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Emergency department visits for depression in the United States from 2006 to 2014

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ABSTRACT

Background: Patients with depression frequently seek care in the emergency department (ED), especially in the context of suicidal ideation (SI) and self-harm (SH). However, the prevalence and trends in the United States (US) of ED visits for depression have not yet been characterized using a nationally representative sample. This study evaluates ED trends for depression in the US from 2006 to 2014.

Methods: Data was obtained from the Nationwide Emergency Department Sample (NEDS) in 2006 and 2014 using a primary ICD-9 diagnosis of depression or a primary diagnosis of suicidal ideation (SI) and a secondary diagnosis of depression.

Results: Between 2006 and 2014, there was a 25.9% increase in visits to the ED for depression, which was higher than the 14.8% increase in total ED visits during this time period. The mean inflation adjusted charges associated with depression-related ED visits increased by 107.7%, which was higher than the increase in mean charges for all ED visits in the same time period (40.47%). Visit rates were bimodally distributed with respect to age, with peaks in adolescence and middle age. Notably there was a 61.3% increase in ED visits for depression in individuals younger than 20 between 2006 and 2014. Over half of patients were admitted for inpatient care with a mean length of stay of 5.6 days in both years. Inpatient charges increased 71.8% between 2006 and 2014.

Conclusions: ED visits for depression in the United States rose 25.9% between 2006 and 2014, which was higher than the 14.8% increase in total ED visits during this time period. Over half of ED depression visits were admitted to inpatient stay (mean 5.6 days both years).

1. Introduction

Depression is among the most common mental health disorders in the United States (US), with approximately 7% of the population (8.5% of women and 4.7% of men) meeting criteria for Major Depressive Disorder (MDD) each year and 17% of the population meeting criteria for MDD at some point in their lives [2–6]. The World Health Organization estimates that approximately 300 million people live with depression globally and has identified depression as the leading cause of ill health and disability worldwide [7].

In addition to its negative effects on health-related quality of life, depression is also associated with significant medical costs and lost productivity [8,9]. The emergency department (ED) represents an important, but costly, resource for individuals with depression. However, the prevalence and temporal trends of patients presenting to the ED for treatment of depression have not yet been adequately characterized. Several studies have evaluated ED visits related to suicidal ideation and self-harm [10,11], which captures a select group of depression-related and other mental health-related ED visits, but these studies did not characterize patients who presented to the ED with depression and without SI or SH. One study using the National Hospital Ambulatory Medical Care Survey in 2012 estimated that depression-related visits accounted for approximately 2% of all emergency room visits, and that approximately 59% of all depression-related visits were not associated with SI or SH [12]; however, no additional descriptive information was available for the 59% without SI/SH. Other studies using nationally representative samples have characterized trends in ED utilization for groups of common psychiatric disorders, such as “depression, anxiety,

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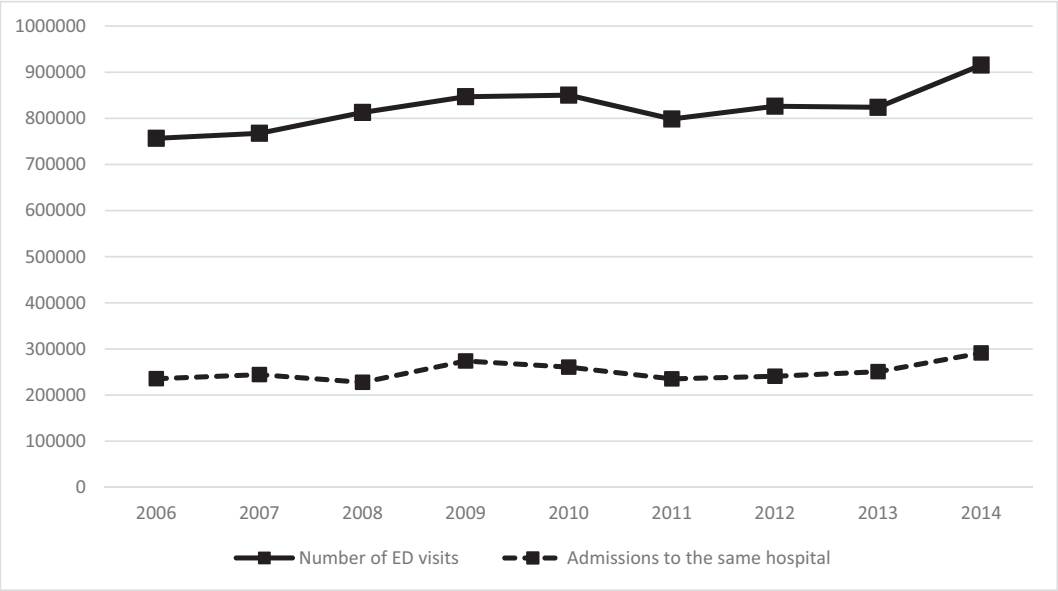

Rate of change between years in number of ED visits:

2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014
+1.4%	+6.0%	+4.2%	+0.4%	-6.0%	+3.5%	-0.3%	+11.1%

Fig. 1. Trends in ED visits and subsequent inpatient hospitalizations for a primary diagnosis of depression between 2006 and 2014.

and stress reactions", for which ED utilization increased 55% between 2006 and 2013 [13]; and for "mood disorders", for which there was a 2% annual growth rate between 2010 and 2014 [14]. However, these studies did not characterize trends for depression specifically.

The current study aims to evaluate trends in all ED visits for depression in the US from 2006 to 2014. A secondary aim of this study is to compare patients with and without documented SI or SH presenting to the ED with depression in 2014.

2. Methods

This study evaluates prevalence and trends in depression-related ED visits between 2006 and 2014 by analyzing patients who presented to the ED with 1) primary diagnosis of depression, or 2) primary diagnosis of suicidal ideation and secondary diagnoses of depression. This analysis was done using the Nationwide Emergency Department Sample (NEDS) from the Healthcare Cost and Utilization Project (HCUP), which is maintained by the Agency for Healthcare Research and Quality (AHRQ) [1,15].

The NEDS is the largest publicly available ED all-payer database in the US. It contains information on approximately 30 million ED visits from approximately 950 hospitals in the US each year, weighted to represent the over 120 million ED visits that occur in the US each year. Individual years of the NEDS are available for purchase and include patient-level data including demographics, location, primary payer, income quartile, and associated costs. Information on admission rates, procedures performed, and associated charges of those admitted to the hospital from the ED are also available.

2.1. Study variables

Patients were included in this study if they had either 1) a primary diagnosis of depression (ICD-9 codes: 296.2x, Major Depression (single episode); 296.3x Major Depression (recurrent episode); 300.4, Dysthymic disorder; 301.12, Chronic Depressive disorder; or 311, Depressive disorder, not elsewhere classified); or 2) a primary diagnosis of suicidality (ICD-9 code V62.84) and a secondary diagnosis of depression. The 2014 sample was then divided into two groups, those with and without suicidality/self-harm (SI/SH), using the pre-coded NEDS variable "intent_self_harm". This variable identifies records that have a diagnosis of suicidality (ICD-9 code V62.84), or an External Cause of Injury Code indicating self-harm (ICD-9 *E*-codes E950.x) [1]. Data using this variable were only analyzed for 2014 data because the code for suicidality (V62.84) was first introduced in the fall of 2005 and may not have been widely implemented by 2006. As a result, any changes seen between 2006 and 2014 in rates of documented SI/SH may not represent accurate trends over time and, thus, are not reported here.

Demographic data were retrieved according to predefined categories set by HCUP and included age, sex, charge (ED and inpatient), primary payer (Medicare, Medicaid, private, self-pay, no charge, and other), hospital region (Northeast, Midwest, South, and West), and household income. Inpatient data for patients admitted through the ED include charges, rates of procedures, and length of stay.

2.2. Statistical analysis

Descriptive data, publicly available through HCUP, were used to provide information about ED visits for depression each year from 2006 to 2014.

For the individual years 2006 and 2014, statistical analyses were performed with STATA/SE 14.1 (College Station, TX, USA) using the NEDS source files for each year. All cost data reported are inflation-adjusted to 2016 dollars using the Consumer Price Index (CPI) inflation calculator [16]. The 2014 data was separated into two groups: those with SI/SH and those without SI/SH and descriptive data was provided for each group. *P*-values are not reported due to the large sample size making statistical power so high as to render their usual interpretation redundant.

3. Results

There were 766,493 ED visits for depression in 2006 compared with 964,733 ED visits in 2014, representing a 25.9% increase over this time period (Fig. 1). For comparison, between 2006 and 2014 the total number of ED visits (for any diagnosis) increased by 14.8% [1]. In

Table 1
Depression related ED visits in 2006 and 2014 in the US.

	2006	2014
Total visits	766,493.39	964,733.83
Mean charge for ED visit	$1432.59	$2975.09
Gender n(%)		
Male	344,059 (44.89%)	448,084 (46.45%)
Female	422,354 (55.11%)	516,632 (53.55%)
Mean age		
Male	37.3	37.7
Female	37.5	35.6
Age group		
0–20	138,225 (18.04%)	222,924 (23.11%)
21–40	305,883 (39.91%)	350,806 (36.36%)
41–60	259,750 (33.89%)	304,356 (31.55%)
61–80	49,755 (6.49%)	74,781 (7.75%)
81–100	12,783 (1.67%)	11,860 (1.23%)
Region n(%)		
Northeast	227,306 (29.66%)	248,890 (25.80%)
Midwest	186,840 (24.38%)	254,478 (26.38%)
South	259,687 (33.88%)	315,665 (32.72%)
West	92,658 (12.09%)	145,699 (15.10%)
Payer n(%)		
Medicare	132,802 (17.41%)	162,243 (16.85%)
Medicaid	189,237 (24.80%)	340,596 (35.37%)
Private	239,661 (31.41%)	278,413 (28.91%)
Self-Pay	155,773 (20.42%)	133,726 (13.89%)
No Charge	14,365 (1.88%)	9579 (0.99%)
Other	31,143 (4.08%)	38,527 (4.00%)
Median household income percentile n (%)		
0–25	212,616 (28.58%)	299,607 (32.05%)
25–50	197,133 (26.49%)	258,672 (27.67%)
50–75	188,192 (25.29%)	201,946 (21.60%)
75–100	146,077 (19.63%)	174,663 (18.68%)
Disposition from ED		
Routine	327,720 (42.8%)	431,939 (44.77%)
Transfer to short-term hospital	23,352 (3.1%)	48,442 (5.02%)
Transfer to other	129,679 (16.92%)	180,295 (18.69%)
Admitted to same hospital	235,620 (30.7%)	291,467 (30.21%)
Other	50,053 (6.53%)	12,591 (1.31%)
Inpatient		
Mean length of stay	5.64	5.79
Mean inpatient charge ($)	$11,979.59	$20,581.64
≥1 procedures after admission	14.6%	15.6%

2006, 50.72% of the ED visits for depression resulted in hospitalization while in 2014, 53.92% resulted in hospitalization (Table 1). Less than 0.01% died in the ED in either year and in both years depression-related visits accounted for < 1% of all ED visits in the US.

3.1. Demographics

3.1.1. Age

There was a bimodal distribution of ED visits for depression by age, with peaks in teenage years (< 20 years old) and in middle age in both years (Fig. 2). Between 2006 and 2014, there was an increase in ED visits for depression among patients 20 years old and younger rising from 18% of the total number of ED depression visits in 2006 to 23% in 2014 (Table 1). Notably, the only other age group to show an increase in proportion of ED depression visits between 2006 and 2014 was the 61–80 year old age group. In both years, the mean age of patients admitted to the ED with depression was 37 years old.

3.1.2. Gender

In 2006, approximately 55.1% of patients who visited the ED with depression were female while in 2014, 53.6% were female (Table 1, Fig. 2).

3.1.3. Income

In both years, the largest percentage by income quartile of patients who presented to the ED with depression fell in the lowest income quartile, while the lowest percentage of patients who visited the ED for depression was in the highest income quartile. In 2006, 28.58% of all depression-related ED visits fell in the lowest income quartile and this rate increased to 32.05% 2014 (Table 1).

3.2. Region

In both years, the South had the highest percentage of ED visits for depression and the West had the lowest. In 2006, 33.88% of all depression ED visits occurred in the South with a similar percentage occurring in 2014 (32.72%). In contrast, in 2006 12.09% of ED visits with depression occurred in the West though in 2014 the rate increased to 15.10% (a 57% increase). These trends are similar to the overall trends in ED visits regardless of primary diagnosis.

3.3. Payer

In 2006, the most common payment form was private insurance (31.41%), while in 2014 the most common payment form was Medicaid (35.27%) (Table 1). From 2006 to 2014, Medicaid coverage for depression-related ED visits increased from 25.8% to 35.4% if all ED depression visits, which was the largest increase in this time span. In contrast, there was a decrease in the percentage of payers presenting to the ED for depression from 2006 and 2014 with self-pay, private, and other forms of payment.

3.4. ED charges

The mean, 2016 inflation-adjusted, charge for a depression-related ED visit in 2006 was $1432.59, which increased to $2975.09 in 2014, representing a 107.7% increase. In contrast, the mean charge for ED visits of any diagnosis increased by only 40.5% between these years, from $2118.48 in 2006 to $3558.9 in 2014.

3.5. Secondary diagnoses

The three most common secondary diagnoses of patients admitted to the ED with depression in 2006 were alcohol abuse (5.07%), unspecified non-psychotic mental disorder (5.00%), and anxiety (4.12%). In 2014, the most common secondary diagnoses were anxiety (6.61%), alcohol abuse (3.43%), and nondependent tobacco use disorder (3.34%).

3.6. Inpatient admissions from the ED

In 2006, 50.72% of people presenting to the ED with depression were admitted to the hospital (including admission to the same hospital and transfers to other hospitals), compared to 53.92% in 2014 (Table 1). For those who were admitted to the same hospital as the ED, the mean length of stay in 2006 was 5.6 days and mean inpatient charges were $11,979. In 2014, the mean length of stay was 5.8 days and mean inpatient charges were $20,582, representing a 71.8% increase in charges in this time span. In comparison, mean charges for inpatient stays of any type were $10,061 in 2006 and $13,191 in 2014, representing only a 31% increase in charges. Mean length of stay for inpatient stay of any type was 4.6 days in both 2006 and 2014.

3.7. Comparing patients with and without SI/SH

Using the 2014 data, we compared the sample of patients with SI/SH (46.7%) to those without SI/SH (53.2%). We found differences in mean ED charges, mean inpatient charges, and mean length of inpatient stay between those with and without SI/SH. Mean ED charges (2016 inflation-adjusted) for SI/SH patients were approximately $400 more than ED visits without documented SI/SH. 73.03% of ED patients with

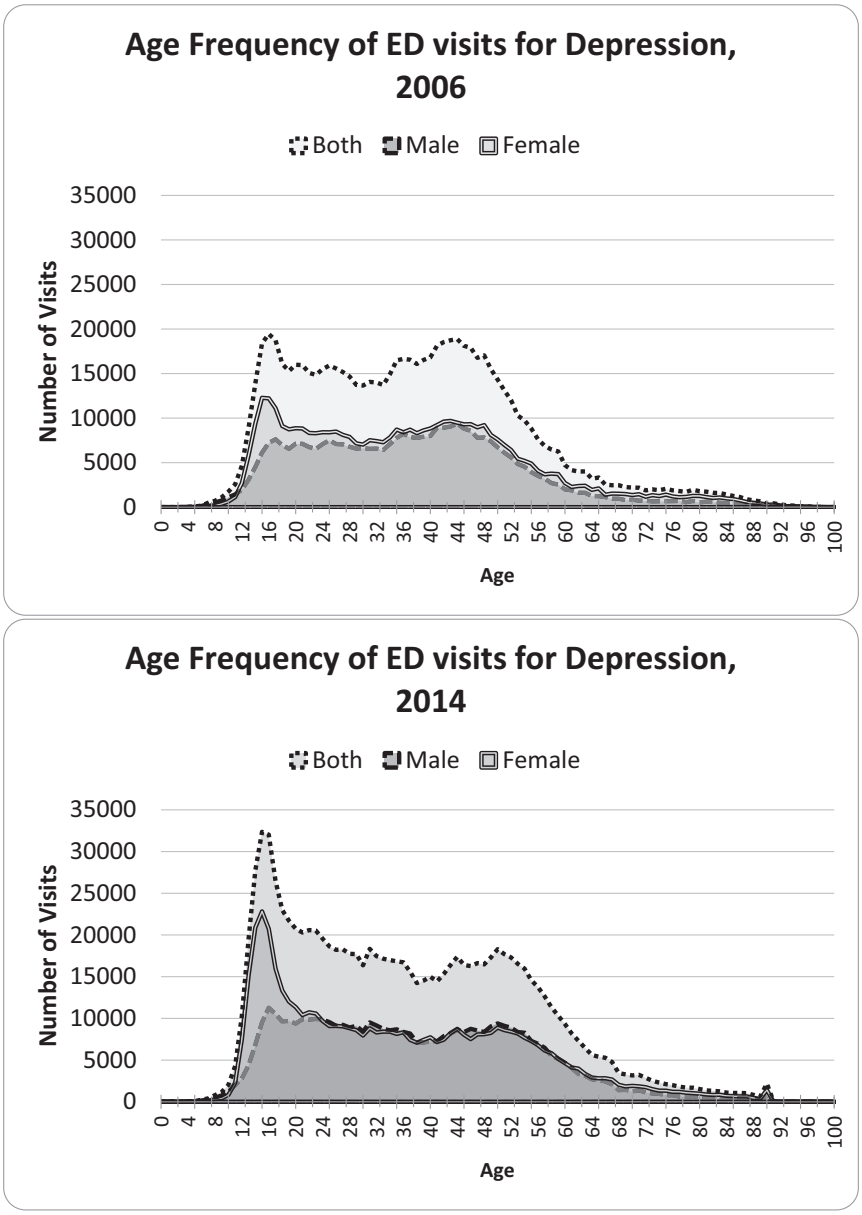

Fig. 2. Age Frequency of ED visits for Depression, 2006 and 2014.

SI/SH were admitted to inpatient hospitalization, compared with 37.14% of patients without SI/SH (Table 2). Interestingly, during inpatient stays, those with SI/SH were charged approximately $1000 less per inpatient visit and stayed approximately one half day shorter than those without SI/SH.

We found similar trends in terms of age, gender, region, and payer when comparing individuals who presented to the ED with and without SI/SH.

4. Discussion

This is the first study to present nationally representative data characterizing depression-specific ED visits. Between 2006 and 2014, we found a 25.9% increase in visits to the ED for depression, which was higher than the 14.8% increase in total ED visits during this time period [1]. The mean charges associated with depression-related ED visits increased from $1432.59 to $2975.09, a 107.7% increase, which was higher than the increase in mean charges for all ED visits in the same time period (40.47%).

The novelty of the current study lies in the characterization of depression-specific visits to the ED using a nationally representative dataset and including visits with and without suicidal ideation. Previous research studies evaluating depression in the ED have focused solely on suicidality [10,11] and/or have combined depression with other mood or anxiety disorders (e.g. bipolar disorder, panic disorder) [10,13,14,17]. There are several possible explanations for the rise in depression-specific ED visits over time. First, it is possible that nurses and physicians in the emergency department are more aware of the relationship between depression and chronic somatic complaints [18,19] and may be screening more for depression now than in the past [20]. Second, it is possible that patients, especially those who are medically underserved or who are without adequate healthcare options, are increasingly using the ED as a means to access mental health care [21].

Several of the findings presented here are consistent with previously published research in depression and mental health. For example, we found a bimodal distribution in age for depression-specific ED visits with peaks in teenage and middle age years, which is consistent with

Table 2
Depression related ED visits in 2014 with and without suicidality/self-harm.

	SI/SH	No SI/SH
Total visits	451,053.53	513,680.3
Mean charge for ED visit	$2745.18	$2355.13
Gender n(%)		
Male	216,388 (48%)	231,696 (45%)
Female	234,651 (52%)	281,981 (55%)
Mean age		
Male	37.5	38.0
Female	33.8	37.1
Age group		
0–20	111,446 (24.71%)	111,478 (21.70%)
21–40	163,948 (36.35%)	186,858 (36.38%)
41–60	143,975 (31.92%)	160,380 (31.22%)
61–80	28,214 (6.26%)	46,566 (9.07%)
81–100	3469 (0.77%)	8391 (1.63%)
Region n(%)		
Northeast	88,391 (19.60%)	160,500 (31.25%)
Midwest	129,103 (28.62%)	125,375 (24.41%)
South	162,152 (35.95%)	153,512 (29.88%)
West	71,406 (15.83%)	74,292 (14.46%)
Payer n(%)		
Medicare	69,322 (15.40%)	92,921 (18.11%)
Medicaid	159,160 (35.36%)	181,436 (35.37%)
Private	134,324 (29.84%)	144,089 (28.09%)
Self-Pay	63,620 (14.13%)	70,106 (13.67%)
No Charge	4749 (1.06%)	4830 (0.94%)
Other	18,955 (4.21%)	19,571 (3.82%)
Median household income percentile n (%)		
0–25	143,260 (32.83%)	156,347 (31.37%)
25–50	123,106 (28.21%)	135,566 (27.20%)
50–75	95,136 (21.80%)	106,809 (21.43%)
75–100	74,930 (17.17%)	99,733 (20.01%)
Disposition from ED		
Routine	117,328 (26.01%)	314,611 (61.25%)
Transfer to short-term hospital	29,988 (6.65%)	18,454 (3.59%)
Transfer to other	115,815 (25.68%)	64,480 (12.55%)
Admitted to same hospital	183,599 (40.70%)	107,868 (21.00%)
Other	4324 (0.96%)	8267 (1.61%)
Inpatient		
Mean length of stay	5.66	6.01
Mean inpatient charge ($)	$17,127.52	$18,177.79
≥1 procedures after admission	15.0%	16.6%

previous research [17,22,23]. Similarly, our findings regarding ED visits for depression by income, region, and payment forms were consistent with previously-reported national depression statistics and with national trends of overall ED visits [1,24,25].

Other findings presented here, however, were not in line with known trends for depression. For example, women accounted for just over half of the visits to the ED in 2006 and in 2014. This is lower than what would be expected if visits to the ED were following well-documented population trends in which women are 1.7 times more likely to have MDD than men [26]. This discrepancy may reflect gender differences in healthcare-seeking behaviors in which men may be less likely to seek help for depression in outpatient settings or may wait until symptoms of depression become an emergency [27]. Notably, women accounted for a majority of ED depression visits in teenage years before leveling out to our observed mean of approximately 50% in both years. This is consistent with existing literature suggesting a larger rise in depression rates in girls than boys during the adolescent period [28].

Consistent with previous estimates [12], we found that 53.2% of the patients presenting to the ED with depression in 2014 did not have documented SI/SH. Unfortunately, further information regarding the reason for presentation to the ED were not available. Interestingly, mean ED charges were higher for SI/SH patients but mean inpatient charges and length of inpatient stays were higher for those without SI/SH. This may be due to the fact that some patients admitted with SI/SH were placed on a 72-h hold, while the majority of patients admitted without documented SI/SH were admitted voluntarily and may have been more motivated to stay longer and/or to consent to available treatments and procedures. Patients presenting to the ED with depression but without SI/SH have been largely overlooked in the literature and further investigation into this subsample is warranted.

There are several limitations to this study. First, we conducted the majority of our analyses on only two years (2006 and 2014) and were not able to conduct all analyses on the intervening years due to the fact that we only had access to the NEDS 2006 and 2014 databases. However, while it is possible that either or both of the years (2006, 2014) were outliers in the analyses presented, we are confident that at least the rates of visits to the ED and rates of inpatient admission are valid due to the trends presented in Fig. 1 for all the intervening years. Second, we were not able to evaluate trends over time in the subset of patients with and without SI/SH because the suicidality codes were introduced in 2005 and thus may not have been reliably used in our 2006 dataset. Third, we cannot be certain that the groups in our secondary analysis (comparing SI/SH and no SI/SH) represented entirely distinct groups. It is possible that there were some patients with both depression and SI/SH who were not given an ICD-9 V-code and were mistakenly included in our "No SI/SH" group. However, given the different rates of admission between the two groups, we feel confident that these groups were generally representative of the target groups with and without SI/SH. Finally, the NEDS dataset does not provide information about race or ethnicity and, thus, we were not able to characterize depression-related ED visits with attention to these variables.

In summary, we found that the rate of ED visits for depression increased 25.9% between 2006 and 2014 using a nationally-representative ED sample. Likewise, costs associated with these visits increased 107.7% during this time period. We also found a bimodal distribution in visits to the ED for depression, with the first peak in visits occurring in teenage years and the second peak in middle age. Additionally, ED patients with documented SI/SH had $400 higher mean ED charges and were more likely to be admitted; however, once an inpatient, those without documented SI/SH were charged $1000 more and stayed one half day longer.

Acknowledgements

Contributors: SB and LS designed the study, interpreted data, and drafted/revised the manuscript; SM, TP, and MJ conducted statistical analysis and provided critical revisions of the manuscript; JZ, CL, ET, JK, TS, and VR contributed to drafting and revising the manuscript.

Declaration of interest

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