The impact of Medicaid expansion on postpartum health care utilization among pregnant women with opioid use disorder

Briana P. Patton, BA[a], **Elizabeth E. Krans, MD, MSc**[b,c], **Joo Yeon Kim, MS**[d,e], **Marian Jarlenski, PhD, MPH**[d,e]

[a]School of Medicine, University of Pittsburgh, Pittsburgh, Pennsylvania, USA;

[b]Department of Obstetrics, Gynecology and Reproductive Sciences, School of Medicine, University of Pittsburgh, Pittsburgh, Pennsylvania, USA;

[c]Magee-Womens Research Institute, Pittsburgh, Pennsylvania, USA;

[d]Department of Health Policy and Management, Graduate School of Public Health, University of Pittsburgh, Pittsburgh, Pennsylvania, USA;

[e]Health Policy Institute, University of Pittsburgh, Pittsburgh, Pennsylvania, USA

Abstract

Background: Opioid use disorder (OUD) during pregnancy has increased dramatically over the past decade, as have associated adverse maternal health outcomes. Although Medicaid has long been the largest payer for deliveries in the United States, states' decisions to expand Medicaid eligibility to low-income adults has the potential to increase access to care for women in the postpartum period. This study aimed to determine the impact of the 2015 Pennsylvania Medicaid expansion on postpartum insurance coverage and preventive care utilization among pregnant women with opioid use disorder (OUD).

Methods: In 2017, we conducted a retrospective cohort study using 2013–2015 administrative Medicaid data provided by the Pennsylvania Department of Human Services. We identified 1562 women with opioid use disorder who had a live birth delivery in a pre-Medicaid expansion or post-expansion study period. We compared length of continuous enrollment in Medicaid following delivery, postpartum visit attendance, and contraception initiation between groups.

Results: More women in the post-expansion group remained enrolled in Medicaid at 300 days postpartum, relative to the pre-expansion group (87% vs. 81%). Medicaid expansion was not associated with differences in postpartum visit attendance or contraceptive use. However, women who remained enrolled in Medicaid for at least 300 days post delivery had an increased odds of postpartum visit attendance (odds ratio [OR]: 1.6, 95% confidence interval [CI]: 1.04, 2.4).

Conclusion: The rate of continuous Medicaid enrollment among postpartum women with OUD was significantly higher after expansion, whereas rates of preventive care utilization were unaffected. Although improving insurance coverage for women with OUD is an important step to improve access to recommended preventive care, additional efforts are needed to ensure utilization of such care.

Keywords

Maternal health; medicaid; opioid-related disorders

Introduction

Opioid use has during pregnancy has increased dramatically over the past decade as a consequence of the opioid epidemic. From 2000 to 2009, the number of women with opioid use disorder (OUD) during pregnancy increased from 1.2 to 6 per 1000 live births.[1,2] Opioid exposure during pregnancy is associated with an increased risk of adverse birth outcomes, such as preterm birth and low birth weight, and significantly increases maternal morbidity and mortality.[3–6] Neonatal abstinence syndrome (NAS), a drug withdrawal syndrome that occurs in 30%–80% of opioid-exposed infants, has also a profound impact on the health care system.[7] In communities where the opioid epidemic has been particularly profound, NAS represents nearly 50% of all neonatal intensive care unit (NICU) hospital admissions and accounts for an estimated $1.5 billion in US health care expenditures.[1,2]

Pregnancy is a unique opportunity to engage patients in OUD treatment and other preventative health care services, including prenatal care, medical and psychosocial comorbidity screening, and family planning services.[8,9] As the single largest payer in the United States for pregnancy and births, state Medicaid programs are a critical source of increased health care access that facilitates preventative health care services utilization among pregnant women with OUD.[10,11] Approximately 80%–90% of pregnant women with OUD are Medicaid insured, and an estimated 81% of NAS costs are paid for by state Medicaid programs.[2]

Despite increases in health care engagement during pregnancy, postpartum health care utilization following delivery is poor. Less than 50% of women with OUD attend the postpartum visit, which is a strong predictor of early initiation of contraception in the postpartum period.[12,13] Only 25% women with OUD used effective or highly effective contraceptive methods in the postpartum period (90 days after delivery), which is significantly lower than postpartum contraceptive utilization rates found among other low-income populations, and women with OUD are far more likely to have unintentional pregnancies compared with women without OUD.[14–16] Over 86% of women with a history of opioid abuse have had an unintended pregnancy, in contrast to 45% of women in the general population.[15,17] As such, the postpartum period is a critical time to maintain health care engagement.

Access to preventive health care services during and following the postpartum period depends on the continuation of Medicaid coverage as patients transition from pregnancy-based eligibility, which covers women from conception to 60 days postpartum, to income-

based criteria. Prior to the enactment of Medicaid expansion under the Affordable Care Act (ACA), most low-income women remained uninsured prior to their first pregnancy and many lacked continuous coverage beyond 60 days after delivery due to income-based restrictions on eligibility.[18] Prior to 2015 in Pennsylvania, adults with dependent children were only eligible for Medicaid through the Temporary Assistance for Needy Families (TANF) program if they had incomes up to 38% of the federal poverty line (FPL) ($7,760 for a family of 3 in 2017), whereas adults without dependent children were not eligible for Medicaid unless they had a disability.[19] In 2015, with the Affordable Care Act (ACA), Pennsylvania expanded Medicaid coverage for all adults with income under 138% of the federal poverty line (FPL) ($27,725 for a family of 3 in 2017).[19] By allowing more women to remain continuously enrolled in Medicaid after delivery, this expansion of coverage should increase access to postpartum and preventive care services for women with OUD.

This study had 2 objectives. First, we investigated the impact of the 2015 Medicaid expansion in Pennsylvania on length of continuous Medicaid coverage after delivery in women with an OUD diagnosis during pregnancy. We hypothesized that the length of postpartum enrollment would be greater among women with OUD who had a delivery after Medicaid expansion, relative to those with a delivery prior to Medicaid expansion. Second, we assessed the association between Medicaid expansion and utilization of recommended postpartum health care services. We hypothesized that rates of postpartum follow-up visits and contraceptive use would be higher in women with a delivery after Medicaid expansion, relative to those with a delivery prior to Medicaid expansion, as we expected that women with continuing insurance coverage would be more likely to engage in postpartum health care services.

Methods

Data set

We conducted a retrospective cohort study using administrative Medicaid health care data provided by the Pennsylvania Department of Human Services. The data set includes all medical and behavioral health encounters from January 2013 to December 2015, including inpatient, out-patient, emergency care, and filled outpatient prescriptions. The data set also includes information on Medicaid eligibility category, enrollment dates, and demographic information (age, race, county of residence) for each enrollee. This study was approved by the University of Pittsburgh Institutional Review Board (IRB) and determined to be IRB exempt due to the use of de-identified data.

Pre-and post-Medicaid expansion groups

Our study population included a total of 1562 women aged 15–45 years with a delivery in Pennsylvania Medicaid in 2014 or 2015 and who had a diagnosis of OUD in pregnancy. Pregnant women were identified using an algorithm validated by the National Committee for Quality Assurance (NCQA) to identify women who had an inpatient delivery and a live birth.[20] OUD was defined as any ICD-9 (International Classification of Diseases, Ninth Revision) diagnosis code of 304.0x (opioid type dependence), 304.7x (combinations of opioid type drug with any other drug dependence), or 305.5x (nondependent opioid abuse)

in 1 or more inpatient, outpatient, or professional claim. Women with dual Medicaid-Medicare eligibility or non-Pennsylvania residency were excluded from the study population.

We then identified 2 groups. The pre-expansion group was composed of pregnant women with OUD who had a delivery between November 1, 2013, and March 1, 2014, which was the period prior to Medicaid expansion in Pennsylvania. The post-expansion group was composed of pregnant women with OUD who had a delivery between November 1, 2014, and March 1, 2015, which was the period after Medicaid expansion in Pennsylvania that was available in our data set. We followed both groups for 300 days after delivery. The 300-day study time period was chosen to maximize the size of our study cohorts within the constraints of the data set. Our available data set included claims through December 30, 2015. Our post-expansion delivery window began (month/day/year) 1/11/2014, as the 60-day postpartum window ran into the start date of Medicaid expansion on 1/1/2015 and continued through 3/1/2015 in order to increase the cohort size. The 300-day window from the latest delivery in the post-expansion cohort (3/1/2015) to the last available claim in the data set (12/31/2015) was then used to determine the follow-up period for all participants. In the post-expansion period, all women with household incomes <138% FPL would be eligible for continued Medicaid coverage beyond 60 days post-partum. In contrast, women in the pre-expansion group would lose Medicaid eligibility at 60 days postpartum, unless they had a disability or an income <38% FPL.

Outcomes

The primary outcome of interest was the length of continuous enrollment in Medicaid following delivery. Continuous Medicaid coverage was evaluated for a 300-day period following delivery and allowed for gaps in coverage for up to 2 weeks. Secondary outcomes included measures of postpartum health care utilization in the both the 60-day postpartum period, to assess timely utilization of preventive care, and in all enrolled days during the 300-day study period following delivery, to assess long-term engagement with postpartum care. Our measures of postpartum health care utilization were defined as (a) contraceptive utilization and (b) attendance at a postpartum visit. Postpartum contraceptive utilization was defined as any oral contraceptives, injection, vaginal ring, hormonal patch, diaphragm, LARC (levonorgestrel-releasing intrauterine device [IUD], the copper T380A IUD, or the subdermal contraceptive implant), or female sterilization in inpatient, professional, or pharmacy claims within the time periods of interest following delivery (National Drug Codes [NDCs] listed in Appendix A). The postpartum visit was defined as ICD-9 diagnosis code of V24.1x (postpartum care and examination) or V24.2x (routine postpartum follow-up) in the office or outpatient hospital setting in 1 or more professional claims within the time periods of interest after delivery.

Control variables

Additional categorical demographic characteristics were measured, including age in years, race/ethnicity (black, white, Hispanic, other), and Medicaid eligibility category (pregnancy medical assistance, TANF, disability, other). This demographic information was recorded for each participant at the time of Medicaid enrollment. Date of death was also recorded when

applicable. The presence of other comorbid conditions that could affect health care utilization was also assessed. This included substance use disorders other than opioid use disorder (i.e., dependence on or remission from dependence on cocaine, marijuana, hallucinogens, sedatives, or other substances), tobacco and alcohol use in pregnancy, utilization of medication-assisted treatment (MAT) in pregnancy, hepatitis C virus (HCV), human immunodeficiency virus (HIV), and psychiatric disorders (i.e., major depressive disorder, anxiety disorder, schizophrenia, bipolar disorder). ICD-9 codes used to identify comorbid medical and behavioral diagnoses are included in Appendix A. The descriptive characteristics of our study population were stratified by pre-and post-expansion delivery groups.

Statistical analysis

Kaplan-Meier curves and log-rank test, censoring women at 300 days postpartum, were used to compare time to disenrollment following delivery between pre-and post-expansion groups. Multivariate Cox proportional hazard regression models were used to evaluate predictors of disenrollment up to 300 days postpartum and were adjusted for age, race, psychiatric disorders, nonopioid substance use disorders, use of medication-assisted treatment (MAT) in pregnancy, and study group (pre-expansion vs. post-expansion). The proportional hazards assumption was validated by inspection of log (–log[time to disenrollment]) curves. The multivariate logistic regressions were used to assess the association between potential predictors and (a) the likelihood of any contraceptive use within both the 60-day and 300-day study periods of interest following delivery, and (b) the likelihood of any postpartum visit, adjusted for age, race, psychiatric disorders, nonopioid substance use disorders, use of MAT in pregnancy, study group (pre-expansion vs. post-expansion), and length of enrollment in Medicaid during the 60-day and 300-day study periods following delivery. Odds ratios (ORs) and 95% confidence intervals (CIs) were reported. Results were considered statistically significant with a 2-sided P value of less than .05.

Results

There were a total of 35,711 live birth deliveries to women covered by Medicaid during the study period, of whom 1562 (4%) were OUD diagnosed in pregnancy. This study includes those 1562 women aged 15–45 years with OUD experienced a live birth in either the pre-expansion ($n = 744$) or post-expansion ($n = 818$) period. Of these women, 33 had a recorded date of death in the pre-expansion ($n = 16$) or post-expansion ($n = 17$) cohort. Table 1 presents the descriptive characteristics of women included in the study, comparing those in the pre-expansion and post-expansion groups. The pre-expansion and post-expansion groups were highly similar on all observed characteristics, with no statistically significant differences detected in the observed variables between the 2 groups.

Postpartum Medicaid enrollment

Figure 1 shows the proportion of the pre-expansion and post-expansion groups remaining enrolled in Medicaid from delivery to 300 days postpartum. A greater proportion of women in the post-expansion group remained enrolled at 300 days postpartum, relative to the pre-

expansion group (87% vs. 81%). In multivariable analysis, women in the post-expansion group (hazard ratio [HR]: 0.67, 95% CI: 0.52, 0.86) and women with a psychiatric comorbidity (HR: 0.70, 95% CI: 0.5, 0.9) were significantly less likely to lose coverage during the study period). Comorbid substance use (HR: 0.9, 95% CI: 0.6, 1.2) and MAT use in pregnancy (HR: 0.8, 95% CI: 0.6, 1.1) were not associated with length of postpartum Medicaid enrollment.

Postpartum visit and contraception utilization

Figure 2 shows the unadjusted proportions of women in the pre-expansion and post-expansion groups who attended postpartum visit and had any method of contraception in the both the 60-day and 300-day study periods following delivery. Within the 60-day postpartum period, the proportion of women attending a postpartum visit was low in both the pre-expansion (15%) and post-expansion (16.4%) groups. Similarly, the proportion of women with postpartum contraception use within the 60 days following delivery was low in both the pre-expansion (23.5%) and post-expansion (21.0%) groups. There was no statistically significant difference in postpartum visit attendance (P = .428) or contracep tive initiation (P = .236) between expansion groups. At the end of the full 300-day study period, the percentage of women attending any postpartum obstetric care visit remained low in both the pre-expansion (17.1%) and post-expansion (19.9%) groups. However, by 300 days after delivery, rates of contraception initiation increased in both the pre-expansion (39.3%) and post-expansion (37.5%) groups.

In multivariable analyses, Medicaid expansion was not associated with any significant difference in the odds of post-partum visit attendance in the 60-day postpartum period (OR: 1.1, 95% CI: 0.8,1.4) or 300-day study period (OR: 1.2, 95% CI: 0.9,1.5), nor was it associated with contraceptive use in the 60-day (OR: 0.8, 95% CI: 0.7,1.1) or 300-day (OR: 0.9, 95% CI: 0.8,1.1) study period (Table 2). However, women across both groups who did not experience disenrollment during the 300-day study period were significantly more likely to have attended a timely postpartum visit within 60 days after delivery (OR: 1.6, 95% CI: 1.04, 2.4). Substance use disorders other than OUD were associated with decreased likelihood of attending a postpartum visit at both 60 days and 300 days (OR: 0.6, 95% CI: 0.4, 0.8), whereas methadone use during pregnancy (OR: 0.6, 95% CI: 0.5, 0.9) was associated with decreased likelihood of initiating contraception within both 60 days (OR: 0.6, 95% CI: 0.5, 0.9) and 300 days (OR: 0.7, 95% CI: 0.5, 0.9) after delivery. Women who stayed enrolled for the entirety of the study period were no more likely to have initiated contraception use in the 60-day post-partum period than those who were disenrolled. A subgroup analysis of only women with recorded MAT utilization in pregnancy found no significant association between Medicaid expansion and postpartum visit attendance (OR: 1.2, 95% CI: 0.8, 1.6) or contraception utilization (OR: 0.8, 95% CI: 0.6, 1.1) within that population.

Discussion

The postpartum period presents multiple challenges to women with OUD, including increased risk of postpartum depression and anxiety due to high prevalence of psychiatric

comorbidities, increased stress associated with parenting, limited resource availability and social support, and loss of pregnancy-related insurance access.[9,21,22] Continued health care engagement in the postpartum period has the potential to address health concerns among women with OUD, including postpartum depression, breastfeeding support, contraception, and the provision of family planning services.[23] To wit, our study found that Pennsylvania Medicaid expansion in 2015 due to the ACA significantly reduced dis-enrollment following delivery. After Medicaid expansion, 87% of women remained continuously enrolled during the 300 days after delivery, compared with 81% prior to expansion. The increase in continued Medicaid coverage in our post-expansion population indicates that the 2015 Pennsylvania Medicaid expansion had a significant impact on the continuation of Medicaid enrollment following the postpartum period.

Despite improvements in postpartum Medicaid coverage post expansion, the utilization of recommended postpartum health care, namely, postpartum visit attendance and contraception utilization, did not substantially change and rates were exceptionally low in both the pre-expansion and post-expansion groups. In our cohort, approximately 15% of women with OUD attended the postpartum visit within the 60-day postpartum window, which is substantially lower than the postpartum visit attendance rates found among other Medicaid populations (50%–60%) and among women with private insurance (75%).[24,25] By 300 days postpartum, only 19.9% of post-expansion and 17.1% of pre-expansion participants had attended a postpartum care visit. Our rate of postpartum visit attendance was also significantly lower than previous estimates in this population. A retrospective chart review of 94 women with OUD receiving care at a high-risk maternity clinic reported a postpartum visit attendance rate of 43%.[12] Differences in attendance rates may be due to the fact that the previous study evaluated a small sample of women from a single high-risk clinic that may have been well equipped to improve postpartum visit attendance among women with OUD. Although Medicaid expansion did not appear to improve rates of postpartum health care utilization, we did find that postpartum women with OUD with continuous Medicaid enrollment during the study period, regardless of study cohort, were significantly more likely to have attended a timely postpartum visit during the 60-day postpartum window.

Substantial barriers often prevent women with substance use disorders from accessing postpartum health care services. Women with OUD often receive frequent health care visits from multiple providers during pregnancy, including OUD treatment and prenatal and behavioral health providers. In contrast, patients quickly transition to one recommended postpartum visit 4–6 weeks after delivery, which reflects a significant change in the intensity and frequency of health care engagement at a particularly vulnerable time. Moreover, less than 15% of substance abuse treatment facilities in the United States offer women-centered services such as contraception, which limits alternative ways to receive postpartum health care services.[26] This fragmented delivery of postpartum care and substance use treatment may have contributed to the decreased rates of contraception utilization we observed among participants who received metha-done treatment. Additionally, many women with OUD do not have reliable housing, transportation, or childcare, which can make it difficult to prioritize ongoing preventative health care.[27] Finally, the stigma of addiction and fears of

legal involvement may also prevent women with substance use disorders from seeking health care services after delivery.[28]

Despite the importance of our findings, this study has limitations. First, our study examined only 1 year of post-Medicaid expansion data and was unable to track longer-term trends in disenrollment and rates of health care utilization. As more data become available, longitudinal analysis with larger cohorts will be possible and allow for a more accurate estimation of the impact of Medicaid expansion. Second, our contraception data only included filled contraceptive prescriptions and we could not account for the use of barrier and/or over-the-counter contraceptive methods. Although we found low rates of contraception in the post-partum period, we lacked longer-term data post-Medicaid expansion to study interpregnancy interval and subsequent pregnancy outcomes. Additionally, our data set is composed of pregnant women with OUD participating in Pennsylvania Medicaid, which may limit the generalizability of our findings to privately insured or uninsured women and to women in other states or regions. Finally, observational study designs are inherently vulnerable to bias and the possibility of residual confounding persists despite efforts to control for these factors.

Conclusions

Improving insurance coverage among women with OUD is an important first step in expanding access to postpartum preventative health care services. The expansion of Medicaid in Pennsylvania appears to have had a substantial impact on rates of continued postpartum insurance coverage, and maintaining this program will ensure continuation of these gains. However, additional efforts are needed to translate access to services to the utilization of those services. Due to exceeding low rates of postpartum visit attendance and contraception utilization, outreach and educational efforts from health care providers regarding the importance of postpartum health care may encourage women with OUD to use the postpartum health services that they can receive through Medicaid. Interventions as simple as a text message or as intensive as one-on-one engagement with a trained navigator after delivery have been shown to significantly increase rates of postpartum visit attendance. [29,30] Likewise, efforts to incorporate family planning services into OUD treatment programs will also close the gaps in postpartum health care utilization identified by this analysis. Finally, regular engagement with health care providers is an important component of recovery and health maintenance for women with OUD, and increasing the frequency of OUD treatment, pediatric, obstetric, and addiction medicine provider contacts following pregnancy may help to improve postpartum health outcomes in this vulnerable population.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Funding

References

[1]. Patrick SW, Schumacher RE, Benneyworth BD, Krans EE, McAllister JM, Davis MM. Neonatal abstinence syndrome and associated health care expenditures: United States, 2000–2009. JAMA. 2012;307(18):1934–1940. [PubMed: 22546608]

[2]. Patrick SW, Davis MM, Lehman CU, Cooper WO. Increasing incidence and geographic distribution of neonatal abstinence syndrome: United States 2009 to 2012. J Perinatol. 2015;35(8): 650–655. [PubMed: 25927272]

[3]. Almario CV, Seligman NS, Dysart KC, Berghella V, Baxter JK. Risk factors for preterm birth among opiate-addicted gravid women in a methadone treatment program. Am J Obstet Gynecol. 2009;201(3):326.e1–326. [PubMed: 19631928]

[4]. Cleary BJ, Donnelly JM, Strawbridge JD, Gallagher PJ, Fahey T, White MJ. Methadone and perinatal outcomes: a retrospective cohort study. Am J Obstet Gynecol. 2011;204(2):139.e1–139. [PubMed: 21145035]

[5]. Tuten M, Fitzsimons H, Chisolm MS, Jones HE, Heil SH, O'Grady KE. The impact of mood disorders on the delivery and neonatal outcomes of methadone-maintained pregnant patients. Am J Drug Alcohol Abuse. 2009;35(5):358–363. [PubMed: 20180664]

[6]. Metz TD, Rovner P, Hoffman MC, Allshouse AA, Beckwith KM, Binswanger IA. Maternal deaths from suicide and overdose in Colorado, 2004–2012. Obstet Gynecol. 2016;128(6):1233–1240. [PubMed: 27824771]

[7]. Behnke M, Smith V. Prenatal substance abuse: short-and long-term effects on the exposed fetus. Pediatrics. 2013;131(3): 1009–1024.

[8]. Jones HE, Deppen K, Hudak ML, et al. Clinical care for opioid-using pregnant and postpartum women: the role of obstetric providers. Am J Obstet Gynecol. 2014;210(4):302–310. [PubMed: 24120973]

[9]. Krans EE, Cochran G, Bogen DL. Caring for opioid-dependent pregnant women: prenatal and postpartum care considerations. Clin Obstet Gynecol. 2015;58(2):370–379. [PubMed: 25775440]

[10]. Markus AR, Andres E, West KD, Garro N, Pellegrini C. Medicaid covered births, 2008 through 2010, in the context of the implementation of health reform. Womens Health Issues. 2013;23(5):e273–e280. [PubMed: 23993475]

[11]. Wen H, Druss BG, Cummings JR. Effect of Medicaid expansions on health insurance coverage and access to care among low-income adults with behavioral health conditions. Health Serv Res. 2015;50(6):1787–1809. [PubMed: 26551430]

[12]. Parlier A, Fagan B, Ramage M, Galvin S. Prenatal care, pregnancy outcomes, and postpartum birth control plans among pregnant women with opiate addictions. South Med J. 2014; 107(11): 676–683. [PubMed: 25365432]

[13]. Bennett WL, Chang HY, Levine DM, Wang L, Neale D, Werner EF. Utilization of primary and obstetric care after medically complicated pregnancies: an analysis of medical claims data. J Gen Intern Med. 2014;29(4):636–645. [PubMed: 24474651]

[14]. Krans EK, Kim JY, James AE, Kelley DK, Jarlenski M. Postpartum contraceptive use and interpregnancy interval among women with opioid use disorder. Drug Alcohol Depend. 2018; 185:207–213. [PubMed: 29462768]

[15]. Heil SH, Jones HE, Arria A, et al. Unintended pregnancy in opioid-abusing women. J Subst Abuse Treat. 2011;40(2):199–202. [PubMed: 21036512]

[16]. Black KI, Stephens C, Haber PS, Lintzeris N. Unplanned pregnancy and contraceptive use in women attending drug treatment services. Aust N Z J Obstet Gynaecol. 2012;52(2):146–150. [PubMed: 22335489]

[17]. Finer LB, Zolna MR. Declines in unintended pregnancy in the United States, 2008–2011. N Engl J Med. 2016;374(9):843–852. [PubMed: 26962904]

[18]. Rosenberg D, Handler A, Rankin KM, Zimbeck M, Adams EK. Prenatal care initiation among very low-income women in the aftermath of welfare reform: does pre-pregnancy medicaid coverage make a difference? Matern Child Health J. 2007;11(1): 11–17. [PubMed: 16763773]

[19]. The Henry J. Kaiser Family Foundation. The Pennsylvania Healthcare Landscape [internet]. 2016 [cited 24 January 2018]Available from: http://kff.org/health-reform/fact-sheet/the-pennsylvania-health-care-landscape/

[20]. National Committee for Quality Assurance. Prenatal and Postpartum Care Quality Measure [internet] 2016 [cited 19 July 2016]Available from: http://www.ncqa.org/portals/0/prenatal%20postpartum%20care.pdf.

[21]. Chapman SLC, Wu LT. Postpartum substance use and depressive symptoms: a review. Women Health. 2013;53(5):479–503. [PubMed: 23879459]

[22]. Ross LE, Dennis CL. The prevalence of postpartum depression among women with substance use, an abuse history, or chronic illness: a systematic review. J Womens Health. 2009;18(4): 475–486.

[23]. Stumbras K, Rankin K, Caskey R, Haider S, Handler A. Guidelines and interventions related to the postpartum visit for low-risk postpartum Women in high and upper middle Income countries. Matern Child Health J. 2016;20(S1):103–S116. [PubMed: 27392705]

[24]. Wilcox E, Levi E, Garrett J. Predictors of non-attendance to the postpartum follow-up visit. Matern Child Health J. 2016;20(S1): 22–S27. [PubMed: 27562797]

[25]. Weir S, Posner HE, Zhang J, Willis G, Baxter JD, Clark RE. Predictors of prenatal and postpartum care adequacy in a Medicaid managed care population. Womens Health Issues. 2011;21(4):277–285. [PubMed: 21565526]

[26]. Terplan M, Longinaker N, Appel L. Women-centered drug treatment services and need in the United States, 2002–2009. Am J Public Health. 2015;105(11):e50–e54. [PubMed: 26378825]

[27]. Pistella C, Synkewecz S. Community postpartum care needs assessment and systems development for low income families. J Health Soc Policy. 1999;11(1):53–64. [PubMed: 10538430]

[28]. Prenatal Gopman S. and postpartum care of women with substance use disorders. Obstet Gynecol Clin North Am. 2014;41(2): 213–228. [PubMed: 24845486]

[29]. Himes KP, Donovan H, Wang S, Weaver C, Grove JR, Facco FL. Healthy beyond pregnancy, a web-based intervention to improve adherence to postpartum care: randomized controlled feasibility trial. JMIR Hum Factors. 2017;10(4):e26.

[30]. Yee LM, Martinez NG, Nguyen AT, Hajjar N, Chen MJ, Simon MA. Using a patient navigator to improve postpartum care in an urban women's health clinic. Obstet Gynecol. 2017;129(5): 925–933. [PubMed: 28383374]
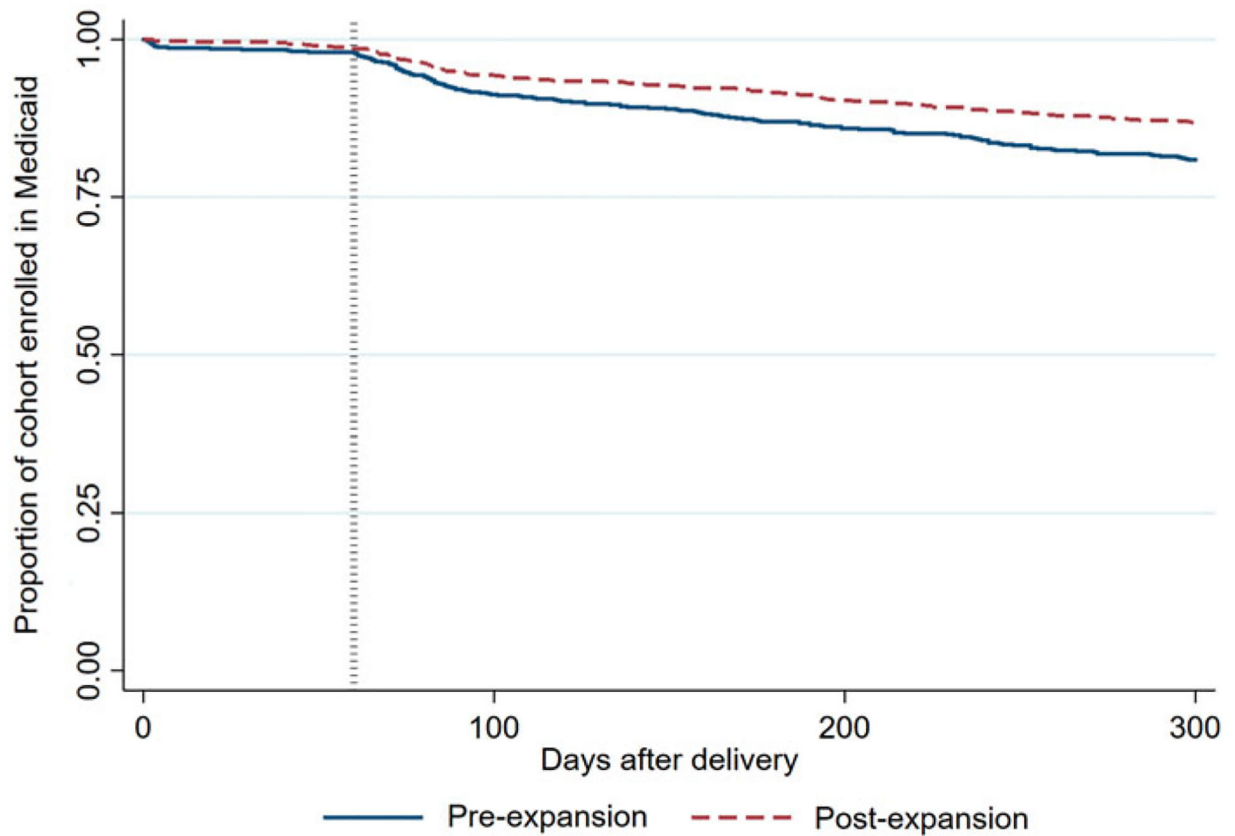
Figure 1.
Kaplan-Meier time-to-event analysis according to pre-or post-Medicaid expansion delivery cohort (source: authors' analysis of 2013–2015 administrative Medicaid data from Pennsylvania Department of Human Services). Days to disenrollment was tracked across the 300-day post-delivery study period for each woman. The vertical gray line marks 60 days post delivery, when coverage ends for women above the income limit for continuous Medicaid eligibility.

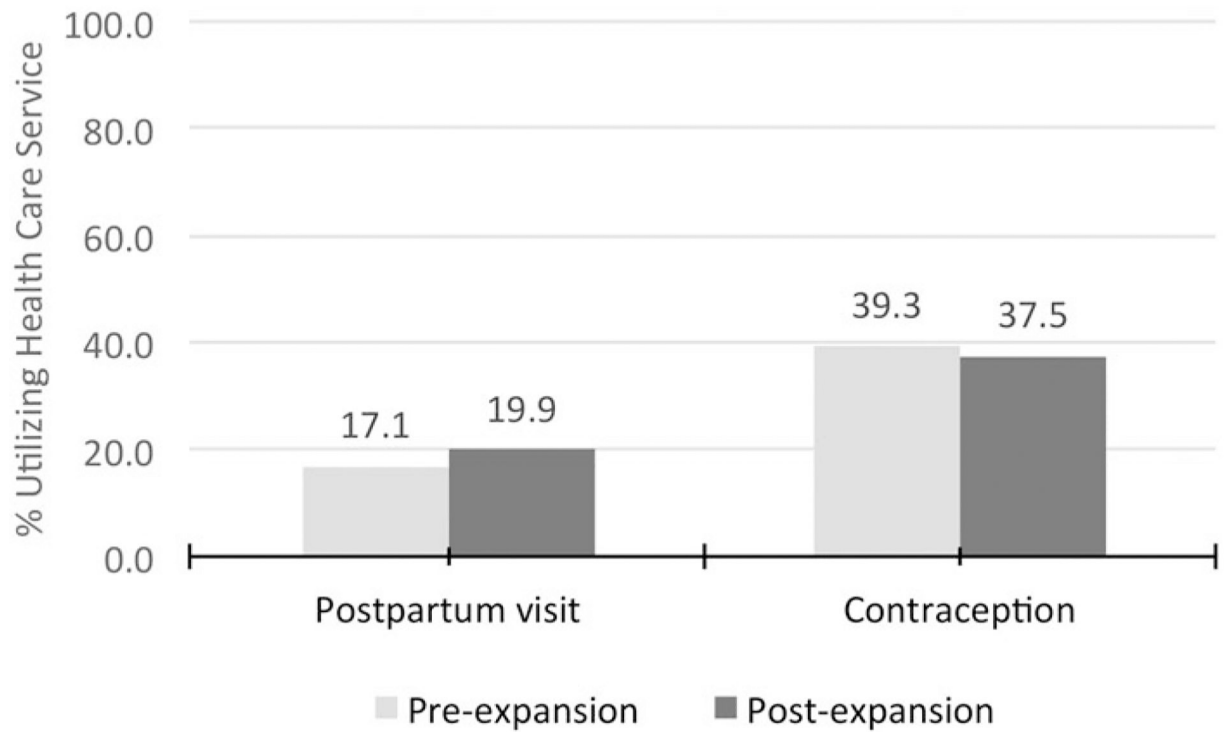**Figure 2.**
Frequency of postpartum visit attendance and contraception initiation in the 300 days after delivery (source: authors' analysis of 2013–2015 administrative Medicaid data from Pennsylvania Department of Human Services). Calculated among Pennsylvania Medicaid-enrolled women with OUD who had a live birth delivery during the pre-expansion ($n = 744$) or post-expansion ($n = 818$) period.

Table 1.

Characteristics of Medicaid-enrolled women with OUD who had a live birth stratified by pre-expansion and post-expansion study periods.

Characteristic	Overall	Pre-expansion[a] (n = 744)	Post-expansion[b] (n = 818)	P value[c]
Demographics				
Age, mean (SD)	28.16 (4.70)	28.01 (4.7)	28.29 (4.7)	.2343
Age				
15–19 years	38 (2.4)	19 (2.6)	19 (2.3)	.471
20–34 years	1397 (89.4)	671 (90.2)	726 (88.8)	
35–45 years	127 (8.1)	54 (7.3)	73 (8.9)	
Race/ethnicity				
Non-Hispanic white	1359 (87.0)	650 (87.4)	709 (86.7)	.837
Non-Hispanic black	131(8.4)	61 (8.2)	70 (8.6)	
Hispanic	43 (2.8)	18 (2.4)	25 (3.1)	
Other race	29 (1.9)	15 (2.0)	14(1.7)	
Substance use history				
Tobacco use	1191 (76.3)	565 (75.9)	626 (76.5)	0.785
Alcohol use disorder	114 (7.3)	50 (6.7)	64 (7.8)	0.402
Nonopioid substance use disorder	1280 (82.0)	623 (83.7)	657 (80.3)	0.079
Medication-assisted treatment				
Buprenorphine[c]	488 (31.24)	223 (30.0)	265 (32.4)	0.302
Methadone[c]	419 (26.82)	213 (28.6)	206 (25.2)	0.125
Medical comorbidities				
Hepatitis C virus	484 (30.99)	223 (30.0)	261 (31.9)	0.409
Psychiatric comorbidity	678 (43.4)	323 (43.4)	355 (43.4)	0.995

Source: Authors' analysis of 2013–2015 administrative Medicaid data from Pennsylvania Department of Human Services.

Note. Data are n (%) unless otherwise specified.

[a] Pre-expansion are women with live births occurring between 11/1/2013 and 3/1/2014. Post-expansion are women with live births occurring between 11/1/2014 and 3/1/2015.

[b] All P values were derived from chi-square tests, except for age, which was tested using a Student's t test.

[c] Indicates any buprenorphine prescription fill in pregnancy or any methadone treatment claim in pregnancy.

Table 2.

Predictors of postpartum health care utilization within 60 and 300 days after delivery among Medicaid-enrolled women with opioid use disorder after a live birth delivery.

Predictor	Postpartum visit[a] OR (95% CI)		Contraception use[b] OR (95% CI)	
	Within 60 days of delivery	Within 300 days of delivery	Within 60 days of delivery	Within 300 days of delivery
Medicaid eligibility				
Pre-expansion[c]	Ref	Ref	Ref	Ref
Post-expansion[c]	1.1 (0.8, 1.4)	1.2 (0.9, 1.5)	0.8 (0.7, 1.1)	0.9 (0.8, 1.1)
Continuous enrollment[d]	1.6 (1.0, 2.4)[*]	N/A	1.3 (0.9, 1.9)	N/A
Demographics				
Age (years)	1 (1.0, 1.0)	1 (1.0, 1.0)	1 (1.0, 1.0)	1 (0.9, 1.0)
Race/ethnicity				
Non-Hispanic white	Ref	Ref	Ref	Ref
Non-Hispanic black	1.4 (0.9, 2.2)	1.8 (1.2, 2.7)[**]	0.6 (0.4, 1)	1.0 (0.7, 1.5)
Hispanic	1.7 (0.8, 3.6)	1.7 (0.9, 3.4)	0.8 (0.4, 1.8)	0.7 (0.4, 1.4)
Other	1.3 (0.5, 3.2)	1.3 (0.5,3.2)	1.6 (0.7,3.4)	1.6 (0.7,3.3)
Medical comorbidities				
Psychiatric comorbidity	1.2 (0.9, 1.6)	1.3 (1.0, 1.7)	1.0 (0.8, 1.3)	1.0 (0.8, 1.3)
Substance use history				
Nonopioid substance use disorder[e]	0.6 (0.4, 0.8)[**]	0.6 (0.4, 0.8)[**]	0.8 (0.6, 1.1)	0.9 (0.7, 1.2)
Buprenorphine[f]	1.0 (0.8, 1.4)	1.1 (0.8, 1.5)	1.0 (0.8, 1.3)	1.0 (0.8, 1.3)
Methadone[f]	0.9 (0.6, 1.3)	1.1 (0.8, 1.5)	0.6 (0.5, 0.9)[**]	0.7 (0.5, 0.9)[**]

Source: Authors' analysis of 2013–2015 administrative Medicaid data from Pennsylvania department of human services.

[a] Includes any OBGYN visit that occurred within 60 days or 300 days of delivery.

[b] Indicates any long-acting reversible contraception (IUD, implant), oral hormonal contraception, or sterilization that was initiated or occurred within 60 days or 300 days of delivery.

[c] Pre-expansion are women with live births occurring between 11/1/2013 and 3/1/2014. Post-expansion are women with live births occurring between 11/1/2014 and 3/1/2015.

[d] Enrollment was defined as continuous if there were no gaps in Medicaid coverage longer than 14 days during the 300-day study period post delivery.

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

[e] Other substance use (SUD) in pregnancy included cocaine dependence, cocaine remission, nondependent cocaine abuse, cannabis dependence, cannabis remission, nondependent cannabis abuse, amphetamine dependence, amphetamine remission, nondependent amphetamine abuse, hallucinogen dependence, hallucinogen remission, nondependent hallucinogen abuse, sedative dependence, sedative remission, nondependent sedative abuse, other substance dependence, other substance remission, nondependent other substance use, drug dependence complicating pregnancy/childbirth/puerperium, antepartum drug dependence, maternal drug dependence at delivery, and postpartum drug dependence.

[f] Any buprenorphine prescription fill in pregnancy or any methadone treatment claim in pregnancy.

[*] $P < .05$;

[**] $P < .01$.