

Clinical Chart Review of Patient Characteristics Among Underserved Women Receiving Treatment for Substance Use Disorder

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Background

Substance use disorder (SUD) among women of reproductive age is a growing public health concern in the United States¹. Notably, overdose deaths among pregnant and postpartum women increased by 81% between 2017 and 2020². These women face a distinct combination of clinical, psychosocial, and structural risk factors that separates them from the broader population of women who seek treatment.³ However, there is limited evidence characterizing this population, particularly among women from underserved populations.

Lloyd C. Elam Mental Health Center (EMHC), a community behavioral health center at Meharry Medical College, provides outpatient and residential treatment for substance use and mental health disorders, predominantly for an underserved patient population. The Rainbow Program at EMHC is a unique program for pregnant and postpartum women with SUD and co-occurring mental health problems. This program provides up to 90 days of residential treatment services, including detox. In this study, we conducted a clinical chart review to examine the characteristics of pregnant and postpartum women in the Rainbow program with women in the same clinical setting but outside the Rainbow program, and mapped abstracted data to the OMOP Common Data Model (CDM). We hypothesize that pregnant and postpartum women enrolled in Rainbow SUD treatment at EMHC will present with distinct character profiles compared to other adult women receiving treatment at the center.

Methods

We conducted a retrospective clinical chart review of women admitted to SUD treatment programs at EMHC between January 1, 2017, and December 31, 2024. Eligible women were 18 years or older with a documented SUD diagnosis. The women were divided into two groups by program enrollment: Rainbow, which exclusively admits pregnant and postpartum women, and non-Rainbow, comprising all other adult SUD programs at EMHC. Non-Rainbow programs do not track pregnancy; therefore, pregnant/postpartum patients was inferred by program enrollment. Only each woman's first admission was included; duplicate records were removed and illogical dates were verified for accuracy, yielding 374 women (Rainbow, n=124; non-Rainbow, n=250).

Data were manually annotated from paper clinical charts, as electronic health records were not available for these patients. Multiple graduate and medical students participated in the chart review using a standardized abstraction instrument. Structured variables documented at admission included sociodemographic characteristics (age at admission, race/ethnicity, education, marital status, housing status, insurance type, and admission source), substance use history (age of first use, number of substances used, primary substance, and substance use diagnoses), psychiatric diagnoses (anxiety, depression, bipolar, PTSD), medications including medication for opioid use disorder (MOUD), and discharge outcomes (discharge disposition and length of stay). For Rainbow patients, pregnancy/postpartum status and timing were abstracted from narrative notes. Variables were selected based on areas documented in relevant literature comparing SUD populations.

We organized the abstracted data into a relational data infrastructure of seven tables and are mapping it to the OMOP CDM v5.4 and its standardized vocabularies to support future harmonization with EHR-based OMOP instances. This technique offers a reproducible solution for integrating clinical charts and other non-EHR data into OMOP-compatible pipelines. ICD codes were mapped through Athena “Maps to” relationships, drug names by RxNorm match, and remaining free-text terms were reviewed in Usagi; local categories were mapped manually in Athena. Group differences were assessed using the Mann-Whitney U test for continuous variables and Pearson’s chi-squared or Fisher’s exact tests for categorical variables ($p < 0.05$). Logistic regression and Cox proportional hazards models estimated adjusted odds ratios (aOR) and hazard ratios (aHR) for discharge against medical advice (AMA), adjusted for age, race, housing status, and legal referral type.

Results

A total of 374 women’s records were reviewed and included in the analysis; nearly half were Black (46%), 90% received grant-funded care, and 33% were homeless at admission. The overall median age at admission was 35 [IQR:28-42]. The median age of first substance use was 16 [IQR:14-19]. Rainbow and non-Rainbow patients differed significantly across multiple characteristics.

Rainbow patients were younger at admission and more often had a psychiatric diagnosis and a child-welfare (DCS) referral, and less often a criminal-justice referral (Table 1). Opioids were the most common primary substance across both groups. Among women with opioid use disorder (OUD), MOUD was documented for 44.1% of Rainbow vs. 13.3% of non-Rainbow patients. Polysubstance use was more prevalent among Rainbow patients.

Table 1. Sample Characteristics by Program

Characteristic	Rainbow	Non-Rainbow	p-value
Sociodemographics			
Age at admission, median [IQR]	28 [25-34]	39 [31-49]	<.001
Race, %			0.021
Black	35.5	50.6	
White	61.3	47.4	
Education, %			0.023
No diploma	31.4	38.3	
HS diploma/GED	43.0	28.4	
Some college or higher	25.6	33.3	
Homeless at admission, %	33.6	32.6	<.001
Legal referral, %	54.6	35.8	<.001
Child-welfare (DCS) referral	29.4	5.0	
Criminal justice referral	25.2	30.8	
Substance use and diagnoses			
Primary substance: opioids, %	43.9	32.8	0.003
Methamphetamine use (within 1 year),%	48.3	26.5	<.001
Any psychiatric diagnosis, %	48.4	23.5	<.001
Depression,%	28.2	9.7	<.001
Anxiety, %	20.2	10.1	0.012
PTSD, %	13.7	5.5	0.012
Treatment and Outcomes			

MOUD documented (women with OUD), %	44.1	13.3	<.001
Length of stay (days), median [IQR]	50 [22-90]	27 [7-44]	<.001
Left AMA within 7 days, %	9.0	22.3	<.001
Treatment completed, %	41.8	42.7	<.001

Note: All percentages are based on available data. DCS = Department of Children's Services; MOUD = medication for opioid use disorder; AMA = against medical advice.

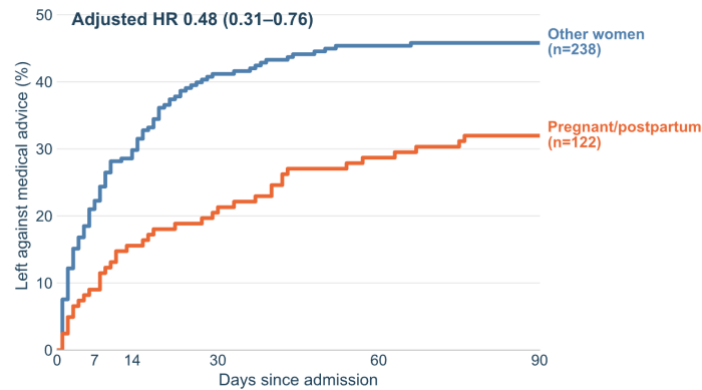


Figure 1. Cumulative discharge against medical advice by program (Rainbow = pregnant/postpartum). Curves are unadjusted; the hazard ratio is adjusted for age, race, housing, and legal referral type.

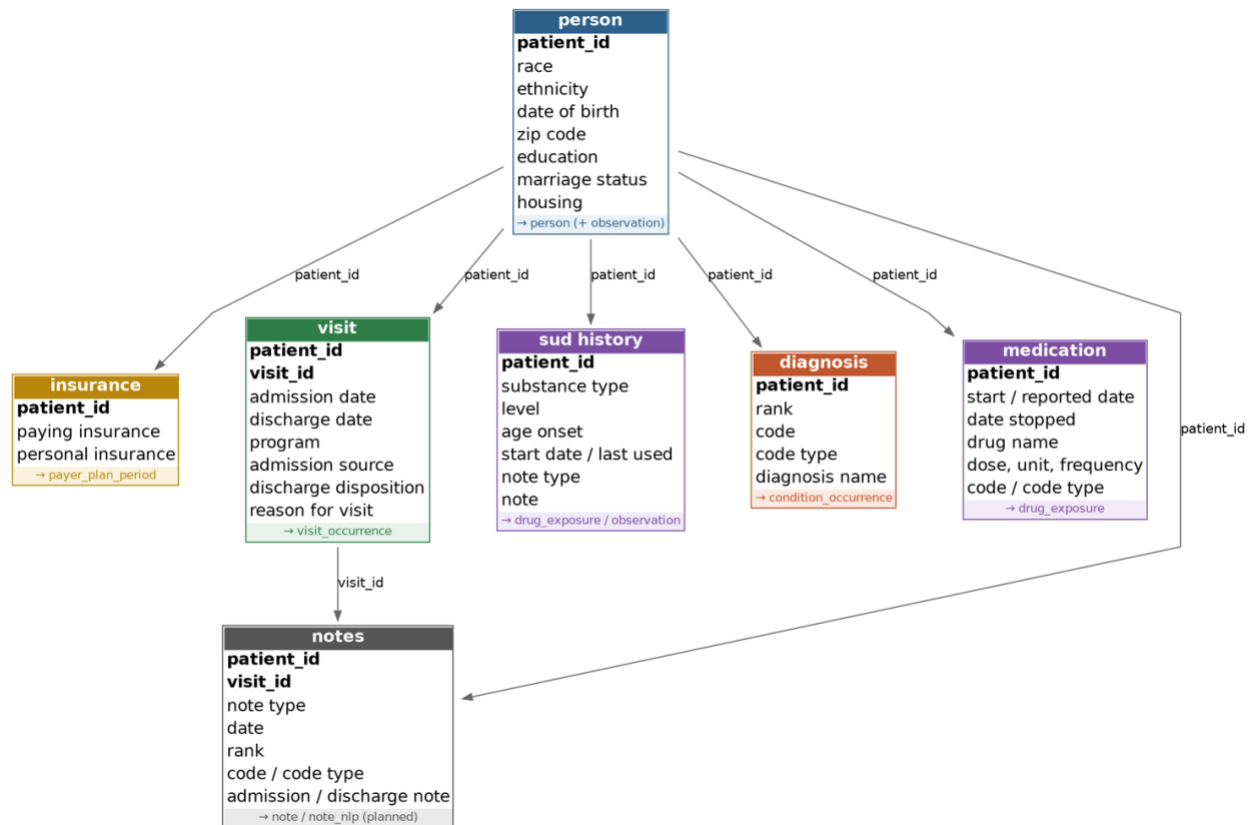


Figure 2. Relational Schema of abstracted tables mapped to OMOP CDM domains.

Discussion

The differences between Rainbow and non-Rainbow patients reflect the complex exposures impacting pregnant and postpartum populations who seek SUD treatment. Although the age of first use was early across groups, Rainbow patients entered treatment at a younger age, indicating pregnancy or legal involvement around child welfare may be a catalyst for treatment and add external pressure. The higher rates of legal involvement show that many of these women are navigating structural pressures while seeking treatment. Pregnancy and the postpartum period represent a critical biological window associated with hormonal shifts, altered drug metabolism, and increased psychological stress that may impact psychiatric vulnerability⁴. The elevated psychiatric comorbidities, i.e., anxiety, depression, and PTSD, reinforce the need for co-occurring mental health services for this population³ in addition to substance use treatment. Although MOUD is the recommended treatment for OUD in pregnancy⁵, it was documented for fewer than half of Rainbow patients with OUD, indicating a treatment or documentation gap. Rainbow enrollment was associated with lower AMA discharge, suggesting that specialized programs may support retention. Findings are limited to a single site, pregnancy status was inferred from program enrollment, and the OMOP mapping has not yet been clinically validated.

Future Directions

Note abstraction using NLP. We plan to apply natural language processing (NLP) methods to abstract variables from notes and compare patterns across manual and automated note reviews.

Clinical validation of OMOP mapping. We will verify the clinical accuracy of mapped terms and complete mapping of pending local categories.

Comparison with All of Us. We plan to compare findings from this cohort with a national reference population in the All of Us Research Program, which uses OMOP CDM. This will allow us to benchmark our manually abstracted, non-EHR safety-net population against a large-scale OMOP dataset.

Conclusion

Pregnant and postpartum women enrolled in SUD treatment at EMHC present with distinct characteristics compared to other adult women receiving treatment at the same center. The most noticeable differences are a younger age at admission, higher rates of legally referred admissions, greater psychiatric complexity, lower MOUD documentation, and better retention. Mapping paper-chart data to OMOP CDM makes this underrepresented population available for network research and highlights the need for specialized SUD programs that address the complex needs of this population.

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References

1. McHugh RK, Wigderson S, Greenfield SF. Epidemiology of Substance Use in Reproductive-Age Women. *Obstet Gynecol Clin North Am*. 2014/06// 2014;41(2):177–189. doi:10.1016/j.ogc.2014.02.001
2. Bruzelius E, Martins SS. US Trends in Drug Overdose Mortality Among Pregnant and Postpartum Persons, 2017-2020. *JAMA*. 2022/12/06/ 2022;328(21):2159–2161. doi:10.1001/jama.2022.17045
3. Sadicario JS, Parlier-Ahmad AB, Brechbiel JK, Islam LZ, Martin CE. Caring for women with substance use

disorders through pregnancy and postpartum during the COVID-19 pandemic: Lessons learned from psychology trainees in an integrated OBGYN/substance use disorder outpatient treatment program. *Journal of Substance Abuse Treatment*. 2021/03/01/ 2021;122:108200. doi:10.1016/j.jsat.2020.108200

4. Cárdenas EF, Kujawa A, Humphreys KL. Neurobiological changes during the peripartum period: implications for health and behavior. *Soc Cogn Affect Neurosci*. 2019/12/23/ 2019;15(10):1097–1110. doi:10.1093/scan/nsz091

5. Gynecologists ACoOa. Committee Opinion No. 711: Opioid Use and Opioid Use Disorder in Pregnancy. *Obstetrics & Gynecology*. August 2017;130(2):e81–e94. doi:10.1097/AOG.0000000000