



COVER STORY

Hospital-based emergency department visits involving dental conditions

Profile and predictors of poor outcomes and resource utilization

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Dental conditions such as dental caries, pulpal lesions and gingival or periodontal conditions are treated routinely in dental office settings. When neglected, these minor localized infections can progress to form cellulitis or systemic infection and even could result in mortality.¹⁻⁴ Most of these dental conditions could be avoided altogether or minimized by periodic receipt of preventive oral health care, maintenance of good oral hygiene and adoption of optimal dietary habits.⁵⁻⁸ Limitations in or lack of financial resources, geographical barriers to accessing dental clinics, and limitations in or lack of oral health care literacy could preclude people from seeking periodic dental care and lead to worsening oral health status.⁹⁻¹² Results of existing research have shown that about 4.3 percent of all hospital emergency department (ED) visits annually were of dental origin.¹³ Research results suggest that 90 percent of dental-care-related ED visits do not result in performance of dental procedures, and most patients are treated with prescription medication.¹³ Additionally, evidence shows that care provided in hospital settings is less effective in managing oral health complaints and therefore could represent a highly inefficient use of limited hospital resources.^{14,15} People without health insurance and those with

ABSTRACT

Background. Untreated dental conditions may progress to lesions that are severe enough to necessitate emergency visits to hospitals. The authors conducted a study to investigate nationally representative trends in U.S. hospital-based emergency department (ED) visits involving dental conditions and to examine patient-related characteristics associated with ED charges.

Methods. The authors used the Nationwide Emergency Department Sample of the Healthcare Cost and Utilization Project, sponsored by the Agency for Healthcare Research and Quality, for the years 2008 through 2010. They selected all ED visits involving patients with a diagnosis of either dental caries, pulpal or periapical lesions, gingival or periodontal conditions, or mouth cellulitis or abscess. Outcomes examined included post-ED disposition status and hospital ED charges.

Results. During the study period, 4,049,361 ED visits involved diagnosis of a dental condition, which is about 1 percent of all ED visits occurring in the entire United States. Uninsured patients made about 40.5 percent of all dental condition-related ED visits. One hundred one patients in the study died in EDs. The mean hospital ED charge per visit was approximately \$760 (adjusted to 2010 dollars), and the total ED charges across the entire United States during the three-year study period was \$2.7 billion.

Conclusions. Patients without insurance are a cohort at high risk of seeking dental care in hospital-based ED settings. A substantial amount of hospital resources are used to treat dental conditions in ED settings. Patients with mouth cellulitis, periodontal conditions and numerous comorbidities are likely to incur higher ED charges.

Practical Implications. Dental conditions can be treated more effectively in a dental office setting than in hospital-based settings.

Key Words. Dental emergencies; access to care; hospital costs.

JADA 2014;145(4):331-337.

doi:10.14219/jada.2014.7

those with government-funded insurance tend to use hospital EDs to seek primary dental care.^{16,17}

With this in mind, we undertook a study to identify nationally representative trends in hospital-based ED visits by patients who have dental conditions. We estimated the use of resources in treating dental conditions on an emergency basis within hospital settings. We hypothesized that resource utilization in hospital-based ED settings is based on a multitude of patient-related factors, including older age, severity of dental conditions and presence of comorbid conditions. In this study, we examined the effect of these factors on hospital ED charges. A secondary aim was to examine the profiles of patients who are likely to experience an extreme adverse event such as death in the ED setting.

METHODS

Description of database. We used the Nationwide Emergency Department Sample (NEDS) for the years 2008 through 2010.¹⁸ The NEDS, sponsored by the Agency for Healthcare Research and Quality (AHRQ) through its Healthcare Cost and Utilization Project,¹⁸ is the largest all-payer hospital-based ED database that is publicly available. The NEDS provides information regarding several types of variables: patient level (age, sex, insurance status, diagnosed conditions, disposition status and comorbid conditions), hospital level (location, geographical region and teaching status), outcomes related (charges and length of stay) and community level (patients' household income levels according to ZIP code).¹⁸

Institutional review board. The corresponding author obtained the NEDS databases after completing the data-user agreement. As per the data-user agreement with AHRQ, we do not present individual item counts of 10 or fewer in this report so as to preserve patient confidentiality. We submitted the proposal for the study to the institutional review board (IRB) of the College of Dentistry at The University of Iowa, Iowa City. The review board designated the study to be exempt from IRB review.

Case selections and outcomes. We selected all hospital-based ED visits involving patients with a diagnosis of dental caries, pulpal or periapical lesions, gingival conditions, periodontal conditions, and mouth cellulitis or abscess on the basis of International Classification of Diseases, Ninth Revision, Clinical Modification¹⁹ (ICD-9-CM) codes. The ICD-9-CM codes used were dental caries (ICD-9-CM codes 521.00, 521.01, 521.02, 521.03, 521.04, 521.05, 521.06, 521.07, 521.08 and 521.09), pulpal or periapical lesions (ICD-9-CM codes 522.0, 522.1, 522.2, 522.3, 522.4, 522.5, 522.6, 522.7, 522.8 and 522.9), gingival or periodontal conditions (ICD-9-CM codes 523.00, 523.01, 523.10, 523.11, 523.20, 523.21, 523.22, 523.23, 523.24, 523.25, 523.3, 523.30, 523.31, 523.32, 523.33, 523.40, 523.41, 523.42, 523.5, 523.6, 523.8 and 523.9),

and mouth cellulitis or abscess (ICD-9-CM code 528.3). The NEDS databases have 15 diagnosis fields for each ED visit. Dental conditions were queried in all 15 diagnosis fields and selected for analysis. The NEDS database does not provide information regarding the reason for an ED visit. Therefore, we were unable to use only the primary diagnosis to identify patients with dental conditions, and so we used all 15 available diagnosis fields to identify dental conditions. We examined demographic variables—including age, sex, insurance status and annual household income levels—for the patients who made the ED visits. "Insurance status" refers specifically to medical insurance and reflects the primary payer listed for each ED visit. Patients had medical insurance coverage through Medicare, Medicaid, private insurance plans or other insurance plans. The NEDS database does not provide information about availability about dental insurance coverage.

The primary outcome variable of interest was hospital ED charges. We adjusted all hospital ED charges for inflation to dollar values for 2010.²⁰ We conducted a subset analysis of all patients who died in the ED and examined characteristics in this cohort. We computed comorbid burden by using the Charlson comorbidity severity index.²¹ This index is a weighted index that takes into account the number and the seriousness of comorbid conditions in hospitalized patients.²¹ The chronic conditions included in the index are myocardial infarction, congestive heart failure, peripheral vascular disease, cerebrovascular disease, dementia, chronic pulmonary disease, connective tissue disease, ulcer, liver disease, diabetes, hemiplegia, renal disease, tumors, metastatic solid tumors and AIDS. A score of 0 is assigned to patients with none of these comorbid conditions and a numerical weighted score is assigned to those with one or more of these conditions.²¹ The Charlson comorbidity severity index is a validated measure that has been used widely to estimate comorbid burden by means of large secondary hospital discharge data sets.²¹⁻²⁴

Statistical approach. We used descriptive statistics to summarize the characteristics of ED visits and computed total ED charges. The unit of analysis was each individual ED visit. We computed all estimates to be nationally representative by using the discharge weight variable assigned for each visit. We used a multivariate linear regression model to examine the effect of patient-related characteristics (age, sex, insurance status and Charlson comorbidity severity index scores) on hospital ED charges. We computed estimates for each level of patient characteristic. We computed error terms by us-

ABBREVIATION KEY. AHRQ: Agency for Healthcare Research and Quality. ED: Emergency department. ICD-9-CM: International Classification of Diseases, Ninth Revision, Clinical Modification. IRB: Institutional review board. NEDS: Nationwide Emergency Department Sample.

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