

Association of Opioid Use Disorder and Provision of Highly Effective Inpatient Postpartum Contraception

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Abstract: We sought to examine the rates of the inpatient provision of postpartum long-acting and permanent methods (IPP LAPM) of contraception in patients with opioid use disorder (OUD). This is a retrospective cross-sectional regression analysis of the National Inpatient Sample between 2012 and 2016. Patients with a diagnosis of OUD that delivered and received postpartum permanent contraception or long acting reversible contraception placement during the same hospitalization were identified. Regression analyses were performed to identify the demographic and clinical factors associated with long acting and permanent contraception method utilization. Of the 22,294 patients with OUD who delivered during the study period, 2291 (10.3%) received IPP LAPM. The majority of patients (1989) (86.6%) with OUD who chose inpatient provision of long acting or permanent methods after delivery received permanent contraception. After adjusting for covariates, patients with OUD had an overall decreased probability of receiving IPP LAPM (aOR=0.89, 95% CI: 0.85–0.95), decreased probability of receiving permanent contraception (aOR: 0.82, 95% CI: 0.78–0.88), but an increased probability of receiving long-acting reversible contraception (aOR: 1.29, 95% CI: 1.04–1.60) compared to patients without OUD. This study highlights the continued need to ensure appropriate measures (such as antepartum contraceptive counseling, availability of access to inpatient LAPM, and removal of Medicaid policy barriers to permanent contraception) are in place so that the contraceptive needs of patients with OUD are fulfilled.

Keywords: opioid use disorder, substance use disorder, pregnancy, disparities, contraception, postpartum, intrauterine device, implant, permanent contraception, surgical contraception

Introduction

The provision of postpartum contraception is associated with the prevention of short-interval pregnancies and resultant maternal and neonatal morbidity and mortality including preterm birth, preeclampsia, and low birth weight.^{1,2} Long-acting and permanent methods of contraception (LAPM) are the most effective methods of contraception and thus result in the greatest reduction in number of short-interval pregnancies.³ Overall, rates of LAPM use postpartum have increased in the last decade, mostly due to increased utilization of long-acting reversible contraception (LARC).⁴

Opioid use disorder (OUD) in pregnancy is associated with increased hospital length of stay, stillbirth, preterm delivery, and neonatal abstinence syndrome and impacts approximately 0.76% of pregnancies in the United States.⁵ While 45% of pregnancies in the general population were unplanned in 2011, patients with opioid use disorders (OUD) have rates of unintended pregnancies approaching 75–90%.^{6–11} Thus, access to reliable contraception in the postpartum period is especially important in patients with OUD given the higher rates of unintended pregnancy in this population and a majority of unintended pregnancies occurring within the first year after delivery.³ Yet, postpartum provision of contraception in this population ranges from 21% to 25% versus 72% for the general population.^{3,12,13} The national rates of LAPM contraception receipt for patients with OUD are not well described with some studies conducted in

individual states suggesting rates range from 8% to 28%; however, national data is lacking.^{12,14,15} Further, as only about 43% of patients with OUD attend their postpartum visit, inpatient provision (IPP) is crucial for ensuring access to those patients with OUD who desire LAPM.^{12,16}

Given that rates of IPP LAPM provision in patients with OUD are largely unknown, we aimed to determine the national rate and trends over time of IPP LAPM provision in those with OUD. We hypothesized that rates of IPP LAPM provision in patients with OUD would be lower than that of the general population.

Materials and Methods

We performed a retrospective cross-sectional study utilizing the National Inpatient Sample (NIS) between the years 2012–2016. The NIS is the largest all-payer database; represents a 20% random sample of discharges from hospitals in the United States, and represents over 95% of the US population due to self-weighting.¹⁷ Diagnosis-Related Group (DRG) codes were used to identify patients who underwent spontaneous vaginal, operative vaginal, or cesarean delivery; patients with OUD; and patients receiving IPP LAPM. Patients who had a hysterectomy during the delivery admission were excluded. Covariates included in the regression analysis were age, race, United States census region, hospital location, hospital size, urbanization level, median household income, pre-existing comorbidities using Elixhauser measures, pregnancy- and delivery-related comorbidities, length of hospitalization, and non-opioid substance use.¹⁸ These covariates were chosen, given their association with contraceptive decision-making and access. Details regarding specific DRG codes utilized for this analysis have been previously published.¹⁹

We evaluated differences between patients with and without OUD who received for LAPM contraception as well as LAPM breakdown among patients with OUD using Wilcoxon rank-sum, Student's *t*-test, the Kruskal–Wallis test, and Fisher's exact test where appropriate. Multivariable logistic regression was performed to determine the association of demographic, geographic, comorbidity, and pregnancy-complication variables on use of LAPM contraception among patients with OUD. Regression results are reported in terms of unadjusted and adjusted odds ratios (OR and aOR, respectively) and 95% confidence intervals (95% CI). In line with the NIS data use agreement, exact numbers are not listed for cells with less than 10 patients.²⁰ Statistical significance was set at $p < 0.05$. All statistical analysis was performed using STATA version 14.1 (Stata Corp, College Station, TX). We complied with relevant data protection and privacy regulations. Studies using the NIS database are considered exempt by the Institutional Review Board of University Hospitals Cleveland Medical Center.

Results

During the study period, there were 3,573,018 unweighted deliveries, of which 22,294 (0.6%) patients had a diagnosis of OUD at the time of delivery. Two thousand two hundred ninety-one (10.3%) patients with a diagnosis of OUD received IPP LAPM compared to 246,826 (6.9%) of those without OUD ($p < 0.001$) (Table 1).

Table 1 Characteristics of Patients with and without Opioid Use Disorder Who Received Inpatient Postpartum Provision of Long Acting and Permanent Contraception Methods

	IPP LAPM with OUD (N=2291)	IPP LAPM without OUD (N=246,826)	P
Age (years), Mean (SD)	30.1 (4.7)	31.4 (5.5)	<0.001
Race			<0.001
Caucasian	1432 (62.5)	98,358 (39.8)	
African-American	119 (5.2)	32,527 (13.2)	
Hispanic	149 (6.5)	53,812 (21.8)	
Asian/Pacific Islander	<10 (<0.4)	7387 (3.0)	
Native American	19 (0.83)	1726 (0.7)	

(Continued)

Table I (Continued).

	IPP LAPM with OUD (N=2291)	IPP LAPM without OUD (N=246,826)	P
Region			<0.001
Northeast	442 (19.3)	34,740 (14.1)	
Midwest	484 (21.1)	46,568 (18.9)	
South	1003 (43.8)	117,515 (47.6)	
West	362 (15.8)	54,209 (21.2)	
Hospital Location			<0.001
Rural	367 (16.0)	31,847 (12.9)	
Urban Non-Teaching	396 (17.3)	76,703 (31.1)	
Urban Teaching	1528 (66.7)	144,482 (58.5)	
Hospital Size			<0.001
Large	1484 (64.8)	142,653 (57.8)	
Medium	548 (23.9)	73,978 (30.0)	
Small	259 (11.3)	36,401 (14.7)	
Urbanization Level			<0.001
Central County (>1 million people)	320 (13.9)	48,089 (19.5)	
Fringe County (>1 million people)	271 (11.8)	33,507 (13.6)	
Large Metro County (250k –999k people)	386 (16.8)	33,948 (13.8)	
Small Metro County (50k-249k people)	156 (6.9)	15,543 (6.3)	
Micropolitan (<50 k people)	215 (9.4)	16,546 (6.7)	
Neither Micropolitan nor Metropolitan (<10,000 People)	154 (6.8)	11,252 (4.6)	
Median Household Income Quartiles			<0.001
1st Quartile	764 (33.3)	71,436 (28.9)	
2nd Quartile	554 (24.2)	56,377 (22.8)	
3rd Quartile	365 (15.9)	47,718 (19.3)	
4th Quartile	162 (7.1)	34,012 (13.8)	
Insurance Type			<0.001
Public Insurance	2098 (91.6)	158,001 (64.0)	
Private	193 (8.4)	88,825 (36.0)	
Pre-existing Conditions			
Alcohol Use	40 (1.7)	472 (0.2)	<0.001
Tobacco Use	1265 (55.5)	20,871 (8.5)	<0.001
Cocaine Use	89 (3.88)	376 (0.15)	<0.001
Stimulant Use	79 (3.45)	535 (0.22)	<0.001
Sedative Use	61 (2.66)	60 (0.02)	<0.001
Cannabis Use	165 (7.20)	1952 (0.79)	<0.001
Depression	335 (14.6)	4839 (2.0)	<0.001
Psychotic Disorders	240 (10.5)	4423 (1.8)	<0.001
Human Immunodeficiency Virus	11 (0.5)	682 (0.3)	0.06
Hepatitis C Virus	498 (21.7)	1111 (0.5)	<0.001
Cardiac Disease	45 (2.0)	1520 (0.6)	<0.001

(Continued)

Table 1 (Continued).

	IPP LAPM with OUD (N=2291)	IPP LAPM without OUD (N=246,826)	P
Lung Disease	216 (9.4)	10,695 (4.3)	<0.001
Hematologic Disorders	407 (17.8)	40,212 (16.3)	0.05
Chronic Hypertension	147 (6.4)	15,248 (6.2)	0.41
Endocrine Disorders	122 (5.3)	20,649 (8.3)	0.004
Obesity	215 (9.4)	29,798 (12.1)	0.004
Neurologic Disease	65 (2.8)	2667 (1.1)	<0.001
Liver Disease	95 (4.1)	568 (0.2)	<0.001
Route of Delivery			<0.001
Cesarean Delivery	1631 (71.2)	193,556 (78.4)	
Spontaneous Vaginal Delivery	539 (23.5)	50,566 (20.5)	
Operative Vaginal Delivery	121 (5.3)	2704 (1.1)	
Pregnancy Related Morbidity			
Multiple Gestation	51 (2.2)	199 (0.1)	0.88
Pre-Term Delivery	269 (11.7)	17,879 (7.2)	<0.001
Pre-Eclampsia	260 (11.3)	26,537 (10.8)	0.19
Eclampsia	0 (0.0)	52 (0.02)	0.49
Hemorrhagic Morbidity			
Postpartum Hemorrhage	80 (3.5)	6853 (2.8)	0.02
Placental Abruption	56 (2.4)	2658 (1.1)	<0.001
Placenta Previa	29 (1.3)	3310 (1.3)	0.86
Transfusion	66 (2.9)	4876 (2.0)	0.001
Intrauterine fetal demise	<10	379 (0.2)	0.18
Length of Stay (days), Median (IQR)	3 (2–4)	3 (2–3)	<0.001

Abbreviations: IPP, Inpatient postpartum provision; LAPM, long acting and permanent contraception methods; OUD, opioid use disorder.

However, after adjusting for confounders, OUD was found to be associated with an overall decreased probability of utilization of IPP LAPM (aOR=0.89, 95% CI: 0.85–0.95). This was primarily driven by the fact that the majority of LAPM in this cohort were permanent contraception and OUD was associated with a decreased probability of receiving permanent contraception (aOR: 0.82, 95% CI: 0.78–0.88) but showed an increased probability of receiving long-acting reversible contraception (LARC) (aOR: 1.29, 95% CI: 1.04–1.60). The results after multivariable logistic regression for utilization of LAPM in patients with OUD are shown in Table 2.

Table 2 Unadjusted and Adjusted Variables Associated with Utilization of Inpatient Postpartum Provision of Long Acting and Permanent Contraception Methods in Patients with Opioid Use Disorder

	Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Age per Year	1.07 (1.07–1.08)	1.09 (1.08–1.11)
Non-White Race	1.14 (1.03–1.20)	1.03 (0.90–1.18)
Hospital Location		

(Continued)

Table 2 (Continued).

	Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Rural	1.09 (0.98–1.22)	1.22 (0.98–1.72)
Urban Teaching	1.19 (1.10–1.29)	1.28 (1.11–1.47)
Urban Non-Teaching*	–	–
Patient Location		
Central County (>1 million people) *	–	–
Fringe County (>1 million people)	0.75 (0.66–0.84)	0.93 (0.78–1.10)
Large Metro County (250k –999k people)	1.14 (1.03–1.27)	1.13 (0.98–1.36)
Small Metro County (50k–249k people)	0.99 (0.85–1.16)	0.95 (0.50–1.18)
Micropolitan (<50 k people)	1.08 (0.93–1.22)	1.31 (0.71–2.43)
Neither Micropolitan nor Metropolitan (<10,000 People)	1.12 (0.96–1.36)	0.47 (0.14–1.52)
Geographic Region		
West*	–	–
Northeast	0.75 (0.70–0.85)	0.85 (0.72–1.29)
South	1.23 (1.13–1.33)	1.09 (0.96–1.22)
Midwest	0.97 (0.87–1.07)	0.43 (0.29–1.13)
Hospital Size		
Large	1.31 (1.20–1.41)	1.21 (1.02–1.43)
Medium	0.83 (0.75–0.91)	0.92 (0.76–1.11)
Small*	–	–
Median Household Income (per quartile)	0.88 (0.85–0.92)	0.91 (0.85–0.96)
Insurance Type		
Public Insurance	1.16 (1.08–1.29)	1.43 (1.22–1.66)
Pre-existing Conditions	1.43 (1.31–1.57)	1.09 (0.97–1.25)
Cocaine Use	1.00 (0.80–1.25)	0.93 (0.72–1.21)
Sedative Use	1.40 (1.06–1.84)	1.25 (0.91–1.72)
Stimulant Use	0.86 (0.67–1.08)	0.80 (0.61–1.06)
Cannabis Use	0.84 (0.71–0.99)	0.98 (0.81–1.19)
Alcohol Use	1.01 (0.73–1.40)	0.93 (0.60–1.42)
Tobacco Use	1.16 (1.06–1.26)	1.14 (1.01–1.27)
Hepatitis C	1.17 (1.06–1.31)	1.06 (0.92–1.21)
Human Immunodeficiency Virus	1.93 (1.00–3.71)	0.56 (0.19–1.73)
Depression	1.38 (1.16–1.64)	1.40 (1.17–1.64)

(Continued)

Table 2 (Continued).

	Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Psychotic Disorders	1.26 (1.09–1.46)	1.08 (0.83–1.41)
Obesity	2.09 (1.79–2.44)	1.31 (1.07–1.62)
Multiple Gestations	2.24 (1.63–3.11)	3.07 (0.18–49.01)
Preterm Delivery	0.84 (0.74–0.96)	0.82 (0.69–0.96)
Pre-Eclampsia/Eclampsia	1.36 (1.19–1.56)	0.96 (0.80–1.15)
Hemorrhagic Morbidity	1.00 (0.85–1.17)	1.01 (0.69–1.45)
Stillbirth	0.24 (0.11–0.55)	0.23 (0.08–0.65)
Mode of Delivery		
Spontaneous Vaginal Delivery*	–	–
Operative Vaginal Delivery	0.68 (0.52–0.88)	0.98 (0.71–1.36)
Cesarean Delivery	5.49 (4.99–6.04)	5.21 (4.64–5.83)

Note: *Indicates referent.

Discussion

In this study of the National Inpatient Sample from 2012 to 2016, patients with OUD had an 11% lower probability of utilizing IPP LAMP for postpartum contraception compared to those without OUD. Importantly, participants were less likely to undergo permanent contraception but more likely to receive LARC.

The reason for the difference in rates of IPP LAMP utilization between patients with and without OUD is likely to be multifactorial. A prior study of attitudes towards contraception in women with OUD noted that if contraception was freely provided, 17% would choose a LARC method and more women with OUD would choose contraceptive injections (41%) than any other method. Another study found that 33–42% of patients with OUD would be unlikely to choose a LARC.^{7,9} This is comparable to the findings in one study of the general population in which 32–53% of patients receiving care at a federally qualified health center had low acceptability of LARCs.²¹ Differences in clinician counseling due to implicit biases may impact access and uptake of LAMP.²² Additionally, policy-level barriers to IPP LAMP may also play a role in our study findings. Rates of IPP LARC were noted to increase after policy changes requiring Medicaid coverage of IPP LARCs in South Carolina.¹ Patients with OUD may also be less likely to receive permanent contraception inpatient than the general population due to the lack of a valid Medicaid sterilization consent form given barriers to prenatal care.²³

The main strength of this study is that it relied on data from the NIS, which provides a representative sample of the hospitals across the US, thus increasing the reliability and generalizability of our results. We acknowledge the limitations inherent with our retrospective methodology utilizing solely inpatient administrative data. While changes in Medicaid coverage for inpatient LARCs that occurred during our study period resulted in overall increases in IPP LARC, additional studies are needed to better understand the impact of Medicaid expansion to cover IPP LARC on rates of utilization specifically in patients with OUD.

Conclusion

Patients with opioid use disorder (OUD) are less likely than patients without OUD to receive inpatient provision of long acting or permanent methods of contraception. Potential areas for improvement include antepartum contraceptive counseling, availability of access to inpatient LAMP, and removal of Medicaid policy barriers to permanent

contraception. This study highlights the continued need to ensure that the contraceptive goals for patients with OUD are being achieved.

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