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RESEARCH ARTICLE

Peripartum Mood Clinic Referral Rates Pre- and Post-COVID

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ABSTRACT

Background: Peripartum depression is a common complication of pregnancy with the potential for dangerous consequences to maternal and infant health if left untreated. The COVID-19 pandemic increased the incidence of mental health disorders globally with an even greater effect on peripartum mothers. Disparities in access to mental health services may further exacerbate health care outcomes for affected individuals.

Aims: The aim of this study is to evaluate Edinburgh Postpartum Depression Scale (EPDS) scores pre- and post-COVID-19 to determine if mental health worsened post-COVID and assess how certain demographics were affected compared to others.

Methods: This is a retrospective cohort study of all pregnant patients referred to the Perinatal Mood Disorder Program at a large academic hospital in Indianapolis between March 1, 2019 to March 1, 2021. March 1, 2020 was the date used to determine our pre- and post-COVID groups, as it was near this time an official coronavirus outbreak was declared. Referral criteria were based on EPDS score and clinical gestalt. A convenience sample of the population was assessed with EPDS score as the primary outcome. Demographic information including zip code of residence, psychiatric history, obstetric and newborn outcomes were also captured. Descriptive analysis, t-test and χ^2 test were performed with statistical significance determined as $p < 0.05$.

Results: There were 1,487 total pregnant patients referred with 733 referred pre-COVID and 754 post-COVID. Six hundred patients were sampled for analysis – 288 pre-COVID and 312 post-COVID. There were no statistically significant differences in age, ethnicity and race between groups. The mean EPDS score was not statistically significant between the groups (9.71 and 9.81, $p = 0.84$). The four zip codes with the highest referral rates to the mood clinical also corresponded to areas within Indianapolis with the highest levels of poverty.

Conclusion: Edinburgh Postpartum Depression Scale scores were not different between pregnant patients pre- and post-COVID. There was also no difference in demographic characteristics between groups. The pandemic exacerbated existing barriers to treatment of peripartum mood disorders, highlighting the responsibility of clinicians and policymakers to support, identify, and facilitate treatment for this vulnerable population to prevent both short and long-term repercussions.

Introduction

Pregnant individuals are particularly susceptible to increased rates of anxiety and depression, making it one of the most common complications of pregnancy and in the postpartum period.¹ It is estimated that perinatal depression affects up to 1 in 7 women with prevalence ranging from 8.9% in pregnant women to 37% at any point in the first year postpartum.² Risk factors for perinatal depression include a history of depression, current depressive symptoms, low-income, single parents, history of abuse, and multiparity.^{2,3}

In November 2019, the first cases of the novel coronavirus were detected in Wuhan, China. As the number of cases grew exponentially, the World Health Organization declared the coronavirus outbreak a global pandemic. This led to nationwide masking mandates, quarantine measures and social isolation.⁴ Although mental health disorders were major causes of distress prior to the COVID-19 pandemic, many studies have shown that the pandemic further exacerbated these issues. It was found that women, young adults, and those with degrees were disproportionately affected by the pandemic compared to other age ranges and men.⁵⁻⁸

Given the incidence of perinatal depression and the disproportionate effect the pandemic had on women, mental health in pregnancy during the pandemic should not be overlooked. Many studies have reported higher rates of stress, anxiety, and depression during the pandemic than before.⁹⁻¹¹ One documented cause for worsening mental health in this population is fear of infection of the fetus¹⁰ and increased vulnerability to the coronavirus during pregnancy.¹¹

While the pandemic appears to have increased the incidence of mental health disorders globally, specifically in women, few studies have analyzed these effects on pregnant and postpartum patients, particularly within the Midwest. We hypothesize mental health disparities could be magnified within this vulnerable population seeking care at our urban, tertiary hospital. Within our healthcare system, pregnant patients identified as having peripartum depression are referred to a formalized Perinatal Mood Disorder Clinic. It is unclear if COVID-19 altered the severity or demographics of patients referred for care, therefore, the objective of our study was to determine if objective measures of depression worsened in postpartum patients after the COVID-19 pandemic.

Material and Methods

We performed a retrospective cohort study of pregnant or postpartum patients referred to a Perinatal Mood Disorder at a large academic hospital located in an urban core between 2019-2021. Patients were referred based on both elevated Edinburgh Postnatal Depression Scale (EPDS) score and clinical concern from the provider team, such as perceived need for additional postpartum support or history of postpartum depression. Those referred before March 1, 2020, were considered “pre-COVID” and those referred afterwards were considered “post-COVID”.

Exclusion criteria included incomplete delivery information, delivery outside of the hospital system, referral made without an associated pregnancy or delivery, and patients without an EPDS score. Medical records were reviewed to obtain patient demographics, medical and mental health history, and delivery outcomes. Neonatal records were reviewed to obtain NICU duration, if applicable.

The primary outcome was the EPDS score (none or mild depression 0-6, mild depression 7-13, moderate depression 14-19, severe depression 19-30).¹² Secondary outcomes included prior mental health diagnoses, length of hospital stay, substance use history, and number of contacts with the program coordinator. A “contact” was defined as any communication documented between the patient and social worker, ranging from voicemails to conversations, while an “encounter” was defined as an in-depth intake or follow-up appointment. We also generated a geospatial heat map using available zip codes to assess where a higher concentration of patients resided.

This study was approved by the institutional review board (IRB#13826). Study data were collected and managed using REDCap (Research Electronic Data Capture) electronic data capture tools hosted at Indiana University School of Medicine. REDCap is a secure, web-based software platform designed to support data capture for research studies, providing 1) an intuitive interface for validated data capture; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for data integration and interoperability with external sources.^{13,14} Descriptive analysis, t-test for continuous variables and χ^2 test for categorical variables were performed with SPSS 29.0 with statistical significance determined as $p < 0.05$.

Results

A total of 1,487 patients received referrals to the Perinatal Mood Disorder Program between 2019 and 2021. 733 (49.3%) patients initially referred in the pre-COVID period dating before March 1, 2020. Our sample was evenly distributed between

the pre- and post-COVID cohorts. A convenience sample was performed and of the 600 patients with 1,069 contacts selected from this sample, 78 were excluded. Exclusion reasons were incomplete delivery information (55) and no EPDS score documented (23), leaving 522 for analysis (Figure 1).

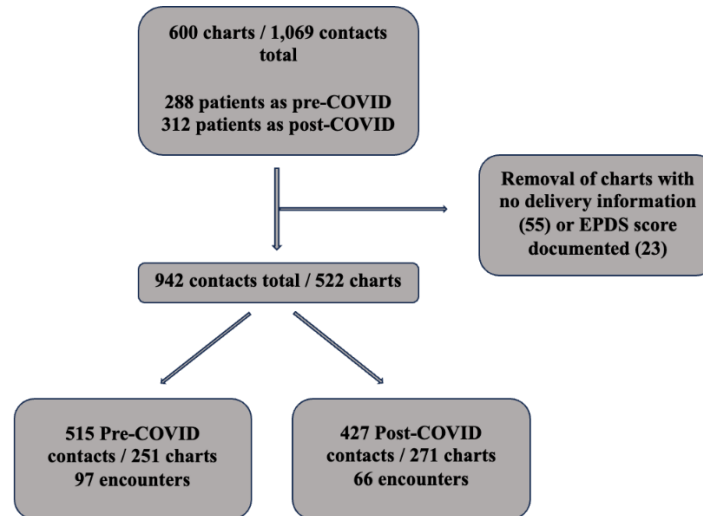


Figure 1. Flowsheet of records that met inclusion criteria.

Two-hundred fifty-one (48.1%) patients were included in our pre-COVID cohort and 271 (51.9%) in post-COVID. When comparing the pre- and post-COVID group demographics there was no statistical difference in age, race, ethnicity, or marital status

(Table 1). There was a significant difference regarding insurance between the groups. It was found that private insurance coverage increased between groups while Medicaid coverage stayed consistent.

| | Total | Pre-COVID | Post-COVID | P-value |
|------------------------------------|--------------|--------------|--------------|---------|
| Age (years) | 28.54 ± 5.77 | 28.63 ± 5.83 | 28.45 ± 5.71 | 0.740 |
| Race (%) | | | | 0.238 |
| American Indian / Alaska native | 1 (.19) | 0 | 1 | |
| Asian | 15 (2.87) | 6 | 9 | |
| Native Hawaiian / Pacific Islander | 0 | 0 | 0 | |
| Black or African American | 139 (26.63) | 77 | 62 | |
| White | 353 (67.62) | 162 | 191 | |
| More than one race | 0 | 0 | 0 | |
| Other / Not reported | 14 (2.68) | 6 | 8 | |
| Ethnicity (%) | | | | 0.692 |
| Hispanic or Latino | 39 (7.37) | 17 | 22 | |
| NOT Hispanic or Latino | 475 (91.0) | 231 | 244 | |
| Unknown / Not Reported | 8 (1.53) | 3 | 5 | |
| Marital Status (%) | | | | 0.555 |
| Single | 242 (46.36) | 125 | 117 | |
| Married | 234 (44.83) | 105 | 129 | |
| Divorced | 15 (2.87) | 6 | 9 | |
| Separated | 10 (1.92) | 4 | 6 | |
| Unknown / Not Reported | 21 (4.02) | 11 | 10 | |
| Insurance (%) | | | | .022 |
| Medicaid | 277 (53.07) | 140 | 137 | |
| Anthem | 81 (15.52) | 36 | 45 | |
| Blue Cross | 29 (5.56) | 9 | 20 | |
| Uninsured | 9 (1.72) | 8 | 1 | |

| | Total | Pre-COVID | Post-COVID | P-value |
|-------|-------------|-----------|------------|---------|
| Other | 125 (23.95) | 58 | 67 | |

Table 1. Participant demographics.

No significant difference was found between the pre- and post-COVID group in terms of the EPDS scores (9.71 and 9.81, p 0.84). The pre-COVID cohort had a significantly higher average number of contacts and encounters with the peripartum

mood clinic coordinator (Table 2). There was no difference in the amount of NICU stays or prior maternal hospitalizations, nor in either average length of stay.

| | Total | Pre-COVID | Post-COVID | P-value |
|--|---------------|---------------|---------------|---------|
| Average EPDS Score | 9.76 | 9.71 | 9.81 | 0.840 |
| Average Contacts | 1.8 | 2.16 | 1.48 | <.001 |
| Average Encounters | 0.31 | 0.39 | 0.24 | 0.011 |
| NICU Stay (%) | 158 (30.27) | 72 | 86 | 0.433 |
| Average NICU Duration (days) | 30.13 ± 42.30 | 28.56 ± 35.80 | 31.42 ± 47.14 | 0.692 |
| Prior Maternal Hospitalization (%) | 88 (16.86) | 43 | 45 | 0.835 |
| Prior Hospitalization Average Stay Length (days) | 1.34 ± .71 | 1.34 ± .65 | 1.35 ± .77 | 0.963 |

Table 2. EPDS scores and hospital course.

There was no difference between the two groups in mental health diagnosis, delivery method, medication use, or medical history (Table 3). Substance use and intimate partner violence (IPV) was similar between the cohorts as well. The only

significance found in Table 3 was in parity (p .014), where the pre-COVID cohort had a higher average number of living children compared to the post-COVID (2.31 vs. 2.04).

| | Total | Pre-COVID | Post-COVID | P-value |
|---|--------------|--------------|--------------|---------|
| Gravidity | 2.96 | 3.21 | 2.72 | 0.109 |
| Parity | 2.17 | 2.31 | 2.04 | 0.014 |
| Average Postpartum Hospitalization (days) | 2.37 ± .99 | 2.43 ± .98 | 2.31 ± 1.01 | 0.179 |
| BMI | 30.25 ± 8.45 | 29.71 ± 8.16 | 30.74 ± 8.69 | .232 |
| Delivery (%) | | | | 0.429 |
| Vaginal | 289 (55.36) | 140 | 149 | |
| Vacuum assisted | 16 (3.07) | 7 | 9 | |
| Forceps assisted | 2 (.38) | 0 | 2 | |
| Cesarean section | 215 (41.19) | 104 | 111 | |
| Mental Health (%) | | | | |
| Anxiety | 227 (43.49) | 107 | 120 | 0.704 |
| Depression | 261 (50.0) | 130 | 131 | 0.430 |
| Bipolar | 42 (8.05) | 17 | 25 | 0.303 |
| History of Suicide Attempt | 23 (4.41) | 14 | 9 | 0.209 |
| Schizophrenia | 1 (.19) | 1 | 0 | 0.481 |
| Therapy | 77 (14.75) | 32 | 45 | 0.208 |
| Medications (%) | | | | |
| Lexapro | 36 (6.90) | 16 | 20 | 0.651 |
| Celexa | 11 (2.11) | 5 | 6 | 0.860 |
| Prozac | 19 (3.64) | 12 | 7 | 0.180 |
| Paxil | 1 (.19) | 0 | 1 | 1.00 |
| Zoloft | 100 (19.16) | 51 | 49 | 0.516 |
| Lithium | 1 (.19) | 0 | 1 | 1.00 |
| Cymbalta | 5 (.96) | 3 | 2 | 0.675 |
| Medical History (%) | | | | |
| Chronic Hypertension | 59 (11.30) | 22 | 37 | 0.078 |
| Gestational Hypertension | 79 (15.13) | 38 | 41 | 0.997 |
| Pre-Eclampsia | 23 (4.41) | 9 | 14 | 0.379 |
| Pre-Eclampsia w/ Severe Features | 48 (9.20) | 22 | 26 | 0.743 |

| | Total | Pre-COVID | Post-COVID | P-value |
|---|-------------|-----------|------------|---------|
| Type 1 Diabetes | 7 (1.34) | 3 | 4 | 1.00 |
| Type 2 Diabetes | 21 (4.02) | 9 | 12 | 0.625 |
| Gestational Diabetes diet controlled | 13 (2.49) | 3 | 10 | 0.068 |
| Gestational Diabetes insulin controlled | 28 (5.36) | 10 | 18 | 0.178 |
| Substance Use & Violence (%) | | | | |
| Tobacco | 107 (20.50) | 55 | 52 | 0.451 |
| Alcohol | 11 (2.11) | 4 | 7 | 0.421 |
| Drugs | 96 (18.39) | 51 | 45 | 0.310 |
| IPV | 54 (10.34) | 26 | 28 | 0.997 |

Table 3. Maternal medical and mental health information.

In geospatial analysis of residency by zip code, participants were represented by 125 unique codes. Our data demonstrated that referrals came primarily from Marion County, with over 25% of study participants living within the seven zip codes labeled in Figure 2. The zip code 46241 had the single highest number of participants at 26. It was found that four of these zip codes also qualify as areas in Indianapolis with the highest percentages of poverty.¹⁵

Discussion

In our retrospective review of perinatal referrals to a mood disorder clinic at a large academic hospital, there was no difference in our primary outcome of EPDS scores pre- and post-COVID. The average EPDS score of patients who received a Peripartum Mood Clinic referral was 9.76. A “clinically significant” score is 13 or higher, indicating increased need for further psychological evaluation and possible treatment.¹⁶ There were also no significant differences between our pre- and post-COVID groups regarding mental health history, hospitalizations, delivery outcomes, IPV, or drug use. Although we anticipated an increase in

depressive symptoms on objective measurements such as EPDS score, IPV, and drug use, our data did not reflect these findings like in previous studies.^{11, 17-19}

The COVID-19 pandemic introduced more risk for mental health deterioration with an increase in factors such as social isolation, loneliness, stress, sleep disorders, and concern of disease exposure.^{20,21} Mateus et al¹⁶ examined differences in mental health and co-morbid symptoms in pregnant and postpartum women across several countries and compared prevalence of anxiety and depression before and during the pandemic using the EPDS and the Generalized Anxiety Disorder (GAD-7) screening. This study found statistically significant increases in both anxiety and depression in studies from all eight countries analyzed among postpartum women. Additionally, five of the eight countries demonstrated higher rates of anxiety and depression in pregnant patients during the pandemic than before. Similarly, Chmielewska et al²² found that mean EPDS were significantly higher during COVID-19 for low- and middle-income countries compared to pre-pandemic rates.

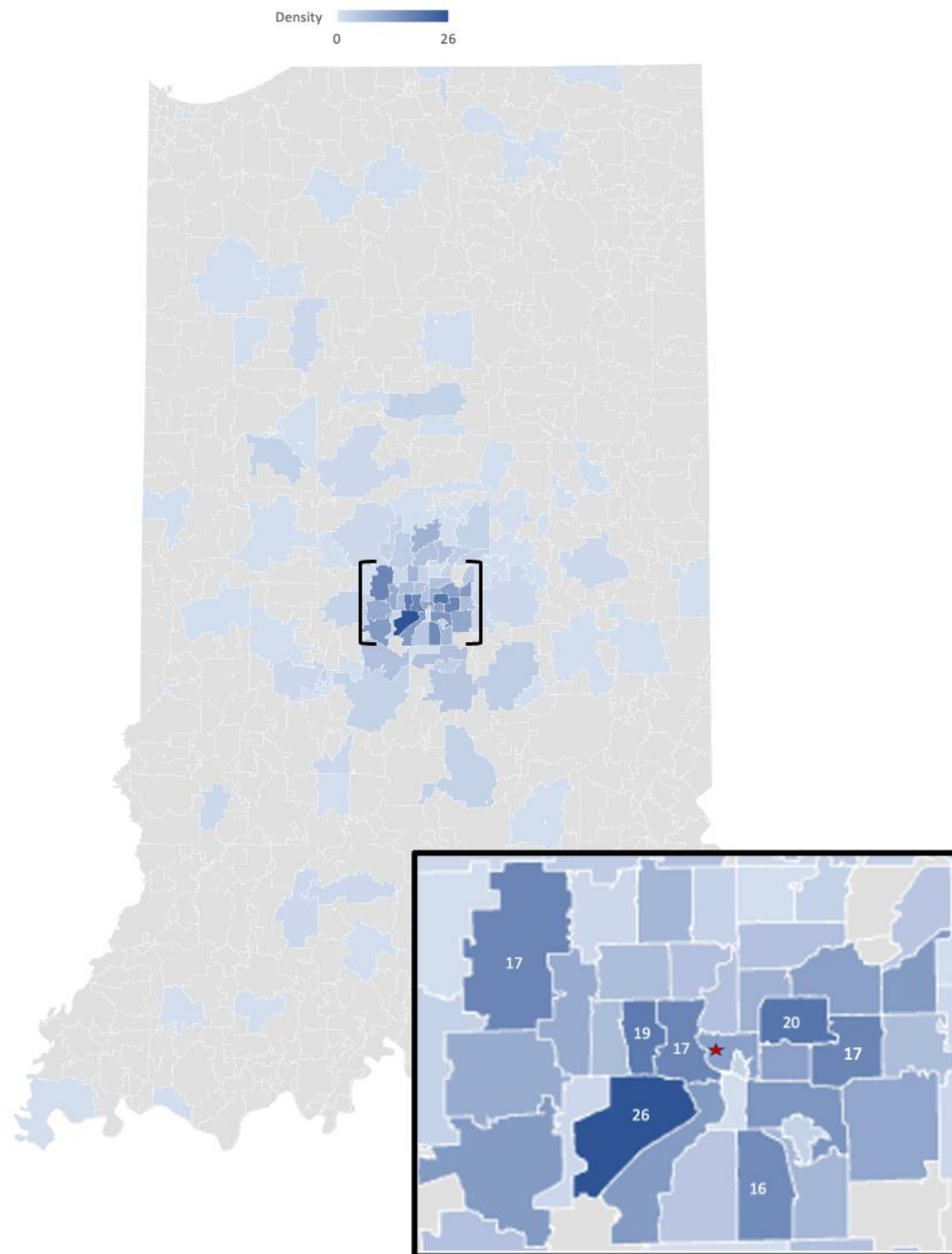


Figure 2. Indiana zip code heat map. The red star depicts the location of the Peripartum Mood Clinic at IU (Indiana University) Health.

We did see significantly more contacts and encounters between our Peripartum Mood Coordinator and patients in the pre-COVID sample. This finding could be due to fewer in-person hospital restrictions and more face-to-face interactions between patients and hospital staff. It could also be attributed to more resource access prior to the COVID-19 outbreak, allowing for better care management and patient follow-up. Additionally, it is unknown if the Peripartum Mood Clinic was understaffed or had higher workload

post-COVID, making it more difficult to consistently reach out to patients like before.

Though our study did not demonstrate the same depression and anxiety findings as the similar studies mentioned above, we did find significance within participant insurance regarding changes in private insurance coverage and a zip code distribution correlated to income. While we do not have an explanation for the change in insurance coverage, it is important to note that Medicaid coverage remained the same. Four of the seven

labeled zip codes are within the top 11 zip codes with the highest poverty levels in the Indianapolis area. These four zip codes have a poverty rate ranging from 21-28%, all four of which are 12.5% above the Indiana poverty rate.¹⁵ These findings may indicate that low-income individuals are receiving more referrals to the Peripartum Mood Clinic, suggesting greater attention should be paid to these individuals.

It is important to note that the rate of maternal mortality in the United States is 2-3 times higher than that of other high-income countries, with over 80% of these deaths ruled to be preventable. Of these deaths, mental health conditions are the leading underlying cause.²³ Although nationwide initiatives are being developed to combat this high morbidity and mortality rate, mental health issues are still often unnoticed. Since mental health is a vital part of physical health, there needs to be a shift toward patient-centered and culturally relevant care addressing these disparities. The use of EPDS score and appropriate follow-up is one way to ensure postpartum patients, particularly those with low resources and minimal support, are not being overlooked.

Strengths of our study include the use of a single site to ensure standardization of referrals and management. Data collection was also uniform and robust. Our study is not without limitations. We only included patients with complete delivery information and differences may exist for those that delivered at other institutions. Additionally, as a Level IV perinatal health center in Indiana, patients may possess greater medical complexities during their pregnancies which adds to selection bias. Lastly, a convenience sample may not reflect the entire population. However, given the absence of a difference witnessed in the pre- and post-COVID cohort, a significant difference is unlikely to manifest based on our results.

Conclusions

Our findings did not demonstrate a significant difference in Edinburgh Postpartum Depression Scale scores pre- and post-COVID in our cohort compared to previous studies. We did find that low-income and low resource individuals receive more referrals to the mood clinic. Our efforts should be focused on these patients and assuring they receive appropriate follow-up, as maternal morbidity, and mortality due to mental health can be overlooked.

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