Social factors associated with pediatric emergency department visits for caries-related dental pain

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Abstract

Purpose: This study was performed to describe and relate sociodemographic factors and management of visits to a pediatric hospital emergency department for caries-related dental pain.

Methods: Retrospective chart review of cases with a verifiable chief complaint of caries-related dental pain in 1998, was conducted using established protocol and trained reviewers.

Results: Three hundred of 984 hospital ED dental emergencies met the study's selection criteria and 109 children were six years old or younger. Almost two-thirds (66%) came from single parent families. Fifty-eight percent were self-pay or covered by government programs and the rest had some insurance. African-American children were 45% of cases. Over 80% were from within Franklin County, OH. Only 4 children (1%) had been seen for the same tooth previously. Lower primary molars were most often affected. Race, insurance, parental marital status were not significantly related to follow-up attendance at the facility ($P>0.05$). Those living outside Franklin County and under 5 years of age were more likely to attend follow-up appointments ($P<0.05$). When compared to the catchment population of Franklin County, this ED sample had six times as many uninsured children, two and a half times more African-Americans, and came from single parent families four and a half times more often.

Conclusions: Children seen in the ED were predominantly poor, from single-parent families, and disproportionately minority, and were different from the catchment area population. These social risk factors were not related to attendance at follow-up. (Pediatr Dent 23:56-60, 2001)

In spite of a major reduction in dental caries of permanent teeth, primary teeth continue to have a caries rate similar to that of a decade ago.[1] In addition, poor and minority children continue to have a disproportionately higher dental caries experience.[2] These same children experience difficulty gaining access to dental services–only about one in five children covered by Medicaid has a preventive dental visit in a year.[3] In those pediatric populations with limited access and a high caries rate, related dental emergencies are reportedly often managed in hospital emergency departments (ED)s.[4]

Several studies have addressed pediatric dental emergencies in hospitals,[5-8] but the emphases are on distribution of injuries by etiology. Only a few describe selected social and demographic aspects of those emergencies or pre- and post-emergency care behaviors. Majewski et al.,[6] Wilson et al.,[5] and Zeng et al.[9] reported racial distributions. Only this last report further analyzed race, indicating that non-Caucasians were twice as likely to seek emergency care for infections. They also reported that those patients on Medicaid seeking emergency care for infection were double the percentage of those seeking care for trauma.

Only Sheller et al.[8] addressed follow-up care seeking and reported that only 9% of the patients seen for caries-related emergencies had follow-up care at their facility. These investigators also reported previous care experience of subjects. For 27% of the children seen, the emergency visit was their first to a dentist. Schwartz[7] isolated 153 of 728 emergency patients with dental pain who had documented previous dental care, but did not report a specific history of previous care for all subjects.

Several studies looked at care seeking *after* regular working hours in an ED. In Schwartz's[7] sample, about 17 percent (of one year's total dental emergencies) sought care after hours. Others report 38%[8] and 35%.[10] Three studies[5,6,9] looked only at dental emergency patients seeking care in hospital emergency departments, and they reported a range from 148 to 949 patients per year.

Other than the above studies, little is known about pediatric dental emergencies in hospital EDs in North America, particularly social and demographic characteristics of care seekers. Edelstein[4] and others[11,12] have characterized these hospital ED care seekers as minority, low-income, or uninsured. However, data that deal directly with these characteristics are limited. Only recently, Graham et al.[13] reported ED visits for non-traumatic dental disease. These authors describe these children as predominantly minority, and only 18% having commercial insurance.

The medical literature suggests that access-to-care difficulties lead to inappropriate utilization of EDs for basic health care services when a child is sick.[14] One large national study found that children who regularly sought care at physicians' offices (rather than community clinics) were less likely to report EDs as a source of sick care. These investigators also found that those on Medicaid, while less likely than those above poverty to have

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Table 1. Demographic Variables of Patient Sample

Demographic variable	Number of subjects (percent sample)			
Patient age	0-60 months 72 (24%)	61-120 months 117 (39%)	121-180 months 59 (20%)	>180 months 52 (17%)
Gender	Male 156 (52%)		Female 144 (48%)	
Parent marital status	Married 68 (23%)	Unmarried 199 (66%)	Not Specified in Record 33 (11%)	
Place of residence	Within County 244 (81%)		Outside of County 56 (19%)	
Race of child	African American 134 (45%)	Caucasian 156 (52%)	Asian, Hispanic or Other 10 (3%)	
Payment method (coverage)	Commercial Insurance 126 (42%)	Public Program 82 (27%)	Uninsured 92 (31%)	

a routine source of care, were still more likely to have such a source than poor children without Medicaid.[15] While physicians have, for almost a generation, expressed concern about the relationship between inappropriate care seeking at EDs and lack of a continuing source of care, dentistry has not addressed this issue.

We were interested in learning more about the association of selected social variables with ED care seeking for dental pain related to dental caries. We hypothesized that the same factors associated with oral health disparities and difficulties gaining access to the dental care system—poverty, minority status, and a single parent family—would describe those seeking care for caries-related dental pain in the ED. The recent report of the Surgeon General has also identified lack of medical insurance as an additional strong indicator of difficulty in gaining access to dental care,[16] so this variable was added to our hypothesis.

The purpose of this study then was to investigate social and demographic characteristics of patients seeking care in a large mid-Western urban children's hospital ED for dental caries-related pain. In addition, we were interested in (1) their previous dental care, (2) any association of treatment and social and demographic variables with post-emergency care seeking behaviors, and (3) how this population differed from that of the population in the hospital's catchment area.

Methods

This study utilized a structured retrospective chart review of all emergency records for children seen in the ED at Columbus Children's Hospital during 1998. Criteria for inclusion in this study were:

1. Chief complaint of dental pain, caries-related and not of traumatic origin;
2. ability to identify from records a carious tooth or teeth as a focus for the visit; and
3. treatment after hospital dental clinic regular working hours.

Two trained reviewers (DVK and DV), working together, reviewed each chart and recorded variables, using pre-defined criteria for dental care.[17] The ED visit for dental pain became the focus visit around which all data were related. Demographic variables obtained included age, gender, and place of residence (zip code). Parental marital status, patient race, and method of payment were included as risk factors associated by others with poor childhood outcomes.[16] The characteristics of the focus emergency visit included tooth or teeth affected, treatment rendered, patient's previous care pattern at the institution, and follow-up care.

Patients were culled from a master log maintained for continuous quality improvement purposes that tracked all emergencies seen, both during and after hours, in both the hospital dental clinic and ED. In our hospital, any child, whether a patient of record or not, can obtain emergency care during regular hours in the dental clinic, yet some families choose to seek care from the hospital ED after hours. No one is turned away because of inability to pay for care. Our hospital is also the sole provider of after-hours emergency dental care for children in central Ohio. Emergency complaints included traumatic injuries, soft tissue pathology and diffuse complaints of pain of unknown origin. We limited cases to those seen by dental personnel who reliably could associate pain with dental caries, because other investigators have noted the ambiguity when physician-derived diagnoses of dental problems are used to analyze ED data.[13]

Demographic information was obtained from the computerized hospital patient database obtained at each visit registration, including race, parental marital status, and method of payment. County data were obtained for comparison from census and other sources.

Reviewers practiced on 20 cases to clarify variables and these cases were then included in the sample analyzed. Data were entered on computer using SPSS+. Analyses included descriptive statistics, frequency distributions, cross-tabulations with chi-square and one way ANOVA.

Results

Cases selected

Between January 1 and December 31, 1998, 4,486 visits were recorded at Columbus Children's Hospital for dental emergencies. Of these 4,486, 3,502 were seen in the dental clinic during regular hours. The remaining 984 cases were seen in the ED and thus suitable for study review, since we were interested in only those patients who sought care in an emergency department setting. After eliminating visits for trauma (440 cases), soft tissue pathology, and diffuse complaints not related to carious teeth (205 cases), 339 cases remained. Of these, 39 cases were without specific tooth identification or otherwise unclear as to focus of the visit, so 300 cases met inclusion criteria for the study.

Demographic information

Males and females were evenly distributed, 156 (52%) and 144 (48%), respectively (see Table 1). The mean age was 9 years, 2 months, but 109 (36%) were under six years of age. Single parents accounted for 199 (66%) of cases, while the remainder of parents were either married (68/23%) or marital status was not clear from available records (33/11%). Most children

Table 2. Teeth Most Commonly Involved in ED Visits•

Tooth numbers in standard and (International System) and numbers of teeth affected below					
Right side	Maxillary arch				Left side
#3 (16)	#A (55)	#E (51)		#J (65)	#14(26)
10	19	19		14	15
Mandibular arch					
#30(46)	#T (85)	#S (84)	#L (74)	#K (75)	#19(36)
23	33	18	19	41	26

•Teeth listed occurred in at least 10 visits; teeth not involved in at least 10 cases are not included.

were from Franklin County, Ohio (244/81%), with the remainder from outside the county. Over half (156/52%) were Caucasian, but 134 (45%) were African-American and only 10 children (3.3%) were either Asian or Hispanic or of a race not determinable.

Forty-two percent (126) of patients had commercial insurance coverage of some type, 82 (27%) were covered by public funding, and 92 (31%) were self-pay (uninsured). Only 39 (13%) patients had changed their source of coverage in the 12 months prior to the ED visit.

Care-seeking behaviors

The medical literature suggests that care affiliation with a physician or a clinic is associated with less ED utilization for non-emergent needs. A dental correlate to this concept of a "medical home" has not been studied, so we were interested in determining previous care seeking at our institution as well as follow-up care-seeking behavior. We could not investigate existing dentist-patient relationships due to the retrospective nature of the study. Our experience also has been that in many cases, dental encounters are problem-related rather than continuing care. Seventy-four patients (25%) had visited the hospital dental clinic within the 36 months prior to the ED visit and were considered patients of record (POR). We used the definitions of Cashion et al.[15] to categorize the previous care seeking of this POR sub-sample of 74. Forty-eight patients had a history of complete care, and 26 had had emergency or sporadic care in that period. Thirty-three of the 74 patients of record had broken one or more appointments in that period.

The POR sub-sample was further divided to see if these patients previously had sought emergency care for the tooth or teeth identified in the focus visit or for other teeth. Only four patients had sought care for the focus tooth, while 28 had sought emergency care for another tooth within the previous 36 months.

Forty percent (121 cases) of patients sought follow-up care at our institution with most of these presenting for care of the focus visit tooth alone (56 cases), the focus tooth and triage into the primary dental care system (11cases), or the focus tooth and other restorative or emergency care (7 cases). Almost 60% (179 cases) did not return for follow-up care at our institution, but it was not possible to determine whether patients had attended other providers.

Teeth affected and management at focus visit

The teeth most commonly involved at the focus visit are listed in Table 2. The lower left second primary molar was the most commonly affected, followed by the lower right second primary molar. Only the maxillary right primary central incisor was found to be highly represented in the sample (frequency > 10) as a primary tooth typically associated with a nursing caries pattern.

The most common management approach was referral (40/13%) followed by extraction or no treatment (each 36/12%). Antibiotics were prescribed alone or in combination with other management for 110 patients (37%). Pain medication was prescribed for 115 patients (38%). Fifty-three patients (18%) had extraction with some other management and only 7 patients (2%) had a temporary restoration placed alone or in combination with another treatment.

Variables related to follow-up

The literature suggests that difficulty in access, minority status, and ability to pay affect care seeking, so we were interested in seeing if any relationship emerged between follow-up and social and demographic variables. We allowed up to 12 months for a follow-up visit to occur, which we felt would account for most if not all patients who intended to return. Table 3 depicts the results of those analyses. Race, insurance status, and parents' marital status were not significantly related to follow-up attendance at our facility. Place of residence was significantly related to follow-up attendance ($P< 0.05$), but contrary to expectation, those residing outside the county were more likely to attend than those within.

We also hypothesized that treatment would have an effect on return for follow-up, with those receiving definitive treatment (extraction or temporization) less likely to return. When definitive treatment was compared to both referral and to pain and antibiotic prescriptions, no significant difference was found at the $P= 0.05$ level. We also wondered whether the child's age would alter follow-up behavior and when children were grouped into four cohorts—birth to 5 years, over 5 to 12 years, over 12 to 15 years, and over 15 years old—a highly signifi-

Table 3. Correlation of Selected Variables with Follow-Up Visits

Variable	*P*-value and chi square
Ages, grouped (0-60 months, 61-120 months, 121-180 months, and more than 180 months old)	0.001• (χ^2=39.335, df=3)
Marital status	0.26 (χ^2=2.691, df=2)
Within or outside of county	0.025• (χ^2=4.382, df=1)
Emergency management rendered, grouped (Pain/Antibiotics only, Restoration/ Extraction and Referral/Other Treatment)	0.183 (χ^2=3.394, df=2)
Insurance status	0.135 (χ^2=9.759, df= 6)
Race	0.061 (χ^2=8.986, df=4)

Table 4. Comparison of Study Sample with Catchment Area Population As Percentages

Variable	ED sample	County population
Insurance status (0-18 yrs)		
Not covered	31	5
Private or public	69	95
Race		
African American	45	18
Caucasian	52	78
Asian and others	3	4
Marital status		
Single Parent	75	16
Married	25	84

cant difference emerged ($P < 00.001$) with the youngest group most likely to return (43 of 72 cases) and a decreasing proportion of each subsequent older-aged cohort returning.

Comparison to catchment area population

We wanted to see if the patients who attended the ED differed demographically from the population of the hospital's catchment area, which has its highest component in Franklin County (>71% for all ambulatory services). Table 4 shows the percentages for the ED and Franklin County. In order to do this comparison, we used several sources of data.[22,23] For insurance status, we merged private or commercial insurance with public programs to make our data comparable with county surveys. In addition, we proportionately distributed the unknown or unreported cohort for marital status according to the distribution of married and single parent cohorts in our ED sample. These data are reported as percentages only and no statistical analysis is provided.

The most notable comparison is that the percentage of uninsured patients seeking ED care was over six times the percentage of the county population (ED: 31 vs. County: 5%). African-American attendance in the ED was two-and-half-times their representation in the county population (ED: 45 vs. County: 18%). Finally, the ED sample had over four-and-a-half times the single parent families than the catchment population of Franklin County (ED: 75 vs. County: 16%).

Discussion

The observations of others[4,11,12] about patients seeking dental care in hospital EDs are confirmed by this study. The limited data from previous studies of pediatric patients[8,9] hint at racial and income disparity related to attendance in EDs for dental caries-related emergencies, but our study sample confirms that these patients are at-risk children. The typical child in our study was more likely to be from a single parent family, disproportionately African-American and either uninsured or under some government program. These are children who are also considered most vulnerable in society with a reduced chance for healthy development in several other areas.[18]

Having one parent, living below the poverty line, receiving welfare, and being without health insurance are considered risk factors which can predict poor outcomes for children, such as dropping out of high school or teen parenthood.[18] ED care seeking for dental pain can be added to that list of negative outcomes predicted by these risk factors.

Relating the sample in this study to the population of Franklin County reinforces an association of hospital ED dental care seeking with poor oral health, access difficulties, being poor, and minority status. In Franklin County, Ohio, African-Americans comprised only 18% of the population in 1998,[19] yet two-and-half times that percentage sought care in the ED. Only 23 percent of African-Americans in Franklin County in 1998 had one or more ED visits for any reason and this was almost the same for Caucasians at 22 percent.[23]

In the county, approximately 21% of children in 1998 were covered by Medicaid and 5% uninsured; those using our ED represented 27% and 31% respectively. Graham et al.[13] also found a high occurrence of private pay (self-pay) and Medicaid patients in their study of a children's hospital ED in Dallas, Texas. Single parented (unmarried parent) children accounted for almost two-thirds of cases, which for comparison purposes was adjusted to 75 percent which was about four-and-a-half times the county. Again, children from one parent households appear to be at risk for dental problems as well as others. While at first glance, one might attribute this to income, it may also relate to a host of other social factors such as lack of transportation, lack of temporary daycare for other children, ignorance about oral health, or competing work and lifestyle priorities. Recent reports address the impact of some of these factors on access to care.[24]

Two dental findings in this study deserve comment. The first is that the teeth most commonly associated with baby bottle tooth decay (BBTD) were not predominant. The most commonly affected teeth were lower second primary molars followed closely by lower first permanent molars. This may be explained by the clinical observation that these teeth tend not to drain easily intraorally due to the density of the surrounding bone, while maxillary anterior teeth do. This distribution is consistent with findings in Ohio's children [20] who experience 82% of dental caries on pit and fissure surfaces. It is important to note that traditional BBTD (maxillary anterior primary teeth) was not predominant here, that the primary teeth most affected last well into the mixed dentition, and permanent molars were well represented, even in a relatively young sample.

The other dental finding to note is that few of these children received what could be considered definitive care in the ED. Most children were managed with prescriptions, primarily because of time limitations, behavior, pain, and the opportunity to treat them later during regular clinical hours within a reasonable time. This limited care in the ED should discourage parents from seeking help in this venue, but that did not seem to be the case. Undoubtedly, in many locales, children seek care from EDs without the benefit of a dental service, so one would expect that the cost-benefit of such practices would be far worse than seen in this ED with a dental service.

The low attendance at follow-up appointments may be explained by the fact that families may have sought care at local dentists who were unavailable at the time of the ED visit. However, previous data from our institution suggest that parents are aware of pain in their children a week prior to seeking care[21] The follow-up we saw was much different from the nine percent reported by Sheller et al.,[8] with the difference perhaps being the 12 month period we allowed for return. The extent

of caries which would lead to an ED visit strongly suggests that parents have not sought care or have previously experienced difficulty gaining access. It is highly unlikely they have a dental home.

A final commentary on this study relates to the finding that 74 children or 25% were patients of record at our dental clinic. We looked at this one quarter sub-sample and found that among those, broken appointments or sporadic care (examination, some treatment but no recall visit) were common. Only four patients had previously sought care for the focus tooth, making *de novo* cases the overwhelming occurrence. This is still another indication that access to care and oral health priority are issues in this group.

Our study suffers from several limitations common to retrospective studies. For example, marital status was determined from the report and children may have come from unmarried two-parent households. Insurance status as recorded did not indicate details of dental coverage that may have influenced care seeking. We did not ask about previous dental care and we also do not know whether patients sought follow-up care elsewhere.

The use of focus teeth provides only a limited indicator of oral health. It is not uncommon for children to present for a dental emergency with many decayed and potentially painful teeth and it is often difficult to determine which of many teeth to treat.

Finally, readers need to remember that these 300 cases are merely a working sub-sample of a group of well over two thousand caries-related emergencies seen annually at our institution during and after regular clinic hours.[5] In addition, far more patients choose to attend our clinic for similar dental caries problems not yet emergent, than seek care in the ED or during working hours, for emergencies. The statistics reported here represent but a portion of the dental caries problem which continues to plague certain U.S. children, particularly those who are poor and minority.

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