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Postpartum care and contraception provided to women with gestational and preconception diabetes in California's Medicaid program[☆]

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Abstract

Objectives: To compare rates of postpartum care and contraception provided to women with gestational or preconception diabetes mellitus to women with no known diabetes mellitus.

Methods: A retrospective cohort study of 199,860 women aged 15–44 years who were continuously enrolled in California's Medicaid program, Medi-Cal, from 43 days prior to 99 days after delivering in 2012. Claims for postpartum clinic visits and contraceptive supplies were compared for 11,494 mothers with preconception diabetes, 17,970 mothers with gestational diabetes, and 170,396 mothers without diabetes. Multivariable logistic regression was used to control for maternal age, race/ethnicity, primary language, residence in a primary care shortage area, state-funded healthcare program and Cesarean delivery, when examining the effects of diabetes on postpartum care and contraception.

Results: Although postpartum clinic visits were more common with diabetes (55% preconception, 55% gestational, 48% no diabetes, $p < .0001$), almost half did not receive any postpartum care within 99 days of delivery. Women with pregnancies complicated by diabetes were more likely to receive permanent contraception than women without diabetes (preconception diabetes, aOR: 1.39, 95% CI: 1.31–1.47; gestational diabetes, aOR: 1.20, 95% CI: 1.14–1.27). However, among women without permanent contraception, less than half received any reversible contraception within 99 days of delivery (44% preconception, 43% gestational, 43% no diabetes) and less effective, barrier contraceptives were more commonly provided to women with preconception diabetes than women without diabetes (aOR: 1.24, 95% CI: 1.16–1.33).

Conclusions: Low-income Californian women with pregnancies complicated by diabetes do not consistently receive postpartum care or contraception that may prevent complication of future pregnancies.

Implications: Efforts are needed to improve rates of provision of postpartum care and high quality contraceptive services to low income women in California, particularly following pregnancies complicated by diabetes.

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Keywords: Diabetes; Gestational diabetes; Women; Postpartum; Contraception

1. Introduction

The postpartum period is challenging for women and their families. Postpartum care is recommended to assess women's recovery from pregnancy, need for contraception, success with lactation, risk of postpartum depression, and ongoing need for

care of medical conditions identified during pregnancy, such as gestational diabetes [1]. Postpartum care and postpartum contraception play a critical role in ensuring mothers have adequate time to recover from delivery before conceiving a subsequent pregnancy. For women with pregnancies affected by diabetes mellitus (DM), the postpartum period is further complicated by the need to adjust medication regimens to ensure euglycemia [2]. Currently, women with pregnancies affected by DM more frequently require emergency care during the 6 months postpartum than women without DM [3].

In 2011, the state of California's Medi-Cal program financed maternity care for 50.4% of all births occurring in

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California hospitals [4]. As part of the Adult Medicaid Quality Grant (AMQG), California was one of 24 states that worked to test and evaluate methods for collection and reporting of a core set of measures for the Medicaid program specified by the Centers for Medicare and Medicaid Services (CMS), including a measure of postpartum care. Although the National Committee on Quality Assurance (NCQA) Healthcare Effectiveness Data and Information Set (HEDIS) measures postpartum visit rates as an indicator of quality care, it does not examine in detail the services provided during postpartum visits such as contraception. Women who do not receive postpartum contraception are at risk of conceiving a rapid repeat pregnancy [5]. When interpregnancy intervals are less than 18 months, maternal and infant health both suffer [6]. When glycemic control is poor, rates increase of congenital anomalies, preeclampsia, large for gestational age infants, and birth trauma [7,8]. These preventable pregnancy complications result in both significant human suffering and higher medical costs. Although postpartum women who have no vascular disease may safely use all methods of contraception 3 weeks after delivering, women with vascular complications should avoid estrogen, making contraceptive options more limited [9]. Prior studies have indicated that women with DM may be less likely to receive contraceptive services than women without DM [10]. Although there is no ideal rate of contraceptive use among women with diabetes, contraceptive use among women with diabetes should not be lower than among women without diabetes, because diabetes increases risks of pregnancy complications [8]. As DM is increasingly common during pregnancy [11], and DM has been a focus of quality improvement projects for the state of California, the purpose of this study was to assess associations between maternal diabetes (either pre-conception or gestational) and rates of postpartum care and contraception, compared to women with no known diabetes.

2. Materials and methods

Women aged 15–44 years were included in this analysis once per delivery of a live birth that occurred between November 6, 2011, and November 5, 2012, regardless of whether it was a singleton or multiple gestation. Deliveries of live births were identified through Medi-Cal claims and encounter data with procedure and diagnosis codes indicative of live birth, and verified using birth statistical master file records. A total of 245,623 deliveries to women aged 15 to 44 years during the study period were identified. Women were excluded if they were not continuously enrolled in Medi-Cal during the peri-partum period, defined (as specified by HEDIS for measurement of postpartum care [12]) as 43 days prior to 99 days after delivery (N=32,650). Women enrolled in Medi-Cal programs known to produce incomplete claims data (e.g., “share-of-cost Medi-Cal” or “dual eligibility” for Medi-Cal and Medicare) were also excluded (N=7761). Finally, women with missing data on race/ethnicity, language,

and delivery type (N=5352) were excluded, producing an analytic sample of 199,860 women. Women with pregnancies affected by diabetes were identified if an ICD-9 code for diabetes [see Appendix A] appeared on one or more occasions during the 43 days prior to 99 days after delivery; women were categorized as having (a) preconception DM (b) gestational diabetes or (c) no diabetes mellitus.

The postpartum visit outcome was defined in three ways. First, postpartum visits were defined as specified by NCQA for the HEDIS Postpartum Care Measure; [12] a second definition expanded the type of visits considered in the same time period; the third, and broadest, definition expanded on both visit types and the timeframe considered. The HEDIS Postpartum Care Measure [12] specifies a postpartum visit occurred if at least one paid claim or encounter record was identified between 21–56 days after delivery with a code indicative of postpartum care. These codes address procedures and diagnoses relevant to provision of postpartum care, pelvic exams, cervical cytology, IUC insertion/removal, or diaphragm fitting. In addition, a HCPCS code for postpartum care (Z1038) that was used for postpartum care in California in 2012 was included. The second definition expanded on the definition used by HEDIS, to include other types of office visits, including family planning, or provision of contraception. The broadest definition of postpartum care expanded the time period considered from HEDIS’ 21–56 days postpartum to 0–99 days postpartum, and considered all office visits and provision of contraceptive services.

Women were identified as having received postpartum contraception if they had at least one Medi-Cal Managed Care encounter record or paid Medi-Cal or FamilyPACT claim within 99 days postpartum for surgical sterilization, intrauterine, subdermal, injectable, or other hormonal contraception, or barrier methods; immediate postpartum contraceptive services including tubal ligation provided during the delivery hospitalization were included in this measure. Because Medi-Cal and FamilyPACT have separate enrollment systems, a probabilistic linking algorithm was used to link Medi-Cal clients to FamilyPACT claims [13]. Contraceptives were categorized as permanent (sterilization), highly effective reversible (intrauterine contraception (IUC) or subdermal implants), injectable, combined hormonal (oral pills, patch, or vaginal ring), or barrier (diaphragm, condoms (male or female), spermicide, or sponge). Women who received multiple forms of contraception during the study period were categorized by the most effective method received. Women with no paid claims for contraceptives in Medi-Cal or FamilyPACT were categorized as having received no postpartum contraception.

Medi-Cal and FamilyPACT enrollment records were used to define maternal age at delivery, race/ethnicity, and primary language. Residence in a primary care shortage area was defined as residing in a census tract designated by the California Healthcare Workforce Policy Commission as a primary care shortage area for at least 1 month between 0–99 days postpartum. Deliveries that had claims with codes for Cesarean delivery within 7 days of their delivery date were considered Cesarean. Publicly funded healthcare program participation

was defined by the program that a woman was enrolled in on her 99th day postpartum. Further detail on these methods has been published previously [14].

Differences in maternal demographic and service delivery characteristics by diabetes history were examined using chi square tests for categorical variables. Claims for postpartum visits and contraceptive services were similarly compared between women with and without diabetes. Multivariable logistic regression was used to assess the likelihood of receiving postpartum care or contraception among women with gestational or preconception diabetes compared to women with no known DM while adjusting for maternal age at delivery, race/ethnicity, primary language, residence in a primary care shortage area, Cesarean delivery, and publicly funded health care program enrollment at 99 days postpartum. Variables were selected for inclusion into the multivariable model based on *a priori* hypotheses within the constraints of the available data. All analyses were conducted using SAS 9.2. This study was approved by the Committee of Human Subjects Research of the University of California, San Francisco, and the California Department of Health and Human Services' Committee to Protect Human Subjects, with a waiver of informed consent.

3. Results

In this cohort of 199,860 women continuously enrolled in Medi-Cal from 43 days prior to 99 days after delivery, we identified 11,494 women with preconception diabetes (5.7%), 17,970 women with gestational diabetes (9.0%), and 170,396 women (85.3%) without diabetes. Women with diabetes were older than women with no known diabetes (mean age of women with preconception diabetes was 30.2 years, with gestational diabetes was 29.1 years, and with no

diabetes was 26.0 years, $p < .0001$). Women with diabetes were more likely to be Latina, and speak Spanish as their primary language. Cesarean delivery was more common among women with diabetes (Table 1).

While rates of postpartum clinic visits were low overall, they were somewhat higher among women with diabetes compared to women without diabetes (55% among both preconception and gestational diabetes compared to 48% among women with no known diabetes, $p < .0001$), even after adjusting for Cesarean delivery and other relevant variables (Table 2). When the definition of postpartum care was expanded to include office visits other than those considered by HEDIS and family planning services, rates of receiving any postpartum care increased for all women and remained somewhat higher among women with diabetes (Table 2). However, even when using the broadest possible definition of postpartum care, 11% of women with preconception diabetes and 12% of those with gestational diabetes received no state-funded postpartum care of any kind within 99 days postpartum. In multivariable models controlling for all variables shown in Table 1, the odds of women making a postpartum visit or receiving other postpartum care were at least 20% higher for women with preconception or gestational diabetes than women without known DM (Table 2).

When we examined women's receipt of postpartum contraception, we found that those with diabetes were more likely to undergo postpartum sterilization (14% preconception, 10% gestational, 6% no diabetes, $p < .0001$), leading to a higher rate of receiving any postpartum contraception within 99 days of delivery for women with diabetes (Table 3). In multivariable models, adjusting for maternal age at delivery, race/ethnicity, primary language, residence in a primary care shortage area, Cesarean delivery, and publicly funded health care program enrollment at 99 days postpartum, the odds of permanent postpartum contraception remained higher for

Table 1
Demographic and service delivery characteristics of low-income women delivering in California, 2012*

Characteristic	No Known Diabetes N=170,396	Preconception Diabetes N=11,494	Gestational Diabetes N=17,970
Age at delivery			
<20	22,014 (12.9)	468 (4.1)	1003 (5.6)
20–29	102,536 (60.2)	4734 (41.2)	8497 (47.3)
30–39	42,591 (25.0)	5505 (47.9)	7568 (42.1)
40+	3255 (1.9)	787 (6.8)	902 (5.0)
Race/ethnicity			
White	27,744 (16.3)	1221 (10.6)	2406 (13.4)
Black	14,545 (8.5)	719 (6.3)	1088 (6.1)
Latina	113,516 (66.6)	8630 (75.1)	12,461 (69.3)
Asian/Pacific Islander	10,303 (6.0)	692 (6.0)	1517 (8.4)
Other	4288 (2.5)	232 (2.0)	498 (2.8)
Primary language			
English	86,788 (50.9)	4875 (42.4)	8053 (44.8)
Spanish	77,277 (45.4)	6281 (54.6)	9063 (50.4)
Other	6231 (3.7)	338 (2.9)	854 (4.8)
Cesarean delivery	55,093 (32.3)	5688 (49.5)	7000 (39.0)
Ever resided in a Primary Care Shortage Area (PCSA) in the 99 days postpartum	110,779 (65.0)	7556 (65.7)	10,968 (61.0)

* All variables differ across diabetes categories at $p < .0001$, when compared using chi square tests.

Table 2
Clinic visits during the postpartum period for women with and without diabetes

Visit definition	No known diabetes N=170,396	Preconception diabetes N=11,494	Gestational diabetes N=17,970
HEDIS Postpartum Care Visit*			
Percent	48.4	55.0	55.3
Adjusted [†] odds ratio (95% CI)	Referent	1.22 (1.18–1.27)	1.24 (1.20–1.28)
Expanded definition of postpartum care 1 [‡]			
Percent	61.9	69.7	68.5
Adjusted [†] odds ratio (95% CI)	Referent	1.33 (1.27–1.38)	1.25 (1.21–1.29)
Expanded definition of postpartum care 2 [§]			
Percent	82.2	88.9	87.6
Adjusted [†] odds ratio (95% CI)	Referent	1.48 (1.39–1.57)	1.35 (1.29–1.42)

* HEDIS Postpartum Care Visit: HEDIS-defined visits made 21–56 days postpartum.

[†] Odds ratios adjusted for maternal age at delivery, race/ethnicity, primary language, residence in a Primary Care Shortage Area, Cesarean delivery, and publicly funded health care program enrollment at 99 days.

[‡] Expanded definition of postpartum care 1: HEDIS-defined visits made 21–56 days postpartum plus all other visits made 21–56 days postpartum.

[§] Expanded definition of postpartum care 2: All visits made 0–99 days postpartum in addition to HEDIS-defined visits.

women with preconception (aOR=1.39, 95% CI 1.31–1.47) and gestational (aOR=1.20, 95% CI 1.14–1.27) diabetes compared to those with no diabetes. However, claims for any reversible postpartum contraception were slightly less common among women with diabetes (38% preconception, 39% gestational and 41% no diabetes, $p<.0001$).

Among women who did not undergo postpartum sterilization (N=186,038), most (56%) received no form of reversible contraception. The most commonly dispensed reversible contraceptives contained estrogen, whether or not women had diabetes (Table 4). Women were half as likely to receive highly effective reversible (intrauterine or subdermal) contraception, which contain no estrogen, as they were to receive combined hormonal contraception. Women with gestational diabetes were more likely than those without diabetes to receive highly effective reversible contraception (aOR=1.13, 95% CI 1.07–1.19). However, women with preconception diabetes were no more likely than those without diabetes to receive highly effective reversible contraception (aOR=1.01,

95% CI 0.94–1.09). In contrast, barrier contraception was more commonly dispensed (without a more effective contraceptive) to women with preconception diabetes than women without diabetes (aOR=1.24, 95% CI 1.16–1.33). Mothers with gestational diabetes were not more likely than those without diabetes to receive only barrier contraception (aOR=1.04, 95% CI 0.98–1.11, Table 4).

4. Discussion

This large cohort study found that many low-income California women receive no postpartum care or contraception after a pregnancy affected by either preconception or gestational diabetes. This is unfortunate as postpartum care plays an important role in ensuring glycemic control, and postpartum contraception is critical to preventing rapid repeat pregnancy [15]. As pregnancy is more likely to be complicated for women with diabetes, and hyperglycemia increases risk of

Table 3
Claims for postpartum contraception within 99 days of delivery, N=199,860

Type of Contraception	No Known Diabetes N=170,396	Preconception Diabetes N=11,494	Gestational Diabetes N=17,970
Permanent contraception			
Percent	6.1	14.1	10.3
Adjusted* OR (95% CI)	Referent	1.39 (1.31–1.47)	1.20 (1.14–1.27)
Reversible contraception			
Percent	40.7	37.9	39.4
Adjusted* OR (95% CI)	Referent	1.01 (0.97–1.05)	1.02 (0.99–1.06)
Any Postpartum Contraception			
Percent	46.8	52.0	49.7
Adjusted* OR (95% CI)	Referent	1.16 (1.11–1.20)	1.08 (1.0–1.12)
No Postpartum Contraception			
Percent	53.2	48.0	50.3
Adjusted* OR (95% CI)	Referent	0.86 (0.83–0.90)	0.93 (0.89–0.95)

* Odds Ratios adjusted for maternal age at delivery, race/ethnicity, primary language, residence in a Primary Care Shortage Area, Cesarean delivery, and publicly funded health care program enrollment at 99 days.

Table 4

Claims for postpartum contraception within 99 days of delivery, among women who did not undergo postpartum sterilization, N=186,038*

Type of Contraception	No Known Diabetes N=160,033	Preconception Diabetes N=9879	Gestational Diabetes N=16,126
Intrauterine or subdermal			
Percent	10.2	9.3	10.8
Adjusted [†] OR (95% CI)	Referent	1.01 (0.94–1.09)	1.13 (1.07–1.19)
Injection			
Percent	7.6	7.0	6.7
Adjusted [†] OR (95% CI)	Referent	0.98 (0.90–1.06)	0.94 (0.88–1.01)
Combined hormonal (pill [‡] , patch, ring)			
Percent	19.6	19.3	19.6
Adjusted [†] OR (95% CI)	Referent	1.02 (0.97–1.07)	1.02 (0.98–1.06)
Barrier contraception [§]			
Percent	7.2	9.8	8.1
Adjusted [†] OR (95% CI)	Referent	1.24 (1.16–1.33)	1.04 (0.98–1.11)
Any reversible postpartum contraception			
Percent	43.4	44.1	43.9
Adjusted [†] OR (95% CI)	Referent	1.08 (1.04–1.13)	1.06 (1.02–1.09)
No postpartum contraception			
Percent	56.6	55.9	56.1
Adjusted [†] OR (95% CI)	Referent	0.93 (0.88–0.96)	0.94 (0.92–0.98)

* Numbers and percentages do not sum as women may have received multiple forms of contraception.

[†] Odds Ratios adjusted for maternal age at delivery, race/ethnicity, primary language, residence in a primary care shortage area, Cesarean delivery, and publicly funded health care program enrollment at 99 days.

[‡] Oral contraceptives include a small number of progestin-only pills.

[§] Includes only women with claims for a barrier method without a claim for prescription contraception.

adverse birth outcomes [8], focused efforts on interconception care for women with diabetes are warranted. This is particularly true in California, where rates of preconception diabetes are higher than have been previously reported for Medicaid populations [16].

Our findings are consistent with a prior, smaller study from Maryland which also found that women with preconception diabetes were less likely to use postpartum contraception [17]. The reasons why barriers exist to accessing contraception for women with diabetes likely include patient, community, clinician and health system factors. For instance, prior studies have shown gaps in clinician knowledge and practice relating to postpartum screening and care for women with DM [18]. Our finding that women with diabetes were more likely than women without diabetes to undergo postpartum sterilization echoes a prior study of a privately insured managed-care population which also reported that women with diabetes were more likely to undergo surgical sterilization [19]. This is despite the fact that women with prior gestational DM need not be advised to avoid subsequent pregnancies; women with a history of gestational diabetes are not more likely to experience deterioration in glucose metabolism or insulin sensitivity with recurrent pregnancy. Taken together, these studies highlight the need to ensure that women with diabetes receive up to date information on alternatives to permanent contraception. Nationally, 24% of women express desire for reversal of sterilization, with even higher rates of regret among Black women [20] [21]. Intrauterine and subdermal contraceptives are both more effective than tubal ligation [22] and promptly reversible. IUC do not affect postpartum glucose tolerance [23] or glycemic control [24]. Similarly, in a 2-year study of

women with insulin-dependent diabetes who used a subdermal contraceptive [25], no significant changes were seen in daily insulin requirement, mean HbA1c, body mass index, or lipid control. Thromboembolism is rare when women with diabetes use hormonal contraception, particularly with use of IUC or subdermal contraception [26].

As women with diabetes have greater risk of vascular disease than women without diabetes, we were surprised to find no differences in rates of use of estrogen-containing contraception between women with and without diabetes. Moreover, women who undergo Cesarean section (which are more common when pregnancies are complicated by diabetes) have a further increase in their risk of thrombosis [27,28]. This may indicate a need for greater awareness of highly effective alternatives to estrogen-containing contraceptives among Medi-Cal providers caring for postpartum women.

Strengths of this study include the racial and ethnic diversity of the study population, and the fact that California's publicly funded family planning programs cover all FDA-approved contraceptives. It is possible that we misclassified some women with gestational diabetes who had previously unrecognized preconception DM. In addition, administrative data may undercount contraceptive service provision if correct claims were not submitted, if clients paid for contraceptives out-of-pocket, or relied on vasectomy. It should be noted that the HEDIS postpartum visit rates found with this administrative data are lower than rates produced with chart review and self-reported by mothers in the national Pregnancy Risk Assessment Monitoring System (PRAMS). However, there is no indication that these differences vary by history of diabetes. The use of administrative data limited the covariates we were

able to control for; information was not available on parity, maternal country of origin, lactational amenorrhea, women's glycemic control, desire for future children, and use of assisted reproductive technology. However, as Medi-Cal does not cover assisted reproductive services, they are rarely used by this population). In conclusion, this study found that many mothers who received publicly funded maternity care in California did not receive recommended postpartum care or contraception after pregnancies affected by diabetes.

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Appendix A. Codes used to identify pregnancies affected by diabetes mellitus

Diagnosis	ICD-9 codes
Preconception diabetes	250
	648.00
	648.01
	648.02
	648.03
	648.04
Gestational diabetes	648.80
	648.81
	648.82
	648.83
	648.84
No diabetes mellitus	V12.21
	None of the above codes

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