

Trends in dental-related use of hospital emergency departments in Florida

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Abstract

Objectives: The inability to access regular dental care may lead to care seeking at hospital emergency departments (EDs). However, EDs generally are not equipped or staffed to provide definitive dental services. This study examined trends and patterns of hospital ED use for dental-related reasons in Florida, a large, diverse state with serious barriers to accessing dental care.

Methods: Data for this study were drawn from ambulatory ED discharge records compiled by Florida's Agency for Health Care Administration for 2005-2014. Visits for dental-related reasons in Florida were defined by the patient's reported reason for seeking care or the ED physician's primary diagnosis using ICD-9-CM codes. We calculated frequencies, age-specific and age-adjusted rates per 100,000 population, and secular trends in dental-related ED visits and their associated charges.

Results: The number of dental-related visits to Florida EDs increased each year, from 104,642 in 2005 to 163,900 in 2014; the age-adjusted rate increased by 43.6 percent. Total charges for dental-related ED visits in Florida increased more than threefold during this time period, from \$47.7 million in 2005 to \$193.4 million in 2014 (adjusted for inflation). The primary payers for dental-related ED visits in 2014 were Medicaid (38 percent), self-pay (38 percent), commercial insurance (11 percent), Medicare (8 percent), and other (5 percent).

Conclusions: Dental-related visits to hospital EDs in Florida have increased substantially during the past decade, as have their associated charges. Most patients did not receive definitive oral health care in EDs, and this trend represents an increasingly inefficient use of health care system resources.

Introduction

The inability to access periodic, regular dental care due to financial, geographic, cultural, or attitudinal barriers may lead to poor oral health outcomes (1). Those outcomes frequently include acute pain and infection, leading individuals to seek care at one of the few facilities accessible to them: the local hospital emergency department (ED). However, EDs generally are not equipped or staffed to provide definitive dental services, and most patients attending for a dental complaint receive only temporary palliative care in the form of analgesics and antibiotics (2). The cost of palliative dental care delivered in EDs is relatively high, with a national average of about

\$760 per visit in 2008-2010 (3), and is not an effective use of societal resources from health outcomes or cost perspectives.

For several reasons, the state of Florida provides a particularly poignant example when examining local hospital ED use for dental problems. Presently, Florida is the nation's third largest state and, with nearly 20 million residents, it represents about 1 in 16 Americans. Florida has the nation's oldest age distribution, with persons aged 65 years or older comprising 18.7 percent of the population (4). It is also one of the most ethnically and racially diverse states in the union, with Hispanics/Latinos, blacks/African Americans, and Asians comprising about 44 percent of Florida's population. An

estimated 16.3 percent of Florida residents live below the federal poverty level. Access to dental services is a significant challenge in Florida. For enrolled adults, Florida's Medicaid program provides only emergency services (generally limited to tooth extraction or incision and drainage of an abscess), dentures, and limited denture-related services (5). Florida has one of the nation's lowest Medicaid reimbursement rates relative to private fees; the fee-for-service rate in 2014 was 36.6 percent of commercial insurance charges in the state, ranking Florida as 43rd among the 50 states and the District of Columbia (6). Due in part to that reimbursement rate, the state's Medicaid dental program has the nation's lowest rate of dentist participation: as of July 9, 2014, there were 831 dentists enrolled as Medicaid dental providers in the state (7), or about 8 percent of the 10,800 professionally active dentists in the state (8). In comparison, 35 percent of dentists nationally reported having patients covered by public assistance (9). As of August 5, 2015, Florida had 223 dental care health professional shortage areas (DHPSAs); to remove these DHPSA designations, the state requires an additional 849 dentists (10). That is, by far, the greatest projected shortfall of dentists among the states; the next highest, Arizona, needs 425 dentists to remove its DHPSA designations (10).

In light of challenges that persons in Florida might experience in seeking dental care, this study examined the trends and patterns of use of the state's hospital EDs for dental-related problems. Earlier reports have described a national increase in ED use for dental problems, while others have reported cross-sectional information from state-based or local data or trend data for young children (11-19); there is little research on state-specific trend analyses or population-based visit rates for dental problems. This is an important research gap because states vary significantly in their care delivery systems and resources that influence ED use for dental problems, such as the scope of Medicaid dental benefits for adults, Medicaid participation by dentists, demographic characteristics, and socioeconomic conditions. State-specific trends may be more useful than national trends in identifying and evaluating policies and workforce interventions that are most likely to be implemented at the state level. At the time of this submission, this is the first detailed trend analysis of dental-related ED use within a state, particularly one characterized by a large and demographically diverse population, low rates of provider participation in Medicaid, minimal coverage for adult Medicaid services, and many dental health provider shortage areas.

Methods

Data sources

Data on use of hospital EDs were derived from quarterly datasets of ambulatory ED discharge records compiled by

Florida's Agency for Health Care Administration (AHCA), the state's primary health policy and planning entity. The data include all ED visits in Florida in which ED registration occurs. These data have been collected by AHCA since the beginning of 2005 and undergo certification and auditing procedures (20). The dataset includes patient demographic characteristics such as sex, age, race/ethnicity, and county of residence; principal payer for the ED services rendered; and characteristics of the medical condition that led to the ED visit. The latter includes the patient's self-reported reason for the visit (admitting diagnosis), the principal diagnosis made by the provider, and up to nine secondary diagnoses, all reported as ICD-9-CM codes. The dataset also includes up to five evaluation and management codes for each patient and up to 30 current procedural terminology (CPT) or healthcare common procedure coding system (HCPCS) codes for other services rendered during that ED visit. Total charges for the ED visit are recorded in the dataset along with charges for a wide range of component services, including pharmacy, laboratory, radiology, medical supplies, and emergency room use among others.

In order to calculate crude and age group-specific rates of ED visits, we used midyear population estimates for the state of Florida for 2005-2014 developed by the US Census Bureau. Population estimates for 2005-2009 were based on intercensal estimates published in October 2012 (21). Estimates for 2010-2014 were derived from the vintage 2014 estimates for the state of Florida produced by the US Census Bureau (22).

Definition of "dental-related ED visit"

Because physician diagnoses alone may underestimate the frequency of ED encounters for dental conditions, our operational definition of an ED visit due to a dental-related reason was based on the patient's reported reason for seeking care (admitting diagnosis) *or* the physician's primary diagnosis of the problem. That is, we defined the ED visit as being for a dental problem if the admitting diagnosis *or* primary diagnosis was coded as one of the following ICD-9-CM codes: 520 – 526.9, 528 – 528.9, 784.92, V52.3, V53.4, V58.5, or V72.2. These codes are identical to those used in a recent analysis of national ED data by the American Dental Association (23).

Analysis

Applying our operational definition, we calculated the frequency of dental-related ED visits in Florida for each year, 2005 through 2014, overall and by age group. We then calculated crude, age-specific, and age-adjusted rates for each year. The crude rate of dental-related ED visits was calculated as the total number of dental-related ED visits that occurred during a calendar year, divided by the estimated July 1 population of Florida for that year, multiplied by 100,000, and expressed as the annual rate per 100,000 population.

Table 1 Number of Dental-Related* Visits to Hospital Emergency Departments, by Age. Florida, 2005-2014

Year	Age (y)											Total visits	Florida population†
	<1	1-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	≥85		
2005	1,195	4,469	4,848	25,563	32,242	19,732	10,561	3,435	1,414	910	277	104,646	17,842,038
2006	1,248	4,623	4,947	27,426	34,602	20,533	11,166	3,488	1,599	971	320	110,923	18,166,990
2007	1,313	4,880	5,350	27,944	38,012	21,230	12,432	3,902	1,714	962	331	118,070	18,367,842
2008	1,407	5,079	5,606	29,219	41,181	22,130	13,339	4,352	1,754	998	375	125,440	18,527,305
2009	1,487	5,520	5,787	30,509	43,998	23,044	14,777	5,052	1,896	1,071	426	133,567	18,652,644
2010	1,375	5,557	5,937	30,745	45,373	23,158	15,468	5,429	2,089	1,034	449	136,614	18,852,220
2011	1,443	5,941	6,401	31,330	48,451	24,637	16,615	6,339	2,286	1,125	458	145,026	19,107,900
2012	1,548	5,448	6,952	30,941	49,888	25,122	16,604	6,858	2,657	1,265	546	147,829	19,355,257
2013	1,611	6,467	7,782	30,801	52,598	26,083	16,548	7,374	2,817	1,282	528	153,891	19,600,311
2014	1,489	6,394	8,260	31,366	57,143	28,201	17,486	8,220	3,181	1,511	655	163,906	19,893,297
Percent change, 2005-2014	+24.6%	+43.1%	+70.4%	+22.7%	+77.2%	+42.9%	+65.6	+139.3%	+125.0%	+66.0%	+136.5%	+56.6%	+11.5%

*Reason for visit or primary diagnosis ICD-9-CM codes 520 – 526.9, 528 – 528.9, 784.92, V52.3, V53.4, V58.5, or V72.2.

†Based on July 1 estimates (Refs. 21 and 22).

Age-specific rates were calculated as the number of dental-related ED visits that occurred within one of 11 age groups during a calendar year, divided by the estimated July 1 population for that age group in Florida for that year, and multiplied by 100,000. To compare rates across years, we used the direct method to calculate age-adjusted rates. Age-adjusted rates were calculated by weighting the age-specific rates for each calendar year to the age distribution of the year 2000 US standard population in 11 age groups (24). We used the Joinpoint software version 4.1.1.5 (25) to conduct time trend analysis of the age-adjusted ED rates, taking into account the autocorrelation of the time series data. That software was used to test whether an apparent change in trend over time was statistically significant and to estimate the average annual percent change (APC) within each segment of the trend line. Autocorrelation refers to the correlation of a time series with its own past and future values: data from the same source

such as utilization rates from the same state over time are not truly independent observations and trend analysis should account for the correlated nature of those observations. We used a threshold of $P < 0.05$ to assess the statistical significance of the calculated APC under the null hypothesis that $APC = 0$.

We calculated total, mean, and median charges for dental-related ED visits for each year based on total charges reported in the discharge data. To allow comparisons across time, we also calculated charges in 2005 dollars across the nine years of data collection by applying the consumer price index inflation calculator developed by the Bureau of Labor Statistics (26).

Descriptive analysis was conducted for selected demographic, payer, and visit characteristics for patients receiving care in Florida EDs for the most recent year of data collection.

This study was approved by our institution’s Institutional Review Board (protocol IRB201400377). A data use

Table 2 Age-Specific, Crude, and Age-Adjusted* Rates† of Dental-Related Emergency Department Visits. Florida, 2005-2014

Year	Age (y)											Crude	Age-adjusted
	<1	1-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	≥85		
2005	552.53	523.51	213.47	1,099.96	1,486.31	771.00	424.28	173.78	96.80	79.63	67.62	586.49	630.44
2006	562.76	537.91	215.43	1,159.03	1,557.32	807.01	437.70	168.69	105.65	84.45	73.98	610.57	657.60
2007	584.03	566.50	231.27	1,163.64	1,682.53	840.65	477.84	181.95	110.81	83.60	73.51	642.78	691.72
2008	633.35	588.24	243.06	1,212.30	1,812.37	891.75	507.62	197.92	112.01	86.90	76.60	677.04	733.67
2009	703.51	636.35	252.24	1,262.92	1,928.60	946.96	557.16	224.15	119.68	93.83	83.32	716.06	780.28
2010	653.02	643.45	268.61	1,249.32	1,971.68	954.59	563.29	230.61	120.08	93.89	102.31	724.65	789.27
2011	674.96	689.11	288.56	1,260.95	2,056.82	1,021.09	601.55	259.88	128.60	100.85	98.19	758.98	827.49
2012	720.79	631.86	311.02	1,241.13	2,070.60	1,042.84	603.16	278.13	140.36	111.58	112.15	763.76	834.17
2013	753.20	750.12	345.61	1,234.11	2,134.54	1,081.36	603.79	293.74	141.73	110.85	104.30	785.12	861.53
2014	691.74	735.71	364.81	1,260.48	2,256.66	1,164.31	638.85	319.38	152.73	127.34	125.41	823.90	905.14
Percent change, 2005-2014	+25.2%	+40.5%	+70.9%	+14.6%	+51.8%	+51.0%	+50.6%	+83.8%	+57.8%	+59.9%	+85.6%	+40.5%	+43.6%

*Adjusted to the 2000 US standard population, in 11 age groups as shown in table.

†Rates per 100,000 population, based on US Census Bureau estimates for the State of Florida.

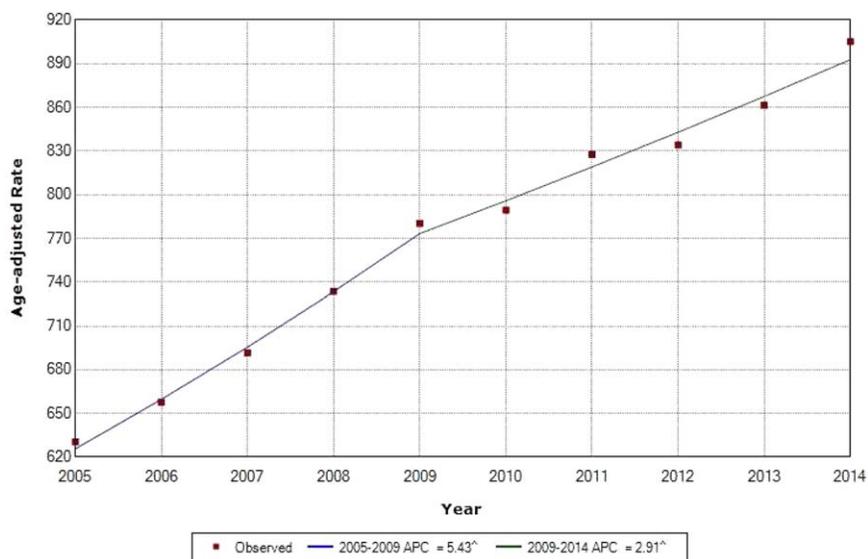


Figure 1 Age-adjusted annual rate of emergency department visits for dental-related reasons. Florida, 2005-2014. The Average Percent Change (APC) is significantly different from zero at alpha = 0.05.

agreement was signed with the Florida Agency for Health Care Administration.

Results

The number of dental-related visits to Florida EDs increased each year, from 104,646 in 2005 to 163,906 in 2014 (Table 1). The number of visits increased within all age groups during that time period. Throughout that time period, ED visits by persons aged 25-34 years comprised a larger proportion of all dental-related visits than any other age group, accounting for about one-third of visits in any given year.

The rate of dental-related ED visits generally increased within every age group during the 2005-2014 time period

(Table 2). The crude annual rate of dental-related ED visits increased each year, from 586.49 per 100,000 population to 823.90 per 100,000, a 40.5 percent increase. Age-adjusted rates followed the same pattern, increasing by 43.6 percent from 2005 to 2014.

Trend analysis revealed that the observed age-adjusted rates of dental-related ED visits increased significantly during 2005-2014 (Figure 1). The data were best fit by two slopes, both of which indicated statistically significant positive trends in age-adjusted rates. There was an average annual increase of 5.43 percent from 2005 to 2009 ($P = 0.000022$), and an average annual increase of 2.91 percent in 2009 to 2014 ($P = 0.000062$).

Dental-related ED visits increased as a percentage of all ED visits in Florida from 1.8 percent in 2005 to 2.0 percent in

Table 3 Mean, Median, and Total Charges for Dental-Related Emergency Department Visits, in Current-Year Dollars and in 2005 Dollars*. Florida, 2005-2014

Year	Dental-related emergency department visits	Mean charge (sem) (\$)	Median charge (\$)	Total charges (\$)	Total charges in 2005 dollars (\$)
2005	104,646	456.11 (2.32)	274.00	47,730,225	47,730,225
2006	110,923	516.92 (2.52)	307.00	57,338,161	55,546,340
2007	118,070	571.43 (2.83)	332.00	67,469,172	63,550,700
2008	125,440	709.19 (6.93)	385.00	88,961,114	80,696,070
2009	133,567	776.00 (3.67)	446.00	103,648,441	94,354,540
2010	136,614	864.37 (4.24)	514.00	118,084,672	105,761,530
2011	145,026	979.97 (4.36)	571.00	142,120,995	123,394,480
2012	147,829	1083.42 (4.39)	662.00	160,160,912	136,237,990
2013	153,891	1245.90 (4.96)	750.00	191,733,360	160,740,070
2014	163,906	1430.35 (5.73)	832.00	234,443,074	193,408,410

*Based on average annual Consumer Price Index developed by US Bureau of Labor Statistics (Ref. 25). SEM, standard error of the mean.

Table 4 Selected Characteristics of Persons Seeking Care for Dental Conditions in Hospital Emergency Departments, Florida, 2014

Characteristics	Number of visits	Percent
Sex		
Male	72,687	44.3
Female	91,219	55.7
Age (y)		
<1	1,489	0.9
1-4	6,394	3.9
5-14	8,260	5.0
15-24	31,366	19.1
25-34	57,143	34.9
35-44	28,201	17.2
45-54	17,486	10.7
55-64	8,220	5.0
65-74	3,181	1.9
75-84	1,511	0.9
≥85	655	0.4
Race/Ethnicity		
Hispanic/Latino	21,204	12.9
Black/African American, non-Hispanic	49,044	29.9
White, non-Hispanic	87,139	53.2
Other/unknown, non-Hispanic	6,519	4.0
Primary Payer		
Medicare/Medicare Managed Care	12,874	7.8
Medicaid/Medicaid Managed Care	63,873	39.0
Commercial Health Insurance	20,846	12.7
Self-pay	58,313	35.6
Other	8,000	4.9
TOTAL	163,906	100.0

2008, remaining fairly stable from 2009 to 2014 (data not shown).

Total charges for dental-related ED visits in Florida increased about fourfold from \$47.7 million in 2005 to \$234.4 million in 2014 (Table 3). Even when converted to 2005 dollars to account for general inflation, the total charges increased substantially during the eight-year period. The increase in total charges was driven partly by the increased number of dental-related ED visits during each year during this time period and partly by a rapidly rising cost per visit. Reflecting the right-skewed distribution of charges per visit, the mean charge always greatly exceeded the median charge. However, both measures of central tendency increased substantially from 2005 through 2014. The mean charge for a dental-related ED visit in 2014 was \$1430.35; the median charge was \$832.00. In comparison, the mean total charge for all 8.1 million ED visits in Florida in 2014 was \$4545.68; the median charge was \$2340.00.

Table 4 presents selected characteristics of persons who presented for dental-related ED visits in Florida in 2014. Substantially more visits were made by females than by males. As noted above, the age group presenting most frequently for dental-related ED visits was 25-34 years, which accounted for 34.9 percent of all such visits. About three-

quarters of visits were by individuals who were either covered by Medicaid (39.0 percent) or were self-pay (35.6 percent).

The most commonly recorded admitting diagnosis for the patient's dental-related ED visit was "unspecified disorder of the teeth and supporting structures" (ICD-9-CM code 525.9), reported for 68.2 percent of visits, followed by "other and unspecified diseases of the oral soft tissues" (528.9) (Table 5). The remainder of the top 10 admitting diagnoses each accounted for 0.7-5.2 percent of visits. The three most common primary diagnoses made by the ED physician were "unspecified disorder of the teeth and supporting structures," "dental caries, unspecified" (521.00), and "periapical abscess without sinus," which together accounted for 68.2 percent of primary diagnoses.

Table 5 Top 10 Admitting Diagnoses and Top 10 Primary Diagnoses for Dental-Related ED Visits, Florida, 2014

	Number	Percent
Admitting Diagnosis (ICD-9-CM* code)		
Unspecified disorder of the teeth and supporting structures (525.9)	111,707	68.2
Other and unspecified diseases of the oral soft tissues (528.9)	10,368	6.3
Jaw pain (784.92)	8,508	5.2
Swelling, mass, or lump in head and neck (784.2)	4,904	3.0
Periapical abscess without sinus (522.5)	4,459	2.7
Dental caries, unspecified (521.00)	3,868	2.4
Headache (784.0)	1,973	1.2
Fever, unspecified (780.60)	1,817	1.1
Oralgia (388.70)	1,301	0.8
Other specified disorders of the teeth and supporting structures (525.8)	1,153	0.7
Other	13,848	8.5
Total	163,906	100.0
Primary Diagnosis (ICD-9-CM code)		
Unspecified disorder of the teeth and supporting structures (525.9)	51,441	31.4
Dental caries, unspecified (521.00)	33,574	20.5
Periapical abscess without sinus (522.5)	26,727	16.3
Acute apical periodontitis of pulpal origin (522.4)	5,616	3.4
Open wound of tooth, without mention of complication (873.63)	3,758	2.3
Jaw pain (784.92)	3,671	2.2
Chronic gingivitis, plaque induced (523.10)	3,067	1.9
Other and unspecified diseases of the oral soft tissues (528.9)	3,041	1.9
Stomatitis and mucositis, unspecified (528.00)	2,852	1.7
Oral aphthae (528.2)	2,159	1.3
Other	28,000	17.1
Total	163,906	100.0

*International Classification of Diseases, Ninth Edition, Clinical Modification.

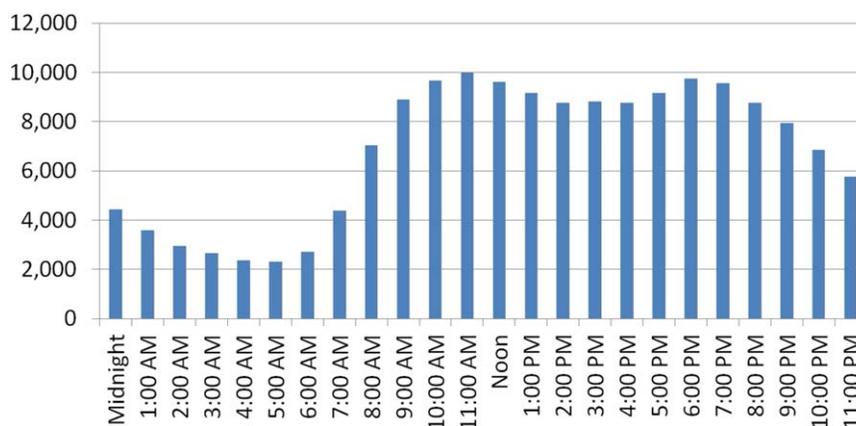


Figure 2 Dental-related emergency department visits, by arrival time. Florida, 2014.

The large majority (69.9 percent) of dental-related ED visits occurred on Monday through Friday (data not shown), although there were slightly more ED visits on Sundays in 2014 (25,366) than on other days of the week (21,843–24,566). The distribution of arrival times for dental-related ED visits is depicted in Figure 2. Dental-related ED visits were lowest at 5 am, increased sharply after 6 am, peaked at 10–11 am, declined slightly through the afternoon hours, peaked again at 6 pm, and then dropped off during the late night hours.

All dental-related visits to Florida EDs in 2014 were coded for evaluation and management; five CPT codes accounted for more than 95 percent of the visits: 99281 (ED visit for the evaluation and management that includes problem-focused history, problem-focused examination, and straightforward medical decision-making; 9.4 percent); 99282 (ED visit that includes expanded problem-focused history, expanded problem-focused examination, and medical decision making of low complexity; 33.2 percent); 99283 (ED visit that includes expanded problem-focused history, expanded problem-focused examination, and medical decision making of moderate complexity; 44.4 percent), 99284 (ED visit that includes detailed history, detailed examination, and medical decision making of moderate complexity; 7.3 percent), and 99285 (ED visit that includes comprehensive history, comprehensive examination, and medical decision-making of high complexity; 0.9 percent). In addition, 29.5 percent of the patient visits were coded for at least one additional service or procedure during the visit. More than 560 unique CPT or HCPCS codes were entered, although ten codes accounted for more than half of the services provided: five of those involved injection of local anesthesia or other substances (codes 96372, 96374, 64400, 64402, J1885). Other procedures in the top 10 included drainage of abscesses (41800), providing prescription drugs (J8499), collection of venous blood (36415), urine pregnancy test (81025), or non-covered items or services (A9270). Among patients seen for dental-related

problems, 97.5 percent were treated and released from the ED and 2.0 percent left against medical advice or discontinued care; most of the remaining 0.5 percent either were transferred for inpatient care or discharged to another type of facility. Examples of other types of facilities include rehabilitation facilities, nursing facilities, long-term care hospitals, psychiatric hospitals, hospices, and courts or law enforcement.

Discussion

Findings from this study suggest that dental-related use of hospital EDs is a large and growing occurrence in the state of Florida. The sheer volume is a cause for concern, with dental-related ED visits now exceeding 163,900 per year in the state, or about 450 visits per day, with annual charges exceeding \$234 million, or more than \$642,000 per day. The number of dental-related ED visits increased by more than 56 percent between 2005 and 2014, while the number of EDs in Florida increased by just 5 percent during that period, from 203 to 214. The net result was an increased average burden on each Florida ED to address dental-related visits. The trend analysis indicates an increase in both the frequency and rate of dental-related ED visits and their associated charges each year during 2005–2014. The age-adjusted rate increased by 5.43 percent each year from 2005 to 2010, and by 2.91 percent each year from 2010 through 2014, for an overall increase of 43 percent during the 10-year period. That pattern indicates that the increased dental-related use of EDs was not driven only by population growth, and that the annual rate of increase slowed somewhat after 2010. The rapid growth in the total charges associated with dental-related ED visits in Florida was fueled by that increased rate of utilization coupled with a rate of inflation for hospital charges that far exceeded the general consumer price index (27). Consequently, the inflation-adjusted total amount of charges increased about fourfold during the 10-year period. The use of EDs for dental

conditions largely occurred during normal business hours, suggesting that utilization is not primarily driven by persons seeking urgent care at times when dental offices are not open.

A large proportion of the costs of dental-related ED visits are covered by public funds: in 2014, Medicaid was the primary payer for 39 percent of these ED visits in Florida and Medicare was the primary payer for an additional 8 percent of visits. About 36 percent of visits were made by individuals who were self-paying patients. Although not specific to patients seeking care in an ED for a dental condition, about 70 percent of hospital charges for self-pay patients ultimately become uncompensated care (28). The cost of uncompensated care is not borne entirely by hospitals and providers; in 2013, about \$53.3 billion of the estimated \$84.9 billion in uncompensated health care in the United States was paid to providers to help offset the cost of uncompensated care. Of that, the federal government paid 62 percent, and state and local governments paid most of the remainder (28). Consequently, the reliance on hospital EDs to manage dental conditions represents significant expenditure of public funds, despite the fact that most hospital EDs are neither equipped nor staffed to provide definitive dental care. In this study, we found that less than one-third of dental-related ED visits resulted in any care other than evaluation and diagnosis. Among the minority who received additional treatment services, almost all of it was strictly palliative. The most common primary diagnoses among patients seeking care for a dental-related condition in Florida could have been avoided with preventive dental services and disease management. Florida's lack of coverage for basic diagnostic, preventive, and restorative dental services for adults under its Medicaid program may ultimately lead to far worse clinical outcomes and a far less cost-effective approach to managing oral health. Florida opted out of Medicaid expansion for adults through federal funding that became available for that purpose under the Affordable Care Act (29).

The findings of this study are consistent with earlier reports indicating increasing use of EDs for dental problems in the United States (11,12). Surprisingly, however, few national studies calculate population-based rates (30,31). Calculating population-based rates is critical in interpreting trends in ED visits for dental problems, particularly in states with rapidly growing populations such as Florida. Illuminating state-specific trends is also important given the significant variation in access to dental services among the states. Identifying potential strategies to interrupt the growing problem of dental-related ED visits may be dependent on uncovering how growth in dental-related ED encounters compares to overall increases in ED use and the links between state-based policies and resources and these costly visits. This study provides a detailed analysis of dental-related ED use and cost within the third most populous state, characterized by significant diversity, and poor access to dental care particularly

among low-income adults. Compared with national estimates, dental-related visits in Florida comprised a slightly larger proportion of total ED visits (1.8-2.1 percent in Florida compared with 1.0-1.6 percent nationally) (24). However, because national estimates are based only on primary discharge diagnosis and do not include patients' reasons for seeking care (admitting diagnoses) in the ED, the national and state proportions are not directly comparable. However, we contend that ignoring the reasons motivating patients to visit an ED results in an underestimation of the magnitude of ED visits for dental problems.

There are factors and limitations to consider when interpreting findings from this study. We used the patient's reported reason for the visit (admitting diagnosis) as well as the clinician's primary diagnosis to operationally define dental-related ED visits. Our rationale is that the patient's perception of the cause of the problem is at least as important as the physician's diagnosis in assessing the impact of dental conditions on ED utilization. That is, people who are experiencing pain that they perceive as odontogenic and subsequently seek care at an ED are clearly using the ED for a dental-related purpose, even if the condition is later diagnosed as being non-dental. Diagnostic coding for a specific clinical presentation may differ between clinicians and institutions and may be influenced by factors such as reimbursement and physician's knowledge of dental conditions; there is no feasible way to assure coding consistency across thousands of physicians and hundreds of facilities. Because the unit of observation in the ED discharge data was a single ED visit and personal identifiers were stripped from the ED discharge data made available for analysis, we are unable to account for individuals who made multiple ED visits for dental-related conditions.

In summary, dental-related visits to hospital EDs in Florida have increased substantially during the past decade, as have their associated charges. A large proportion of these charges are covered by public funds. Expansion of Medicaid in Florida and expansion of the state's Medicaid coverage for dental services could lead to more effective use of public funds and better health outcomes.

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