

Original Research

The Impact of COVID-19 on Admission Rates for Individuals with Substance Use Disorders

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Abstract

Background

Limited data exist regarding the prevalence of substance use disorders or utilization of mental health care during the COVID-19 pandemic. Our study aims to specifically identify trends in the utilization of behavioral health units (BHU) in those with substance use disorders (SUD).

Methods

Patient electronic health records (EHR) were analyzed from fourteen hospitals principally located in the US mid-Atlantic region. To compare SUD admissions before and after COVID-19 quarantine time periods, patient data from BHUs were collected from two time-periods: February 1st, 2019 to May 31st, 2019, and February 1st, 2020 to May 31st, 2020.

Results

The number of SUD admissions to BHUs did not change from 2019 to 2020 but there was a statistically significant difference in the proportion of SUD patients admitted to BHUs ($\chi^2 = 83.47$, $p < .001$, $V = 0.06$). We also detected a significant difference in the proportion of SUD severity between 2019 and 2020 with a small but significant overall decrease in the proportion of moderate/severe cases ($\chi^2 = 5.70$, $p < .001$, $V = 0.05$) in SUD patients.

Conclusion

Our data suggest that even during the times of a global pandemic when there is a decline in health care utilization in other settings, the need for inpatient substance use treatment should not be expected to decrease and increased use of telemedicine may be beneficial for this vulnerable population.

Keywords

SARS-CoV-2, COVID-19, substance-related disorders, telemedicine, patient admission, behavioral medicine

Background

Substance use disorders (SUD) are a growing concern nationwide, with a 3-fold increase in SUD-related deaths since the 1980s and with total deaths from substance use exceeding those due to motor vehicle crashes and gun violence.¹ Between 2002 and 2015, the national substance use disorder-related death rate increased from 16.0 to 27.5 per 100,000.

Researchers have found that patients with substance use disorders, in particular alcohol use or substance use with comorbid psychiatric

disorders, have a higher health care utilization rate,² and that SUD was associated with a 30% higher rate of specialty medical care services. Yet limited data exist regarding the prevalence of SUDs and the utilization of mental health care during times of national emergency such as the COVID-19 pandemic. Some studies have suggested trends in mental health care needs by citing data on the mental health impact in China during previous outbreaks such as MERS and SARS.^{3,4} These studies were focused specifically on the Chinese population and health-care system, and provide limited insight into

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the impact of the COVID-19 pandemic within the United States population and healthcare system and specifically individuals with SUDs. Some studies have examined health care utilization world- and nationwide during the pandemic,⁵⁻⁷ suggesting a decrease in utilization of non-coronavirus-related medical services. Despite this finding of decreased health care utilization, editorials have been published suspecting a greater potential impact of COVID-19 on SUDs.^{8,9} Dr. Sederer refers to the conditions of the pandemic as “triple trouble” of a pandemic, indicating that unemployment and diminished personal and community supports could lead to increased substance use.⁹ For example, outpatient mental health services including substance use services experienced a reduction in outpatient visits and were required to reduce services during the COVID-19 pandemic.^{10,11} However, no studies available have demonstrated a trend in mental health care utilization, specifically for SUDs during the COVID-19 pandemic, and initial data from the United States have been limited to literature reviews.¹²

Our study aims to specifically identify trends in the utilization of inpatient BHUs in those with SUDs during the first stages of the COVID-19 pandemic compared to utilization the previous year prior to the pandemic.

Methods

Study Population and Data Collection

Patient electronic health records (EHR) were analyzed from fourteen hospitals principally

located in the US mid-Atlantic region. An HCA Healthcare database analyst obtained the data, which was delivered to the research team. To compare SUD admissions before and after COVID-19 quarantine time periods, patient data from BHUs were collected from two time-periods: February 1st, 2019 to May 31st, 2019, and February 1st, 2020 to May 31st, 2020. A total of 26,858 patients admitted to BHUs were identified.

In order to be included for further analyses, patients (of the 26,858) had to have a SUD in their top three diagnoses. Of the 26,858 patients admitted to BHUs during the two time-periods, 2,391 patients met this criterion (1,206 in 2019 and 1,185 in 2020). Demographics, encounter and specific diagnoses data were only made available for patients with SUDs. No additional inclusion/exclusion criteria were applied. This study was deemed exempt from IRB oversight by the US Office for Research Protections rule 45 CFR 46.104(d)(4) or “Common Rule”.¹³ All data were stored on a password-protected virtual desktop instance. Before receiving the data for analyses by the research team, the patients’ identifying information was removed in accordance with “Safe Harbor” standards,¹⁴ and an ID number was assigned.

Data Analyses

A chi-square test was conducted to compare the proportion of SUD admissions during the two time-periods. Additionally, of those with SUDs, the proportion of mild versus moderate/severe designations were compared. Descriptive statistics were also calculated for

Table 1. Demographic descriptive statistics and group comparisons.

	Before	After		Cohen’s d / Cramer’s V
	Mean(sd)		t / χ^2	
Age (years)	40.7 (14.1)	39.8 (13.7)	132.33***	-0.07
Race (% Caucasian)	78.4%	76.5%	14.71*	0.13
Sex (% female)	38.7%	40.3%	0.52	0.02
Length of Stay (days)	5.16 (4.31)	5.56 (4.28)	42.44***	0.09

* p < .05, ** p < .01, *** p < .001

“Before” refers to February 2019-May 2019 time period and “After” refers to February 2020-May 2020 time period.

Note: t-tests and Cohen’s d values are reported for continuous variables and χ^2 and Cramer’s V values are reported for categorical variables.

Table 2. BHU admissions in 2019 and 2020 and proportion of SUD compared to total admission.

	Before	After	Total	Δ
No SUD	14,695	9,763	24,485	4,932
SUD	1,206	1,185	2,391	21
Total Year	15,901	10,948		
Proportion SUD/Total	8%	11%*		

* $\chi^2 = 83.47, p < .001, V = 0.06$

“Before” refers to February 2019-May 2019 time period and “After” refers to February 2020-May 2020 time period.

demographic information and appropriate tests, including calculating effect sizes, were conducted to investigate differences in demographics. Logistic regression analyses were also conducted to further evaluate the role of patient demographics in differentiating admission time and SUD severity and allowed for the inclusion of multiple variables (as compared to univariate tests). All analyses were conducted in the R Statistical Environment.¹⁵

Results

Demographics

Demographics descriptive statistics and group comparisons are reported in **Table 1**. Statistically significant differences in age, distribution of race and hospital length of stay were found between time periods; however, further examination of the effect sizes indicates that while statistically different, the differences were not “practically significant” and were likely the result of the large sample size.

SUD Admissions

A 4,962 (31%) decrease in patients admitted to BHUs from 2019 (n = 15,910) to 2020 (n = 10,948) was observed. A statistically significant difference in the proportion of SUD patients

treated at BHUs during 2019 and 2020 (**Table 2**) was detected ($\chi^2 = 83.47, p < .001, V = 0.06$) revealing increase in proportion of SUD patients (from 8% to 11%). Importantly, the increase in the proportion of SUD patients in 2020 was due to the overall reduction in BHU patients, not a change in the gross number of SUD patients (1,206 in 2019 to 1,185 in 2020).

In order to assess the ability of different demographic variables to predict time of admission, a logic regression was conducted to predict the odds of admission time period membership using patient demographics (sex, race, insurance type, length of stay and SUD severity). Only SUD severity significantly predicted admission time period ($\beta = -0.28, p < .05, odds = 0.76$) indicating that there was a 24% decrease in the odds of a patient with moderate/severe SUD being admitted during the second time period.

SUD Severity

We also detected a significant difference in the proportion of SUD severity between 2019 and 2020 (**Table 3**) with a small increase in the number of mild cases and a small decrease in the number of moderate/severe cases ($\chi^2 = 5.70, p < .001, V = 0.05$) in SUD patients. There

Table 3. Proportion of mild and moderate/severe cases 2019 and 2020.

	Before	After	Total	Δ
Mild	904	932	1799	-28
Moderate/Severe	302	253	537	49
Total Year	1206	1185		
Proportion Mild/Total	75%	79%*		

* $\chi^2 = 5.70, p < .001, V = 0.05$

“Before” refers to February 2019-May 2019 time period and “After” refers to February 2020-May 2020 time period.

was not a statistically significant change in the proportion of SUD types (e.g., opioids, alcohol, etc.) between the two time-periods.

Finally, we report the results of a logistic regression model to predict the odds of having mild or moderate/severe SUD using patient demographics. Patients admitted before the COVID-19 pandemic ($\beta = -0.27$, $p < .05$, odds = 0.76) and not insured by Medicaid ($\beta = -0.33$, $p < .05$, odds = 0.71) had a 24% and 29% decrease in the odds of having a moderate/severe SUD diagnosis, respectively. There was no significant association between admission period and any demographic variable, including sex, age or insurance.

Discussion

Our results show an increase in the proportion of patients admitted with SUDs to BHUs during the pandemic compared to the year prior, before the start of the pandemic. This change in proportion reflected a decrease in total admissions with little change in SUD admission rates from 2020 compared to 2019. The cause for these findings is not fully known at this time and will require further studies.

Previous studies have seen an overall hesitancy to avoid medical care during the COVID-19 pandemic even amongst patients with heart failure.⁵ This hesitancy was also seen in BHUs as evidenced by the 31% decrease in total admissions compared to the year prior. Because the number of inpatient admissions for substance use did not decrease, this shows that the utilization of inpatient SUD treatment continued during the pandemic. While there was a lower medical care utilization in certain populations and settings during the pandemic, our results stress the importance of continuing to provide sufficient resources and treatment for patients with SUDs in the inpatient setting.

Our study was observational and cannot prove the cause of this change in SUD proportion. A possible explanation, however, is that isolation,¹⁶ unemployment and limited access to community resources like Alcoholics Anonymous¹⁷ increased problematic substance use. Research using animal models (e.g., rats and rhesus monkeys) support the conclusion that social isolation increases substance abuse.^{18,19} Furthermore, positive romantic relationships and attending religious services, for example,

are two activities that appear to have protective effects against substance abuse, both of which are limited by the pandemic.²⁰ Our finding that there was a statistically significant increase in the number and the proportion of patients with mild SUDs compared to moderate/severe SUDs, after controlling for demographic variables (see logistic regression results), may support the conclusion that the current pandemic environment has increased problematic substance use among individuals that previously did not meet SUD criteria. Because of these “new” patients that developed SUDs during the pandemic, total admissions did not decrease despite general hesitancy to seek medical care. However, these changes were relatively small and may simply reflect the change in proportion of total SUD patients to total BHU from 2019 to 2020.

A second explanation is that there were no differences in patients from the two time-periods. Some research suggests that individuals with SUDs are more likely to engage in risky health behaviors²¹ and impulsive decision-making,²² which may result in an insensitivity to the risk of seeking medical attention. We did not find meaningful differences (statistically different but clinically negligible) in demographic variables and these demographic variables did not predict admission time period. Given the similarity in demographic variables, as well as no change in proportion of different SUD diagnoses, it is possible a similar group of patients was admitted during the pandemic as the year prior. The increase in mild diagnoses and decrease in moderate/severe diagnoses could indicate that patients with previous SUD diagnoses seeking inpatient care as their only option due to the unavailability of other personal and community substance abuse treatments (e.g., AA) during the pandemic. Further research is needed to identify the most plausible cause for the change in SUD proportions.

One factor that could account for the change in the proportion of BHU admissions is the increased utilization of telemedicine during the COVID-19 pandemic. Telemedicine has shown to decrease alcohol consumption in a systematic review published earlier this year.²³ There has been an increase in the amount of telemedicine utilized for SUDs from 2016–2019 but this increase has been slow, non-homogenous and likely under-utilized.²⁴ The CDC published

recommendations to optimize the use of telehealth during the COVID-19 pandemic.²⁵ According to data collected by FAIR Health Inc. for the southern region of the United States, there has been a dramatic increase in telemedicine use during the pandemic especially for mental health treatment.²⁶ In February 2020, telemedicine had seen a 212.42% increase in percent of medical claim lines utilizing telehealth compared to February 2019 and mental health conditions accounted for 12.55% of telehealth claim lines. By May 2020 there was a 3,434.64% increase in percent of medical claims utilizing telehealth compared to May 2019 and mental health conditions accounted for 32.49% of telehealth claim lines. In the early months of the pandemic, telehealth was not as available or highly utilized for patients with mental health conditions. As outpatient clinics were also closed, patients with SUD, whether new or those with previous diagnoses, may have presented to the inpatient BHUs as their only option. However, it is possible that this increase in telehealth use encapsulates depression and anxiety diagnoses but not SUDs, accounting for our findings.

Another advantage of telehealth services for mild SUD is the potential reduction in health care costs for the patient. We found that patients not insured by Medicaid (a federal-state funded healthcare plan that typically covers most medical costs) were less likely to be diagnosed with a moderate/severe SUD. Telehealth may provide a more affordable treatment outlet for patients with mild SUD than more expensive inpatient care. Telemedicine utilization should continue to increase for patients with SUDs as it may be a useful tool to decrease substance use as well as rate of admissions to inpatient BHUs, and thus reduce possible exposure to infected individuals and health care costs, especially in those with mild SUDs.

In summary, our results suggest that even during the times of a global pandemic, when health care utilization in many settings declines, the need for inpatient substance use treatment should not be expected to decrease and necessary resources should continue to be allocated. Availability and improvement of telehealth services could be considered to prevent and treat the development or relapse of substance use that may have occurred during the

pandemic and decrease admissions to inpatient BHUs,²⁷ thus reducing risk of exposure and health care costs.

Conflicts of Interest

The authors declare they have no conflicts of interest.

Drs. McDonald and Zhang are employees of LewisGale Medical Center, a hospital affiliated with the journal's publisher.

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