

Correlates of Length of Stay and Boarding in Florida Emergency Departments for Patients With Psychiatric Diagnoses

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Objective: Length of stay (LOS) and boarding in the emergency department (ED) for psychiatric patients have been the subject of concern, given the problems with crowding and excessive wait times in EDs. This investigation examined correlates of LOS and boarding in Florida EDs for patients presenting with psychiatric complaints from 2010 to 2013.

Methods: Utilizing the Florida ED discharge database, the authors examined the association of LOS and boarding with hospital and encounter factors 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 compared with other diagnoses ($p < .05$). Patient encounters resulting in a presentation

of intentional self-harm and suicidality or schizophrenia were associated with significantly longer stays compared with other psychiatric diagnoses. Commercial insurance was associated with the shortest average LOS. African Americans, Hispanics, and patients age 45 and older were associated with a longer average LOS. Smaller hospital size, for-profit ownership, and rural designation were associated with a shorter average LOS. Teaching status was not associated with LOS. Furthermore, 73% of encounters resulting in transfers qualified as episodes of boarding (a stay of more than six or more hours in the ED).

Conclusions: Extended LOS was endemic for psychiatric patients in Florida EDs.

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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 LOS include inadequate bed capacity and staffing (11,12), financing (2,11,13), patient boarding, and nonurgent visits (11,13). Despite these deleterious outcomes, long LOS for psychiatric patients remains a problem in EDs (14–19).

Patients with psychiatric disorders have significantly longer LOS compared with the general ED population (15,20). For example, Chakravarthy and colleagues (15) 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 nonpsychiatric patients. In addition, Karaca and others (21) found that the mean LOS among ED patients was nearly an hour and a half longer for patients with mental disorders who were treated and released compared with all patients. The longer LOS for these

patients was likely the result of delays in psychiatric consultations or in locating a psychiatric inpatient bed. These types of delays result in high rates of psychiatric patient boarding, defined here as holding a patient in an ED for six hours or longer while waiting for admission or transfer. The practice of boarding significantly increases ED LOS, which, in turn, exacerbates the strain on resources that contribute to boarding (4,22–24).

In this study, we examined factors associated with LOS among 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 at large nonprofit hospitals to involve longer LOS compared with encounters in for-profit hospitals. We also predicted that primary payer status would be associated with LOS, with uninsured patients staying the longest and commercially insured patients staying for the shortest durations (24). Finally, we hypothesized that patients with schizophrenia, intentional self-injury and suicidality, or mood disorders would have longer stays compared

with patients with 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 data set. As mentioned, this data set excludes patients who present to the ED and are admitted to the same hospital. The overall sample contained 28,749,452 ED patient encounters. Of these, 761,037 involved a primary psychiatric diagnosis, and 706,636 involved patients who were 18 years or older. We restricted the sample to include adults only, given the differences in prevalence of diagnoses between adults and youths (26,27), the potential for disposition to be influenced by variables of interest (such as payer status), and the presence of children's services in some hospitals. Duplicate encounters and encounters with substantial missing data ($N=59,380$) were deleted by using a listwise deletion process. The final sample was restricted to patient encounters involving a primary diagnosis of selected psychiatric disorders ($N=597,541$). The Clinical Classifications Software 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 hyperactivity, conduct, and disruptive behavior disorders; mood disorders; schizophrenia and other psychotic disorders; alcohol-related disorders; other substance-related disorders; and intentional self-injury and suicidality.

Dependent Variables

Patient LOS (in hours) was the dependent variable and was calculated using time of arrival in the ED and time of discharge from the ED. If the LOS was greater than one day, the LOS was calculated as $(\text{LOSdays} \times 24) + (\text{hour discharge} - \text{hour arrival})$. Following Nolan and colleagues (24), we considered ED stays lasting six or more hours for patients who were eventually transferred to represent boarding.

Patient-Level Variables

Patient age was categorized into ten-year increments (24). The mean \pm SD age of the restricted sample was 41.2 ± 15.8 years. The sample was 47.1% female ($N=281,480$); categorization of race-ethnicity was limited to Caucasian, African American, and Hispanic because of small sample sizes for other racial categories. Primary payer refers to the expected source of primary payment at the time of disposition. Medicare and Medicaid patient encounters were classified by fee-for-service (FFS) or managed care organization (MCO) scheme.

Hospital-Level Variables

Hospital factors, including 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 nonprofit), number of licensed beds, teaching

status (statutory or community teaching versus nonteaching) and rural status (rural designation versus no designation).

Disposition

Patient disposition was categorized as discharged home, transferred to another health care 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, we employed generalized linear mixed models (GLMMs) by 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 with intercepts-only models by comparing the deviance of each fixed-effects model with the deviance of the intercept-only model, which follows a chi-square distribution with degrees of freedom corresponding to the difference between the number of parameters in each model (32). Post hoc group comparisons for all possible pairwise comparisons were computed by 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 hours. Table 1 presents the mean LOS by psychiatric diagnosis. Diagnosis was significantly associated with LOS ($p < .01$). Post hoc group comparisons found significant differences in mean LOS between all pairwise comparisons of diagnoses ($p < .01$). Patients who presented with intentional self-inflicted injury or suicidality had the longest LOS (12.86 hours), followed by patients with schizophrenia and other psychotic disorders (11.77 hours) and mood disorders (10.04 hours). The shortest LOS was for anxiety disorders (4.44 hours), with LOS for attention-deficit hyperactivity, conduct, and disruptive behavior disorders (8.25 hours) and alcohol- and other substance-related disorders (8.17 hours and 7.07 hours, respectively) falling in the middle.

Table 2 presents the mean LOS by patient and hospital characteristic. Patients' 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 45- to 54-year-olds, 55- to 64-year-olds, and 65- to 74-year-olds. Generally, older patients (>45 years) stayed longer compared with younger patients (<45 years).

Patients' race-ethnicity was significantly associated with LOS ($p < .05$). Caucasian patients had significantly shorter LOS (7.38 hours) compared with African-American patients (8.47 hours) and Hispanic patients (9.85 hours). The

TABLE 1. Mean±SD length of stay in hours during 597,541 patient encounters in emergency departments in Florida, by diagnosis

Diagnosis	N	M	SD
Total	597,541	7.77	13.16
Anxiety disorders	174,502	4.44	8.70
Attention-deficit hyperactivity, 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
Other substance-related disorders	82,166	7.07	12.41
Intentional self-inflicted injury and suicidality	20,868	12.86	15.33

difference between LOS for African Americans and Hispanics was also significant ($p < .01$).

Payer was significantly associated with LOS ($p < .01$). Commercially insured patients had the shortest LOS (6.43 hours), followed by patients insured by Medicaid (both FFS [7.52 hours] and MCO [7.56 hours]), Medicare FFS (7.80 hours), the U.S. Department of Veterans Affairs/TRICARE (8.26 hours), and Medicare MCO (8.33 hours). For uninsured patients, LOS was 8.31 hours. All pairwise comparisons of LOS between payers were significantly different ($p < .01$) except for comparisons between patients with Medicaid FFS and Medicaid MCO, other payers and Medicare, other payers and TRICARE, and other payers and no insurance.

Hospital size, measured by number of beds, was significantly associated with LOS ($p < .01$). In post hoc tests, we found significant differences in LOS between hospitals with fewer than 25 beds versus those with 101 to 200 beds and greater than 400 beds ($p < .001$) and between hospitals with 25 to 100 beds versus those with greater than 400 beds ($p < .01$). In general, smaller hospitals tended to have a shorter average LOS.

Patients' LOS was significantly shorter at for-profit (6.74 hours) compared with nonprofit hospitals (8.37 hours) ($p < .001$). There was no significant association between teaching hospital status and LOS. Rural designation was significantly associated with LOS ($p < .001$). Patients at rural hospitals had a mean LOS of 4.74 hours compared with 7.90 hours at nonrural hospitals ($p < .001$).

Disposition was significantly associated with LOS ($p < .05$). Patients who left against medical advice had the shortest stays (5.62 hours), followed by patients who were discharged home (7.00 hours), transferred to a psychiatric facility (11.53 hours), or transferred to another health facility (12.58 hours). Post hoc Tukey tests showed that all pairwise differences were significant ($p < .01$).

Table 3 summarizes the percentage of eligible encounters (patients who were transferred) that met the criteria for boarding (approximately 40% of the overall sample). Overall, 73% of patients who were transferred qualified as boarders. In general, the proportion of encounters that represented boarding was similar across categories, except for encounters related to mood disorders (38%) and hospitals with fewer than 25 beds (49%).

TABLE 2. Mean±SD length of stay in hours during 597,541 patient encounters in emergency departments (ED) in Florida, by patient- and hospital-level factors and disposition

Factor	N	M	SD
Patient level			
Age			
18–24	97,817	6.73	11.81
25–34	138,692	7.18	11.83
35–44	116,435	7.92	12.28
45–54	130,335	8.63	13.10
55–64	67,735	8.32	16.65
65–74	25,753	7.97	14.85
≥75	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 ^a			
Commercial	101,487	6.43	11.29
Medicare FFS	70,643	7.80	13.52
Medicare MCO	33,886	8.33	13.59
Medicaid FFS	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
Hospital level			
Size (beds)			
<25	7,984	5.16	17.31
25–100	41,361	4.91	8.69
101–200	84,316	7.36	13.44
201–300	122,040	6.74	9.52
301–400	78,310	6.71	14.36
>400	263,530	9.23	14.36
Ownership			
For profit	218,550	6.74	10.38
Nonprofit	378,991	8.37	14.49
Teaching status			
Teaching	135,705	9.63	14.55
Nonteaching	461,836	7.23	12.80
Rural status			
Rural	23,549	4.74	11.62
Not rural	573,992	7.90	13.20
Disposition			
Transferred to other health care facility	48,462	12.58	19.97
Discharged	476,247	7.00	12.30
Transferred to psychiatric facility	49,456	11.53	11.72
Left against medical advice	23,376	5.62	11.60
Boarded ^b			
Yes	229,856	15.80	18.50
No	367,685	2.75	1.38

^a FFS, fee-for-service; MCO, managed care organization

^b Defined as an ED stay of ≥ 6 hours for patients who were eventually transferred

DISCUSSION

LOS in the ED was associated with age, race-ethnicity, hospital size, hospital ownership, rural designation, and disposition but not with hospital teaching status. Our findings, adjusted for random effects of individual hospitals, were similar to findings by others (4,15,22,24,25). For example, Chakravarthy and colleagues (15) found similar patterns in LOS with regard to hospital size, rural location, and

TABLE 3. Use of boarding during 97,918 patient encounters involving a transfer from the emergency department (ED), by diagnosis, patient- and hospital-level factors, and disposition^a

Factor	Transferred	Boarded		Factor	Transferred	Boarded	
		N	%			N	%
Diagnosis				Hospital level			
Anxiety disorders	5,596	3,873	69.2	Size (beds)			
Attention-deficit hyperactivity, conduct, and disruptive behavior disorders	495	346	69.9	<25	948	485	49.3
Mood disorders	37,001	27,320	37.8	25–100	6,223	4,450	71.5
Schizophrenia and other psychotic disorders	21,500	16,230	75.5	101–200	12,922	10,204	79.0
Alcohol-related disorders	11,384	8,270	72.6	201–300	20,405	15,446	75.7
Other substance-related disorders	8,164	5,278	64.7	301–400	11,739	7,848	66.9
Intentional self-inflicted injury and suicidality	13,778	10,513	76.3	>400	46,645	33,397	73.2
Patient level				Ownership			
Age				For profit	56,670	42,041	74.2
18–24	14,732	10,496	71.3	Nonprofit	41,248	29,789	72.2
25–34	21,952	16,069	73.2	Teaching status			
45–54	23,081	14,932	74.7	Teaching	21,326	16,937	71.8
55–64	11,259	17,240	73.5	Nonteaching	76,592	54,893	79.4
65–74	3,654	2,671	73.1	Rural status			
≥75	3,130	2,144	68.5	Rural	3,340	2,077	62.2
Race-ethnicity				Not rural	94,578	69,753	73.8
Caucasian	67,011	48,555	72.5	Disposition			
African American	17,169	12,592	73.3	Transferred to other health care facility	48,462	34,498	71.2
Hispanic	7,772	6,053	77.9	Discharged	—	—	—
Payer ^b				Transferred to a psychiatric facility	49,456	37,332	75.5
Commercial	12,189	8,342	68.4	Left against medical advice	—	—	—
Medicare FFS	12,802	9,250	76.1	Total	97,918	71,830	73.4
Medicare MCO	6,471	4,926	73.0				
Medicaid FFS	10,151	7,410	75.8				
Medicaid MCO	9,052	6,857	72.8				
VA/TRICARE	3,346	2,314	69.2				
Uninsured	42,286	31,694	75.0				

^a Boarding was defined as an ED stay of ≥6 hours for patients who were eventually transferred.^b FFS, fee-for-service; MCO, managed care organization

ownership. In another study, Chang and colleagues (5) examined LOS at EDs in five hospitals in San Francisco, which had a longer mean LOS compared with our study, and found variable results. The authors reported similar patterns with regard to LOS and disposition compared with results of this study. The difference in mean LOS between our study and the study by Chang and colleagues (5) may be due to their inclusion of all patients presenting in the ED with psychiatric diagnoses, especially those who were admitted. Nonetheless, our study presents results similar to other researchers' findings in terms of the relationships between LOS and age, race-ethnicity, payer type, hospital size, location, hospital ownership, and disposition in psychiatric and general medical populations (21,22,25).

Diagnosis was a strong predictor of LOS for patients with psychiatric disorders. Not surprisingly, disorders associated with an increased risk of patients' harming themselves or others—such as self-injury, schizophrenia, and mood disorders—were associated with the longest LOS, likely because patients with these disorders required a transfer, which was linked to longer average LOS. The mean LOS for patients with

intentional self-injury and suicidality, schizophrenia and other psychotic disorders, and mood disorders was longer by approximately 2.25 to 5.00 hours compared with the mean LOS for all psychiatric disorders and was more than double the mean LOS for anxiety disorders. This difference in LOS may be due to 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 high rate of boarding for transferred patients, it appears that individuals who required the most intensive inpatient intervention were forced to wait several hours before this care can be provided. That is not surprising considering that the most intensive interventions necessitated a consultation from a psychiatrist followed by protocols for locating an appropriate bed at another facility and 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 a shorter average LOS, which may be due to lower severity of primary condition or fewer comorbid conditions. Regardless of

underlying causation (for example, diagnosis), mean LOS varied by approximately 1.90 hours between age groups with the shortest (18- to 24-year-olds) and longest LOS (45- to 54-year-olds). We also found a difference in LOS by race-ethnicity. On average, Hispanic patients stayed more than two hours longer compared with Caucasian patients and more than one hour longer compared with African-American patients. These LOS differences might be due to underlying differences in insurance type (34). Nonelderly African-American and Hispanic patients were less likely to have health insurance coverage, which creates fewer alternatives for transfer should it be needed and, hence, a longer average LOS. Further analysis is needed to elucidate the reason for this finding.

Finally, the results for patient insurance produced mixed findings. As noted, patients with commercial insurance experienced the shortest LOS, whereas 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, that patients with commercial insurance are less likely to require transfer, or that commercial insurers cover more transfer alternatives, which reduces the time to transfer. In addition, patients with commercial insurance may be healthier compared with publicly insured patients, given that 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 involving Medicare MCO were associated with a shorter stay compared with those involving Medicare FFS; however, the relationship did not hold true for patient encounters involving Medicaid MCO and FFS.

Another possible explanation for the association between payer and ED LOS 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). Although this possibility has not yet been empirically demonstrated, ED physicians and managers put forth these explanations in the context of explaining reasons for boarding (13). We also found that patients without insurance stayed nearly two hours, or almost 25%, longer than patients with commercial insurance. Compared with funded patients, uninsured patients are more challenging to place.

Several hospital factors were also associated with LOS. For example, we found that hospital size was positively associated with LOS among hospitals with 100 or fewer beds. Our choice of modeling technique took 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 fewer hours compared with nonprofit hospitals, which may reflect differences in the degree to which administrative practices at for-profit and not-for-profit hospitals emphasize cost containment. Moreover, nonprofit hospitals generally

provide safety-net services for patients who lack steady care or insurance, who may be less healthy.

We also found that rural designation was a significant predictor of shorter LOS, which is consistent with the findings noted above. 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 two-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 a 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 because our sample included no admitted patients and because a proxy was used for identification of boarding.

There were some study limitations. We report cross-sectional associations with LOS, because causal relationships could not be inferred from our data set. Our data set also limited our ability to study LOS and boarding among patients who were admitted to the same hospital. Given the nature of this data set, we were not able to determine when and if a patient's 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 patients in Florida EDs who are treated and released or transferred. 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.

CONCLUSIONS

This study's findings are consistent with the findings of other studies across settings. Our findings that nearly 40% of patients in the study sample stayed in an ED for longer than six hours, and in some cases many hours more, strongly suggest that a focus on EDs 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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