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# Shifts in inpatient psychiatry utilization patterns at a U.S. Academic Medical Center during the COVID-19 pandemic

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## ARTICLE INFO

### Keywords:

COVID-19

Hospital admissions

Inpatient psychiatry

## ABSTRACT

The COVID-19 pandemic has impacted utilization volumes and patterns for inpatient psychiatry, though reports have noted inconsistencies on small populations. We obtained demographic and diagnostic data from a retrospective cohort of admitted psychiatric patients at a single-site from March-July 2020 and the corresponding months in 2019. Despite controlling for the modest decrease in inpatient admissions, no statistically significant changes in demographics or utilization was found, except for an increase in patients with substance use disorder ( $p < 0.001$ ). These early findings highlight the demand and necessity for inpatient psychiatry services even during the first COVID-19 spike.

## 1. Introduction

The COVID-19 pandemic has impacted behavioral health services in multiple ways. Patterns of utilization for inpatient psychiatric services have been drastically affected, though the reported findings are not consistent across regions and patient groups thus far. One study found a 20% reduction in volume of inpatient psychiatric admissions during the early COVID-19 lockdown (Abbas et al., 2020). Another study found a 21.4% increase in geropsychiatry admissions (Lee et al., 2020), while among youths another study found a 41% decrease (Ugueto and Zeni, 2021). The characteristics of admitted patients have also been impacted and reports suggest that hospitalized patients during the early pandemic were more likely to have a separated marital status, less severe mental illness (SMI), and involuntary admission status (Abbas et al., 2020; Itrat et al., 2020). The youths admitted during the pandemic were on average older, more likely to have been diagnosed with substance use disorder (SUD), and had a longer length of stay (LOS) (Ugueto and Zeni, 2021).

The pandemic has impacted symptom burden and presentation of mental health conditions. A systematic review measuring psychiatric symptoms found a generalized worsening of symptoms among patients with pre-existing psychiatric disorders (Vindegaard and Benros, 2020). An observational study provided early evidence of more severe psychopathology in patients presenting to the psychiatric emergency department during the pandemic (Ambrosetti et al., 2021; Gonçalves-Pinho et al., 2020). Reports indicate there are increases for non-affective psychosis, bipolar disorders, and anorexia nervosa, but fewer

presentations for depression, anxiety, adjustment, and personality disorders (Haripersad et al., 2021; Abbas et al., 2021). Variations in admission presentation could be due to shifts in patient access to acute mental health services, increased need for behavioral health resources, or delayed care during the COVID-19 pandemic (Grimshaw and Chaudhuri, 2021).

Although the literature shows a shift in volumes and utilization patterns for psychiatric inpatients, these have not been consistently reported and many of these studies have called for larger sample sizes to address this concern. In our study, we explore if there was a reduction in inpatient admissions at a large academic center during the COVID-19 outbreak and if there were changes in utilization across various demographic, diagnostic, and outcome variables. To address these questions, we performed a retrospective analysis of inpatient admission data early in the COVID-19 pandemic in comparison to a pre-pandemic control period.

## 2. Methods

We obtained demographic and diagnostic data for a retrospective cohort of admitted psychiatric patients from 2019 to 2020 at [Institution A]. The study period ran between March 1st to July 31st, 2020, based upon the initial COVID-19 surge and subsequent lockdown. The corresponding dates in 2019 served as the baseline for the comparison. Demographic variables of age, gender, race, and insurance status were examined, in addition to psychiatric diagnosis and 30-day all-cause

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readmission. General estimating equation (GEE) models were employed using a logit link and subject cluster effects to account for multiple admissions for the same patient. The outcome variable was 2019 versus 2020 admission and each demographic variable served as predictors (see Table 1). All statistical analyses were conducted using SAS, version 9.4 (Cary, NC).

### 3. Results

A combined total of 2546 admissions among 2063 patients were observed in 2019 and 2020 during the study periods (see Table 1). Most patients (83%) had a single admission during the periods studied, while 13% had two admissions, 3% had three admissions, and 1% had four or more admissions. During the pandemic period (2020), there were 1218 admissions, which is a 9% reduction in overall admission volume compared to the previous year ( $N = 1328$  in 2019). No significant differences were observed for age categories ( $p = 0.129$ ), gender ( $p = 0.47$ ), or insurance status ( $p = 0.871$ ) between 2019 and 2020 admissions. The pandemic patient cohort identified as 16.2% Hispanic, 21.4% Black, 54.9% White, and 7.6% Other, which was not statistically different from the 2019 cohort ( $p = 0.76$ ). The proportion of admissions classified as 30-day all-cause readmissions was not significantly different between the study cohorts ( $p = 0.16$ ).

There was a significant effect of psychiatric diagnosis between the

**Table 1**  
Patient cohort characteristics for March-July 2020 and CORRESPONDING 2019 CONTROLS.

	Pre-COVID ( $N = 1328$ )	%	COVID ( $N = 1218$ )	%	P value
Age Categories					0.129
13–23	425	32.0	356	29.2	
24–63	754	56.8	740	60.8	
64+	149	11.2	122	10.0	
Gender					0.47
Female	649	48.9	576	47.3	
Male	679	51.1	642	52.7	
Race					0.76
Hispanic	199	15.0	197	16.2	
Non-Hispanic Black	291	21.9	260	21.4	
Non-Hispanic Other	112	8.4	92	7.6	
Non-Hispanic White	726	54.7	669	54.9	
Insurance Status					0.087
Commercial/Private/ Managed Care	266	20.0	253	20.8	
Medicaid	390	29.4	389	31.9	
Medicare	188	14.2	128	10.5	
Medicare Managed Care	81	6.1	60	4.9	
Other <sup>a</sup>	204	15.4	167	13.7	
Self-Pay/Uninsured	199	15.0	221	18.1	
Primary Diagnosis					0.0004
Anxiety and Adjustment Disorders	65	4.9	75	6.2	
Mood Disorders	686	51.7	619	50.8	
Schizophrenia and other psychotic Disorders	359	27.0	333	27.3	
Substance Use Disorders**	54	4.1	83	6.8	
Other <sup>b,***</sup>	164	12.4	108	8.9	
30-day all-cause Readmissions					0.16
N	1230	92.6	1102	90.5	
Y	98	7.38	116	9.52	

\*\*  $p < 0.05$  in post-hoc analysis.

<sup>a</sup> Other insurance status includes Veteran's Affairs payors as well as grant and project funding.

<sup>b</sup> Other diagnosis includes Attention deficit and other conduct/behavior disorders, Delirium, Dementia, and other cognitive disorders, Disorders usually diagnosed in childhood, Impulse control disorders, Miscellaneous Mental Disorders such as suicide attempts, and other medical diagnosis.

study cohorts ( $p = 0.0004$ ). Post-hoc tests indicated significant increases in substance use disorders (SUD) admissions (4.1% pre- vs. 6.8% post-COVID) relative to the changes observed for anxiety and adjustment disorders ( $p = 0.049$ ), mood disorders ( $p = 0.0009$ ), and schizophrenia and other psychotic disorders ( $p = 0.005$ ). Significant decreases in disorders classified as "other" (12.4% pre- vs. 8.9% post-COVID) were observed relative to the changes observed for all other diagnostic categories ( $p$  range, 0.03–0.0001).

### 4. Discussion

This retrospective analysis shows the total number of admissions during the early COVID-19 outbreak did not have a statistically significant decrease compared to 2019. To our knowledge, this study is the largest at an academic medical center examining the impact of COVID-19 on psychiatric inpatient volumes, patient characteristics, and readmissions. While prior studies showed variations in COVID-19 inpatient psychiatry admissions (both increased and reduced), our study found that inpatient admission volume had a 9% reduction that was not statistically significant. (Abbas et al., 2020; Itrat et al., 2020; Lee et al., 2020; Ugueto and Zeni, 2021). One reason for this could be that inpatient admission volumes may be dependent on ED volumes (Biancosino et al., 2009). In fact, a study by Goldenberg and Parwani at the same period in the psychiatric emergency setting highlighted the reductions in overall emergency visit volume, but the higher relative numbers of increased admissions (Goldenberg and Parwani, 2021). They also concluded that psychiatric ED volume decreased less so than ED volume, which might indicate patients were less willing to delay mental health care during the pandemic and have similar symptom acuity (Goldenberg and Parwani, 2021). The pandemic has also increased demand for psychiatric care across many disorders nationwide and decreased treatment options (52% organizations had to close programs) (APA, 2021; Majlessi, 2020). Coupling these factors leaves the psychiatric population at a serious disadvantage during a time of heightened demand for psychiatric care.

Our findings suggest that admission volume was heavily impacted by structural changes in response to COVID-19 infection prevention standards, and not fully a function of reductions due to lessened demand. For example, we developed a COVID+ inpatient psychiatry unit for 4 weeks that impacted inpatient bed volumes (decreased number of beds on one unit) (Li et al., 2021; Luming Li et al., 2020). In addition, we made accommodations to temporarily reduce inpatient volume capacity to meet social distancing requirements and to quarantine patients. As a large hospital serving as a regional safety-net for patients requiring psychiatric hospitalization, we continued to experience demand for psychiatric services throughout the pandemic as soon as we expanded capacity.

Our findings highlight that reductions in inpatient psychiatry beds must be done carefully to balance infection prevention standards and avoid long term negative impacts to the SMI population. According to a report done by the Treatment Advocacy Center, patients with SMI and unable to access care will resort to emergency departments and corrections (E. Fuller Torrey, 2012). Furthermore, a higher occupancy rate could be a proxy for adverse outcomes in psychiatry care, emphasizing the need for equitable bed distribution (Kaboli et al., 2021).

There was a significant change in admissions presenting with SUD (2.7% increase) and other diagnoses (3.5% decrease). In a report from the CDC, 13% of Americans reported resorting to alcohol to cope with quarantine stress and an 18% increase in national overdoses was reported (CDC, 2020). This is a worrisome finding, since patients with comorbidities of SUD and COVID-19 are at greater risk of adverse events (Jacques Baillargeon et al., 2020). This finding might coincide with the added stress and anxiety caused by social distance measures, which might have increased the likelihood of resorting to substances to cope (Clay and Parker, 2020). Public health initiatives should focus on addressing substance use to reduce unintentional negative health outcomes. For other diagnosis, given the large array of diagnoses captured

by this designation (Table 1), this may suggest that patients at risk of suicide and other less severe illness may have been less able to seek inpatient care until it was too late (Haripersad et al., 2021; Abbas et al., 2021). Patients unable to receive necessary care could potentially be at increased risk for adverse outcomes and complications (Mahmud et al., 2020; Oseran et al., 2020; Siegler et al., 2020; Solomon et al., 2020).

Without significant differences for the other outcome and demographics variables between the time periods, these findings differ from prior studies. Reports with smaller patient samples found unique changes in youth and psychogeriatric admission volumes, which was not found in our analysis (Lee et al., 2020; Ugueto and Zeni, 2021). Though adverse medical outcomes of COVID-19 disproportionately impact older patients (Yanez et al., 2020), this does not appear as a rise in psychiatric volume amongst older patients in our study. Even though the pandemic has exacerbated several pre-existing health, economic disparities, and accessibility challenges within minority populations (Golestaneh et al., 2020; Gross et al., 2020), there does not appear to be an increase in admissions for these groups. The effect of COVID on admissions seems to be pervasive and transcends traditional barriers experienced by racial and ethnic minority groups and the elderly (Yancy, 2020).

There are a variety of limitations for this report. This data only represents one academic institution in a Northeastern U.S. state, which can impact the generalizability of these findings. Additional variables such as legal status, illness severity, and LOS were not available. Furthermore, data utilized in the study was obtained from the electronic medical record, so provider coding errors could influence study results. Finally, impacts of the COVID-19 pandemic continue at the time of writing and might not be captured in this data.

Future studies should focus on exploring admission data featuring facilities from diverse settings and the at the national level. By capturing an expanded study window to include the entire pandemic period and adding additional outcome variables, these can help to better understand the pandemic's full effect on health equity, service utilization, and long-term consequences of delaying care.

### Conflict of interest

No others have any conflicts of interest to report in performing this research or preparing this manuscript.

### CRediT authorship contribution statement

**William Kulp:** Conceptualization, Methodology, Investigation, Formal analysis, Writing – original draft, Writing – review & editing, Project administration. **Thomas O. Mitchell:** Methodology, Writing – review & editing. **Brian Pittman:** Data curation, Validation, Formal analysis, Writing – review & editing. **Luming Li:** Conceptualization, Investigation, Writing – review & editing.

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