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Postpartum Care Utilization Among Women with Medicaid-Funded Live Births in Oregon

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Abstract

Introduction—Postpartum care is an important strategy for preventing and managing chronic disease in women with pregnancy complications (i.e., gestational diabetes (GDM) and hypertensive disorders of pregnancy (HDP)).

Methods—Using a population-based, cohort study among Oregon women with Medicaid-financed deliveries (2009–2012), we examined Medicaid-financed postpartum care (postpartum visits, contraceptive services, and routine preventive health services) among women who retained Medicaid coverage for at least 90 days after delivery (n = 74,933). We estimated postpartum care overall and among women with and without GDM and/or HDP using two different definitions: 1) excluding care provided on the day of delivery, and 2) including care on the day of delivery. Pearson chi-square tests were used to assess differential distributions in postpartum care by pregnancy complications ($p < .05$), and generalized estimating equations were used to calculate adjusted odds ratios (aORs) with 95% confidence intervals (CIs).

Results—Of Oregon women who retained coverage through 90 days after delivery, 56.6–78.1% (based on the two definitions) received any postpartum care, including postpartum visits (26.5% −71.8%), contraceptive services (30.7–35.6%), or other routine preventive health services (38.5–39.1%). Excluding day of delivery services, the odds of receiving any postpartum care (aOR 1.26, 95% Cl 1.08–1.47) or routine preventive services (aOR 1.32, 95% Cl 1.14–1.53) were meaningfully higher among women with GDM and HDP (reference = neither).

Discussion—Medicaid-financed postpartum care in Oregon was underutilized, it varied by pregnancy complications, and needs improvement. Postpartum care is important for all women and especially those with GDM or HDP, who may require chronic disease risk assessment, management, and referrals.

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Declarations

Conflict of interest The authors that they have no conflict of interest.

Keywords

Postpartum care; Medicaid; Gestational diabetes; Hypertensive disorders of pregnancy

Introduction

As “a window to future health,” pregnancy provides an opportunity for early identification of a woman’s future cardiovascular disease (CVD) risk (Cain et al., 2016). Specifically, pregnancy complications, such as gestational diabetes mellitus (GDM) and hypertensive disorders of pregnancy (HDP), may signal increased risk of future diabetes and CVD (Savitz et al., 2014a; Tobias et al., 2017). Although CVD is uncommon among women of reproductive age, one study found that HDP predicted increased risk of hospitalization for heart failure (aOR=2.6), coronary heart disease (aOR = 2.1), and type 2 diabetes (aOR= 1.6) during the year after delivery (Savitz et al., 2014b). If pregnancy can be considered a window to future health problems (Cain et al., 2016), then postpartum care may be the doorway to future well-being.

National guidelines and experts recommend timely postpartum care for all women (American Academy of Pediatrics, Committee on Fetus and Newborn, & ACOG Committee on Obstetric Practice, 2012; American College of Obstetricians & Gynecologists, 2016, 2018; Johnson et al., 2006; Mosca et al., 2011; National Committee for Quality Assurance, 2017). Postpartum care includes a full assessment of physical, social, and psychological wellbeing, chronic disease management, and provision of contraceptive services. Postpartum care is important for all women to enable a smooth transition to well woman care. For women with pregnancy complications, postpartum care also presents an opportunity for follow up through provision of chronic disease risk assessment, management, and referral to specialists (American College of Obstetricians & Gynecologists, 2018).

Despite the evidence-based recommendations that all women attend a postpartum visit within the first six weeks of giving birth, approximately 40% of women do not (American College of Obstetricians & Gynecologists, 2016). In fact, optimal postpartum care should be ongoing through 12 weeks postpartum, rather than a single visit (American College of Obstetricians & Gynecologists, 2018). Studies using administrative data have demonstrated suboptimal receipt of postpartum care (50–81%) among women with Medicaid-financed deliveries (Bennett et al., 2014; Masho et al., 2018; Rankin et al., 2016). Moreover, the proportions of Medicaid-insured women with HDP and GDM who receive postpartum visits (PPVs) are also low (64% and 67, respectively) (Bennett et al., 2014), suggesting a missed opportunity to provide important follow up care.

Given the potential opportunity for impacting postpartum care delivery through Medicaid policy changes (Gee and Rosenbaum, 2012), many states have undertaken a variety of Medicaid delivery system reforms such as implementation of managed care and Medicaid expansions (“Status of state Medicaid expansion decisions: Interactive map,” 2020). However, about a dozen states have not yet adopted Medicaid expansion (“Status of state Medicaid expansion decisions: Interactive map,” 2020). Approximately 50% of Oregon’s births are financed by Medicaid (Kaiser Family Foundation, 2019), and prior to Medicaid

expansion in Oregon, pregnant women were presumptively eligible for Medicaid coverage from conception through 60 days after delivery, if their household income was less than 190% of poverty. Continued Medicaid eligibility after was contingent on income (i.e., 44% of poverty if working and 35% of poverty if jobless) or having a Medicaid-eligible child.

The objective of this analysis was to describe patterns of postpartum care among women on Medicaid in Oregon prior to Medicaid reforms, particularly among women with and without GDM and/or HDP This analysis estimated prevalence of non-urgent postpartum care utilization (i.e., PPVs, contraceptive services, and routine preventive health care services) among women with Medicaid-financed deliveries (prior to implementation of Medicaid changes in Oregon), and compared utilization among women with and without GDM and/or HDP The results can serve as baseline data for quality improvement efforts in Oregon and clarify utilization of postpartum care among women with GDM and/or HDP.

Materials and Methods

Study Population

The linked data were collected as part of a larger research agenda to examine health outcomes and health care utilization among low-income women of reproductive age and their infants, before and after implementation of Medicaid expansion in Oregon. The present study population was derived from the pre-expansion cohort of reproductive aged women. For the present study, we conducted a population-based, retrospective cohort study among Oregon women with Medicaid-financed deliveries 2009–2012 who had Medicaid coverage through 90 days postpartum. We selected 90 days as the endpoint because postpartum Medicaid coverage begins on the day that the pregnancy ends and continues through the last day of the month in which the 60th postpartum day occurs. Therefore, women often receive 60–90 days of coverage. The 90 days postpartum period also coincides with the time period used in several other studies (range 90–99 days) (Rankin et al., 2016; Schwarz et al., 2017; Thiel de Bocanegra et al., 2017).

Data

Oregon birth certificate and maternal Medicaid claims data were linked using a combination of deterministic and probabilistic algorithms with an overall linkage rate of 95.3%. Of 82,301 live birth deliveries to women ages 15–44 years who had a Medicaid-financed delivery in 2009–2012,78,043 (94.8%) women retained Medicaid coverage through 90 days postpartum. Of these, we excluded 3,110 (4.0%) with missing information on variables of interest or covariates. Our final analytic sample included 67,139 women with one or more Medicaid-financed deliveries resulting in 74,993 live births during the study period.

Variables of Interest

Outcomes—We examined three subtypes of non-urgent postpartum care utilization: PPVs, contraceptive services, and routine preventive health care services, and an overall measure (any postpartum care). The subtypes of postpartum care were based on Medicaid claims data according to the presence of specified codes from the *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM); *Current Procedural*

Terminology (CPT); *Healthcare Common Procedure Coding System (HCPCS),* and pharmaceutical databases using National Drug Codes (NDC) (Table 1). Global obstetric CPT codes (also known as bundled codes) are widely used individual codes that bill for prenatal, delivery, and postpartum care together and are typically coded to the day of delivery. Given widespread use of global obstetric codes on the day of delivery, some researchers have estimated postpartum care two different ways - with and without bundled codes (DeSisto CL, Rohan A, Handler A, et al., 2020). Therefore, we estimate prevalence of each postpartum care outcome both ways: 1) using a conservative definition that excludes global obstetric codes, and captures postpartum care documented 1–90 days after delivery, and 2) using a liberal definition that includes global obstetric codes and documented postpartum care 0–90 days after delivery. Each outcome is described below and detailed in Table 1.

Postpartum Visits—Our conservative definition included ICD-9-CM and non-bundled CPT codes occurring 1–90 days after delivery. Our liberal definition included ICD-9-CM codes, non-bundled, and bundled codes occurring 0–90 days postpartum. The codes used for the liberal definition are consistent with the National Center for Quality Assurance's Healthcare Effectiveness Data and Information Set (HEDIS) performance measure (National Committee for Quality Assurance, 2017).

Contraceptive Services—Our conservative definition included claim codes defined by HEDIS (National Committee for Quality Assurance, 2017) occurring 1–90 days postpartum for sterilization, intrauterine contraceptive device, implantable subdermal contraceptive, contraceptive injection, oral contraceptives, contraceptive patch, vaginal ring, and diaphragm that were indicated by ICD-9-CM, CPT, HCPCS, or NDC. Our liberal definition included claims based on the same codes that occurred 0–90 days postpartum.

Routine Preventive Health Services—Our conservative definition included encounters for evaluation and management, consultation, and preventive medicine services with corresponding ICD-9-CM or CPT codes that occurred 1–90 days postpartum (exclusive of PPV codes). Our liberal definition included claims based on the same codes that occurred 0–90 days postpartum.

Any Postpartum Care—We created a summary variable for any postpartum care utilization (yes/no), defined as receipt of one or more postpartum care subtypes. Our conservative definition included conservatively defined PPV, or contraceptive services, or routine preventive health services. Our liberal definition included liberally defined PPV, or contraceptive services, or routine preventive health services.

Pregnancy Complications and Other Variables—Since GDM and HDP (i.e., gestational hypertension, preeclampsia, and eclampsia) can be comorbid conditions, we created a single variable with four mutually exclusive categories to denote GDM-only, HDP-only, both complications or neither. Hereafter, we refer to the GDM-only category as "GDM" and the HDP-only category as "HDP." We classified women as having GDM or HDP based on the presence of ICD-9-CM codes from claims data, or a positive indication on the birth certificate (Table 1). Women with indications of both pre-existing diabetes

and GDM (3.05%) were considered to have preexisting diabetes and therefore were not included in the GDM-only category; this approach is similar to that used in previous studies (Albrecht et al., 2010; Correa et al., 2015). For consistency, we handled the HDP-only category similarly; Women with both pre-existing hypertension and HDP (3.66%) were classified as having pre-existing hypertension (Savitz et al., 2014b). Women with only pre-existing diabetes, pre-existing hypertension, or both of these pre-existing conditions were coded as neither (i.e., GDM nor HDP). We obtained demographic characteristics and pregnancy-related covariates from the linked birth certificate data.

Analysis—We report ranges for the proportion of women who received PPVs, contraceptive services, routine preventive health services, and any postpartum care. We describe ranges in the distributions of women utilizing postpartum care subtypes by maternal and pregnancy-related characteristics, using Pearson chi-square tests to assess statistically significant differences in the distributions ($p<0.05$). We examined associations between pregnancy complications and postpartum care subtypes (both definitions) using generalized estimating equations to calculate adjusted odds ratios (aORs) with 95% confidence intervals (Cl). Generalized estimating equations account for non-independence of women with more than one pregnancy during the study period. Adjusted analyses controlled for potential confounders (age, race/ethnicity, education, residence, marital status, and previous live births), which were selected a priori based on existing literature and a conceptual model. We emphasize results where prevalence differences were greater than five percentage points or associations (aORs) were greater than 1.20 (comparing women with HDP, GDM, or both conditions to women who had neither condition).

We conducted two sensitivity analyses. First, we excluded women with deliveries in 2011 and 2012 (n = 36,802 remained) because Oregon began to implement a managed care model called Coordinated Care Organizations (CCOs) during this time, which aimed to improve patient care, health outcomes, and to control costs by integrating medical, behavioral, and oral health care. We were concerned that the integrated care provided during that time might influence access to prenatal and postpartum health care. Second, we excluded women with preexisting diabetes or preexisting hypertension (n = 68,641 remained) to control for the potential confounding effect of these conditions. We used SAS version 9.1 (SAS Institute Inc., Cary, NC) to conduct analyses. This study is based on de-identified administrative claims data (not clinical data), and the institutional review boards of Oregon Public Health and Oregon State University approved this study.

Results

Of women who retained Medicaid coverage through 90 days after delivery (n = 74,933), most women in the sample were ages 18–34 years (87.6%), non-Hispanic white (55.3%), had a high school education or less (65.2%), resided in an urban area (85.4%), were unmarried (58.1%), and only had one delivery during the study period (71.2%) (Table 2). Overall, 7.7% had GDM, 7.7% had HDP, 1.1% had both conditions, and 83.6% had neither complication.

The proportion of women receiving any type of non-urgent postpartum care was 56.6–78.1% (range of estimates based on conservative and liberal definitions). This includes those who received a postpartum visit (26.5%−71.8%), or contraceptive services (30.7–35.6%), or other routine preventive health services (38.5–39.1%) (Table 2). By pregnancy complications, any postpartum care utilization ranged 53.5–75.1% among women with GDM and 61.8–81.2% among women with HDP. Women with GDM had the lowest occurrence of each subtype of postpartum care relative to their counterparts ($p < 0.05$).

Regarding other pregnancy characteristics examined, the lowest occurrence of any postpartum care utilization occurred among women who had ≥ 2 previous live births (50.4–72.9%) (Table 2). These same women had the lowest occurrence of each subtype of postpartum care relative to women with fewer previous live births, with one exception being that previously nulliparous women had the lowest occurrence of liberally defined contraceptive services. Additionally, women without preterm delivery had lower utilization of routine preventive services compared with women with preterm delivery. Differences in any postpartum care by preterm delivery status were both clinically and statistically significant when using the conservative definition.

Conservative and liberal estimates of any postpartum care and subtypes varied by five or more percentage points within the following demographic characteristics: age, race/ethnicity, and education. ($p<0.05$). Among demographic subgroups, the lowest estimates of any postpartum care utilization occurred among women who were 35–39 years (45.9–66.6%), Hispanic (34.9–51.9%), and women who had less than a high school education (43.5–62.6%), relative to their respective counterparts. Women with those same characteristics also had the lowest occurrence of PPVs, contraceptive services, and routine preventive health services. One exception was among women ages 40–44 years who had the lowest occurrence of contraceptive services relative to other age groups (Table 2). Additionally, married women had lower utilization of contraceptive services and any postpartum care compared with unmarried women.

The direction of associations between pregnancy complications and postpartum care were consistent when using the two definitions, but some differences in statistical significance and magnitude of the association were noted (Table 3). Women with both GDM and HDP had increased odds of receiving routine preventive services [conservative (aOR 1.31, 95% Cl 1.13–1.52) and liberal (1.32 95% Cl 1.14–1.53)] when compared with women who had neither complication. Women with both GDM and HDP also had increased odds of receiving any postpartum care [conservative (aOR 1.26, 95% Cl 1.08–1.47) and liberal (aOR 1.25, 95% Cl 1.04–1.52)] when compared with women who had neither complication. Additionally, in models using liberal estimates of the outcomes, women with both pregnancy complications also had increased odds of receiving contraceptive services (aOR = 1.22, 95% Cl: 1.05–1.41). Results from sensitivity analyses that excluded women with deliveries 2011–2012 (to control for potential confounding effect of CCO implementation) were not meaningfully different from the full analysis results (results not shown). Likewise, we found no meaningful differences in associations after excluding women with preexisting diabetes or preexisting hypertension.

Discussion

This study established a baseline assessment of the types of visits Oregon women used to access health care in the postpartum period prior to implementation of Medicaid expansion and described characteristics associated with low utilization of postpartum care. We estimated prevalence of non-urgent postpartum care utilization among women with Medicaid-financed deliveries in Oregon and compared utilization between women with and without GDM and/or HDP. This study illustrates the utility of administrative data for healthcare evaluations at the state-level. In this sample of Oregon Medicaid-insured women, we found only about one-half to three-quarters of women received at least one type of postpartum care within 90 days of delivery. Furthermore, we found only women with both GDM and HDP, but not those with either GDM or HDP, had a meaningfully increased odds (i.e., > 20%) of receiving any postpartum care compared with women who had neither complication. Low rates of postpartum care - overall, by type of care, and among women with pregnancy complications - suggested missed opportunities for important follow up postpartum care. The Oregon Medicaid expansion increased the allowable household income eligibility threshold (after 60 days postpartum) from 44% of poverty for working women and 35% of poverty for jobless women to 138% of poverty.

Other studies have reported higher estimates of postpartum care among Medicaid-insured women (Bennett et al., 2014; Masho et al., 2018; Rankin et al., 2016; Schwarz et al., 2017; Thiel de Bocanegra et al., 2017), which may be explained by differences in definitions of postpartum care, postpartum period of study, or in study population demographics. For example, we found 57–78% of women received any postpartum care, which was lower than the 81% reported in Illinois (Rankin et al., 2016). However, the Illinois study included multiple screenings and risk assessments (i.e., depression, diabetes, domestic violence, body mass index, personal history, and social issues), counseling, pap smears, vaccinations, and other care in their definition of any postpartum care within the first 90 days postpartum (including the day of delivery). Because of the variability in the way postpartum care is defined in the literature, we estimated prevalence of each outcome two different ways: including and excluding the day of delivery. Additionally, by including global obstetric codes recorded on the day of delivery in our definition of PPV, we found overall prevalence of PPVs was higher (72%) than estimates reported by others (49–67%) (Bennett et al., 2014; Masho et al., 2018; Thiel de Bocanegra et al., 2017). Further study is needed to identify methods to improve accuracy of administrative data for describing postpartum care utilization.

Limitations

Misclassification is possible due to reliance on diagnostic and procedure codes using administrative and encounter data. Under ascertainment of care due to under-coding, is a potential weakness in all administrative data. Conversely, the liberal estimate of PPV includes bundle codes, but our data cannot confirm if all women with a bundled code actually received the PPV after delivery. Since bundled codes are valued for uncomplicated care, providers who use bundled codes may bill separately for evaluation and management encounters when they provide more than routine care during the postpartum period.

Similarly, physicians bill separately for glucose testing (which we did not capture as part of routine postpartum care), and this may explain why women with GDM had lower prevalence of postpartum care relative to the other pregnancy complication groups.

Codes for contraceptive services may not accurately reflect women's current contraceptive status, since these data do not capture women who rely on partner vasectomies, nor do the data capture services received outside of Medicaid and non-prescription methods such as condoms. We also acknowledge that prescriptions for contraception do not necessarily denote actual use, and the data do not allow for identification of women who are infertile, sexually inactive, or those who do not desire contraception. Conversely, clinicians may provide contraceptive counseling at PPVs or evaluation and management visits without submitting a separate code for that service.

Indication of GDM and HDP from birth certificate and ICD-9-CM data is also subject to misclassification (Dietz et al., 2015). However, assuming misclassification is non-differential, we would not expect our findings to differ with respect to postpartum care utilization among women with and without GDM and HDP. Confounding due to unmeasured comorbidities may also introduce bias.

Finally, these data are representative of the Oregon Medicaid-insured population before Medicaid expansion, are, therefore, not generalizable to Medicaid populations in other locales, which differ in population and coverage characteristics.

Despite the data limitations, administrative data are useful for improving understanding about healthcare utilization, and this study adds to the small body of literature that describes postpartum care using administrative data. Next steps include a pre- and post-Medicaid expansion analyses of postpartum care using the Oregon data. Additionally, multi-state studies with comparable data across states can improve understanding about opportunities for increasing postpartum care. Although our administrative data lacked information on language barriers and social determinants of health such as transportation, perceived discrimination in healthcare settings, and other barriers that may impact postpartum care, future analyses of claims data linked with Pregnancy Risk Assessment Monitoring System data could be explored and may provide insights regarding our findings of lower postpartum care among Hispanic and other subpopulations. Finally, given variability in postpartum care definitions used in research studies, consensus and standardization of postpartum care definitions would improve comparability across studies.

Implications for Policy and Practice

Postpartum follow-up for women with pregnancy complications is an important strategy for preventing and managing chronic disease (American Academy of Pediatrics, Committee on Fetus and Newborn, & ACOG Committee on Obstetric Practice, 2012; American College of Obstetricians & Gynecologists, 2016; Johnson et al., 2006). Yet our findings suggest postpartum care was underutilized, and strategies are needed to improve postpartum care utilization. Provider-level strategies may improve postpartum care utilization for women who forego attending to their own personal health needs over the demands of having a new baby. For example, one promising practice that addresses that barrier is integration of

postpartum care at well child visits through screenings and brief interventions (Srinivasan et al., 2018). Policy-level strategies include incentives for postpartum care, such as those implemented by Oregon's CCOs in 2015 and 2019, the future launch of a non-hospital focused Alliance for Innovation on Maternal Health (AIM) maternal safety bundle to improve postpartum care, and changes in postpartum care reimbursement, such as increasing the bundled payment to cover ongoing postpartum care, or unbundling postpartum care and shifting to episodic payments (Henderson et al., 2016; Kumar et al., 2021; U.S. Department of Health & Human Services, 2020). States can also use Medicaid data to evaluate the impact of strategies on utilization, timeliness, and quality of postpartum care among all women, and to monitor active, postpartum management of pregnancy complications among women with GDM and HDP.

Conclusions

In the Oregon Medicaid population, postpartum care varied by definitions used, demographic characteristics, pregnancy characteristics, and the pregnancy complications, GDM and HDP. Although women with both GDM and HDP had increased odds of receiving any postpartum care compared with women who had neither complication, postpartum care utilization among the Oregon Medicaid population needs improvement. All postpartum women need access to postpartum care including contraceptive services, which can increase the interval between pregnancies, and preventative health services, which provide chronic disease risk assessment, management, and referrals to specialists if needed.

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Significance

What is already known on this subject?

Postpartum care is an important strategy for preventing and managing chronic disease, particularly for women who experienced gestational diabetes or hypertensive disorders of pregnancy. However, postpartum care utilization by women with gestational diabetes and hypertensive disorders of pregnancy is not well understood.

What this study adds?

Only about one-half to three-quarters of women received any postpartum care within 90 days of delivery. Women with both gestational diabetes and hypertensive disorders of pregnancy had meaningfully increased odds of receiving postpartum care compared with women who had neither pregnancy complication.

Table 1

Definitions of Postpartum Care and Pregnancy Complications

Postpartum Care *
Postpartum Visits
The conservative definition includes any of the following ICD-9-CM or non-bundled CPT codes occurring 1–90 days after delivery: Lactating women (V24.1); routine postpartum follow up (V24.2); postpartum care only (59430); home visit for postnatal assessment and follow-up care (99501)
In addition to above ICD-9-CM codes and non-bundled CPT codes, the liberal definition includes any of following bundled CPT codes occurring 0–90 days after delivery ≠: routine obstetric care including antepartum care, vaginal delivery and postpartum care (59400), vaginal delivery only including postpartum care (59410), routine obstetric care including antepartum care, cesarean delivery, and postpartum care (59510), Cesarean delivery only; including postpartum care (59515), routine obstetric care including antepartum care, vaginal delivery and postpartum care, after previous cesarean delivery (59610), vaginal delivery only, after previous cesarean delivery including postpartum care (59614), routine obstetric care including antepartum care, cesarean delivery, and postpartum care, following attempted vaginal delivery after previous cesarean delivery (59618), cesarean delivery only, following attempted vaginal delivery after previous cesarean delivery including postpartum care (59622)
Contraceptive Services
The conservative definition includes any of the following ICD-9-CM, CPT, HCPCS, or specified NDC codes occurring 1–90 days after delivery. These codes correspond with postpartum claims for sterilization, insertion/removal/complication of an intrauterine contraceptive device/system, insertion/removal/reinsertion of implantable subdermal contraceptive, contraceptive injection, counseling/prescription of oral contraceptives, contraceptive supplies (e.g., patch, vaginal ring), and diaphragm fitting/device: ICD-9-CM Codes: 66.2, 69.7, 97.71, 996.32, V25.01, V25.ll, V25.12, V25.13, V25.2, V25.41, V25.42, V25.43, V25.5, V26.51, V45.51, V45.52; 11976, 11981, 11982,11983, 57170, 58565,58600, 58605, 58611,58615, 58670,58671, 58300, 58300–53, 58301, A4264, A4266, J1050, J7297, J7298, J7300, J7301, J7302, J7303, J7304, J7306, J7307, Q0090, S4989, S4981, S4993, over 400 NDC codes included (available upon request)
The liberal definition includes above ICD-9-CM, CPT, HCPCS, or specified NDC codes occurring 0–90 days after delivery
Routine Preventive Health Services
The conservative definition includes any of the following ICD-9-CM or CPT codes occurring 1–90 days after delivery: General medical exam (V70.0), routine gynecological exam (V72.31), person with complaint but no diagnosis made (V65.5), evaluation and management—problem oriented for new patients based on time spent with patient (99201–99205), evaluation and management—problem oriented for established patients based on time spent with patient (99211–99215), consultation—individual and family medical history, examination, and medical decision making based on problem complexity (99241–99245), initial comprehensive preventive medicine services—annual check-ups, individual counseling for risk reduction based on patient age and time spent with patient (99384–99386), periodic comprehensive preventive medicine reevaluation and management of an individual established patient based on age of patient (99394–99396), preventive medicine counseling and/or risk factor reduction intervention(s) provided to an individual based on time spent with patient (99401–99404), preventive medicine counseling and/or risk factor reduction intervention(s) provided to individuals in a group setting (99411–99412)
The liberal definition includes above ICD-9-CM or CPT codes occurring 0–90 days after delivery
Any Postpartum Care Utilization
The conservative definition includes includes one or more conservatively defined postpartum care subtypes occurring 1–90 days after delivery: PPV, or contraceptive services, or routine preventive health services
The liberal definition includes one or more liberally defined postpartum care subtypes occurring 0–90 days after delivery: PPV, or contraceptive services, or routine preventive health services
Pregnancy Complications ≠
Gestational Diabetes
Positive indication on birth certificate or ICD-9-CM code for abnormal glucose tolerance complicating pregnancy, childbirth, or postpartum (648.8x)
Hypertensive Disorders of Pregnancy
Positive indication on birth certificate or any of the following ICD-9-CM codes: Transient hypertension of pregnancy (642.3x), mild or unspecified pre-eclampsia (642.4x), severe pre-eclampsia (642.5x), eclampsia (642.6x); and unspecified hypertension complicating pregnancy, childbirth, or the puerperium (642.9x)

Notes: ICD-9-CM: International Classification of Diseases, Ninth Revision, Clinical Modification; CPT: Current Procedural Terminology; HCPCS: Healthcare Common Procedure Coding System; NDC: National Drug Codes in the pharmaceutical databases

*Postpartum care is comprised of three subtypes: Postpartum Visits, Contraceptive Services, and Routine Preventive Health Services. We examined each outcome using two definitions: including the day of delivery (liberal) and excluding (conservative) the day of delivery

†Given widespread use of global obstetric codes on the day of delivery, this definition of the postpartum visit also includes bundled CPT codes occurring on the day of delivery, for which the date of actual service provision cannot be determined with these data

≠GDM is exclusive of pre-existing diabetes mellitus and HDP is exclusive of pre-existing hypertension

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Table 2

Study Population Characteristics and Prevalence Range[*] of Postpartum Care Utilization among Women with Medicaid-Financed Deliveries and Medicaid coverage through 90 days after delivery, Oregon, 2009-2012

Characteristic	Study Population N	%	Postpartum Visits % Range[†]		Contraceptive Services % Range[‡]		Routine Preventive Health Services % Range[§]		Any Postpartum Care Utilization % Range[¥]	
Overall	74,933	100	26.5–71.8		30.7–35.6		38.5–39.1		56.6–78.1	
Demographic Characteristics										
Age(years)			**	**	**	**	**	**	**	**
15–17	2,673	3.6	31.9–75.4		36.2–36.3		42.2–42.6		62.9–81.4	
18–25	36,845	49.2	28.6–76.2		35.8–38.0		40.7–41.3		60.8–82.1	
26–34	28,758	38.4	24.2–68.8		26.6–34.0		36.5–37.1		52.8–75.1	
35–39	5,419	7.2	22.1–59.2		18.1–29.4		32.2–32.9		45.9–66.6	
40–44	1,238	1.7	24.3–62.6		16.7–30.1		36.0–36.8		48.8–70.9	
Race/Ethnicity			**	**	**	**	**	**	**	**
Non-Hispanic White	41,455	55.3	30.5–85.5		37.9–43.8		46.7–47.2		68.2–92.1	
Non-Hispanic Black	2,929	3.9	39.5–83.5		32.8–36.8		46.1–46.4		67.8–89.7	
Non-Hispanic American Indian or Alaska Native	2,589	3.5	36.1–84.9		36.0–40.8		53.1–53.7		71.5–92.0	
Non-Hispanic Asian	2,081	2.8	29.5–71.9		26.5–30.5		35.7–36.2		52.4–76.6	
Non-Hispanic Native Hawaiian and Pacific Islander	947	1.3	19.1–56.2		19.8–23.8		24.8–25.9		39.5–62.5	
Non-Hispanic Other race	587	0.8	27.9–74.6		25.4–29.1		41.9–42.3		57.4–80.6	
Hispanic	24,345	32.5	17.2–46.4		18.6–22.1		22.6–23.5		34.9–51.9	
Education			**	**	**	**	**	**	**	**
< High School	24,189	32.3	21.0–56.1		22.4–26.6		29.6–30.4		43.5–62.6	
High School/GED	24,629	32.9	27.9–76.7		34.7–39.9		40.9–41.5		61.0–83.0	
Some college, no degree	18,419	24.6	30.8–82.9		36.8–42.5		45.7–46.3		66.4–89.1	
College degree	7,696	10.3	29.0–79.8		29.5–34.2		40.9–41.4		59.8–84.9	
Residence			**	**	**	**	**	**	**	**
Urban	64,007	85.4	26.7–61.8		30.6–35.4		38.4–39.0		56.3–78.1	
Large rural	8,153	10.9	22.8–70.1		33.3–38.4		37.8–38.3		57.5–78.6	

Characteristic	Study Population N	%	Postpartum Visits % Range[†]		Contraceptive Services % Range[‡]		Routine Preventive Health Services % Range[§]		Any Postpartum Care Utilization % Range[¥]	
Small rural	2,773	3.7	32.3–66.5		26.3–32.3		42.5–42.7		59.3–76.3	
Marital Status			**	**	**	**	**	**	**	**
Married	31,395	41.9	24.7–69.0		26.2–32.2		35.7–36.3		52.2–75.1	
Unmarried	43,538	58.1	27.8–73.9		34.0–38.2		40.5–41.1		59.7–80.3	
Pregnancy Characteristics										
Pregnancy Complications			**	**	**	**	**	**	**	**
GDM Only	5,756	7.7	25.0–68.6		27.7–35.0		37.2–37.7		53.5–75.1	
HDP Only	5,772	7.7	29.6–74.2		32.7–37.1		43.5–43.9		61.8–81.2	
GDM and HDP	801	1.1	25.5–71.9		30.8–38.5		44.2–44.7		60.4–80.0	
No Pregnancy Complications	62,604	83.6	26.4–71.9		30.8–35.5		38.0–38.7		56.3–78.0	
Previous Live Births			**	**	**	**	**	**	**	**
0	28,022	37.4	30.2–76.6		34.6–34.8		42.8–43.3		62.4–82.7	
1	21,874	29.2	26.3–72.8		31.8–36.2		37.8–38.5		56.1–78.2	
2+	25,037	33.4	22.5–65.7		25.4–36.1		34.1–34.9		50.4–72.9	
Mode of Delivery			**	**	**	**	**	**		**
Vaginal	54,251	72.4	26.1–72.3		32.3–33.6		37.7–38.3		56.4–77.8	
Cesarean section	20,682	27.6	27.6–70.7		26.6–40.9		40.5–41.0		57.0–78.9	
Preterm Delivery			**	**	**		**	**	**	
Yes	5,469	7.3	30.2–68.1		29.4–36.4		45.1–46.1		61.2–79.0	
No	69,464	92.7	26.2–72.1		30.8–35.6		37.9–38.5		56.2–78.0	

Notes: GDM: gestational diabetes, HDP: hypertensive disorders of pregnancy

[*] Prevalence ranges of postpartum care reflect estimates that are based on the conservative and liberal definitions of each type of care as specified

[**] Differences by characteristics are significant at $p < 0.05$ based on Chi-square tests

[†] Low prevalence of range defined by the following ICD-9-CM, non-bundled CPT codes occurring 1–90 days postpartum: V24.1, V24.2, 59,430, 99,501 (conservative definition); High prevalence of range defined by the following ICD-9-CM, non-bundled and bundled CPT codes occurring 0–90 days postpartum: V24.1, V24.2, 59,430, 59,400,59,410, 59,510, 59,515,59,610, 59,614, 59,618, 59,622,99,501 (liberal definition)

[‡] Low prevalence (conservative definition) in range based on 1–90 days postpartum and high prevalence (liberal definition) based on 0–90 days postpartum. Prevalence defined by ICD-9-CM, CPT, HCPCS, or specified NDC codes for sterilization, insertion/removal/complication of an intrauterine contraceptive device/system, insertion/removal/reinsertion of implantable subdermal contraceptive, contraceptive injection, counseling/prescription of oral contraceptives, contraceptive supplies (e.g., patch, vaginal ring), and diaphragm fitting/device

[§] Low prevalence (conservative definition) in range based on 1–90 days postpartum and high prevalence (liberal definition) based on 0–90 days postpartum. Prevalence defined by the following ICD-9-CM or CPT codes: V70.0, V72.31, V65.5, 99,201–99,205, 99,211–99,215, 99,24199,245,99,384–99,386, 99,394–99,396,99,401–99,404, 99,411–99,412

[¥] Low prevalence (conservative definition) in range based on 1–90 days postpartum and high prevalence (liberal definition) based on 0–90 days postpartum. Prevalence defined as a postpartum visit or contraceptive service or routine preventive health service

Table 3

Associations Between Pregnancy Complications and Postpartum Care Utilization among Oregon Women with Medicaid-Financed Deliveries 2009-2012 and Medicaid coverage through 90 days after delivery (N=74,933)

Conservative models using outcomes defined as 1–90 days	**Postpartum Visits (N= 19,849)***	**Contraceptive Services (N=23,009)†**	**Routine Preventive Health Services (N=28,808)‡**	**Any Postpartum Care Utilization (N = 42,379)§**
Pregnancy Complication	**Adjusted Odds Ratio (95% CI)¥**	**Adjusted Odds Ratio (95% CI)**	**Adjusted Odds Ratio (95% CI)**	**Adjusted Odds Ratio (95% CI)**
GDM only	1.03(0.97–1.10)	1.04(0.98–1.11)	1.09(1.03–1.16)	1.07 (1.01–1.14)
HDP only	1.10(1.03–1.17)	1.02 (0.96–1.09)	1.16(1.09–1.22)	1.14(1.07–1.21)
GDM + HDP	0.96(0.81–1.13)	1.09 (0.93–1.27)	1.32(1.14–1.53)	1.26(1.08–1.47)
Neither GDM nor HDP	Referent	Referent	Referent	Referent
Liberal models using outcomes defined as 0–90 days	**Postpartum Visits (N = 53,833)****	**Contraceptive Services (N=26,705)††**	**Routine Preventive Health Services (N=29,268)‡‡**	**Any Postpartum Care Utilization (n=58,509)§§**
Pregnancy Complication	**Adjusted Odds Ratio (95% CI)**	**Adjusted Odds Ratio (95% CI)**	**Adjusted Odds Ratio (95% CI)**	**Adjusted Odds Ratio (95% CI)**
GDM only	1.11 (1.04–1.19)	1.09(1.03–1.16)	1.08(1.02–1.14)	1.16(1.08–1.24)
HDP only	0.99 (0.92–1.06)	1.04(0.99–1.11)	1.15(1.08–1.21)	1.05 (0.97–1.13)
GDM + HDP	1.07 (0.90–1.27)	1.22(1.05–1.41)	1.31 (1.13–1.52)	1.25 (1.04–1.52)
Neither GDM nor HDP	Referent	Referent	Referent	Referent

NOTES: Cl: confidence interval, GDM: gestational diabetes, HDP: hypertensive disorders of pregnancy

*Defined by the following ICD-9-CM, non-bundled CPT codes occurring 1–90 days postpartum: V24.1, V24.2,59430, 99501

**Defined by the following ICD-9-CM, non-bundled and bundled CPT codes occurring 0–90 days postpartum: V24.1, V24.2, 59430, 59400, 59410,59510, 59515, 59610, 59614, 59618,59622, 99501

†Defined by ICD-9-CM, CPT, HCPCS, or specified NDC codes for sterilization, insertion/removal/complication of an intrauterine contraceptive device/system, insertion/removal/reinsertion of implantable subdermal contraceptive, contraceptive injection, counseling/prescription of oral contraceptives, contraceptive supplies (e.g., patch, vaginal ring), and diaphragm fitting/device occurring 1–90 days postpartum

‡Defined by the following ICD-9-CM or CPT codes: V70.0, V72.31, V65.5, 99201–99205, 99211–99215, 99241–99245, 99384–99386, 9939499396,99401–99404, 99411–99412 occurring 1–90 days postpartum

§Defined as a postpartum visit or contraceptive service or routine preventive health service occurring 1–90 days postpartum

¥Generalized estimating equations used to calculate adjusted odds ratios with 95% confidence intervals, controlling for age, race/ethnicity, education, residence, marital status, and previous live birth

[††] Defined by ICD-9-CM, CPT, HCPCS, or specified NDC codes for sterilization, insertion/removal/complication of an intrauterine contraceptive device/system, insertion/removal/reinsertion of implantable subdermal contraceptive, contraceptive injection, counseling/prescription of oral contraceptives, contraceptive supplies (e.g., patch, vaginal ring), and diaphragm fitting/device occurring 0–90 days postpartum

[‡‡] Defined by the following ICD-9-CM or CPT codes: V70.0, V72.31, V65.5, 99201–99205, 99211–99215, 99241–99245, 99384–99386, 99394–99396, 99401–99404, 99411–99412 occurring 0–90 days postpartum

[§§] Defined as a postpartum visit or contraceptive service or routine preventive health service occurring 0–90 days postpartum