

Retrospective Study of Psychiatric Hospitalizations in a West Texas Mental Health Treatment Facility during the COVID-19 Pandemic

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Objectives: The association between the coronavirus disease (COVID-19) pandemic and adverse mental health outcomes has been well documented; however, little is known about its impact in rural areas of the United States. This study aims to characterize and compare inpatient psychiatric admissions in West Texas before and during the initial months of the COVID-19 pandemic.

Methods: A retrospective study was conducted using the electronic health records of 1392 inpatient psychiatric admissions from period A (March 13, 2019–July 3, 2019) to period B (March 13, 2020–July 3, 2020).

Results: During period B, there was a significant increase in the length of stay ($P < 0.01$) compared with period A. The pandemic was associated with an increased history of psychiatric medication use ($P < 0.01$), substance use ($P \leq 0.01$), and suicide risk at the time of admission ($P < 0.01$). Significant differences were found in employment status ($P < 0.01$), living situation ($P < 0.01$), and ethnicity ($P = 0.03$).

Conclusions: Rural communities in West Texas experienced a decrease in psychiatric hospitalizations during the beginning of the COVID-19 pandemic, followed by an increase as lockdown restrictions began to lift; this warrants further investigation into healthcare service utilization during the pandemic.

Key Words: COVID-19, hospital admission, lockdown, mental health, pandemic

In December 2019, the novel coronavirus, now known as severe acute respiratory syndrome-coronavirus-2 or coronavirus disease 2019 (COVID-19), was discovered in patients with pneumonia in Wuhan, China.¹ Since then, it has spread worldwide leading to a global pandemic. The first COVID-19 case in the United States was reported on January 20, 2020.² The state of Texas reported its first case on March 4, 2020,³ with evidence of community spread by March 11, 2020,⁴ which was followed by the initiation of the early phases of lockdown on March 13, 2020.⁵

Historically, quarantine has been linked with a number of negative psychological implications, including depression and posttraumatic stress symptoms.⁶ Inadequate public messaging from government authorities also have been identified as a stressor.⁷ Research has shown that isolation can increase addictive disorder-related symptoms, including substance use,⁸ and psychological distress associated with fear of infection.⁹ The COVID-19 pandemic in particular has been associated with a significant mental health burden in the general population.¹⁰ Despite this, studies have demonstrated an appreciable decline in psychiatric emergency consultations^{11,12} and psychiatric inpatient admissions¹³ during the COVID-19 pandemic in Europe. Furthermore, there is an underutilization of mental health resources in rural communities.¹⁴

The aim of this study was to compare and characterize the trends in psychiatric inpatient admissions and compare the

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Key Points

- The coronavirus disease 2019 (COVID-19) pandemic has affected rural inpatient psychiatric admissions in the United States.
- Admissions increased when COVID-19 lockdown restrictions began to ease.
- Further multicenter studies are needed to assess regional differences in admissions.
- Variation in service utilization may be used to better prepare for future crises.

sociodemographic and clinical characteristics of patients in a mental health treatment center in West Texas between the early months of the COVID-19 pandemic in 2020 and the same months in 2019. To the authors' knowledge, this article is the first to examine the associations between inpatient admissions and the pandemic in a rural psychiatric hospital.

Methods

Setting and Study Design

A retrospective study was conducted using inpatient psychiatry admissions from a psychiatric hospital serving 26 rural and semirural counties within an approximately 373-mi radius of Amarillo, Texas. Amarillo has a population of 200,000 inhabitants, with a sizable Asian and African refugee population and serves more than 600,000 inhabitants of the surrounding states of Oklahoma, New Mexico, Kansas, and Colorado. The hospital has 75 beds with six inpatient units: acute adult, children and adolescents, dual diagnoses, general adult, geriatrics observation, and uniformed service. The significance of this particular treatment center is twofold: it serves the surrounding area of meatpacking facilities that became a hotspot source of transmission of COVID-19 in May 2020¹⁵ and much of the surrounding area is considered rural.

To determine the time periods for the study, the timeline of the COVID-19 pandemic in Texas was taken into account. On March 13, 2020, a state of emergency was declared in Texas, initiating the early phases of lockdown; on May 1, 2020, reopenings were phased in, initiating the ease of lockdown.⁵ On July 3, 2020, 2 months after the end of lockdown, the mask mandate was implemented, requiring face coverings in buildings and outdoor public spaces.¹⁶ As such, the prepandemic period includes March 13, 2019 to July 3, 2019 (period A) and the pandemic period includes March 13, 2020 to July 3, 2020 (period B).

All voluntary and involuntary inpatient psychiatric admissions aged 18 to 65 years during the 16 weeks in periods A and B were eligible for the study. If the patient had multiple inpatient psychiatric admissions during this time period, then only the most recent admission was used for analysis. The study protocol was approved by the Texas Tech University Health Sciences Center (TTUHSC) Amarillo institutional review board.

Data Collection

Data were collected from the electronic health records of inpatient psychiatric patients after discharge, and all of the patient information was anonymized before analysis. Sociodemographic characteristics (age, sex, self-identified race, ethnicity, insurance status at the time of admission, employment status during the time of visit, and living situation during the time of the visit) and clinical characteristics (primary psychiatric diagnosis, psychiatric medication history, substance use history, and risk of suicide) were extracted for analysis. The primary diagnosis was categorized into seven

“disorder” groups and “other,” reflecting *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* diagnosis categories. The disorder groups were categorized as psychotic disorders, bipolar disorders, depressive disorders, anxiety and obsessive-compulsive disorders, substance/medication-related disorders, personality and conduct disorders, and trauma-related and dissociative disorders. Psychiatric medications included but were not limited to selective serotonin reuptake inhibitors, serotonin and norepinephrine reuptake inhibitors, mood stabilizers, and antipsychotics. Prescription pain medications and anesthetics were excluded. The risk of suicide was defined as demonstrating suicidal ideation and/or suicidal behavior at the time of admission. Substance use history included a documented history of alcohol, nicotine, and/or recreational drug use at the time of admission. Missing patient information regarding the aforementioned variables was labeled as “unknown.”

Data Analysis

Sociodemographic and clinical characteristics were summarized using descriptive statistics (mean, standard deviation) for continuous variables and percentages for categorical variables. The mean daily, weekly, and monthly admissions were assessed from the date of admission. The differences in these continuous variables of interest and the mean age at admission across both time periods were evaluated using the independent sample *t* test after checking for Gaussian assumption and Levene's test of equality of variance. Differences in hospital length of stay between periods A and B were evaluated using the Mann-Whitney *U* test, a non-parametric alternative to the independent sample *t* test because the data did not meet the normality assumptions as indicated by the Kolmogorov-Smirnov test and the Shapiro-Wilk test. Associations among the categorical variables of sociodemographic and clinical characteristics were assessed using the Pearson χ^2 and Fisher exact tests. *P* values less than 0.05 were set as statistically significant. All of the analyses were conducted using SPSS version 27 (IBM SPSS Statistics, Armonk, NY).

Results

Trends in Psychiatric Hospitalization

A total of 1392 inpatient psychiatric admissions were analyzed. The number of admissions during the early COVID-19 pandemic accounted for 51.58% of the total admissions during the study period (Table 1). Although the number of admissions was slightly higher for period B, there was no significant difference between periods A and B in mean daily, weekly, and monthly admissions. The Figure shows the trends in weekly admissions during periods A and B. Week 8 of period B had the largest increase (50%) in the number of weekly psychiatric admissions during the 16-week study period compared with period A. The length of hospital stay was significantly higher ($z = 3.7$, $P < 0.01$) during period B (mean 6.05 ± 5.46 days, median 4,

Table 1. Characterization of inpatient psychiatric admissions and length of stay, March 13, 2019–July 3, 2019 (period A) and March 13, 2020–July 3, 2020 (period B)

| | Period A (n = 674) | Period B (n = 718) | P |
|------------------------------|-----------------------|-----------------------|--------|
| Hospital admissions | | | |
| Daily mean (SD) | 6.07 (2.47) | 6.41 (2.82) | 0.34 |
| Weekly mean (SD) | 39.18 (9.50) | 42.24 (9.81) | 0.36 |
| Monthly mean (SD) | 134.80 (75.45) | 143.60 (84.45) | 0.87 |
| Length of stay, d, mean (SD) | 5.47 (4.79) | 6.05 (5.46) | <0.01* |

SD, standard deviation.

* $P < 0.01$.

interquartile range 3–6) compared with the length of stay during period A (mean 5.47 ± 4.79 days, median 5, interquartile range 4–7).

Sociodemographic Characteristics

The sociodemographic characteristics are reported in Table 2. There was a significant difference in mean age between the two study periods ($P < 0.05$), with period A having the higher mean age of 38.20 ± 13.26 years. Although more males were admitted to the mental health facility during both time periods, there was no significant association between sex and hospitalizations during the two time periods. In addition, there was no significant association between race and the different periods. A significant difference was seen in employment status ($\chi^2(2) = 23.91$, $P < 0.01$), living situation ($\chi^2(2) = 22.71$, $P < 0.01$), and ethnicity ($\chi^2(2) = 7.42$, $P < 0.05$) between periods A and B. During both study periods, unemployment and cohabitation made up the highest percentage of admissions. Although the majority of the sample population were non-Hispanic/Latinx (82% in period A and 77.7% in period B), there was a significantly higher percentage of patients who self-identified as Hispanic/Latinx in period B versus period A (20.1% vs 17.2%, $P < 0.05$). The majority of patients in the study periods were insured (64.1% in period A and 62.8% in period B); however, there was no significant difference in the percentage of insured and uninsured patients between the time periods.

Clinical Characteristics

Depressive disorders accounted for the majority of primary diagnoses in periods A (43.5%) and B (45.3%), followed by psychotic disorders (Table 3). The history of psychiatric medication use ($\chi^2(2) = 9.45$, $P < 0.01$), history of alcohol use ($\chi^2(2) = 18.56$, $P < 0.01$), history of nicotine use ($\chi^2(2) = 8.7$, $P = 0.01$), history of recreational drug use ($\chi^2(2) = 13.15$, $P < 0.01$), and suicide risk ($\chi^2(2) = 25.74$, $P < 0.01$) at the time of admission were significantly different between the two time periods. A significantly higher percentage of patients had a documented history of psychiatric medication use during period B compared with period A. During period B, a significantly higher percentage of patients reported a history of alcohol, nicotine,

and/or recreational drug use at the time of admission. Compared with period A, a significantly higher percentage of patients in period B had demonstrated suicidal thoughts and/or behaviors at the time of admission.

Discussion

The findings of this study suggest that COVID-19 pandemic and lockdown restrictions may have changed the patterns of inpatient psychiatric admissions. Although the pandemic period did not demonstrate a significant difference in the mean number of inpatient psychiatric admissions, there was a decreased utilization of psychiatric care during the lockdown, followed by a sharp increase during week 8 (Fig.). This change corresponds with the first phase of reopening in Texas on May 1, 2020, which allowed nonessential services, such as movie theaters, shopping malls, and dine-in restaurant services, to operate at up to 25% of the total listed occupancy of the business.⁵ As COVID-19 lockdown restrictions started to ease, there was an overall positive percentage change in weekly admissions in period B compared with period A, with the exception of weeks 12 and 14. Many studies from Europe, Australia, and the United States also have demonstrated a decline in psychiatric emergencies and outpatient visits during the COVID-19 lockdown^{11,13,17–24} and an increase in visits after the gradual lifting of lockdown restrictions.^{25,26} Given that the pandemic has been associated with increased stress and mental illness,^{27,28} this finding raises questions as to how people were coping with mental illness during the lockdown and whether they were able to use other resources, such as telemedicine, for treatment, if available. The pandemic may have exacerbated the mental health burden on individuals, possibly resulting in the longer length of hospital stay found in period B. Furthermore, the reduced number of hospitalizations during the lockdown period at the beginning of the pandemic may have resulted from patients avoiding the hospital because of fear of infection.⁹

Although primary diagnoses did not change significantly during the pandemic, there was an increase in admissions with

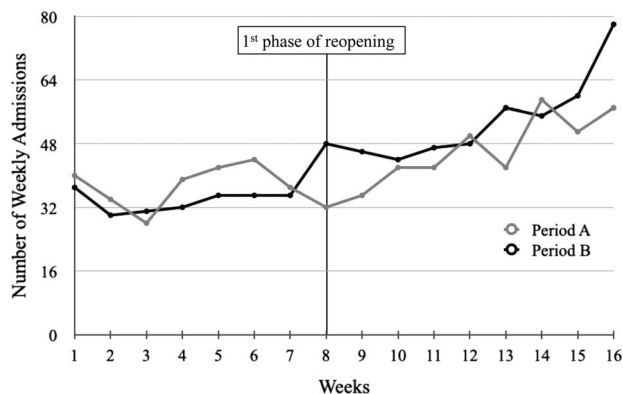


Fig. Number of weekly psychiatric admissions before and during COVID-19. Period A (gray line) includes March 13, 2019 to July 3, 2019 and period B (black line) includes March 13, 2020 to July 3, 2020. COVID-19, coronavirus disease 2019.

Table 2. Sociodemographic characteristics of patients who visited the mental health hospital, March 13, 2019–July 3, 2019 (period A) and March 13, 2020–July 3, 2020 (period B)

| Sociodemographic characteristics | Period A (n = 674) | Period B (n = 718) | P |
|---|--------------------|--------------------|---------|
| Age, y, mean (SD) | 38.20 (13.26) | 36.63 (13.11) | 0.03* |
| Male sex, n (%) | 361 (53.6) | 406 (56.5) | 0.28 |
| Race, n (%) | | | 0.62 |
| White | 482 (71.5) | 501 (69.8) | |
| Black or African American | 53 (7.9) | 56 (7.8) | |
| Asian/Native Hawaiian or other Pacific Islander | 5 (0.7) | 7 (0.97) | |
| American Indian or Alaska Native or Aleut | 9 (1.3) | 5 (0.7) | |
| Other | 125 (18.5) | 149 (20.8) | |
| Employment, n (%) | | | <0.01** |
| Unemployed | 211 (31.3) | 265 (36.9) | |
| Employed | 179 (26.6) | 217 (30.2) | |
| Disability | 94 (13.9) | 110 (15.3) | |
| Student | 12 (1.8) | 12 (1.7) | |
| Retired | 10 (1.5) | 8 (1.1) | |
| Unknown | 168 (24.9) | 106 (14.8) | |
| Living situation, n (%) | | | <0.01** |
| Living alone | 112 (16.6) | 148 (20.6) | |
| Cohabiting | 301 (44.7) | 369 (51.4) | |
| Homeless/shelter | 80 (11.9) | 80 (11.1) | |
| Other | 12 (1.8) | 10 (1.4) | |
| Unknown | 169 (25.1) | 111 (15.5) | |
| Ethnicity, n (%) | | | 0.03* |
| Hispanic/Latinx | 116 (17.2) | 144 (20.1) | |
| Non-Hispanic/Latinx | 553 (82) | 558 (77.7) | |
| Unknown | 5 (0.7) | 16 (2.2) | |
| Insured, n (%) | | | 0.66 |
| Uninsured | 242 (35.9) | 267 (37.2) | |
| Insured | 432 (64.1) | 451 (62.8) | |

SD, standard deviation.

* $P < 0.05$.

** $P < 0.01$.

substance- and medication-related diagnoses in period B. This increase coincided with a significant rise in admissions with a history of substance use. These findings reflect the current literature showing increased substance use during the pandemic.²⁹ Studies similar to ours from the United States have shown an increase in psychiatric visits resulting from substance use during the pandemic^{22,23,29}; however, studies from Italy and Australia have demonstrated a decrease in outpatient and inpatient visits for substance use during the lockdown,^{11,30} warranting further investigation into geographic differences in admissions and healthcare utilization during the pandemic.

Period B admissions also had a significantly higher percentage of patients who demonstrated suicidal ideation and/or behavior at the time of admission. This aligns with findings from aggregate

studies that have demonstrated an increase in self-harm and suicidal ideation during the pandemic.^{31,32} A significant increase in the percentage of patients identifying as Hispanic/Latinx also occurred during the pandemic period. Minority communities have been disproportionately affected by COVID-19 infection,³³ and evidence also shows an increased prevalence of depression, anxiety, and pandemic-related stressors among Hispanic adults in comparison to other racial groups.^{34,35}

As a retrospective study examining rural and semirural communities, our study has several limitations. Not only can the findings not be generalized to the broader population but also there were gaps in the documentation of healthcare information in the electronic health records. Although there were statistically significant changes in employment status and living situation of admitted patients during the pandemic, the large number of unknown variables should be considered when interpreting the

Table 3. Clinical characteristics of patients who visited the mental health hospital, March 13, 2019–July 3, 2019 (period A) and March 13, 2020–July 3, 2020 (period B)

| Clinical characteristics | Period A (n = 674) | Period B (n = 718) | P |
|--|--------------------|--------------------|---------|
| Primary diagnosis, n (%) | | | 0.07 |
| Psychotic disorders | 133 (19.7) | 145 (20.2) | |
| Bipolar disorders | 81 (12.0) | 82 (11.4) | |
| Depressive disorders | 293 (43.5) | 325 (45.3) | |
| Anxiety and obsessive-compulsive disorders | 11 (1.6) | 9 (1.3) | |
| Substance/medication-related disorders | 91 (13.5) | 120 (16.7) | |
| Personality and conduct disorders | 9 (1.3) | 7 (1.0) | |
| Trauma-related and dissociative disorders | 32 (4.7) | 18 (2.5) | |
| Other | 24 (3.6) | 12 (1.7) | |
| Psychiatric medication history, n (%) | | | <0.01** |
| Yes | 393 (58.3) | 476 (66.3) | |
| No | 281 (41.7) | 242 (33.7) | |
| Substance use history, n (%) | | | <0.01** |
| Alcohol | | | <0.01** |
| Yes | 440 (65.3) | 544 (75.8) | |
| No | 207 (30.7) | 152 (21.2) | |
| Unknown | 27 (4.0) | 22 (3.1) | |
| Nicotine | | | 0.01* |
| Yes | 434 (64.4) | 514 (71.6) | |
| No | 208 (30.9) | 181 (25.2) | |
| Unknown | 32 (4.7) | 23 (3.2) | |
| Recreational drug | | | <0.01** |
| Yes | 392 (58.2) | 485 (67.5) | |
| No | 254 (37.7) | 210 (29.2) | |
| Unknown | 28 (4.2) | 23 (3.2) | |
| Suicide risk, n (%) | | | <0.01** |
| Yes | 102 (15.1) | 188 (26.2) | |
| No | 572 (84.9) | 530 (73.8) | |

* $P < 0.05$.

** $P < 0.01$.

significant association. This reflects one of the major drawbacks of nonstandardized electronic medical record documentation protocols. In addition, despite comparing the same calendar time during periods A and B, underlying causes of psychiatric admissions cannot be assessed in this study. As such, caution should be taken when interpreting results. A regression model or extensive time series analysis may address this limitation.

Conclusions

This study shows a decrease in hospitalizations in a rural region of the United States during the pandemic and an increase in hospitalizations when lockdown restrictions began to be lifted. During the pandemic, more individuals reported psychiatric medication, alcohol, nicotine, and recreational drug use as well as suicidal ideation and behavior. In addition, there was an increase in admissions among the Hispanic/Latinx community. This highlights the importance of understanding the effects of the pandemic on mental health in rural and semirural regions. Further studies are needed to understand the effects of lockdown on urban, metropolitan populations in Texas because psychiatric hospitalizations and service utilization across regions may vary. Understanding regional sociodemographics and healthcare utilization patterns may allow public health officials to better plan for behavioral health services during times of crisis.

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