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## Correlates of Length of Stay and Boarding in Florida Emergency Departments For Patients with Psychiatric Diagnoses

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### Abstract

**Objective.**—Length of stay (LOS) and boarding in the emergency department (ED) for psychiatric patients has been the subject of concern given ED crowding and wait times. This investigation examined correlates of LOS and boarding in Florida EDs for patients presenting with psychiatric complaints from 2010–2013.

**Methods.**—Utilizing the Florida ED discharge database, the association of LOS and boarding with hospital and encounter factors was examined for adult patients presenting with a primary psychiatric diagnosis (n=597,541).

**Results.**—The mean LOS was 7.77 hours. Anxiety disorders were the most frequent psychiatric complaint and were associated with the lowest mean LOS ( $p<0.05$ ). Patient encounters resulting in a presentation of suicidality or schizophrenia were associated with significantly longer stays relative to other psychiatric diagnoses. Commercial insurance was associated with the shortest average LOS. African-American, Hispanic patients, and patients >45 years were associated with longer average LOS. Smaller hospital size, for-profit ownership, and rural designation were associated with shorter average LOS. Teaching status was not associated with LOS. Furthermore,

73% of encounters resulting in transfers qualified as having boarded (stayed six or more hours in the ED).

**Conclusion.**—Extended LOS was endemic for psychiatric patients in Florida EDs.

### Keywords

Length of stay; Boarding; Emergency Department; Psychiatry; Suicide; Schizophrenia

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### Introduction

Psychiatric patients represent one in eight emergency department (ED) visits, contributing to ED overcrowding (1, 2). As a result, length of stay (LOS) for psychiatric patients presenting in the ED has been increasing (3–6). ED LOS is associated with increased ED crowding (7), increased costs (8), decreased quality of care (9), decreased staff morale (10), and decreased patient satisfaction (10). The causes of long lengths of stay include inadequate bed capacity and staffing (11, 12), financing (2, 11, 13), patient boarding and non-urgent visits (11, 13). Despite these deleterious outcomes, LOS for psychiatric patients remains a problem in EDs (14–19).

Patients with psychiatric disorders have significantly longer LOS compared to the general ED population (15, 20). For example, Chakravarthy et al. examined all psychiatric visits in the 2002–2008 National Hospital Ambulatory Medical Care Survey, finding that psychiatric patients stayed an average of 1.2 hours longer than non-psychiatric patients (15). In addition, Karaca et al. found that the mean LOS in treat-and-release patients with mental disorders was nearly an hour and a half longer compared to the mean of all patients (21). The longer LOS in these patients is likely the result of delays in psychiatric consultations and/or locating a psychiatric inpatient bed, which results in high rates of psychiatric patient boarding (defined here as LOS in the ED of 6 hours or longer). The practice of boarding, or holding patients in the ED while waiting for admission or transfer, significantly increases ED LOS, which in turn exacerbates boarding (4, 22–24).

In this report, we examine factors associated with the LOS for ED patients with primary complaints of mental illness or substance use who were treated and released or transferred (but not admitted to the same hospital). Consistent with other studies (21, 24, 25), we expected patient encounters occurring at large non-profit hospitals to involve longer LOS than those in for-profit hospitals. We also predicted that primary payer status would be associated with LOS, with uninsured staying the longest and commercially insured the shortest durations (24). Finally, we hypothesized that patients with schizophrenia, suicidality, or mood disorders would have longer stays compared to encounters related to anxiety disorder diagnoses.

### Methods

The study sample was selected from the 2010–2013 Florida Agency for Health Care Administration (AHCA) ED public dataset. As mentioned, this dataset excludes patients who presented to the ED and were admitted to the same hospital. The overall sample

contained 28,749,452 ED patient encounters. Of these, 761,037 had a primary psychiatric diagnosis, and 706,636 were 18 years or older. We stratified the sample to include adults only given differences in prevalence of diagnoses between adults and youth (26, 27), potential for disposition to be influenced by variables of interest (e.g., payer status), and presence of children's services in some hospitals. Duplicate encounters and encounters with substantial missing data (n=59,380) were deleted using a listwise deletion process. The final sample was restricted to those with a primary diagnosis of selected psychiatric disorders (n=597,541). The Clinical Classifications Software (CSS) was used to identify psychiatric diagnoses (21, 24) and is available from the Agency for Healthcare Research and Quality (28). We included only anxiety disorders, attention-deficit, conduct, and disruptive behavior disorders, mood disorders, schizophrenia and other psychotic disorders, alcohol-related disorders, substance-related disorders, and suicide and intentional self-injury.

### **Dependent Variables**

Patient LOS (in hours) was the dependent variable and was calculated by combining time of arrival in the ED and discharge time with LOS in days. If the LOS was greater than one day, then the LOS was calculated as (LOSdays\*24) + (hour discharge – hour arrival). Following Nolan et al.(24), we considered ED stays  $\geq 6$  hours for transferred patients to represent boarding.

### **Patient-Level Variables**

Patient age was categorized into 10-year increments (24). The mean age of the restricted sample was 41.2 years (standard deviation [SD] = 15.8 years). The sample was 47.1% female; race/ ethnicity was limited to Caucasian, African-American or Hispanic due to small sample sizes of omitted race categories. Primary payer refers to the expected source of primary payment at the time of disposition. Medicare and Medicaid patient encounters were classified as being a fee for service (FFS) or managed care organization (MCO) scheme.

### **Hospital-Level Variables**

Hospital factors including hospital ownership status, teaching status, and rural status were examined. Hospital characteristics were obtained from the AHCA 'Florida Health Finder' online database (29). Hospital variables included ownership type (for-profit versus non-profit), number of licensed beds, teaching status (statutory or community teaching versus non-teaching) and rural status (rural designation versus no designation).

### **Disposition**

Patient disposition was categorized as discharged home, transferred to another healthcare facility, transferred to a psychiatric facility, or left against medical advice.

### **Analytic Plan**

Descriptive statistics were used to characterize patient data. To evaluate the relationship between hospital factors and LOS, generalized linear mixed models (GLMMs) were employed using the lme4 package (30) in the R statistical programming language (31). Given that LOS behaves as a count variable, a negative binomial distribution was assumed

for the GLMMs, and random intercepts corresponding to hospital unit were estimated. To evaluate the omnibus impact of fixed effects, models with fixed effects were compared to intercepts-only models by comparing the deviance of each fixed-effects model to the deviance of the intercept-only model, which follows a  $\chi^2$  distribution with degrees of freedom corresponding to the difference in number of parameters between the models (32). Post-hoc group comparisons for all possible pairwise comparisons were computed using the Tukey Honestly Significant Difference test via the multcomp package (33) in R, which adapts traditional Tukey comparisons to GLMMs.

## Results

The mean LOS was  $7.77 \pm 13.16$ . Sample characteristics and summary statistics are provided in Tables 1 and 2.

Table 1 presents the mean LOS by diagnosed psychiatric disorders. Diagnosis was significantly associated with LOS ( $p < .01$ ). Post-hoc group comparisons found significant differences in mean LOS between all pairwise comparisons of diagnoses ( $p < .01$ ). The longest LOS was for patients who were suicidal or inflicting self-harm ( $12.86 \pm 15.33$  hours), followed by schizophrenia and other psychotic ( $11.77 \pm 20.36$  hours) and mood disorders ( $10.04 \pm 11.65$  hours) on the higher end. The shortest LOS was for anxiety disorders ( $4.44 \pm 8.70$  hours), with ADHD/ disruptive behavior ( $8.25 \pm 15.35$  hours), alcohol and substance ( $7.07 \pm 12.41$  hours) disorders falling in the middle.

Table 2 presents the mean LOS by patient and hospital characteristics. Patient age was a significant predictor of LOS ( $p < .05$ ). In post-hoc testing, we found a significant difference ( $p < .01$ ) in all pairwise comparisons, except for pairwise comparisons between the groups of 45–54 years, 55–64 years, and 65–74 years. Generally, older patients ( $>45$  years) stayed longer compared to younger patients ( $<45$  years).

Patient race/ ethnicity was significantly associated with LOS ( $p < .05$ ). Caucasian patients had significantly shorter LOS ( $7.38 \pm 12.62$  hours) compared to African American patients ( $8.47 \pm 13.74$  hours) and Hispanic patients ( $9.85 \pm 16.48$  hours). The difference in LOS between African Americans and Hispanic patients was also significant with Hispanic patients having a longer LOS ( $p < .01$ ).

Payer was significantly associated with LOS ( $p < .01$ ). Commercially insured patients had the shortest LOS ( $6.43 \pm 11.29$  hours), followed by Medicaid (both FFS [ $7.52 \pm 17.14$  hours] and MCO [ $7.56 \pm 11.95$  hours]), Medicare FFS ( $7.80 \pm 13.52$  hours), Medicare MCO ( $8.33 \pm 13.59$  hours), VA/TriCare ( $8.26 \pm 12.80$  hours), and uninsured ( $8.31 \pm 12.81$ ). Only pairwise comparisons between Medicaid and Medicaid MCO, other and Medicare, other and TriCare, and other and uninsured were not significantly different; all other payer comparisons were significantly different ( $p < .01$ ).

Hospital size, measured by number of beds, was significantly associated with LOS ( $p < .01$ ). In post-hoc tests, we found significant differences only between  $<25$  and  $100$ – $200$  beds ( $p < .001$ ),  $<25$  and  $>400$  beds ( $p < .001$ ),  $<25$  and  $100$ – $200$  beds ( $p < .05$ ) and  $25$ – $100$  and  $>400$

beds ( $p<.01$ ); all other differences were not significant. In general, the smaller hospitals tended to have a shorter average LOS.

Patients' LOS was significantly shorter at for-profit ( $6.74\pm 9.52$  hours) compared to non-profit hospitals ( $8.37\pm 14.49$  hours;  $p<.001$ ). There was no significant association between teaching hospital status and LOS ( $p=.256$ ). Rural designation was significantly associated with LOS ( $p<.001$ ). Patients at rural hospitals had a mean LOS of  $4.74\pm 11.62$  hours compared to non-rural hospitals with mean LOS of  $7.90\pm 13.20$  hours ( $p<.001$ ).

Disposition was significantly associated with LOS ( $p<.05$ ). Patients who left against medical advice had the shortest stay ( $5.62\pm 11.60$  hours) followed by discharged home ( $7.00\pm 12.30$  hours), transferred to psychiatric facility ( $11.53\pm 11.72$  hours) and transferred to another health facility ( $12.58\pm 19.97$ ). Post-hoc Tukey tests showed that all pairwise differences were significant ( $p<.01$ ).

Table 3 presents the number of patient encounters that were eligible (i.e., transferred) for inclusion in the boarding descriptive analysis, as well as the percentage of those eligible encounters that surpassed the 6 hour threshold for boarding. Overall, 73% of patients who were transferred qualified as boarders. In general, the proportion of encounters that boarded was similar across categories. The only notable exceptions were patient encounters related to mood disorders (38% boarded) and hospitals with fewer than 25 beds (49% boarded).

## Discussion

LOS in the ED was associated with age, race, hospital size, hospital ownership, rural designation, and disposition, but not teaching status. Our findings, adjusted for random effects of individual hospitals, were similar to others (4, 15, 22, 24, 25). For example, Chakravarthy et al. found similar patterns in LOS with regard to hospital size, location (rural), and ownership (15). In another study, Chang et al. examined five hospitals in San Francisco and found variability among these hospitals, which had a higher LOS compared to our study, but reported similar patterns with regard to LOS and disposition (5). This difference may be due to the inclusion of *all* patients presenting in the ED with psychiatric diagnoses, especially those who were admitted. Other researchers reported similar relationships between LOS, and age, race/ethnicity, payer type, hospital size, location, hospital ownership and disposition in psychiatric and general medical population (21, 22, 25).

Diagnosis was a strong predictor of LOS for psychiatric patients. Not surprisingly, disorders associated with increased risk of patients harming themselves or others had the longest LOS, likely because they required transfer, which is associated with the longer average LOS. The mean LOS for patients with suicidal thoughts, schizophrenia, psychoses or mood disorders was high than the mean for all psychiatric disorders by 2.25 to 5 hours and more than double the mean LOS for anxiety disorders. This difference in LOS may be due the need to stabilize patients in crisis and transfer them for inpatient psychiatric care to ensure that no immediate risk of harm persists, which would be associated with the longer average LOS. Taken together with the rate of boarding for transferred patients, it appears that individuals who

require the most intensive inpatient intervention were forced to wait several hours before this care can be provided since it necessitated both a consultation from a psychiatrist followed by locating an appropriate bed at another facility and then arranging the transfer.

Patient-level factors were also significant predictors of LOS. For example, we found a general positive association between age and LOS, with the younger age groups having shorter average LOS, which may be due to their primary diagnoses on average being less likely to require a transfer or due to fewer comorbid conditions. Regardless of underlying causation (i.e. diagnosis), mean LOS varied by 1.9 hours between the shortest (18–24 years) and longest LOS (45–54 years). We also found a difference in LOS by race/ ethnicity. On average, Hispanic patients stayed two hours longer than Caucasian patients did and one hour longer than African American patients did. These LOS differences might be due to underlying differences in insurance type (34). Non-elderly African American and Hispanic patients are less likely to have health insurance coverage, which creates fewer alternatives for transfer when needed and hence a longer average LOS. Further analysis is needed to elucidate the reason for this finding.

Finally, the results by patient insurance produced mixed findings. As noted above, patients with commercial insurance experienced the shortest LOS, while those with either Medicare or Medicaid and the uninsured had a significantly longer LOS. This finding may suggest that utilization management techniques commonly employed by commercial insurance companies may play a role in reducing LOS, they are less likely to require transfer, or more transfer alternatives exist due to their funding, which reduces the time to transfer. In addition, patients with commercial insurance may be healthier relative to publicly insured patients, since the majority of commercial plans are employer-provided, which implies that these patients are healthy enough to work (35). Consistent with the utilization management hypothesis, patient encounters with Medicare MCOs were associated with a shorter stay compared to Medicare FFS; however, the relationship did not hold for patient encounters with Medicaid MCOs and FFS. Another possible explanation is that ED personnel have difficulty finding facilities willing to accept uninsured patients and may use administrative techniques to prioritize patients with higher-reimbursing insurance (11, 13). While this has not yet been empirically demonstrated, these explanations were put forth by ED physicians and managers in the context of explaining reasons for boarding (13). We also found those patients without insurance stayed 2 hours, or 25%, longer than patients with commercial insurance. Uninsured patients are more challenging to place, relative to funded patients.

Several hospital factors were also associated with LOS. For example, we found that hospital size, as measured by number of beds, was positively associated with LOS, but not for hospitals with greater than 100 beds. Our choice of modeling technique takes into account underlying differences in each hospital, which provides some support for the notion that hospitals tend to practice in such a way that LOS varies more by patient than by hospital. We also found that for-profit hospitals kept patients about 1.6 hours fewer than non-profit hospitals, which may reflect administrative practice that emphasize cost containment in a manner that differs from not-for-profit hospitals. Moreover, non-profit hospitals generally provide safety-net services for patients that lack steady care or insurance, whom may be less healthy. We also found that rural designation was a significant predictor of lower LOS,



which follows our findings noted above. The differences in LOS by hospital characteristics may be explained by the fact that larger, nonprofit hospitals tend to be found in urban areas because of the higher population density and demand for care. Rural hospitals may be less able to provide care for patients requiring psychiatric treatments necessitating an expedient transfer to another facility capable of providing the appropriate level of care. Contrary to previous research (15, 21), we did not find a relationship between hospital teaching status and LOS, despite what appears to be a 2 hour difference in raw mean LOS.

As expected and consistent with the literature, we found that being transferred to another facility, regardless of type, led to significantly longer LOS (5, 6, 22). To that end, we found that 73% of transferred patients with a primary psychiatric diagnosis met the criteria for boarding. Other studies found that rates of boarding ranged from 9.7% to 27.5% (24, 36, 37); however, one survey found that greater than 30% of EDs board at least 75% of all patients (38). Our rate of boarding was likely high due to our sample characteristics (i.e. no admitted patients) and use of a proxy for identification of boarding.

There are some study limitations. We report cross-sectional associations, because causal relationships could not be inferred from our dataset. Our dataset also limited our ability to study LOS and boarding patients who were admitted to the same hospital (i.e. admitted, but not transferred). Given the nature of this dataset, we were not able to determine when and if a patient disposition was modified from transfer to admission or discharge and vice versa. Future research should use more detailed records as available. In addition, the study may not be generalizable beyond treat and release and transfer patients in Florida EDs. Finally, this study utilized only hospital data, which excludes information regarding community-based care availability. Consequently, we could not assess the impact of local services that were provided beyond the ED. Despite these limitations, this study is consistent with the findings of other studies across settings. Our findings that nearly 40% of those in the study sample stayed longer than 6 hours, in some cases many hours more, strongly suggests that a focus on emergency departments and length of stay is warranted for clinical and policy reasons. This is particularly true in an environment in which the Affordable Care Act emphasizes preventive care, makes behavioral health one of the essential benefits in insurance coverage, and ties financial incentives and penalties for hospitals to best practices.

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**Table 1:**

Mean LOS by Diagnosis (n=597,541)

<b>Diagnosis</b>	<b>n</b>	<b>Mean LOS</b>	<b>Standard Deviation</b>
ALL DIAGNOSES	597,541	7.77	13.16
Anxiety Disorders	174,502	4.44	8.70
Attention-Deficit, Conduct, And Disruptive Behavior Disorders	2,110	8.25	15.35
Mood Disorders	108,138	10.04	11.65
Schizophrenia And Other Psychotic Disorders	56,460	11.77	20.36
Alcohol-Related Disorders	153,297	8.17	11.87
Substance-Related Disorders	82,166	7.07	12.41
Suicide And Intentional Self-Inflicted Injury	20,868	12.86	15.33

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**Table 2:**

Mean LOS by Patient, Hospital, and Disposition Factors (n=597,541)

	n	Mean LOS	Standard Deviation
<b>Patient-Level</b>			
Age			
18–24 y	97,817	6.73	11.81
25–34 y	138,692	7.18	11.83
35–44 y	116,435	7.92	12.28
45–54 y	130,335	8.63	13.10
55–64 y	67,735	8.32	16.65
65–74 y	25,753	7.97	14.85
75+ y	20,774	8.42	16.65
Race/Ethnicity			
Caucasian	404,026	7.38	12.62
African-American	94,546	8.47	13.74
Hispanic	58,936	9.85	16.48
Payer			
Commercial	101,487	6.43	11.29
Medicare	70,643	7.80	13.52
Medicare MCO	33,886	8.33	13.59
Medicaid	62,876	7.52	17.14
Medicaid MCO	51,842	7.56	11.95
VA/TriCare	19,509	8.26	12.80
Uninsured	251,638	8.31	12.81
<b>Hospital-Level</b>			
Size			
<25 beds	7,984	5.16	17.31
25–100 beds	41,361	4.91	8.69
100–200 beds	84,316	7.36	13.44
200–300 beds	122,040	6.74	9.52
300–400 beds	78,310	6.71	14.36
>400 beds	263,530	9.23	14.36
Ownership			
For-Profit	218,550	6.74	10.38
Non-Profit	378,991	8.37	14.49
Teaching Status			
Teaching	135,705	9.63	14.55
Non-teaching	461,836	7.23	12.80
Rural Status			
Rural	23,549	4.74	11.62
Not Rural	573,992	7.90	13.20

	<b>n</b>	<b>Mean LOS</b>	<b>Standard Deviation</b>
Disposition			
Transferred	48,462	12.58	19.97
Discharged	476,247	7.00	12.30
Psychiatric Facility	49,456	11.53	11.72
Left Against Medical Advice	23,376	5.62	11.60
Boarding			
Boarded (>6hr)	229,856	15.80	18.50
Not Boarded (<6hr)	367,685	2.75	1.38

<sup>a</sup> = SD is standard deviation

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**Table 3:**

Boarding of Patient Encounters by Diagnosis, Patient, Hospital and Disposition (n=97,918)

Factor	<i>n eligible</i> <sup>a</sup>	% Boarded
<b>Diagnosis</b>		
Anxiety Disorders	5,596	69.2
Attention-Deficit, Conduct, And Disruptive Behavior Disorders	495	69.9
Mood Disorders	37,001	37.8
Schizophrenia And Other Psychotic Disorders	21,500	75.5
Alcohol-Related Disorders	11,384	72.6
Substance-Related Disorders	8,164	64.7
Suicide And Intentional Self-Inflicted Injury	13,778	76.3
<b>Patient-Level</b>		
<b>Age</b>		
18–24 y	14,732	71.3
25–34 y	21,952	73.2
35–44 y	20,110	74.3
45–54 y	23,081	74.7
55–64 y	11,259	73.5
65–74 y	3,654	73.1
75+ y	3,130	68.5
<b>Race/Ethnicity</b>		
Caucasian	67,011	72.5
African-American	17,169	73.3
Hispanic	7,772	77.9
<b>Payer</b>		
Commercial	12,189	68.4
Medicare	12,802	76.1
Medicare MCO	6,471	73.0
Medicaid	10,151	75.8
Medicaid MCO	9,052	72.8
VA/TriCare	3,346	69.2
Uninsured	42,286	75.0
<b>Hospital-Level</b>		
<b>Size</b>		
<25 beds	948	49.3
25–100 beds	6,223	71.5
100–200 beds	12,922	79.0
200–300 beds	20,405	75.7
300–400 beds	11,739	66.9
>400 beds	46,645	73.2

Factor	<i>n eligible</i> <sup>a</sup>	% Boarded
Ownership		
For-Profit	56,670	74.2
Non-Profit	41,248	72.2
Teaching Status		
Teaching	21,326	71.8
Non-teaching	76,592	79.4
Rural Status		
Rural	3,340	62.2
Not Rural	94,578	73.8
Disposition		
Transferred	48,462	71.2
Discharged	**	**
Psychiatric Facility	49,456	75.5
Left Against Medical Advice	**	**
<b>Total</b>	<b>97,918</b>	<b>73.4</b>

<sup>a</sup> = Encounters were eligible if they were transferred to another healthcare facility or psychiatric hospital

\*\* = Categories did not meet criteria for boarding eligibility