

Increasing prevalence of emergency department visits for pediatric dental care, 1997-2001

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During the last several decades, there has been an increase in emergency department (ED) use by patients with nonurgent medical complaints.¹⁻⁵ Likewise, there has been an increase in ED use by patients with dental problems, particularly those that are nontraumatic in nature.⁶⁻¹¹

BACKGROUND

In general, people who use the ED as their primary treatment source tend to be poor and uninsured and belong to racial or ethnic minorities. Grumbach and colleagues¹² found that for nearly one-half of the patients seeking care in EDs, barriers to primary care were the reasons for using the ED. These barriers included lack of insurance to pay for care, poor access to regular sources of care (for the uninsured and those enrolled in Medicaid) and a lack of awareness among patients about how to access health care providers.

In 1999, only 18 percent of Medicaid-eligible children had had a single dental care visit in a primary care setting.¹³ The National Access to Care Survey¹⁴ indicated that more Medicaid beneficiaries reported experiencing problems receiving dental care than medical

ABSTRACT

Background. Hospital emergency department (ED) visits for non-urgent care have been increasing since the late 1950s. This study investigated the prevalence and characteristics of pediatric ED visits for dental problems during a five-year period.

Methods. This retrospective study included newborns through 17-year-olds with dental complaints identified from the electronic register of the ED of Texas Children's Hospital, Houston, between January 1997 and December 2001. The authors described patient characteristics, diagnoses, factors associated with ED use for nontraumatic problems and annual changes in ED visits for dental and nondental complaints.

Results. Of the 1,102 subjects, 809 (73.4 percent) had nontraumatic and 293 (26.6 percent) had traumatic dental complaints. The study revealed a 121 percent increase in ED visits for dental complaints and a 66-fold increase in admissions between 1997 and 2001. Of the inpatient admissions, 68 percent were the result of caries and its sequelae.

Conclusions. This study revealed a substantial increase in ED visits and hospital admissions for dental problems during the study period. The majority of dental problems were nontraumatic in nature.

Practice Implications. Dental care experts should be available in ED settings in which increases in such visits are seen. Studies must be conducted to explore ways of keeping patients from seeking care in EDs inappropriately.

Key Words. Pediatric care; pediatric dental services; medical emergencies; dental caries; tooth injuries.

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care. In a study of Boston Medical Center's pediatric ED patients, the lack of appropriate and timely dental care was a significant problem.¹⁵ Interviews of patients seen for nontraumatic problems revealed that obstacles to getting definitive and timely care included not only the cost of treatment and lack of insurance, but also limited clinic hours and the difficulty in arranging visits to a small pool of dentists willing to accept Medicaid-enrolled patients.¹⁵ In a study of pediatric dental emergencies, Sheller and colleagues¹⁶ reported that the emergency visit was the first contact with a dentist for 27 percent of all children and for 52 percent of children younger than 3½ years.

Edelstein and Douglass¹⁷ found that although dental caries in the United States has decreased in recent years, it still represents a substantial problem for children, especially poor children and those from minority groups. Furthermore, many studies indicate that dental caries and its sequelae are common dental complaints among patients who visit the ED for emergent care. Battenhouse and colleagues⁸ found that nontraumatic conditions, primarily dental caries and abscesses, were responsible for 54 percent of dental emergencies in the ED at Children's Hospital of Pittsburgh. Wilson and colleagues¹⁰ found that 73 percent of dental problems seen in the ED were related to dental caries. Graham and colleagues⁷ reported that 96 percent of the dental problems seen in their ED were the result of caries and abscesses.

Moreover, the dental treatment provided in most EDs is less definitive than that provided in dental care facilities.¹⁸ Dorfman and colleagues¹⁵ reported that in most cases, the attending pediatrician, rather than a dentist, treated most patients with dental problems in the ED. Treatments provided usually were nondefinitive, such as intravenous antibiotics or abscess incision and drainage, rather than tooth extraction.

Most studies to date have determined the prevalence of ED use for dental problems within a single year. Only one study,⁶ to our knowledge, examined the trend in ED visits for dental care over several years. That retrospective study, which was conducted from 1982 to 1991, found an increasing proportion of nontraumatic cases, predominantly infection-related, managed in the ED

at Seattle Children's Hospital during the 10-year study period.⁶

Because the pattern of ED use for dental problems likely has changed during the past few decades, we initiated this study to describe the characteristics of patients visiting a pediatric ED with dental complaints, the nature of their problems and the factors associated with ED use for traumatic versus nontraumatic problems during a five-year period.

SUBJECTS AND METHODS

This retrospective cohort study included patients visiting the ED at Texas Children's Hospital, Houston, with dental complaints during the five-year period from Jan. 1, 1997, to Dec. 31, 2001.

Texas Children's Hospital is a tertiary-care teaching hospital with more than 80,000 pediatric ED visits per year. Despite the large number of patients, the hospital had no ED coverage by dentists during the study years. As a result, dental diagnosis and treatment were left to the pediatricians and pediatric emergency medicine specialists who staffed the ED. Specialized dental care was available to children only when they were

admitted to the hospital for dental problems.

We included patients in the study if they were 17 years or younger and came to the ED with dental complaints during the study years. One of us (T.L.) identified these patients from two electronic registers according to International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes.¹⁹ ICD-9 codes were based on diagnoses made by the attending physicians and assigned by medical coders. Given the lack of dental coverage in the ED, dentists did not confirm the dental diagnoses. For 116 electronic records with missing data, we reviewed the medical records to complete them.

One of us (T.L.) merged the electronic datasets and eliminated any duplicate visits, resulting in 2,271 potential subjects. Of these potential subjects, we excluded 182 because the final diagnosis was not dental, the age was not between 0 and 17 years or no medical record number was available. After these exclusions, 2,089 patients were eligible for inclusion in the study.

Diagnosis of stomatitis. Given the large number of patients diagnosed with stomatitis, we

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reviewed for clarification the medical records of a 10 percent simple random sample of patients with this diagnosis. According to the ICD-9-CM, stomatitis includes ulcerative or vesicular stomatitis, but excludes acute necrotizing gingivitis, aphthous ulcers and herpetic gingivostomatitis. Our review of medical records showed clearly that the treating physicians considered this a medical, rather than dental, condition. In addition, many of the children ultimately diagnosed with stomatitis had a fever, rather than oral complaints. Therefore, given the relatively nondental nature of this illness in pediatric patients, we excluded the 987 patients with stomatitis, leaving 1,102 study subjects.

Statistical analysis. We used statistical software (SPSS 11 for Windows, SPSS, Chicago) to complete the data analysis. We calculated frequencies for the demographic characteristics of age, sex and ethnicity, as well as for type of medical insurance. We divided the cohort into three age groups representing children in different stages of dentition: newborn through 5 years, representing preschool children with primary teeth; 6 through 11 years, representing those with mixed dentition; and 12 through 17 years, representing those with permanent teeth. Because children younger than 2 years may have been more likely to have teething problems than those in the other age groups, we explored diagnoses for this group as well. We categorized insurance status into private, public (Medicaid or State Children's Health Insurance Program [SCHIP]) and uninsured.

Time of ED visit. We also evaluated the time of day of the patient's visit to the ED. We did so by categorizing the times according to the hours during which dental offices typically would have been open. We assumed that dental offices were open weekdays between the hours of 9 AM and 5 PM and that they were closed at all other times.

We compared diagnostic frequencies by year of presentation. We grouped the diagnoses into two categories: traumatic and nontraumatic. The traumatic category was subdivided into complicated and uncomplicated trauma. We defined uncomplicated trauma as that involving only the teeth and complicated trauma as that involving not only the teeth, but soft tissues and bones as well.

We compared the numbers of dental and nondental visits for each year. We calculated the percentage change from the first year (1997) for dental and nondental visits to describe the pattern of increasing dental problems in the ED during the five-year study period. In addition, we compared the number of patient admissions for each year and by diagnostic category. We obtained admission information from the electronic records. Because the electronic records did not contain information about patient disposition (such as "admitted to the hospital," "discharged home"), we reviewed a 10 percent simple random sample of medical records to determine this information. We did not use statistical tests in these trend descriptions.

We calculated odds ratios and 95 percent confidence intervals (CIs) for the association between traumatic versus nontraumatic dental complaints and year of presentation, patient age, sex, ethnicity, insurance status and presentation during office hours. We used logistic regression to adjust for these factors in exploring the associations. In so doing, we started with a full model containing all of the patient characteristics and included all variables that were significant at the .20 level for at least one category (for example, patient age).

RESULTS

During the five-year study period, there were 311,901 ED visits, 1,102 (0.4 percent) of which are included in this study. Table 1 presents subjects' demographic characteristics. Most subjects were male and had private medical insurance; a larger percentage of them were Hispanic than any other ethnicity. Subjects' ages ranged from 5 months to 17 years, with a median age of 5 years. The youngest child had oral trauma. Thirty-five subjects (3 percent) were younger than 1 year. Of these 35 subjects, two (6 percent) had abscesses, 12 (34 percent) had teething complaints and 19 (54 percent) had experienced trauma. Of the 113 subjects who were between 1 and 2 years of age, 15 (13 percent) had teething complaints, 26 (23 percent) had caries/abscesses and 50 (44 percent) had experienced trauma. A total of 39 subjects had teething symptoms, 27 (69 percent) of whom were younger than 2 years; the remaining 12 subjects (31 percent) were distrib-

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TABLE 1

Demographic characteristics of pediatric patients visiting the ED,* Texas Children's Hospital, Houston, for dental problems, 1997-2001.

CHARACTERISTIC	TOTAL NUMBER (PERCENTAGE) OF PATIENTS	NUMBER (PERCENTAGE) OF PATIENTS				
		1997	1998	1999	2000	2001
Age (Years)						
0-5	636 (57.7)	79 (54.5)	99 (61.1)	115 (54.5)	153 (58.2)	190 (59.2)
6-11	331 (30.0)	48 (33.1)	48 (29.6)	70 (33.2)	65 (24.7)	100 (31.2)
12-17	135 (12.3)	18 (12.4)	15 (9.3)	26 (12.3)	45 (17.1)	31 (9.7)
Sex						
Male	625 (56.7)	75 (51.7)	103 (63.6)	117 (55.5)	141 (53.6)	189 (58.9)
Female	477 (43.3)	70 (48.3)	59 (36.4)	94 (44.5)	122 (46.4)	132 (41.1)
Ethnicity						
Hispanic	432 (39.2)	61 (42.1)	70 (43.2)	73 (34.6)	101 (38.4)	127 (39.6)
African-American	374 (33.9)	55 (37.9)	57 (35.2)	75 (35.5)	84 (31.9)	103 (32.1)
White	227 (20.6)	25 (17.2)	28 (17.3)	47 (22.3)	60 (22.8)	67 (20.9)
Asian	21 (1.9)	1 (0.7)	2 (1.2)	7 (3.3)	6 (2.3)	5 (1.6)
Other	30 (2.7)	3 (2.1)	3 (1.9)	5 (2.4)	6 (2.3)	13 (4.0)
Unknown	18 (1.6)	0 (0)	2 (1.2)	4 (1.9)	6 (2.3)	6 (1.9)
Medical Insurance						
Private	642 (58.3)	50 (34.5)	88 (54.3)	131 (62.1)	164 (62.4)	209 (65.1)
Uninsured	244 (22.1)	32 (22.1)	44 (27.2)	54 (25.6)	60 (22.8)	54 (16.8)
Publicly funded	216 (19.6)	63 (43.4)	30 (18.5)	26 (12.3)	39 (14.8)	58 (18.1)
TOTAL	1,102 (100)	145 (13.2)	162 (14.7)	211 (19.1)	263 (23.9)	321 (29.1)

* ED: Emergency department.

uted evenly over the remaining ages.

Of the 1,102 subjects, 293 (27 percent) visited the ED during times when dental offices typically would be open. Of those with private medical insurance, 147 (23 percent) came during regular office hours, while 146 uninsured or publicly insured subjects (32 percent) came during these times. Of those with nontraumatic diagnoses, 241 (30 percent) came during regular office hours, while 52 subjects (18 percent) with traumatic diagnoses came to the ED during regular office hours.

As shown in Table 2, 809 (73 percent) of the 1,102 subjects had nontraumatic dental complaints and 293 subjects (27 percent) had traumatic dental complaints. Our review of medical records revealed a 121 percent increase in ED visits for dental complaints during the five-year study period (from 145 to 321), during which there was only a 28 percent increase in ED visits for nondental complaints.

The figure presents the percentage increase in nondental and dental visits for each year (1998 to 2001) from 1997. The number of admissions for dental complaints increased from one in 1997 to 66 in 2001, with 68 percent of all dental admissions being for caries and abscesses and/or cel-

lulitis. This increase is attributable primarily to nontraumatic diagnoses, with the greatest increase taking place between 1998 and 1999.

Table 3 (page 384) presents the unadjusted and adjusted odds ratios for the association between traumatic versus nontraumatic dental diagnoses and age, sex, race, insurance status and visits during dental office hours. Subjects older than 5 years were less likely to be diagnosed with traumatic conditions than were those 5 years and younger. Likewise, girls were less likely to be diagnosed with traumatic conditions than were boys. Hispanics, African-Americans and Asians were less likely to be diagnosed with traumatic conditions than were whites. Those with publicly funded or no medical insurance were less likely to be diagnosed with traumatic conditions than were those with private medical insurance. Only subjects who visited the ED after regular office hours and on weekends (when dental offices were likely to be closed) were more likely to have traumatic conditions than were those who came to the ED during office hours.

The number of recorded traumatic dental complaints increased monotonically every year from 1997 through 2001. This type of constant increase usually is an indication of an upward trend in the

TABLE 2

Dental diagnoses of pediatric patients visiting the ED,* Texas Children's Hospital, Houston, 1997-2001.

DIAGNOSIS	TOTAL NUMBER (PERCENTAGE) OF PATIENTS	NUMBER (PERCENTAGE) OF PATIENTS				
		1997	1998	1999	2000	2001
Nontraumatic	809 (73.4)	114 (78.6)	130 (80.2)	164 (77.7)	187 (71.1)	214 (66.7)
Abscess/cellulitis	294 (26.7)	25 (17.2)	33 (20.4)	56 (26.5)	80 (30.4)	100 (31.2)
Caries	170 (15.4)	28 (19.3)	40 (24.7)	31 (14.7)	33 (12.5)	38 (11.8)
Salivary gland diseases	99 (9.0)	13 (9.0)	13 (8.0)	24 (11.4)	21 (8.0)	28 (8.7)
Periodontal diseases	75 (6.8)	19 (13.1)	11 (6.8)	13 (6.2)	20 (7.6)	12 (3.7)
Other oral soft tissue	76 (6.9)	17 (11.7)	17 (10.5)	14 (6.6)	14 (5.3)	14 (4.4)
Teething syndrome	39 (3.5)	4 (2.8)	6 (3.7)	13 (6.2)	4 (1.5)	12 (3.7)
TMJ† disorder	21 (1.9)	2 (1.4)	2 (1.2)	5 (2.4)	9 (3.4)	3 (0.9)
Disease of the tongue	16 (1.5)	2 (1.4)	2 (1.2)	3 (1.4)	5 (1.9)	4 (1.2)
Postoperative complications	6 (0.5)	1 (0.7)	2 (1.2)	2 (0.9)	0 (0)	1 (0.3)
Cyst	2 (0.2)	0 (0)	1 (0.6)	1 (0.5)	0 (0)	0 (0)
Not specified	11 (1.0)	3 (2.1)	3 (1.9)	2 (0.9)	1 (0.4)	2 (0.6)
Traumatic	293 (26.6)	31 (21.4)	32 (19.8)	47 (22.3)	76 (28.9)	107 (33.3)
Complicated	184 (16.7)	11 (7.6)	18 (11.1)	28 (13.3)	57 (21.7)	70 (21.8)
Uncomplicated	109 (9.9)	20 (13.8)	14 (8.6)	19 (9.0)	19 (7.2)	37 (11.5)
TOTAL	1,102 (100)	145 (13.2)	162 (14.7)	211 (19.1)	263 (23.9)	321 (29.1)

* ED: Emergency department.
† TMJ: Temporomandibular joint.

data. However, the odds ratios for this variable were not significant, and we cannot reject random variation as an explanation. A larger sample size might have confirmed the trend.

DISCUSSION

The results of this study indicate an increasing number of dental visits to a pediatric ED between 1997 and 2001. During the same period, the population in Houston increased by 8 percent (B. Balachandran, City of Houston Planning and Development Department, written communication, Dec. 16, 2002) and nondental visits increased by 28 percent, much less than the 121 percent increase seen for dental visits. It is clear that the increase in dental visits to the ED cannot be explained by an increase in overall ED visits or by the population in the area.

Nontraumatic conditions. The study results indicate that the majority of ED visits were for nontraumatic conditions that could have been treated in a primary care facility. This finding differs from that reported by Zeng and colleagues⁶ in a study conducted between 1982 and 1991. The authors found that 60 percent of the ED visits for dental problems were because of trauma. These investigators, however, noted an increasing proportion of infection-related visits during the 10-year period.⁶ This increase could have been an indication of an emerging pattern of increased ED

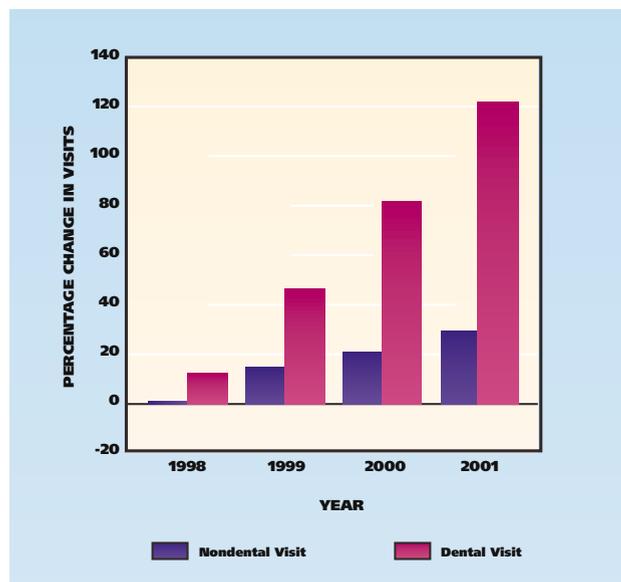


Figure. Percentage change in dental and nondental visits to the emergency department at Texas Children's Hospital, Houston, from 1997 to 1998 through 2001.

use for nontraumatic dental conditions.

Lack of medical insurance did not explain use of the ED for nontraumatic dental conditions. In our study, 78 percent of subjects had health insurance, either publicly funded or private. However, while the publicly funded insurance found among the study population (Medicaid and SCHIP) included dental coverage, we could not ascertain whether the private medical insurance

TABLE 3

Predictors of visits to ED,* Texas Children's Hospital, Houston, for traumatic versus nontraumatic dental problems for 1,102 pediatric patients, 1997-2001.

CHARACTERISTIC	UNADJUSTED OR† (95 PERCENT CI‡)	ADJUSTED§ OR (95 PERCENT CI)
Year		
1997 (reference)	1.00	1.00
1998	0.91 (0.52-1.58)	0.71 (0.40-1.27)
1999	1.05 (0.63-1.76)	0.86 (0.50-1.47)
2000	1.50 (0.93-2.41)	1.19 (0.71-1.98)
2001	1.84 (1.16-2.91)	1.49 (0.92-2.43)
Age (Years)		
0-5 (reference)	1.00	1.00
6-11	0.49 (0.36-0.67)	0.46 (0.33-0.64)
12-17	0.36 (0.22-0.59)	0.31 (0.19-0.53)
Sex		
Male (reference)	1.00	1.00
Female	0.68 (0.52-0.90)	0.69 (0.52-0.93)
Ethnicity		
White (reference)	1.00	1.00
Hispanic	0.46 (0.32-0.65)	0.44 (0.30-0.64)
African-American	0.52 (0.37-0.75)	0.55 (0.38-0.79)
Asian	0.26 (0.08-0.92)	0.21 (0.06-0.75)
Other	0.57 (0.25-1.35)	0.43 (0.18-1.04)
Unknown	0.45 (0.14-1.42)	0.37 (0.11-1.22)
Medical Insurance		
Private (reference)	1.00	1.00
Publicly funded	0.49 (0.34-0.73)	0.53 (0.35-0.80)
Uninsured	0.67 (0.47-0.94)	0.70 (0.49-1.01)
Dental Office Hours		
During (reference)	1.00	1.00
Not during	1.97 (1.41-2.75)	1.85 (1.31-2.63)

* ED: Emergency department.
† OR: Odds ratio.
‡ CI: Confidence interval.
§ Adjusted for year, age, sex, ethnicity, insurance status and visits during dental office hours.

included dental coverage. Because many medical insurance policies do not provide dental coverage, this may account for use of the ED for nontraumatic dental problems by those with private health insurance. More than 58 percent of the patients in this study had private medical insurance; however, nearly three-fourths of the ED visits were for nontraumatic conditions.

This study revealed that inpatient admissions of patients with dental problems increased during the five-year study period. More than two-thirds of these admissions were the result of untreated dental caries and subsequent abscesses and/or cellulitis. It is likely, although not possible to conclude from this study, that many of these suppurative complications could have been prevented by more timely treatment.

Study limitations. There are several limitations to this study. Studies of ED populations

such as this one have an inherent selection bias that results from factors that influence which patients come to the ED. As a result, this study cannot be used to estimate the prevalence of nontraumatic dental conditions among children in the general population. Moreover, the current study included only one tertiary-care pediatric hospital, which may attract certain types of patients and cases. It is possible that other hospitals in the area experienced a decrease in dental ED visits during the study period, with a shift of visits to our study's ED. Inclusion of data from other area hospitals would have provided a more comprehensive picture of the burden of traumatic and nontraumatic dental care in area EDs.

In addition, the dental diagnoses made in this study were likely subject to misclassification. Given the lack of ED coverage by dentists during the study

period, the diagnoses were made by physicians who may not have had any training in dental diagnosis. This means it is possible that some dental diagnoses were not labeled as such, while some of those labeled as dental were not.

Finally, because we did not study the subjects prospectively, it was not possible to explore the reasons for their use of the ED instead of other locations of care. However, we deemed the retrospective study to be appropriate for the research question, which considered only the prevalence and characteristics of ED visits for dental problems. A prospective study would be needed to explore the reasons for using the ED for dental care.

CONCLUSION

This five-year retrospective study of pediatric ED visits found that visits for dental care increased

substantially between 1997 and 2001. The majority of the visits were for nontraumatic dental problems. Factors associated with nontraumatic diagnoses included age older than 5 years, female sex, Hispanic or African-American race and publicly funded or no health insurance. The retrospective nature of this study precludes our drawing conclusions about the reasons for the observed patterns of ED use for dental problems. Future studies are needed to help determine strategies for decreasing the use of emergency services for nonemergent dental problems. ■

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