reported toothache pain at baseline (n=100), fully 90 percent report at least one pain-free interval during the subsequent 24 months.

Specific longitudinal patterns of toothache pain demonstrated the highly labile nature of this oral health problem (Table 1). Each of the 32 possible patterns occurred at least once (for a dichotomous variable, the number of permutations over five repeated measures is 2^5 or 32). To eliminate permutations that included missing data, only respondents who provided sufficient information for the baseline and each follow-up interview were included in this portion of the analysis (n=775). The majority of subjects (n=464; 59.9%) did not experience any toothache pain during the 24-month observation period. Experiencing toothache pain for an extended duration was not widespread. Among the 311 subjects who experienced any toothache pain, approximately one-third (35.2%) reported toothache pain in consecutive interviews. Among those 304 subjects whose reports were

TABLE 1
Pattern of Self-reported Toothache Pain

Baseline	6-month	12-month	18-month	24-month	% of Sample w/ Each Pattern (n=775)*
No	No	No	No	No	59.9
No	No	No	No	Yes	7.8
No	No	No	Yes	No	3.1
No	No	No	Yes	Yes	1.9
No	No	Yes	No	No	3.0
No	No	Yes	No	Yes	0.7
No	No	Yes	Yes	No	1.1
No	No	Yes	Yes	Yes	0.7
No	Yes	No	No	No	3.9
No	Yes	No	No	Yes	1.0
No	Yes	No	Yes	No	0.7
No	Yes	No	Yes	Yes	0.6
No	Yes	Yes	No	No	0.5
No	Yes	Yes	No	Yes	0.7
No	Yes	Yes	Yes	No	1.0
No	Yes	Yes	Yes	Yes	1.5
Yes	No	No	No	No	2.2
Yes	No	No	No	Yes	2.1
Yes	No	No	Yes	No	0.6
Yes	No	No	Yes	Yes	0.6
Yes	No	Yes	No	No	0.2
Yes	No	Yes	No	Yes	0.7
Yes	No	Yes	Yes	No	0.3
Yes	No	Yes	Yes	Yes	0.1
Yes	Yes	No	No	No	0.7
Yes	Yes	No	No	Yes	1.2
Yes	Yes	No	Yes	No	0.1
Yes	Yes	No	Yes	Yes	0.3
Yes	Yes	Yes	No	No	0.6
Yes	Yes	Yes	No	Yes	1.0
Yes	Yes	Yes	Yes	No	0.4
Yes	Yes	Yes	Yes	Yes	0.8

*Analyses are based on weighted data. Weights are normalized so that the weighted and unweighted sample sizes are equal (n=872). To eliminate permutations that include missing data, this aspect of the analysis is based on the 775 (weighted) subjects who provided information on toothache pain at baseline and at every follow-up during the 24-month observation period.

characterized by some variation from interval to interval, over half (58.6%) reported two or more changes in toothache pain.

To gauge the potential social risk factors associated with toothache pain, the bivariate relationships between individual characteristics and three parameters of toothache pain—baseline prevalence, 24-month incidence, and number of intervals reporting toothache pain—are shown in Table 2. As expected, subjects who visited a dentist regularly were significantly less likely to report toothache pain at baseline or to experience onset of toothache pain during the study, compared to subjects who visited a dentist less frequently. Those who visited a dentist regularly also suffered with toothache pain for fewer intervals on average. Education and financial situation were both associated with each aspect of toothache pain. Less affluent subjects and those with less education tended to report higher baseline prevalence, 24-month incidence, and a higher average number of intervals with toothache pain. Younger subjects also tended to experience toothache more than older respondents, although the association between age and number of intervals in which toothache pain was experienced was only marginally significant. African Americans were more likely than whites to report incident toothache pain and to report more intervals overall in which pain was experienced. Sex and place of residence were not significantly associated with toothache pain.

The bivariate association between changes in toothache pain and self-assessments of oral disease and tissue damage are shown in Table 3. Subjects who reported any form of oral disease or tissue damage were consistently more likely to report the co-occurrence of toothache pain during the interval. Abscess, infected or sore gums, and having a loose tooth were particularly likely to occur during the same interval as toothache pain.

To assess the extent to which toothache pain provided motivation to seek dental treatment, we examined service use patterns among the 529 person-intervals during which toothache pain was reported. In a majority of these intervals (56.5%), toothache sufferers sought dental care. Subjects also

TABLE 2
Prevalence and 24-month Incidence of Toothache Pain by Demographic Characteristics and Socioeconomic Status

	Baseline Prevalence*	24-month Incidence Probability†	Mean No. of Intervals Spent with Toothache‡	Weighted Number of Cases
Age (years)				
45–54	15.4¶	.34¶	.79§	268
55–64	10.9	.34	.74	243
65–74	9.5	.31	.72	257
75+	7.6	.20	.47	104
Sex				
Men	11.4	.29	.69	382
Women	11.5	.33	.75	489
Race				
White	11.0	.28¶	.69§	627
African-American	12.7	.38	.84	242
Education				
< High school	19.1¶	.46∞	1.14∞	103
Some high school	13.9	.36	.92	81
High school graduate	13.3	.33	.78	232
Some college	9.7	.27	.58	252
College graduate	6.8	.26	.54	204
Place of residence				
Rural	12.3	.31	.70	437
Urban	10.7	.31	.74	435
Poverty status				
Above 150% of poverty threshold	8.3∞	.25∞	.54∞	521
Within 101–150% of poverty threshold	15.5	.39	.91	139
At or below poverty threshold	20.3	.47	1.19	133
Approach to dental care				
Never goes to dentist	14.6∞	.41∞	1.17∞	29
Goes to dentist only if problem occurs	17.5	.38	.95	369
Goes to dentist occasionally	12.2	.23	.65	86
Goes to dentist regularly	5.4	.26	.48	387
Total	11.5	.31	.72	

*Analyses were based on weighted data. Weights were normalized so that the weighted and unweighted sample sizes were equal (n=872). A total of 872 respondents responded to the question regarding toothache pain at baseline, but the number of cases for each variable may not add to 872 due to missing information. The chi-square statistic and Mantel-Haenszel chi-square trend test (df=1) were used to determine statistical significance for bivariate comparisons when variables were nominal or ordinal, respectively.

†Any report of an occurrence during at least one of the four six-month follow-up interviews. Based on portion of the sample (n=772) that reported no toothache pain at baseline.

‡F-tests were used to determine statistical significance for differences in mean number of intervals experiencing toothache pain.

¶$.05>P\geq.01$.

§$.1>P\geq.05$.

∞$P<.01$.

TABLE 3
Co-occurrence of Toothache Pain with Self-reported Measures of Oral Disease and Tissue Damage

Oral Disease and Tissue Damage	Proportion of Intervals that Toothache Pain Was Reported Co-occurring w/Condition Identified in Row Heading*	Weighted No. Person-Intervals†
Broken filling		
Yes	.32‡	256
No	.15	3,006
Broken tooth or cap		
Yes	.30‡	470
No	.14	2,790
Cavities		
Yes	.30‡	484
No	.13	2,760
Abscessed tooth		
Yes	.77‡	156
No	.13	3,103
Infected or sore gums		
Yes	.39‡	440
No	.12	2,828
Bleeding gums		
Yes	.32‡	292
No	.15	2,979
Loose tooth		
Yes	.37‡	379
No	.13	2,891
Loose cap or bridge		
Yes	.26‡	122
No	.16	3,143
Bad breath		
Yes	.33‡	448
No	.13	2,793

*Analyses are based on the 3,284 six-month intervals experienced by the 872 subjects. Weighted data were used. Chi-square tests were used to test statistical significance. †Weighted distribution of number of intervals (may not sum to 3,374 due to rounding and missing values). ‡$P<.01$.

sought dental care during 48.5 percent of the intervals in which no toothache pain was reported. The difference in proportion seeking care for intervals spent with and without toothache pain was statistically significant (chi-square=11.4; df=1; $P<.001$). Interestingly, in the majority of the intervals (170 of 299) in which a toothache was reported and dental care was sought, subjects cited reasons other than toothache pain for the dental visit.

Dental treatment appeared to facilitate recovery from toothache pain. The six-month recovery probability for toothache pain was .63 for those who sought dental treatment during the interval in which the pain was experienced. This is significantly higher (chi-square=17.4; df=1; $P<.001$) than the six-month recovery probability (.39) observed for those who did not visit a dentist. But the latter rate clearly indicates that many persons who experience a toothache recover without obtaining dental treatment. Among the dental attenders, no significant difference in recovery from toothache pain was found between those who cited toothache pain as their reason for seeking treatment compared to those who cited other reasons.

The types of treatment that subjects received during dental visits also varied by the reasons for the visit. During the 24-month period of study, subjects reported 2,654 dental visits. The most common treatment received during a visit by subjects who reported toothache pain was a dental extraction

TABLE 4
Procedures (Subject-reported Treatments) Obtained During Dental Visits that Occurred in Intervals in Which Toothache was Reported, by Reason for Visit*

Procedure	All Visits (n=2,654) (%)	Visit for Toothache Pain (n=168) (%)	Visit for Other Reason(s): Toothache Pain in Interval (n=411) (%)	Visit for Other Reason(s): No Toothache Pain in Interval (n=2,075) (%)
Restoration	13.7	8.0	16.8	13.6
Cleaning	50.5	5.6	30.7	45.3
Extraction	9.6	52.2	13.2	5.4
Fluoride treatment	6.5	1.0	5.0	7.2
Fixed prosthodontic	13.7	1.2	16.2	14.1
Denture work	6.0	2.1	9.5	5.7
Root canal	3.2	16.1	3.3	2.1
Surgery	1.8	1.8	5.1	1.2
Referral	1.6	4.2	2.4	1.1

*Based on 2,654 dental visits reported during the study. A maximum of 3 dental visits per interval were recorded during each follow-up interview. Above is a list of procedures that were performed during those visits. Note that more than one procedure could have been performed during each visit. The association between procedure and type of visit was statistically significant ($P<.05$) based on chi-square tests.

TABLE 5
Baseline Prevalence and 24-month Incidence of Toothache Pain by Clinical Measures of Oral Disease and Tissue Damage

	Baseline Prevalence*	23-month Incidence†	Mean No. Intervals Spent w/ Toothache‡	Weighted No. of Cases
Number of teeth				
1–10	8.7¶	.32	.64¶	96
11–20	17.0	.39	.95	186
20–32	10.3	.29	.67	604
No. tooth surfaces w/dental decay				
0	5.8§	.24§	.46§	431
1–2	16.1	.34	.81	177
3–4	16.6	.41	.90	72
5+	17.6	.45	1.14	183
No. tooth surfaces w/fillings				
0	18.0§	.38§	.93§	148
1–5	12.5	.39	.94	89
6–15	7.1	.33	.71	110
16–25	15.5	.33	.72	116
26–35	14.5	.32	.84	112
36+	6.1	.24	.49	289
No. crowns				
0	14.9§	.38§	.92§	367
1	15.4	.28	.74	109
2–3	6.4	.30	.58	135
4+	7.3	.26	.51	257
No. bulk restoration fractures				
0	11.4	.30	.70	730
1	12.7	.35	.72	107
2+	12.6	.40	1.16	27
No. cusp fractures				
0	11.1	.32	.71	745
1+	12.4	.27	.73	119
Total	11.5	.31	.72	

*Analyses are based on weighted data. Weights are normalized so that the weighted and unweighted sample sizes are equal (n=872). Categories do not sum to 872 due to missing data. A total of 872 respondents responded to the question regarding toothache pain at baseline. The chi-square statistic and Mantel-Haenszel chi-square trend test (df=1) were used to determine statistical significance for bivariate comparisons when variables were nominal or ordinal, respectively.

†Any report of an occurrence during at least one of the four six-month follow-up interviews. Based on portion of the sample (n=772) who reported no toothache pain at baseline.

‡F-tests were used to determine statistical significance for differences in mean number of intervals experiencing toothache pain.

¶$.05>P\geq.01$.

§$P<.01$.

(52%), followed by root canal treatment (16%), restoration (8%), and cleaning (6%). Extractions and root canal treatments were much more likely when the reason for the visit was toothache pain.

The bivariate relationships between clinical measures of oral disease and tissue damage, and the baseline prevalence, 24-month incidence, and average number of intervals with toothache pain are shown in Table 5. Among subjects in this study, tooth decay was found to have a positive relationship with toothache pain. Those with more tooth decay were more likely to report toothache pain at baseline, were more likely to experience incident toothache pain during the 24-month study, and spent more intervals coping with toothache pain. Conversely, number of fillings and number of crowns exhibited an inverse relationship with toothache pain. Subjects with more fillings were generally less likely to report toothache pain at baseline and in subsequent observation intervals. A similar pattern was observed for number of crowns. The presence of a cusp fracture and the number of bulk restoration fractures were not significantly associated with reported toothache pain.

A discrete-time hazard model, shown in Table 6, was estimated to determine the relative effects of demographic characteristics, socioeconomic status, approach to dental care, and/or self-reported disease and tissue damage on the incidence of toothache pain. To minimize multicol-

TABLE 6
Discrete-time Proportional Hazards Models Regressing Conditional Likelihood of Onset of Toothache Pain on Demographic Characteristics, Socioeconomic Status, Approach to Dental Care, and Oral Disease and Tissue Damage*

	Parameter Estimates Hazard Ratio (95% [Confidence Interval])
Demographic characteristics	
Age†	0.98** [0,97, 0.996]
Sex‡	0.94 [0.70, 1.26]
Race¶	0.91 [0.64, 1.29]
Place of residence§	1.21 [0.89, 1.64]
Socioeconomic status	
Education∞	0.81** [0.70, 0.94]
Poverty status	
In poverty•	1.69** [1.09, 2.62]
Near poverty#	1.25 [0.83, 1.88]
Not near poverty	¶¶
Poverty missing††	1.55 [0.92, 2.62]
Approach to dental care	
Never visits dentists	1.01 [0.46, 2.23]
Visits dentist only for problems	1.11 [0.78, 1.57]
Visits dentist occasionally	0.73 [0.42, 1.29]
Visits dentist regularly	¶¶
Oral disease and tissue damage‡‡	
Broken filling	1.92** [1.16, 3.18]
Broken tooth	1.40 [0.95, 2.08]
Cavity	1.67** [1.15, 2.42]
Sore gums	2.16** [1.42, 2.70]
Bleeding gums	1.31 [0.78, 2.20]
Loose teeth	1.29 [0.82, 2.03]
Loose cap	1.06 [0.48, 2.34]
Bad breath	1.08 [0.70, 1.66]
Intercept	0.47 [0.14, 1.57]
Model chi-square	44.5**
Model df	20

*Analyses are based on weighted data. Weights are normalized so that the weighted and unweighted sample sizes are equal. Models are based on the 1,970 (weighted) pairs of intervals experienced by 786 subjects in which a subject did not experience toothache pain in the initial interval.

†Years of age at the time of the baseline interview.

‡Women=1, men=0; measured at baseline.

¶African-American=1, white=0; measured at baseline.

§Urban=1, rural=0; measured at baseline.

∞Eighth grade or less=1, some high school=2, high school graduate=3, some college=4, at least a college degree=5; measured at baseline.

•Below 100% of poverty threshold=1, otherwise=0; measured at baseline.

#Between 100% and 150% of the poverty threshold=1, otherwise=0; measured at baseline.

**$P<.05$.

††Insufficient information to determine poverty status=1; sufficient information=0; measured at baseline.

‡‡Measures of oral disease and tissues damage were coded so that experienced problem in past 6 months=1 and not experienced problem in past 6 months=0; measured at each six-month follow-up.

¶¶Omitted category.

linearity, clinical measures of oral disease and tissue damage were not included in the regression model. Hazard ratios, the coefficients presented in the regression models, convey the relative likelihood of experiencing toothache pain given a one-unit increase in the independent variable. A hazard ratio >1 indicates an increase in the risk of experiencing an event, while a hazard ratio <1 indicates a decreased risk. A hazard ratio of 1 indicates no difference in the risk of experiencing an event. The model shown in Table 6 identifies three social factors that were significant predictors of toothache pain: age, education, poverty status. Older subjects, those with less education, and those living below the poverty threshold were notably more likely to experience incident toothache pain. Additionally, three aspects of oral disease and tissue damage increase the likelihood of developing toothache pain: broken filling, cavity, and sore gums.

Discussion

This analysis confirms that toothache pain is a common occurrence, and that it is germane to the use of dental services. More than one in 10 of those interviewed at baseline experienced toothache pain at the beginning of the study. Subjects were asked on four subsequent occasions whether they had experienced toothache pain during the previous six months. Between 13.4 and 21.6 percent of subjects responded positively. Over the entire 24-month period, almost one-third of subjects reported at least one episode of toothache pain.

People who reported the experience of a toothache were slightly more likely than others to use dental care in the time period proximate to the toothache, but the observed difference was not as dramatic as might be anticipated.

Subjects who experienced toothache and went to the dentist were significantly more likely to experience recovery than those who chose not to see a dentist (conditional transition probabilities of .63 vs .39). It seems noteworthy, however, that recovery is fairly common even in the absence of a dental visit.

It is of interest to note that persons

who are in general less likely to visit a dentist (African Americans and poor people) are equally likely to have a dental visit that is temporally proximate to the experience of toothache pain. Thus, on this particular dental/oral health status indicator, the observed race and income disparities in dental health are not reflected in comparable disparities in the subsequent use of care. Taken as a whole, this study suggests that toothache is quite common, is salient for understanding incident dental care use, and differs among important population groups.

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