

Dental Visits to a North Carolina Emergency Department: A Painful Problem

Michael B. Hocker, John J. Villani, Joseph B. Borawski, Christopher S. Evans, Scott M. Nelson, Charles J. Gerardo, Alex T. Limkakeng

BACKGROUND Emergency departments (EDs) act as the safety net and alternative care site for patients without insurance who have dental pain.

METHODS We conducted a retrospective chart review of visits to an urban teaching hospital ED over a 12-month period, looking at patients who presented with a chief complaint or ICD code indicating dental pain, toothache, or dental abscess.

RESULTS The number of visits to this ED by patients with a dental complaint was 1,013, representing approximately 1.3% of all visits to this ED. Dental patients had a mean age of 32 ($\pm$ 13) years, and 60% of all dental visits were made by African Americans. Dental patients were more likely to be self-pay than all other ED patients (61% versus 22%, $P < 0.001$). At the vast majority of dental ED visits (97%), the patient was treated and discharged; at most visits (90%) no dental procedure was performed. ED treatment typically consisted of pain control and antibiotics; at 81% of visits, the patient received an opiate prescription on discharge, and at 69% of visits, the patient received an antibiotic prescription on discharge.

LIMITATIONS This retrospective chart review covered a limited period of time, included only patients at a large urban academic medical center, and did not incorporate follow-up analysis.

CONCLUSION Although they make up a small percentage of all ED visits, dental ED visits are more common among the uninsured, seldom result in definitive care or hospital admission, and often result in prescription of an opioid or antibiotic. These findings are cause for concern and have implications for public policy.

Emergency departments (EDs) act as the safety net for the nation's health care system. With increasing unemployment and subsequent lack of health and dental insurance, many patients have few options outside of EDs to obtain care. As a result, the ED has become an alternative care site for patients without insurance who have toothaches or other dental pain [1, 2, 3]. In 2006 alone, dental caries accounted for an estimated 330,757 visits to EDs across the United States. These visits, 45% of which were made by uninsured patients, accounted for approximately \$110 million in charges [1]. ED visits for dental complaints have been shown to make up 0.7%-0.9% of all ED visits; the highest utilization is by those 19-35 years of age; dental visits constitute 1.3% of all ED visits by patients in that age group [2].

Previous studies have demonstrated that being uninsured is a significant factor promoting utilization of EDs for dental-related complaints [2]. In North Carolina, only 2 of the 5 academic medical centers have an affiliated dental school. In addition, most hospitals do not have an on-call dentist readily available. Follow-up care is virtually impossible for the uninsured to find if they do not have any financial resources. Further compounding this problem is the fact that only 58% of federally qualified health centers offer any dental services [4]. Additionally, as many states attempt to reconcile large health care budgets, many are considering reducing or eliminating optional benefits such as dental care

from their Medicaid covered services [5, 6]. In Maryland, ED visits for dental complaints increased 12% the year after Medicaid stopped dental reimbursement [6].

The profile of patients presenting to the ED with dental complaints in the state of North Carolina is poorly characterized. Prior reports have suggested that nontraumatic dental disease is preventable and usually has limited morbidity, and that the most cost-effective care model is early intervention and treatment [7]. What remains unclear is the role that North Carolina EDs currently play in dental care. The goal of this paper is to provide a description of patient visits to the ED of a North Carolina academic health center for dental related complaints.

Methods

The study involved examining the medical records of all patients who presented to the ED of a major urban teaching hospital between 7/1/10 and 6/30/11. Institutional Review Board review and approval was obtained according to institution policy.

Electronically published October 12, 2012.

Address correspondence to Dr. Michael B. Hocker, Department of Surgery, Duke University Medical Center #3096, 2301 Erwin Rd, Durham, NC 27710 (michael.hocker@duke.edu).

N C Med J. 2012;73(5):346-351. ©2012 by the North Carolina Institute of Medicine and The Duke Endowment. All rights reserved. 0029-2559/2012/73502

This ED uses an electronic medical record system that feeds all information into a central data repository, where it is stored. We identified dental patients in the database in 2 ways. All patients at the time of arrival to the ED are assigned a "triage impression" from a fixed list. So first, we captured the records of all patients with a triage impression of "dental" as potentially being patients with a primary dental complaint. After these patients' records were removed from the database, another set of dental patients was identified using discharge diagnosis ICD-9 codes 520-525 (generalized atraumatic dental disorders) and ICD-9 code 873.63 (dental trauma).

All of these digital charts were then reviewed manually by at least 1 of the 4 authors involved in conducting the chart review, and 15 distinct items were abstracted from each chart. All abstractors were trained in chart abstraction methods and data element definitions, and they used a standard abstraction form. Missing data elements and instances of conflicting information were reviewed by the principal investigator, who decided in conjunction with the individual data abstractor how they should be handled.

For 10% of charts, double abstraction was performed, and interrater reliability was assessed for the following variables: "opiates in the ED," "opiate prescription given," "discharge medication," and "procedure in ED." Interrater kappa, a measure of agreement corrected for chance, was calculated [8, 9]. The kappa statistic may range from -1 (perfect disagreement beyond chance) to 1 (perfect agreement beyond chance).

For visual analysis, we graphed simple histograms showing the observed number of visits on each day of the week and the observed number of visits for each of the 24 hours of the day. The resulting database was analyzed using standard summary statistic techniques using Microsoft Excel. A z-test for proportions was used to calculate P values where relevant, with no adjustments for multiple comparisons.

Results

During the study year, there were 1,013 visits for dental complaints in this ED, constituting about 1.3% of the ED's overall patient volume of 77,365. These 1,013 visits were associated with 760 individual patients (Table 1); 133 patients had multiple visits totaling 386 encounters. There was no discernible pattern in day of the week on which patients visited the ED (Figure 1). Patients presented to the ED at all times of day, predominantly during the late morning and early afternoon hours (Figure 2).

Table 1 provides basic characteristics of the dental patients presenting to this ED. There was a nearly even distribution of male and female patients (52% were male). Approximately 60% of the patients were African American. The average age of ED dental patients was 32 ± 13 years. The proportion of patients lacking health insurance was greater among ED patients with dental complaints than among general ED patients (61% versus 22%, $P < 0.001$). The propor-

TABLE 1.
Characteristics of Emergency Department (ED) Patients with Dental Complaints

Characteristics	Patients, No. (%) (n = 760)
Sex	
Male	394 (52%)
Female	366 (48%)
Age group, y	
0-9	34 (4%)
10-19	35 (5%)
20-29	288 (38%)
30-39	197 (26%)
40-49	126 (17%)
50-59	61 (8%)
≥60	19 (2%)
Race (on triage report)	
Black	477 (60%)
White	234 (31%)
Other	49 (6%)
Health insurance status	
Private health insurance	82 (11%)
Medicare	41 (5%)
Medicaid	166 (22%)
Uninsured/self pay	464 (61%)
Other	5 (<1%)
Unknown	2 (<1%)
Number of dental ED visits	
1	627 (79%)
2	79 (10%)
3	24 (3%)
4	14 (2%)
5	7 (1%)
≥6	9 (1%)

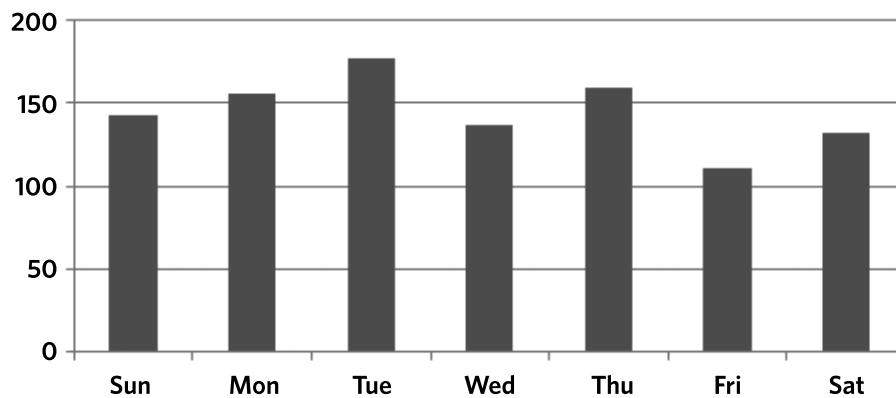
Note. These 760 patients were seen for dental complaints in the ED of a major urban teaching hospital, some of them on more than 1 occasion, between July 1, 2010 and June 30, 2011.

tion of patients covered by Medicaid was about the same for both groups (22%), but the proportion of patients covered by Medicare was significantly lower among dental ED patients than among the general ED population (5% versus 25%, $P < 0.001$). Finally, 11% of the dental ED patients had private medical insurance.

Table 2 summarizes the evaluation, treatment, and disposition of dental patients in the ED. Of the 1,013 dental visits to the ED during the study period, 46 (4.5%) ended with the patient leaving the ED before receiving evaluation and treatment. Of the 967 visits on which the patient stayed for treatment, only 4 (0.4%) resulted in admission to the hospital for inpatient management. On 18 visits (1.9%), the patient was sent from the ED to a short-stay observation unit for less than 24 hours. On the vast majority of visits (942), the patient was treated in the ED and discharged.

ED treatment consisted primarily of pain management

FIGURE 1.
Emergency Department Visits for Dental Complaints, by Day of Week



Note. Data are for 1,013 visits to the emergency department of a major urban teaching hospital for dental complaints between July 1, 2010, and June 30, 2011.

and infection control. Only 4% of visits included a radiological study in the ED, and only 6% of visits included a blood draw for laboratory studies. Dental procedures were performed during only 10% of the ED visits.

Although many ED visits included the administration of nonopioid pain medication, about half of ED dental visits also included intravenous or oral administration of opioid pain medication. Most patients did not receive antibiotics in the ED as part of their visit. However, a large majority of ED dental visits resulted in outpatient prescriptions for oral opioid pain medication, oral antibiotics, or both.

For the 10% of visits that were abstracted by more than 1 rater, interrater agreement was calculated for the manually abstracted items. For "discharge medication" and "procedure in ED," interrater kappa was 0.95, and for "opiates in the ED" and "opiate prescription given," interrater kappa was 0.97, indicating a high level of agreement.

Discussion

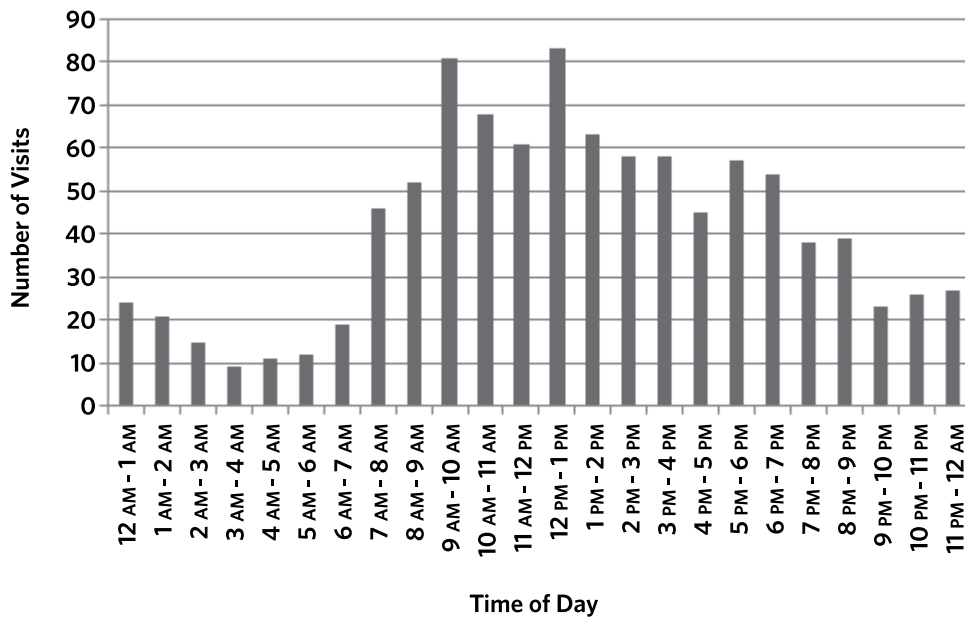
The reasons for patient visits to the ED for nontraumatic dental pain are complex. Multiple contributing factors have been proposed, including a lack of after-hours and weekend coverage for dental care. A previous study found that in contrast to their general population, 36.2% of ED dental visits occurred on the weekend and another 39.3% occurred after hours on a weekday [2]. In our study we found that dental patients were presenting in a pattern that is similar to the pattern for all visitors to the ED, and that weekend and after-hours visits were less common. We found no evidence that patients were presenting primarily at times when most dental offices are closed.

Another claim is that many dental ED patients do not have insurance and cannot afford to pay out of pocket for acute dental care. Behavioral Risk Factor Surveillance System data for 1995 indicated that 44% of Americans lacked den-

tal insurance and had significant difficulty accessing dental care [10]. Census data shows that the number of uninsured people in North Carolina has risen from 12% in 1999 to 17% in 2010 [11]. Because the number of uninsured patients has increased, it follows that the number of those without dental insurance would also be higher. Previous studies have shown that uninsured and Medicaid patients were more likely to utilize the ED for dental complaints than were patients with insurance [2]. Our study found that 61% of patients with dental complaints are self-pay patients. This is dramatically higher than our self-pay population that was noted to be 22% for all patient ED visits regardless of complaint. We found that dental ED patients were no more likely than all ED patients to have Medicaid coverage (22% of each group was covered) but were less likely to have Medicare coverage (5% vs. 25%). This study clearly highlights that lack of insurance is one of the most compelling reasons that many dental patients are visiting the ED. If they cannot afford acute dental care, then they are likely not getting routine preventive care, exposing them to risk for much greater long-term dental and health complications. Previous studies have shown that ED dental visits were more common in single-parent families, the poor, and minority groups [6, 12]. Our finding that 60% of all dental ED visits were made by African-American patients warrants further investigation.

North Carolina has been considering limiting or eliminating Medicaid dental coverage for adults as it attempts to balance its health care budget [13]. Medicaid is required by federal law to provide dental coverage for children; however, adult coverage is not guaranteed. In 2007, 6 states had no dental coverage for adult Medicaid patients, 16 had emergency-only coverage, and 13 had coverage that excluded at least 1 category of service. Only 16 states, including North Carolina, had all-service dental coverage for Medicaid patients [14]. In the event that North Carolina removes den-

FIGURE 2.
Emergency Department Visits for Dental Complaints, by Time of Day



Note. Data are for 1,013 visits to the emergency department of a major urban teaching hospital for dental complaints between July 1, 2010, and June 30, 2011.

tal coverage from the coverage agreement, then all of the state's Medicaid patients will become self-pay patients for their dental coverage. This would likely result in diminished preventive dental care, which would in turn result in an increased frequency of ED visits, dental complaints of higher complexity, and more dental complications.

Preventive dentistry could eliminate many ED visits for dental complaints and the sorts of dental complications that lead to hospital admission. Admissions for dental complaints are extremely costly [15], and most such admissions are preventable. Our study confirmed previously reported data indicating that the relative acuity of this population is very low [2]; the inpatient admission rate for the patients with dental complaints in our study was less than 1%, and only 1.9% of patients were sent to the observation unit. The ED is an appropriate place for triage, diagnosis, stabilization, basic treatment, and after-hours care. In most instances, definitive care was not provided during ED dental visits; the majority of care involved the provision of analgesia and antibiotics; procedures, ancillary studies, and imaging were seldom performed.

Prescription drug abuse is increasing [16], and some patients may be using dental complaints to obtain opioids. Previous research has shown that dental patients presenting to the ED are more likely to receive pain medication than is the average patient who visits the ED: in one study, 72.4% received some analgesic and 37.8% received some form of an opioid [2]. In our study, 48% of patients received a dose of opioid in the ED, and 81% received an opioid prescription.

A majority of patients in our study (627) visited the ED just once during this 12-month period for a dental complaint. However, recurrent utilization of the ED for dental complaints is becoming more pronounced, and it has become difficult to determine whether patients are returning because they cannot procure dental care elsewhere or whether they are experiencing some sort of secondary gain. In our study, 133 patients had multiple visits, for a total of 386 encounters. One of these patients accounted for 8 visits, and another had 12 visits for the same complaint. We did not try to determine whether these frequent visitors also had pain-related visits for nondental complaints, although North Carolina does have a controlled substances reporting system (<http://www.ncdhhs.gov/mhddsas/controlledsubstance/>) that can identify patients receiving a large number of opiate prescriptions.

We would like to acknowledge the limitations of our study. The most important is that this was a retrospective, descriptive study looking only at a 12-month period; it did not incorporate follow-up. And the results for an ED in an urban academic health center without an affiliated dental school may not be representative of what is happening at other EDs within North Carolina or beyond. However, our results resemble previously reported data for both dental-related complaints in the ED and insurance status patients making ED dental visits. Another limitation is that our investigation relied on a large database, and it is possible that some procedures, diagnoses, and end points were miscoded. For this reason we included both triage impressions as well as final

TABLE 2.
Evaluation, Treatment, and Disposition of
Patients Visiting the Emergency Department
(ED) for Dental Complaints

Component of Care	Visits, No. (%) (n = 967) ^a
Evaluation^b	
History and physical exam only	886 (92%)
Radiology studies	42 (4%)
Laboratory studies	61 (6%)
Treatment	
Procedures^b	
Dental block	59 (6%)
Incision and drainage	37 (4%)
Cavity/socket packing	5 (<1%)
Other	1 (<1%)
None	869 (90%)
Oral/IV medication^c	
Opioid pain medication	468 (48%)
Nonopioid pain medication	150 (16%)
Antibiotic	230 (24%)
None	348 (36%)
Disposition	
Admission to hospital	4 (<1%)
Observation unit	18 (2%)
Discharge	942 (97%)
Other	3 (<1%)
Outpatient prescriptions^c	
Opioid pain medication	779 (81%)
Antibiotic	665 (69%)
Neither	87 (9%)

^aThere were 1,013 visits made to this major urban teaching hospital ED for dental complaints between July 1, 2010, and June 30, 2011; however, 46 patients left the ED before they were seen by a provider and thus are not included in this summary.

^bNumbers do not add up to 967 because some patients underwent both radiology studies and laboratory studies.

^cNumbers do not add up to 967 because some patients were given or prescribed both opioid pain medication and an antibiotic.

ICD-9 codes in our query. In addition, because multiple individuals performed data abstraction, it is possible that there was interobserver variability, even though the kappa statistic for the manually abstracted items was high and abstraction was based on sound methodology as outlined by Gilbert and Lowenstein [17].

In conclusion, our findings may have important health care and health policy implications. It can be stated with confidence that the number of patients with dental-related complaints seen in the ED could be dramatically reduced if more affordable and accessible dental care were available. This and other studies have shown that patients seek acute dental care in the ED despite the unavailability of definitive care there. Although emergency physicians continue to provide appropriate safety net care—initial evaluations that exclude more severe conditions, pain control, and infection

treatment—definitive care is seldom provided. It is clear that patients deserve more cost-effective therapies for acute dental-related complaints, including preventive and definitive care. *NCMJ*

Michael B. Hocker, MD, MHS associate professor and chief, Division of Emergency Medicine, Department of Surgery, Duke University Medical Center, Durham, North Carolina.

John J. Villani, MD, PhD assistant professor, and assistant medical director, Division of Emergency Medicine, Department of Surgery, Duke University Medical Center, Durham, North Carolina.

Joseph B. Borawski, MD chief resident, Division of Emergency Medicine, Department of Surgery, Duke University Medical Center, Durham, North Carolina.

Christopher S. Evans, DO resident, Division of Emergency Medicine, Department of Surgery, Duke University Medical Center, Durham, North Carolina.

Scott M. Nelson, MD chief resident, Division of Emergency Medicine, Department of Surgery, Duke University Medical Center, Durham, North Carolina.

Charles J. Gerardo, MD associate professor and vice chief, Division of Emergency Medicine, Department of Surgery, Duke University Medical Center, Durham, North Carolina.

Alex T. Limkakeng, MD assistant professor and research director, Division of Emergency Medicine, Department of Surgery, Duke University Medical Center, Durham, North Carolina.

Acknowledgments

We would like to thank Sandi Williams, David Massung, and Kimberly Brown for their assistance in the preparation of this manuscript and Kraig Delana for helping with data abstraction; in addition, we would like to thank the Duke University Research on Research group (www.researchonresearch.org) and the Duke University Medical Center Performances Services group.

Potential conflicts of interest. All authors have no relevant conflicts of interest.

References

- Nalliah RP, Allareddy V, Elangovan S, Karimbux N, Allareddy V. Hospital based emergency department visits attributed to dental caries in the United States in 2006. *J Evid Based Dent Pract.* 2010;10(4):212-222.
- Lewis C, Lynch H, Johnston B. Dental complaints in emergency departments. A national perspective. *Ann Emerg Med.* 2003;42:93-99.
- Mueller CD, Schur CL, Paramore LC. Access to dental care in the United States. *J Am Dent Assoc.* 1998;129(4):429-437.
- Edelstein BL. Public and clinical policy considerations in maximizing children's oral health. *Pediatr Clin North Am.* 2000;47(5):1177-1189, vii.
- Ku L, Ross DC, Nathanson M. State Medicaid cutbacks and the federal role in providing fiscal relief to states. Center on Budget and Policy Priorities Web Site. August 2, 2002. <http://www.cbpp.org/7-12-02health.htm>. Accessed Nov 1, 2011.
- Cohen LA, Manski RJ, Magder LS, Mullins CD. Dental visits to hospital emergency departments by adults receiving Medicaid: assessing their use. *J Am Dent Assoc.* 2002;133(6):715-724.
- Oral Health in America: A Report of the Surgeon General. Rockville, MD: US Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health; 2000. <http://profiles.nlm.nih.gov/ps/access/NNBBJT.pdf>. Accessed July 31, 2012.
- Randolph JJ. Free-marginal multirater kappa: an alternative to Fleiss' fixed-marginal multirater kappa. Paper presented at: Joensuu University Learning and Instruction Symposium 2005; October 14-15, 2005; Joensuu, Finland. ERIC Document Reproduction Service No. ED490661. <http://www.eric.ed.gov/PDFS/ED490661.pdf>. Accessed July 31, 2012.
- Randolph JJ. Online Kappa Calculator. 2008. <http://justus.randolph.name/kappa>. Accessed April 24, 2012.
- Dental service use and dental insurance coverage—United States, Behavioral Risk Factor Surveillance System, 1995. *MMWR Morb*

Mortal Wkly Rep. 1997;46(50):1199-1203. <http://www.cdc.gov/mmwr/preview/mmwrhtml/00050448.htm>. Accessed July 31, 2012.

11. United State Census Bureau. Health Insurance Coverage Status and Type of Coverage by State-All Persons: 1999 to 2010. HIB-4. Health Insurance Historical Tables-HIB Series. http://www.census.gov/hhes/www/hlthins/data/historical/HIB_tables.html. Accessed August 30, 2012.
12. Cohen LA, Manski RJ, Hooper FJ. Does the elimination of Medicaid reimbursement affect the frequency of emergency department dental visits? J Am Dent Assoc. 1996;127(5):605-609.
13. Casey M. NC Medicaid Dental Program: Impact of Policy on Dental Care. Presented to: North Carolina Institute of Medicine Health Professional Workforce Workgroup; April 26, 2011; Morrisville, NC. http://www.nciom.org/wp-content/uploads/2010/12/Casey_4-26-11.pdf. Accessed August 2, 2012.
14. McGinn-Shapiro M. Medicaid coverage of adult dental services. State Health Policy Monitor. 2008;2(2):1-6. <http://www.nashp.org/sites/default/files/Adult%20Dental%20Monitor.pdf>. Accessed August 2, 2012.
15. Pettinato ES, Webb MD, Seale NS. A comparison of Medicaid reimbursement for non-definitive pediatric dental treatment in the emergency room versus periodic preventive care. Pediatr Dent. 2000;22(6):463-468.
16. Prescription Drugs: Abuse and Addiction. National Institute on Drug Abuse Research Report Series. Washington, DC: National Institutes of Health; revised 2011. NIH Pub. No. 11-4881. <http://www.drugabuse.gov/sites/default/files/rprprescription.pdf>. Accessed August 2, 2012.
17. Gilbert EH, Lowenstein SR, Koziol-McLain J, Barta DC, Steiner J: Chart reviews in emergency medicine research: where are the methods? Ann Emerg Med. 1996;27(3):305-308.



Kids will spend 8 minutes decorating their little brother.

How about two minutes to brush their teeth?

Brushing for two minutes now can save your child from severe tooth pain later. Two minutes, twice a day. They have the time. For fun, 2-minute videos to watch while brushing, go to 2min2x.org.



Ad Council PARTNERSHIP FOR **Healthy Mouths Healthy Lives**
©2012 Healthy Mouths, Healthy Lives