Comparison of patient visits to emergency departments, physician offices, and dental offices for dental problems and injuries

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Keywords
dental problems and injuries; physician offices; hospital emergency departments; dental offices.

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Received: 12/2/2009; accepted 7/23/2010.

doi: 10.1111/j.1752-7325.2010.00195.x

Abstract

Objectives: Our understanding of the use of emergency departments (EDs) and physician offices for the management of dental problems is limited. We undertook this study to examine whether there are differences in their use by low-income White and minority adults as compared with higher-income adults.
Methods: Participants included White, Black, and Hispanic adults who had experienced a dental problem during the previous 12 months and who visited a physician, ED, or dentist for treatment. We selected a stratified random sample of 27,002 Maryland households with listed telephones to screen for eligibility. We identified 1,387 households with an eligible adult, selected 423 for interviews, and completed interviews with 401 (94.8%).
Results: To restore correct proportionality to the sample, and to adjust for nonresponse and the distribution of demographic characteristics, weights were created for use in the analyses. Only 7.1 percent of respondents contacted an ED, while 14.3 percent contacted a physician and 90.2 percent a dentist. The vast majority of respondents who contacted an ED (96.0%) or a physician (92.2%) also contacted a dentist. Lower-income respondents were more likely to seek care from an ED, while higher-income respondents were more likely to seek care from a dentist. Overwhelmingly, respondents visiting EDs (89.4%) and physicians (51.7%) were instructed to see a dentist or given prescriptions/samples. Treatment provided by EDs, physicians, and dentists was not associated with the respondent's income or race/ethnicity.
Conclusions: Respondents visiting EDs and physicians typically did not receive definitive care and subsequently visited a dentist for treatment.

Introduction

Individuals lacking a regular source of medical care are less likely to access needed health services (1,2). Similarly, individuals lacking a usual source of dental care may utilize hospital emergency departments (EDs) (3-7) or physician offices for treatment of their dental problems (7-14). Although the use of EDs and physicians for the treatment of dental problems is well documented, only a few studies have described the actual services provided (4,7,13) or patient satisfaction with care received (7,14).

The potential role of physicians in alleviating oral health disparities, especially among children has gained increased

Grant number 5R01DE017685-02 from the National Institute of Dental and Craniofacial Research supported this research.

recognition (15-17). Also, there has been a growing awareness of the more general need for better integration between medicine and dentistry if oral health disparities are to be alleviated. This was reflected in the 1995 report by the Institute of Medicine, Dental Education at the Crossroads, which called for closer integration of medicine and dentistry at the levels of research, education, and patient care (18). In 2006, the American Dental Education Association and the Association of American Medical Colleges published a report addressing the need for changes in professional curricula to foster a greater integration of medicine and dentistry (19).

Compared with this growing emphasis on the physician's role in providing needed oral screening and preventive services for children, studies examining the physician's role in providing services to adults for the treatment of dental emergencies or other dental problems are limited. "Oral Health in America: A Report of the Surgeon General" addressed the lack of data on physician-based services for oral and craniofacial conditions (20). Most EDs lack readily available dental services, and therefore, generally do not provide definitive treatment (21). Thus, although EDs are an important source of care for dental-related problems, particularly for individuals lacking private dental insurance, services need to be enhanced to provide better triage, diagnoses, and basic treatment (4). Clearly, ED services would be enhanced by the addition of dental care providers or ED physicians who have received specialized training in the delivery of emergency dental services. Unfortunately, historically, physicians have received minimal if any training in the management of adult dental problems (22-24).

We previously examined visits to EDs and physicians for relief of toothache pain (7). The present study was designed to extend our understanding of services provided in EDs and physician offices by examining visits for oral health problems and injuries in general and compare them with those provided by dentists. Our hypothesis was that there are predisposing, enabling, and need-based characteristics, specific to low-income and minority adults that are associated with the use of professional health-care services for the treatment/management of dental problems and injuries. Specifically, we hypothesize that (1) low-income adults will utilize physician offices and EDs for the treatment of dental problems at a greater frequency than higher-income individuals, (2) Black and Hispanic adults will utilize physician offices and EDs for the treatment of dental problems at a greater frequency than Whites, and (3) that treatment provided at physician offices, EDs, and dental offices will vary based on patient income and race/ethnicity. Due to the variability and low number in the "other" racial/ethnicity category, "other" responses were excluded from the data analysis.

Methods

Conceptual models

This study used a model developed by Locker for measuring the association of toothache pain with quality of life and social well-being (25), and a behavioral model of health services utilization developed by Anderson (26). These models were utilized to aid in the development of the survey instrument and to guide data analysis especially the selection of variables to include as covariates in the logistic regression model. The Locker model identifies aspects of human experience in relation to illness and disease and links them in sequence, moving from biophysical to behavioral and social concerns. This model highlights qualitative differences in how people experience the social impact of a condition as well as the interconnections between the different impacts (27). Anderson's model of health services utilization focuses on how the characteristics of the external environment, the dental care delivery system, and the personal characteristics of the users of services influence their oral health behaviors. Health behaviors (oral health practices and dental services use) are intermediate variables influencing oral health outcomes. The association of toothache pain with both quality of life/social well-being and the use of services becomes the basis for integration of Anderson's behavioral model and Locker's model of oral pain and social well-being.

Study population

Our survey was conducted on a probability sample of Maryland households with an adult age 21 years or older who had experienced a dental problem/injury during the previous 12-month period and who visited a physician, ED, or dental office for treatment of that problem. Low-income was defined as respondents with annual family income less than $25,000, which is approximately 150 percent of the Federal poverty level for a family of three. Participants with higher income were included in the study for comparative purposes and to examine the relative impact of income levels on respondent service use. Dental problem/injury was self-defined by a positive response to the question, "Have you had a dental problem or injury at any time during the past 12 months? By dental problem or injury we mean things like toothaches, accidents and other trauma, gum infections, jaw or face pain, dry or burning mouth, tongue or lip problems, sores or ulcers in the mouth, bleeding anywhere in the mouth, and pain caused by dentures, crowns or bridges, but not routine dental care like cleanings or check-ups."

Questionnaire development

The investigators used qualitative results from prior focus groups as the basis for developing questionnaire items (28).

Because it was necessary to conduct telephone screenings and interviews with Hispanic respondents with limited English language capability, the screening and interview instruments were translated into colloquial Spanish that could be understood by Spanish-speaking persons with limited education. Trained bilingual interviewers conducted the screening and interviews with Spanish-speaking persons.

Sample selection

US Census data from 2000 were used to stratify the 3,058 block groups in Maryland according to the percentages of low-income persons and persons of different races/ethnicities that they contained. The strata consisted of block groups whose population was (1) more than 50 percent non-Hispanic Black and at least 50 percent under 125 percent of the federal poverty level, (2) more than 50 percent non-Hispanic Black and 25 percent under 125 percent of the poverty level, (3) more than 50 percent Hispanic and 25 percent under 125 percent of the poverty level, (4) more than 50 percent White and 25 percent under 125 percent of the poverty level, and (5) the remaining block groups (those with 25% or less of the population under 125% of the poverty level and with no restriction on racial/ethnic population density). A random sample of 27,002 Maryland households with listed land line telephones was selected from across the strata of block groups identified by poverty level and racial/ethnic composition with the objective of having approximately equal numbers of interviewed persons from each stratum.

Survey execution

Interviews were conducted using computer-assisted telephone interviewing (CATI) technology to screen for eligible adults (those who had a dental problem or injury and sought treatment) and to interview only one eligible adult per household. Interviewers completed the screening and interview in either English or Spanish, based on the respondent's needs. All of the 27,002 telephone numbers were called; however, 6,758 (25.0%) were not working residential land line telephones, but were instead business phones, cell phones, pay phones, fax machines, or nonworking numbers. Of the remaining 20,244 working residential numbers, actual contact was made with 13,136 (64.9%). Of those households contacted, 4,357 (33.2%) completed a screening interview. From these, we identified 1,387 households that contained one or more eligible persons. Where there was more than one eligible in a household, the CATI program randomly selected one to interview. In order to attain some balance between the numbers of persons visiting an ED or a physician's office and a dentist, the CATI program was programmed to select a random sample of approximately 20 percent of the large majority of eligible adults who reported visiting only a dentist for treatment of their dental problem or injury. Interviews were completed with 401 (94.8%) of the 423 randomly selected eligible respondents: females 282 (70.3%) and males 119 (29.7%); Hispanics 41 (10.2%), Whites 144 (35.9%), Blacks 199 (49.6%), and other 17 (4.2%). Only 12 of the selected eligible respondents who were contacted for an interview refused; however, there were 10 additional who had not been recontacted when the study ended. All respondents were asked a common set of background questions dealing with their dental problem experience as well as specific questions related to their treatment site/provider.

Survey respondent data were weighted to represent the number of adults statewide who experienced a dental problem/injury and sought treatment from an ED, a physician, or a dentist. The weighted sample represents the following statewide demographic distribution ($n = 80{,}203$): males 33,280 (41.5%), females 46,923 (58.5%); and Hispanics 2,928 (3.7%), Whites 64,928 (81.0%), Blacks 9,472 (11.8%), and other 2,875 (3.6%). There were no statistically significant associations between the respondent's age, gender, race/ethnicity, and income with the exception that a larger percentage of males were in the older age groups [chi square 3.0; degrees of freedom (d.f.) 3; $P = 0.03$] and Blacks were more likely to be in the lower-income groups than Whites or Hispanics (chi square 3.9; d.f. 6; $P = 0.001$). The research protocol was reviewed by the University of Maryland at Baltimore Office for Research Studies and judged exempt from International Review Board review. A verbal informed consent was obtained from all participants. Respondents were mailed a $10 gift card for taking time to complete the interview.

Data analysis

Respondents' data were weighted for analysis to adjust for the stratified sampling design that employed unequal probabilities of selection, as well as for screening and interview nonrespondents. We used a stratified sampling design to more efficiently target areas of the state where we would be more likely to find low-income White and minority (Hispanic and non-Hispanic Black) households. The analysis is thus based on the estimated number of adults in Maryland who had a dental problem/injury in the past 12 months and sought care from a physician, ED, or dentist ($n = 80{,}203$). Respondents whose reported race/ethnicity was other than White, Black, or Hispanic were not included in the analysis because there were so few. Cross tabular analysis was performed along with Chi square tests of statistical significance. Tabular analyses included comparisons by income level, age group, gender, race/ethnicity, and education, as well as other selected variables. Response categories were combined when necessary due to small cell sizes. All statistical tabular analyses used SUDAAN (Research Triangle Institute, Research Triangle Park, NC, USA) an analytic package designed to analyze

complex survey samples with clustered and weighted data. In addition, multivariable logistic regression analyses were performed using odds ratios (R-sq in LOGISTIC) (29) to examine specific associations between demographic variables and measures of utilization while controlling for the effects of other covariates (e.g., insurance, use pattern, pain level, etc.) expected to be associated with of the use of services.

Results

Dental problem experience

The largest percentage of respondents (37.3%) reported having had more than five dental problems/injuries during the past 10 years, while 37.1 percent reported having three to five, and 25.6 percent one or two. On a perception of pain continuum ranging from 0 (no pain) to 10 (worst pain ever) only 17.7 percent of respondents rated their pain as high (scores 9-10). Respondent pain level was associated with race and income level, with Blacks (chi square 2.3; d.f. 6; $P = 0.035$) and low-income respondents (chi square 4.5; d.f. 4; $P = 0.001$) reporting the highest pain intensity. The most frequently reported dental problem was toothache pain (32.5%), followed by problems with broken/cracked teeth or fillings (21.6%), and infections/swelling/abscess (16.5%).

Overall use of professional services

Respondents were asked about their sources of dental care. Multiple responses were possible. Only 7.1 percent of the respondents reported contacting an ED for their dental problem/injury. Almost all of these persons (96.0%) subsequently contacted a dentist. Contacts with a physician's office were reported twice as often (14.3%) as visits to EDs, with 92.2 percent of respondents subsequently contacting a dentist. Overall, contacts with a dentist were reported by 90.2 percent of the respondents. There were no differences in ED, physician, or dentist visits for treatment based on respondent race/ethnicity or family income with the exception that lower-income respondents were more likely to have visited an EDs (chi square 3.4; d.f. 2; $P = 0.04$).

We used logistic regression analysis to examine whether there were statistically significant variables associated with a respondent first seeking care from a dentist rather than a physician or an ED (Table 1). Only two variables emerged as significant – having a regular source of dental care and pain level experienced. Respondents without a regular dentist or source of dental care had 71 percent lower odds of going to a dentist first or only for treatment than those who reported they did have a regular source of dental care. Further, respondents who reported the dental problem was associated with only a low level of pain had 355 percent higher odds of visiting a dentist for their treatment than those who reported a high level of pain from their dental problem or injury.

Use of hospital EDs

Overwhelmingly, respondents who contacted an ED did so within 72 hours of experiencing their dental problem/injury (92.8%). A majority of the respondents (57.7%) reported that the most important reason for contacting an ED was that they could not get an appointment with a dentist (Table 2). The reason for contacting an ED was associated with the respondent's race (chi square 2.1; d.f. 14; $P = 0.01$), educational level (chi square 1.7; d.f. 15; $P = 0.05$), and income (chi square 1.9; d.f. 10; $P = 0.04$). Hispanic respondents were least likely to report not being able to get an appointment with a dentist as the most important reason. Whites were most likely to report that they thought a physician could treat their dental problem/injury. Being in severe pain was most frequently cited by Hispanics as the most important reason for contacting an ED. Respondents reporting lower educational levels were more likely to report difficulty in getting a dental appointment and to think a physician could treat the problem as their most important reason. Lower-income respondents were more likely to report difficulty in getting a dental appointment and to think a physician could treat their problem, and less likely to report extreme pain as the most important reason for contacting an ED.

Respondents who contacted an ED were asked what the ED provider did or told them to do (Table 3). The overwhelming majority of the respondents (89.4%) reported that they were told to see a dentist. There were no differences in treatments associated with the respondent's demographic characteristics except for those who were told to see a dentist. Only 15.8 percent of Hispanic respondents reported being told to see a dentist compared with 98.2 percent of Whites, and 57.8 percent of Blacks (chi square 4.6; d.f. 3; $P = 0.003$). Overall, the majority of respondents reported that the treatment/advice provided helped "a lot" (68.4%), while 29.6 percent reported that it helped "a little bit," and 2.0 percent said "not at all." There were no differences in perceived effectiveness associated with the respondent's sociodemographic characteristics.

Use of physician offices

Approximately three-quarters of the respondents (72.8%) who contacted a physician's office did so within 72 hours of experiencing their dental problem/injury. The largest percentage (44.5%) reported that the most important reason was that they thought a physician could treat their problem/injury (Table 2). The most important reason for contacting a physician was associated with the respondent's race (chi square 2.1; d.f. 13; $P = 0.01$). Not being able to get a dental

Table 1 Results of Multivariable Logistic Regression Analysis of Factors which are Associated with Going to a Dentist Rather than a Physician or Emergency Department First/Only for Treatment of Most Recent Dental Problem/Injury

Independent variables	Odds ratio	Lower 95% confidence limit	Upper 95% confidence limit	Wald *F* test	*P*-value of Wald *F*
Age group (years)				0.57	0.638
35-49	0.89	0.39	2.03		
50-64	0.71	0.32	1.57		
65+	1.27	0.46	3.55		
21-34	Reference				
Gender				0.07	0.792
Male	0.90	0.41	1.98		
Female	Reference				
Race/ethnicity				1.20	0.310
Hispanic	0.88	0.28	2.76		
Black	0.50	0.22	1.12		
Other	0.81	0.18	3.62		
White	Reference				
Income				0.72	0.488
<$25,000	0.57	0.18	1.83		
$25,000–<$50,000	0.88	0.33	2.39		
$50,000 +	Reference				
Education level				0.54	0.653
< High school	0.71	0.26	1.92		
High school or trade school graduate	1.06	0.42	2.69		
Some college	1.33	0.48	3.65		
College graduate +	Reference				
Has Medicaid				0.01	0.929
No	1.04	0.47	2.29		
Yes	Reference				
Has health insurance				0.22	0.642
No	1.22	0.53	2.77		
Yes	Reference				
Has dental insurance				2.55	0.111
No	0.55	0.26	1.15		
Yes	Reference				
Has source of medical care				3.20	0.074
No	2.20	0.93	5.21		
Yes	Reference				
Annual preventive MD visit				0.44	0.507
Yes	0.81	0.44	1.50		
No	Reference				
Has source of dental care				12.33	0.001
No	0.29	0.14	0.58		
Yes	Reference				
Annual preventive DDS visit				0.15	0.696
Yes	0.87	0.44	1.72		
No	Reference				
Type of dental problem				1.19	0.305
Toothache pain	1.21	0.54	2.69		
Injury	0.43	0.10	1.85		
Gingival problem	0.31	0.08	1.22		
Miscellaneous	0.33	0.06	1.88		
Infection	0.85	0.34	2.14		
Other pain	0.68	0.18	2.52		
Bridge/denture	1.07	0.26	4.37		
Broken/cracked tooth	Reference				

Table 1 *Continued*

Independent variables	Odds ratio	Lower 95% confidence limit	Upper 95% confidence limit	Wald *F* test	*P*-value of Wald *F*
Pain level				3.36	0.036
Low	4.55	1.36	15.21		
Medium	1.14	0.56	2.32		
High	Reference				
Level of disability				1.44	0.239
Low	1.82	0.74	4.50		
Medium	0.90	0.44	1.85		
High	Reference				
Frequency of dental problems				1.03	0.358
Once or twice	1.51	0.70	3.25		
Three to five times	1.71	0.80	3.63		
More than five times	Reference				

MD, Doctor of Medicine; DDS, dentist.

appointment was the most important reason for 20.8 percent of White respondents but was not reported as being most important by any other respondents. Hispanic respondents were less likely to report thinking a physician could treat their problem (4.1%) as compared with Whites (50.4%) or Blacks (68.8%). Severe pain was reported as the most important reason by only 1.0 percent of Hispanic respondents as compared with 28.2 percent of White and 24.6 percent of Black respondents.

Respondents who contacted a physician's office were asked what the physician did or told them to do (Table 3). As was the case with respondents who visited an ED, the majority (51.7%) were told to see a dentist/oral surgeon. The treatment provided did not vary based on the respondent's sociodemographic characteristics. Treatment effectiveness generally mirrored that reported previously for ED contacts, with 63.4 percent of the respondents reporting that the treatment/advice helped "a lot," while 30.12 percent reported that it helped "a little bit," and only 6.5 percent "not at all." Again, consistent with the analysis of EDs, perceived effectiveness was not associated with the respondent's sociodemographic characteristics.

Table 2 Percentage Distribution of Most Important Reason for Contacting an Emergency Department or Physician

Reasons	ED (%) (n = 5,683)	MD (%) (n = 11,236)
Could not get appointment with dentist	57.7	12.4
Thought MD could treat	25.2	44.5
Severe pain/needed to be seen right away	12.5	21.7
No insurance/no money	2.2	1.3
Had medical complication	2.1	0.2
Other	0.3	19.9

Note: Responses coded by interviewer.
ED, emergency department; MD, Doctor of Medicine.

Use of dentist offices

Respondents were asked how long after they first felt the dental problem or experienced the injury did they contact a dentist. Approximately one-half (52.5%) of the respondents reported contacting a dentist within 3 days. Early care seeking (contacting a dentist within 3 days) was not associated with the respondent's sociodemographic characteristics, Medicaid, or dental insurance status.

Respondents who reported contacting a dentist after more than 3 days of experiencing their dental problem/injury (delayed-care seekers) were asked why they had delayed seeking care (Table 4). The most frequently cited reason for the delay was that they did not think their problem/injury was serious (66.5%). The reasons given for the delay in seeking care were associated with respondent age, race/ethnicity, education, and income (Table 4). In addition, respondents reporting the least interference with their daily activities (sleeping; eating; drinking; mood; general health; ability to socialize; or ability to talk, go to school, take care of a child or another person; and work) were more likely to report that they waited to contact a dentist because they did not think their problem was serious enough (63.9% versus 40.7%) (chi square 2.7; d.f. 14; $P = 0.001$). Furthermore, as would be expected, respondents with a regular source of dental care were less likely to report delaying seeking care because they could not get an earlier appointment (21.7% versus 35.1%) (chi square 2.4; d.f. 7; $P = 0.02$).

Respondents who went to a dentist for treatment were questioned concerning what the dentist did or told them to do (Table 3). The most frequent services provided were traditional dental procedures (root canals, fillings, crowns, and

Table 3 Percentage Distribution of Treatments/Instructions Received from Emergency Department, Physician, or Dentist

Treatments/Instructions Received	ED (%) (n = 5,683)	MD (%) (n = 11,236)	DDS (%) (n = 66,036)
Told me to see dentist/referred to oral surgeon*	89.4	51.7	20.8
Gave me a prescription for medicine	65.3	38.0	18.7
Gave me a prescription sample	43.4	13.2	2.5
Told me how to treat the problem/injury at home	27.4	15.1	8.7
Made other medical referral	0.0	6.2	0.0
Performed examination, took radiograph, or performed test	4.6	2.0	37.4
Told me how to prevent problem in the future	1.2	1.1	12.6
Extracted tooth	1.8	2.5	6.5
Drained area of swelling	0.2	1.1	0.1
Performed restorative/endodontic dental procedure	n/a	n/a	39.6
Made future dental appointment	n/a	n/a	5.1

* DDS referred patient to oral surgeon.
Note: Totals more than 100% due to multiple responses. Responses coded by interviewer.
ED, emergency department; MD, Doctor of Medicine; DDS, dentist.

denture repairs) (39.6%). Treatment provided was not associated with the respondent's sociodemographic characteristics except for respondents who received a prescription. Female respondents were more likely to be given a prescription than were males (30.6% versus 6.5%) (chi square 5.3; d.f. 1; $P = 0.02$). Additionally, treatment provided was not associated with whether the respondent was on Medicaid. Respondents with dental insurance were more likely to be told to see an oral surgeon than those without insurance (22.6% versus 1.9%) (chi square 7.2; d.f. 1; $P = 0.008$). All respondents who called or visited a dentist were asked about the effectiveness of the treatment received. Overwhelmingly, respondents reported that the dental treatment helped "a lot" (86.0%), while 9.5 percent reported it helped "a little bit," and 4.5 percent "not at all." No differences were associated with the respondent's demographic characteristics.

Discussion

It is important to note that our findings only address those individuals who accessed medical or dental services to treat a dental problem/injury, and do not address the experiences of persons with a dental problem/injury who did not seek out and receive professional care. Our hypotheses that respondent treatment site selection and the treatment received would be associated with respondent income and race/ethnicity were only partially supported. Lower-income respondents were found to be more likely to seek care from an ED than were higher-income respondents. Further, respondents who did not have a regular dentist (more often lower-income respondents) were less likely to choose a dentist as their first or only treatment site. However, with only minor exceptions, the treatment provided by EDs, physicians, and

Table 4 Percentage Distribution of Most Important Reason for Delay in Seeking Care (>72 hours) from a Dentist by Selected Demographic Characteristics

	Age groups (years) (%)					Race/ethnicity (%)			Education (%)				Income (%)		
	Overall	21-34	35-49	50-64	65+	Hispanic	White	Black	<HS	HS	College	>College	<$25K	$25-$50K	>$50K
Sample size	29,652	2,999	9,109	11,836	5,701	2,462	24,048	3,010	554	5,256	5,045	18,797	2,449	7,177	18,466
Reasons															
Did not think it was serious	66.5	86.8	77.3	70.4	30.5	95.0	63.2	69.1	48.7	52.6	24.4	82.2	14.4	70.1	69.8
Could not get dental appointment	23.5	4.5	0.8	25.6	65.3	1.2	27.5	9.8	14.7	4.9	72.6	15.7	62.8	26.0	19.0
Thought MD could treat	6.1	0.0	19.3	0.3	0.0	0.0	7.3	1.3	0.0	33.5	0.0	0.2	3.3	0.0	9.3
No insurance/no money	2.0	5.4	2.4	0.7	2.1	3.2	0.7	10.8	14.4	7.4	1.2	0.3	14.3	1.8	0.2
Other (afraid of dentists, could not wait, had medical complication, etc.)	1.9	3.2	0.1	2.9	1.9	0.6	1.6	9.1	22.9	1.5	1.6	1.5	5.1	2.1	1.6
	(Chi sq 1.8; d.f. 21; $P = 0.02$)					(Chi sq 1.9; d.f. 19; $P = 0.01$)			(Chi sq 2.2; d.f. 21; $P = 0.002$)				(Chi sq 2.8; d.f. 14; $P = 0.0005$)		

Note: Sample size estimates are based on the number of individuals responding to each question. Responses coded by interviewer.
MD, Doctor of Medicine; HS, high school; d.f., degrees of freedom.

dentists was not associated with the respondent's income or race/ethnicity.

Almost 9 out of 10 respondents contacted a dentist because of their dental problem/injury, which far exceeded the percentage of respondents contacting EDs and physicians. These contact rates mirror those reported elsewhere for toothache pain (7). The greater use of physician offices as compared with EDs is consistent with prior reports as well (7,8). Also, as was the case regarding contacts for toothache pain (7), the vast majority of respondents contacting EDs and physicians because of their dental problem/injury eventually sought care from a dentist. As has been reported nationally for ED use for medical problems (30), low-income respondents were more likely to contact EDs. Respondents without a usual source of dental care were far less likely to seek care from a dentist as their first or only treatment site. This is consistent with other reports that have documented the association of a usual source of dental and medical care with access to needed services (1, 2, 8,). It was somewhat surprising that dental insurance status was not associated with seeking care from a dentist first or only as the presence of dental insurance has been found to be associated with the use of dental services (7,31). In the present study, it appears that having a usual source of dental care had a greater influence than having dental insurance on the choice of first provider seen. Additionally, as has been reported elsewhere (4,7), respondent's suffering from a high level of pain were more likely to initially seek care from an ED or physician than from a dentist. Over 90 percent of the respondents who sought care from an ED did so within 72 hours of first experiencing their problem/injury as compared with 52.5 percent of respondents contacting dentists. Thus, although dental visits have been reported to be associated with pain (9,32), pain sufferers appear more likely to initially seek relief from other providers who might be more readily accessible.

The inability to access a dentist was mentioned by a majority of the respondents as the most important reason for seeking care from an ED. This was markedly different from toothache pain sufferers reported elsewhere who most frequently cited severe pain as their reason (7). The largest percentage of respondents (44.5%) mentioned their belief that a physician could treat their problem as the most important reason for contacting a physician, while as reported elsewhere, toothache pain sufferers were less likely to indicate this as their reason for visiting a physician (20.8%) (7). These differences are most likely due to the broader array of dental problems (not limited to toothache pain) examined in the present report.

Consistent with other reports (7), the majority of respondents seeking care from EDs and physicians did not receive definitive treatment but were referred to dentists for further care. Next, most frequently, EDs and physicians provided the respondents with prescriptions and/or prescription samples. Prior reports found an association between provider prescription practices and the respondent's socio-demographic characteristics, suggesting potential provider biases in prescription practices (7,8,33). There was no such association in the present study. As would be expected, dentists most frequently provided traditional dental procedures and associated examinations, tests, and radiographs. Treatment was not associated with the respondent's income, race/ethnicity, or Medicaid or dental insurance status except that respondent's with dental insurance were more likely to be referred to an oral surgeon. The absence of treatment disparities associated with race is important and consistent with other reports (34).

Prior reports have linked access to dental services to patient income and dental insurance status (7,31,35). In the present study, early care seeking was not associated with the respondent's sociodemographic characteristics, Medicaid, or dental insurance status. This may be related to the fact that the majority of respondents who reported a delay in seeking care from a dentist did not report traditional access problems (35), but stated that they did not think their problem/injury was serious, with higher-income respondents more likely to make this determination.

Almost 9 out of 10 respondents rated dentist treatment as helping "a lot." Although dentist treatment ratings were higher than those reported for EDs and physicians, they were not overwhelmingly so. It might have been assumed that dentist care being provided more definitive, it would have received considerably higher effectiveness ratings. Dentist ratings may reflect the fact that the respondents had higher expectations for treatment from dentists than they did for other providers (36).

One potential limitation to telephone surveys is the extent of noncoverage of the target population. In this study, it amounts to a risk that a disproportionate number of low-income or minority households will not have a listed landline telephone. Specifically in Maryland, the most recent 2000 US Census reported that only 1.6 percent of Maryland households did not have telephone service in 1999, and only 7.9 percent of households with incomes below the Federal Poverty Level did not have telephone service (37). More recent national data from the National Health Interview Survey (July-December 2007), however, indicate that the percentage of households with wireless service only has increased to 15.8 percent nationally (38). Nevertheless, research has not demonstrated this to be a significant source of bias in other surveys. For example, estimates from the 2004 and 2005 National Health Interview Survey of the use of health-care services for adults with landline telephones showed relatively small differences from those for all adults (39). Differences between face-to-face surveys and telephone surveys have generally found few statistically significant differences and even fewer differences of practical significance (40). Although noncoverage bias has not been cause to discontinue the use of general population telephone

surveys in helping guide public health policy and program decisions (39), the ever increasing use of cell phones will pose an increasing problem for public health data collection (41). Finally, although the findings are representative of Black, Hispanic, and White Maryland residents with recent dental problems/injuries who visited an ED, physician, or dentist, they should only be generalized to other populations with great caution.

Individuals, especially those in pain, who lack access to traditional dental services may continue to seek care and consultation from EDs and physicians. This issue may assume greater importance as the US population ages and becomes more diverse, because the elderly and ethnic/racial minorities often face economic barriers to accessing private dental services (35,42). To be prepared, physicians will need greater training in the management of oral health problems to fully achieve their potential to help alleviate oral health disparities. Fortunately, an expansion of the physician's clinical practice paradigm may be occurring. A children's oral health curriculum developed by the Society of Teachers of Family Medicine Group on Oral Health also contained educational modules directed at adult oral health issues (43). More recently in New Mexico, family practice and emergency room residents have been provided dental training to provide an understanding of dental anesthesia, treatment planning, diagnosis and the management of dental trauma and infections (44). A similar family practice training program in Maine provided residents training in emergency dental evaluation and treatment procedures, including extractions, and general oral health care for adults (45). Training programs such as these undoubtedly enhance a physician's ability to provide effective adult emergency dental services. As physicians' provision of oral health-care services increases, it will be important to ensure the cooperation of the dental profession. This study found a very high rate of referral from EDs and physicians to dentists. However, concerns with potential encroachment, especially with the provision of children's preventive services, have been voiced (46). These concerns are likely to escalate if the provision of adult emergency services by physicians, including extractions, becomes more widespread.

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