2020

Women's use of Preventive Primary Care in the Late Postpartum Period

Katherine Price BS
UVM, keprice@uvm.edu

Martha Seagrave BSN, PA-C
UVM

Women's use of Preventive Primary Care in the Late Postpartum Period

Katie Price B.S., Martha Seagrave BSN, PA-C

Larner College of Medicine at the University of Vermont

April 2020

Abstract

The literature has limited data on how women access health care after the traditional postpartum period (<60 days postpartum). Modeled after a paper by Bryant (2016), this project assesses the prevalence of primary care visits in the late postpartum period (LPP)(60- 730 days postpartum). Study objectives included (1) Identify demographics of general delivering population at UVMMC compared to patients with UVM-affiliated primary care provider (UVMPCP). (2) Understand how the general delivering population uses the UVMHN LPP (3) Among women with a UVM-affiliated PCP, identify the prevalence of preventive care visits in the LPP. (4) Identify characteristics associated with LPP visit attendance. Hypothesis: Women with an established PCP prior to pregnancy are more likely to attend preventive PCP LPP visits. This was a retrospective cohort study for all women who delivered at UVMMC between 7/1/2015-6/30/2017. Data was extracted from Epic EMR. During the study period, 4169 women had one singleton pregnancy, 3413 (82%) had a known PCP, and 1279 (31%) had UVMPCP. 2535 (61%) of all delivering singleton women and 1112 (87%) of UVMPCP women had at least one clinical visit within UVMHN in the LPP. 959 (75%) of UVMPCP women had a LPP PCP visit, and 382 patients (30%) had preventative PCP LPP visits. Our hypothesis was rejected (OR 0.930), but attending any LPP PCP visit was associated with having a PCP established prior to pregnancy (OR 1.684). Attending preventive PCP visit was associated with having the same delivering provider as PCP (OR 1.742), a pre-pregnancy PCP visit (OR 1.460), a PCP visit during prenatal time (OR 1.459), ED visit early postpartum period (OR 0.402), a fetal or neonatal demise (OR 0.445), being single (0.601), and with public insurance (OR 0.489). Further work in understanding these associations will be important in developing improved transition of care models and increasing overall engagement in women's preventive medicine.

Introduction

Maternal child health and women's health practice and policy is shifting towards more holistic and lifelong approach in the wake of increasing prevalence of chronic disease in childbearing aged women. (1). In this model, recognizing that pregnancy is a 'window of opportunity' (1) to engage women in primary and preventive care is essential. In the United States, 58.9% of pregnancies are unplanned (2). The high frequency of care contact in pregnancy is an opportunity to diagnose chronic disease, manage behavior risk factors, and initiate therapy. Continuing to address these problems after this structured period, remains a challenge with a fragmented transition of care process from obstetrical care into well woman health.

In the US, increasing rates of maternal morbidity and mortality have driven significant ongoing efforts to increase participation in the postpartum visit (3, 1, 4, 5) and identifying models of care that best address new mothers' needs (6, 7, 8). Postpartum care has been traditionally defined as the 6-8wks after delivering by the medical community; however, mothers continue to experience change in physical and mental well-being over the year and beyond after delivery (9, 10, 11).

Multiple studies have identified gaps mothers experience in their own postpartum care and reasons for postpartum visit non-attendance(7,4,5). The psychosocial context of motherhood has been identified as a critical yet, infrequently addressed area of need for new mothers (8). Using the postpartum visit to assess concerns beyond the physiologic and connecting women with professional and social supports in

this critical time should be a priority. Essential to this transition is continued access to maternal health care into early motherhood and beyond.

Work on optimizing transition of care from postpartum to well-woman care/interpregnancy care is lacking. Most new mothers interact with a minimum of three distinct health care providers after pregnancy: obstetrician-gynecologist, primary care physician, and pediatrician. This "siloed" system provides a challenge in communicating health needs and engaging patients in care beyond the postpartum period (12). The ACOG interpregnancy consensus statement (13) acknowledges need for continued care, and it recommends discussing a preferred primary care provider during the postpartum period. However, there is limited data on how this process is integrated into practice and the prevalence of well women visit attendance in the late postpartum period (beyond 2 months).

Bryant et al (12) began to address this gap in the literature by evaluating visit patterns among women who had an established primary care prior to pregnancy in an academic medical center. Their data demonstrate high prevalence of primary care visits (80.7% of patients) during the 2 years postpartum. Their paper is presented as part of a larger project to "think more expansively about health care delivered at the conclusion of a pregnancy and in the years beyond.."(12) Apart from this more comprehensive data set, a few studies have looked at visit patterns in specific patient populations with medical comorbidities including diabetes and hypertension (14, 15, 16, 17).

In this study we build upon Bryant et al. (2016)'s work and aim to map out current patterns of how women in Vermont interact with the UVM health network (UVMHN) in the late postpartum period (defined as 60-730 days after delivery). We included all women who delivered at UVM from 2015-2017 regardless of where they received prenatal care and affiliation of primary care physician. We were specifically interested in identifying women who had a documented primary care visit in the 12 months prior to conception and how they access preventive medical care in the late postpartum period. This project will provide context for whom these patients are among the general delivering population at an academic medical center. It will also add to the limited literature on health behavior in this period, describing a more rural-suburban population. Our study objectives are as follows:

1. Identify demographics of general delivering population at UVMMC and compare to that of patients with UVM-affiliated primary care provider
2. Understand how the general delivering population uses the UVMHN in the late postpartum period (60-730 days after birth)
3. Among women with a UVM-affiliated PCP, identify the prevalence of preventive care visits in the late postpartum period (LPP)
4. Identify patient characteristics associated with LPP visit attendance

Hypothesis: Women with an established PCP prior to pregnancy are more likely to attend preventive PCP visit in the LPP

Methods

We designed a retrospective cohort study that included all women who delivered at UVMMC between July 1, 2015- June 30, 2017. Patient data extracted from EMR encompassed any encounters in the 12

months prior to pregnancy through 730 days after delivery. Women who had multiple pregnancies in the study period or gave birth to multiples were excluded.

To complete objective 1, the following information was extracted from Epic EMR to understand the characteristics of the delivering population at UVMMC:

- Demographics: Maternal age, race, marital status, insurance type, radius of residence from hospital (by zip code), and parity. (Table 1)
- Clinical characteristics: BMI recorded at first prenatal visit, gestational age at delivery, mode of delivery, delivery outcome, chronic medical comorbidities, obstetrical conditions in current pregnancy, known primary care provider, and type of prenatal provider (Table 1)
- Visit attendance in the EPP (<60 days after delivery): postpartum visit, obstetrical visit, PCP visit, emergency or urgent care visit, inpatient admission, non-PCP outpatient visit. (Table 2)

Chi-square analysis was performed comparing the UVM-PCP population to the general delivering population. Post-hoc testing was conducted for significant findings.

Table 1 Demographic and clinical characteristic definitions

Term	Definition
Radius from UVMMC	Patient zipcodes were transposed into radii using https://www.freemaptools.com/find-zip-codes-inside-radius.htm Radii include: <25 miles, 25-50miles, 50-100miles, 100-150miles, >150miles
Gestational Age at delivery	Previable (<24wks), early preterm (31 6/7 wks), late preterm (32-36 6/7 wks), term (>37 wks)
Chronic Medical comorbidities	ICD10 diagnostic codes for diabetes mellitus, hypertension, hyperthyroidism, hypothyroidism, asthma, bipolar disorder, depression, anxiety, breast cancer, cardiovascular disease, cervical cancer, chronic kidney disease, Factor V Leiden, HIV, venous thromboembolism, obesity, PTSD
Obstetrical condition in current pregnancy	ICD10 diagnostic codes for gestational diabetes, pre-eclampsia, hypertension in pregnancy, puerperal infection, antepartum hemorrhage, postpartum hemorrhage, Rh isoimmunization, uterine rupture, pregnancy thromboembolism, fetomaternal placental transfusion syndrome, fetal abnormality
Prenatal Provider	General: Private practice, community health center, UVM-affiliated UVM subpractices: REI, MFM, UOM (general OB), Family Medicine, CNM

To complete objective 2, visit attendance was extracted for patients in the late postpartum period (LPP) (60-730 days after delivery) for the following types of visits: PCP visit, preventive PCP visit, ED visit, IP visit, non-PCP visit. (Table 2)

Table 2 Visit Definitions

Visit	Definition
Prenatal Visit	Visit with statistical code Z9902 or Encounter type of 'ANTEPARTUM VISIT', within the time from conception to delivery. Can be to any department

PCP Visit	A visit to **any** Family Medicine or Internal Medicine outpatient Department at UVMMC. Excluding prenatal and postpartum visits
PCP Preventive Care Visit	A visit to any Family Medicine or Internal Medicine outpatient Department at UVMMC using CPT code 99381-99397 or 99401-99409
Postpartum Visit	Visit with statistical code Z9924, after delivery.
OB Visit	Visit to a OB or OB/GYN department
ED Visit	Visit to ED or urgent care where patient was discharge from ED (not admitted)
Inpatient Visit	Visit where patient was admitted as an inpatient. (If admitted through ED, ED visit not counted)
Non-PCP Visit	Any other visit that is not a nurse visit, lab draw, imaging, or any of the other categories described above. Hospital outpatient procedures/observation visits are included in this bucket.

To complete objective 3, the following PCP characteristics, visit attendance, and visit timing were extracted for patients with an identified UVM-affiliated PCP:

- PCP characteristics: Time PCP established in relation to first PN visit (before, same date, after), PCP= delivering provider (Prenatal practice was the same as PCP)
- Visits: PCP visit in the 12 months prior to pregnancy, PCP visit during prenatal time (excluding prenatal visits), preventive PCP visit prior to delivery date, PCP visit EPP, PCP visit LPP, preventive PCP visit LPP

To complete objective 4, all patients with UVM-PCP bivariate analyses were performed with LPP visit attendance type and (1) sociodemographics, (2) clinical characteristics, (3) EPP visit attendance. Chi-square with $P<0.05$ was calculated in SPSS as well as unadjusted odds ratios with 95% CI. This analysis evaluated the study hypothesis.

Results

Between July 1, 2015 and June 30, 2017, 4377 women delivered at UVMMC. Of these women, 4169 had one, singleton pregnancy and within this population, 1279 had a UVM-affiliated PCP. These women were the primary study population. Table 3 describes the general delivering population including women with multiple pregnancy and those with multiples.

Table 3 Delivering Population Characteristics

	All Women n	**Women with UVM PCP** n
Total Women	**4377**	**1333**
Women who had one, singleton pregnancy in study period*	4169	1279
Women who had multiple pregnancies in study period	81	21

Women who had one pregnancy with multiples	121	30
Women who had multiple pregnancies, one of which had multiples	6	3
Women with one singleton pregnancy AND a documented new prenatal visit	305	99

*Primary study population

Tables 4, 5, and 6 include patient demographics, clinical characteristics, and EPP visit attendance. Among all singleton women, most were between 30-39 years old, parity 0, had at least one chronic medical comorbidity, an identified PCP within the EMR, private insurance, lived within 25 miles of UVMMC, white, and married. In the study pregnancy, most women were healthy weight with first prenatal BMI 18-24, did not have an obstetrical condition in current pregnancy, delivered at term (<37wks), via spontaneous vaginal delivery, an alive newborn, used a UVM-affiliated prenatal provider and CNM most among UVM sub-practices. Most women attended a scheduled postpartum visit and had an additional obstetrical visit in the early postpartum period.

Compared to all singleton mothers, women with a UVM PCP were noted to be more likely older, have private health insurance, live closer to the hospital, be married, deliver at term, and have a family medicine prenatal provider. They were less likely to use the community health center for prenatal care or have MFM as a prenatal provider. There was no noted difference in the attendance of EEP visits.

Table 4 Demographic Characteristics

	All Singleton Mothers		**Women with UVM PCP**		**Chi Square**
	n	%	n	%	(adjusted P value)
Demographics					
Age					**0.002**
<20 years	98	2.4%	13	1.0%	(0.009)
20-29 years	1578	37.9%	425	33.2%	(0.014)
30-39 years	2332	55.9%	797	62.3%	**(0.001)**
>/= 40 years	160	3.8%	44	3.4%	(0.596)
Parity					0.563
0	1807	43.3%	555	43.4%	
1	401	9.6%	122	9.5%	
2	1185	28.4%	388	30.3%	
>2	776	18.6%	214	16.7%	
Public insurance	1320	31.7%	324	25.3%	**4.890E-04**
Radius from Hospital					**1.572E-19**
<25 miles	3325	79.8%	1183	92.5%	**(0)**
20-50 miles	604	14.5%	85	6.6%	**(0)**

50-100 miles	156	3.7%	2	0.2%	**(0)**
100-15 miles	11	0.3%	0	0.0%	(0.082)
>150 miles	27	0.6%	8	0.6%	(0.984)
Unknown	46	1.1%	1	0.1%	
Race					0.347
White	3567	85.6%	1151	90.0%	
Asian	202	4.8%	44	3.4%	
Black	146	3.5%	32	2.5%	
Declined	54	1.3%	17	1.3%	
Hawaiian-Pacific	6	0.1%	2	0.2%	
Native American	21	0.5%	3	0.2%	
Multiracial	61	1.5%	19	1.5%	
Other	8	0.2%	1	0.1%	
Marital Status					**4.970E-04**
Single	1215	29.1%	298	23.3%	
Married	2778	66.6%	934	73.0%	

Table 5 Clinical Characteristics

	All Singleton Mothers		**Women with UVM PCP**		**Chi Square**
	n	%	n	%	(adjusted P)
Clinical Characteristics					
Gestational Age at Delivery					**0.002**
<24w	18	0.4%	2	0.2%	(0.159)
24-31w 6d	66	1.6%	8	0.6%	(0.023)
32-36w 6d	314	7.5%	63	0.6%	(0.008)
>37w	3657	87.7%	1164	91.0%	**(0.000)**
Unknown	114	2.7%	42	3.3%	
Mode of Delivery					0.283
SVD	2806	67.3%	882	69.0%	
CS LST	1037	24.9%	309	24.2%	
CS Classical	17	0.4%	1	0.1%	
CS low vertical	10	0.2%	2	0.2%	
Operative Vaginal	217	5.2%	67	5.2%	
Breech Vaginal	11	0.3%	0	0.0%	
Unknown	71	1.7%	18	1.4%	
Delivery Outcome					**0.044**
Alive	4011	96.2%	1230	96.2%	(0.020)
Fetal Demise	26	0.6%	3	0.2%	(0.134)
Neonatal Demise	12	0.3%	0	0.0%	(0.047)
Unknown	120	2.9%	46	3.6%	

BMI at First Prenatal Visit					0.352
<18	8	0.2%	0	0.0%	
18-24	846	20.3%	309	24.2%	
25-29	517	12.4%	156	12.2%	
30-34	292	7.0%	98	7.7%	
>35	344	8.3%	107	8.4%	
unknown	2162	51.9%	609	47.6%	
Chronic Medical Comorbidities	2478	59.4%	763	59.7%	0.923
Obstetrical Condition in current pregnancy	1397	33.5%	408	31.9%	0.376
Identified PCP in Epic	3413	81.9%	1279	100%	N/A

Table 6 Prenatal Provider Type and EPP visits

	All Singleton Mothers		**Women with UVM PCP**		**Chi Square**
	n	%	n	%	(adjusted P)
Prenatal Provider Type					**9.100E-05**
Private Practice	1600	38.4%	520	40.7%	(0.289)
Community Health Center	110	2.6%	7	0.5%	**(0.000)**
UVM-Affiliated	1909	45.8%	593	46.4%	(0.920)
UVM Subpractice					**1.424E-10**
REI	9	0.2%	2	0.2%	(0.646)
MFM	524	12.6%	98	7.7%	**(0.000)**
UOM	454	10.9%	139	10.9%	(0.912)
Family Medicine	141	3.4%	120	9.4%	**(0)**
CNM	781	18.7%	234	18.3%	(0.603)
Early Postpartum Period visits (<60 days from delivery)					
Postpartum visit*	1213	56.11%	414	68.0%	
OB visit*	1300	60.13%	406	66.7%	
PCP visit			268	21.0%	N/A
Non-PCP OP visit	786	18.9%	258	20.2%	0.396
ED visit	234	5.6%	89	7.0%	0.166
Inpatient Admission	43	1.0%	15	1.2%	0.71

* These analyses are limited to women with a UVM-affiliated PN provider

Looking at visit attendance in the late postpartum period (LPP), the majority of singleton mothers had at least one documented visit (Table 7). On average, each patient had 5.70 visits; however, the range is wide which is reflected in the standard deviation.

Table 7 LPP visit attendance

	All Singleton Mothers			Women with UVM PCP		
	n	%	mean visits ±SD (min,max)	n	%	mean visits ±SD (min,max)
Any LPP Visit	**2535**	**60.8%**	**5.70±7.23 (1,92)**	**1112**	**86.9%**	**7.57±10.14 (1,92)**
nonPCP LPP	1510	36.2%	4.40±7.24 (1,74)	581	45.4%	5.12±8.31(1,74)
ED LPP	1150	27.6%	2.02±2.10 (1,34)	429	33.5%	2.01±2.36 (1,34)
IP LPP	352	8.4%	1.13±0.65 (1,10)	105	8.2%	1.08±0.36 (1,4)
No documented LPP visits	1634	39.2%	N/A	167	13.1%	N/A
PCP LPP				959	75.0%	4.68± 5.42 (1,58)
PrevPCP LPP				382	29.9%	1±0 (1,1)

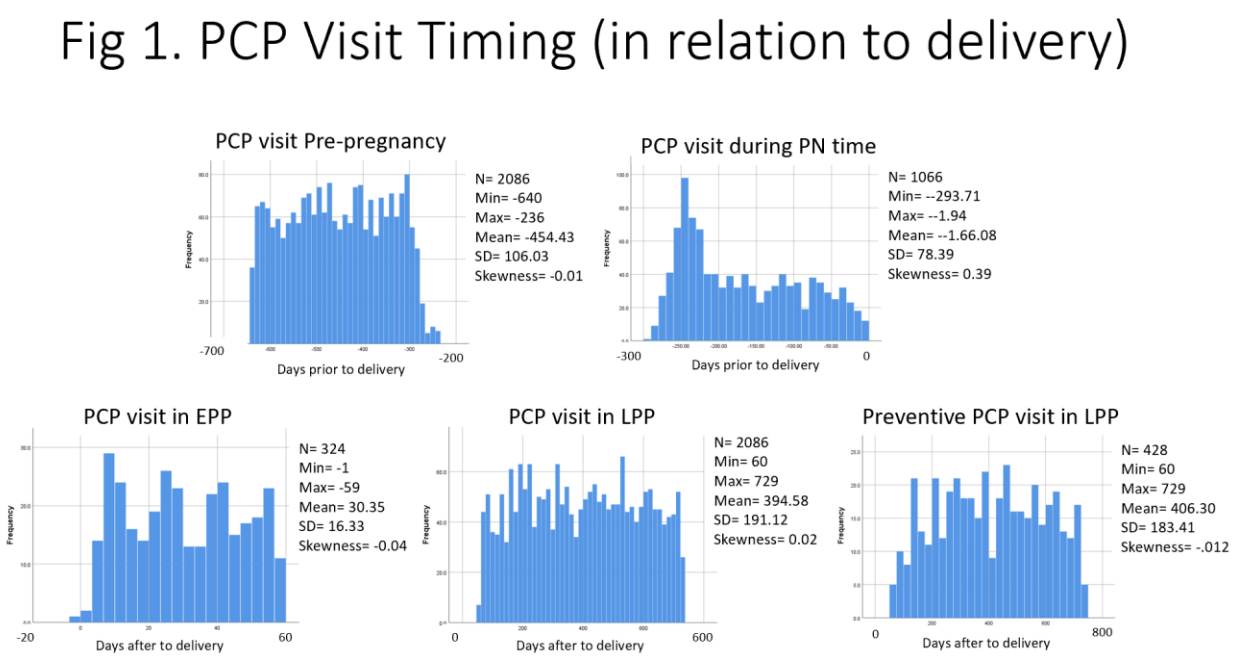
Among women with a UVM-affiliated PCP with known established date, 76.8% had an established provider before the pregnancy, and 62.6% of patients attended a visit in the 12 months prior to pregnancy. 10.5% of patients had the same delivering provider as PCP (Table 8).

Table 8 PCP characteristics and interactions

	UVM PCP Characteristics		Mean visits per patient
	n	%	± SD (min, max)
PCP established before prenatal course	459	76.76%	
PCP established after prenatal course	132	16.10%	
PCP established on prenatal course day 0	7	0.85%	
PCP established date unknown	681	53.24%	
PCP= delivering provider	134	10.48%	
PCP visit prior to pregnancy	800	62.55%	2.63± 2.07 (1,17)
PCP visit during prenatal time*	605	47.30%	4.14± 4.72 (1, 21)
PCP EPP visit	268	21.0%	1.38± 0.95 (1, 10)
Preventive visit PCP LPP	382	29.9%	1± 0 (1,1)
PCP visit LPP	959	75.0%	4.66± 5.41 (1,58)
*Excludes regularly scheduled PN visits			

Figure 1 displays visit timing for each type of primary care visit. In general, there was not trend to timing of visits, except more PCP visits during the prenatal time which occurred in the beginning of this period.

Figure 1 PCP visit timing distribution



Bivariate analyses were performed for women with UVM PCP and specific LPP visit attendance (Tables 9, 10, 11).

Any LPP

Demographics and any LPP visit attendance was notable for decreased attendance in patients living outside 25 mile radius of the hospital (OR 0.404). Clinical characteristics and any LPP visit attendance was decreased in patients with a private prenatal provider (OR 0.686) and increased in women with a family medicine prenatal provider (OR 5.434). PCP characteristics and EPP attendance was notable for increased LPP attendance with PCP= delivering provider office (OR 4.252), PCP established before pregnancy (OR 2.068), attended a PCP visit pre-pregnancy (OR 3.011), attended PCP visit during prenatal period (OR 3.363), and attended a PCP EPP visit (OR 5.098).

PCP LPP

Demographics and PCP LPP visit was notable for decreased attendance in mothers parity >P2 (OR 0.700), having public insurance (OR 0.744), living outside 25 mile radius of the hospital (OR 0.569), black women (OR 0.274), being single (OR 0.682). Clinical characteristics and PCP LPP visit attendance was increased in patients with operative vaginal delivery (OR 2.103), family medicine prenatal provider (OR 8.039), and decreased in patients with CHC as prenatal provider (OR 0.215). PCP characteristics and EPP visits with PCP LPP visit attendance was increased in patients with PCP=delivering provider (OR 3.741), PCP established before prenatal course (1.684), Pre-pregnancy PCP visit (OR 4.367), PCP visit during prenatal period (3.741), EPP PCP visit (OR 8.561).

Preventive PCP LPP

Demographics and preventive PCP LPP visit was notable for increased attendance in mothers 30-39 years old (OR 1.365), and decreased attendance with public insurance (OR 0.489), being single (OR 0.601). Clinical characteristics and preventive PCP LPP visit attendance was decreased in patients with a fetal or neonatal demise (OR 0.445). PCP characteristics and EPP visit attendance and Preventive PCP visit attendance was increased in patients with PCP=delivering provider (OR 1.742), PCP established before pregnancy (OR 1.460), PCP visit during prenatal period (OR 1.459), and decreased attendance with EPP ED visit (0.402).

Our hypothesis was rejected with an OR 0.930 for patients with an established PCP before prenatal course and attending a preventive PCP visit in the LPP

Non-PCP LPP

Demographics and other non-PCP outpatient LPP visit attendance was increased with public insurance (OR 1.377), decreased attendance with zip >25miles (OR 0.617). Clinical characteristics and Non-PCP outpatient LPP visit attendance did not have any associations. Bivariate analysis of PCP characteristics and EPP visits with Non-PCP LPP visit attendance was increased in patients with Pre-pregnancy PCP visit (OR 1.573), PCP visit during prenatal period (OR 1.528), ED EPP (OR 1.701), PCP EPP (OR 1.698), non-PCP EPP (OR 1.423).

ED LPP

Demographics and emergency LPP visits was notable for increased attendance in patients less than 20 years old (OR 4.494), with public insurance (2.585), black women (OR 2.598), being single (OR 2.795), and decreased with zip >25 miles (0.348). Clinical characteristics and emergency LPP visit noted attendance increased in patients with a cesarean section (OR 1.544), patients with BMI 30-34 (OR 1.828), and BMI >35 (2.113), and decreased in patients with private prenatal provider (OR 0.687). PCP characteristics and EPP visits with ED LPP visit noted attendance was increased in patients with PCP visit during prenatal time (OR 1.331), ED EPP visit (OR 3.127), EPP PCP (OR 1.380), EPP non-PCP (OR 1.335).

Inpatient Admission LPP

Demographics and inpatient admission was notable for decreased occurrence age 30-39 years old (OR 0.060), Parity P1 (OR 0.487) and increased in patients with public insurance (OR 1.699). Clinical characteristics and inpatient admission noted decreased occurrence in patients with pre-pregnancy BMI 25-29 (OR 0.407). PCP characteristics and EPP visits with inpatient admission LPP did not find any associations.

Table 9 Bivariate Analysis for demographics and LPP visits for women with UVM-affiliated PCP

DEMOGRAPHICS	ANY LPP		PCP LPP		Preventive Care PCP LPP		Non-PCP Outpatient LPP		Emergency or Urgent Care LPP		Inpatient Admission LPP	
	OR	CI	OR	CI	OR	CI	OR	CI	OR	CI	OR	CI
AGE (REF 20-29)	NS		NS				NS					
<20					0.203 (0.026, 1.564)	NS			**4.494 (1.219, 16.562)**	**95%**	1.462 (0.314, 6.799)	NS
20-29												
30-39					**1.365 (1.051, 1.775)**	**95%**					**0.060 (0.040. 0.089)**	**95%**
>40					1.378 (0.717, 2.647)	NS					1.627 (0.870, 3.045)	NS
PARITY (REF P0)	NS				NS		NS					
Parity 0												
Parity 1			1.001 (0.632, 1.586)	NS					0.707 (0.457, 1.093)	NS	0.493 (0.220, 1.106)	P<0.10
Parity 2			0.990 (0.730, 1.342)	NS					0.823 (0.623, 1.087)	NS	**0.487 (0.294, 0.807)**	**95%**
Parity >2			**0.700 (0.483, 0.993)**	**95%**					1.331 (0.963, 1.840)	P<0.10	0.610 (0.339, 1.099)	P<0.10
INSURANCE TYPE (REF PRIVATE)	NS											
Private insurance												
Public			**0.744 (0.561, 0.986)**	**95%**	**0.489 (0.361, 0.644)**	**95%**	**1.377 (1.070, 1.773)**	**95%**	**2.585 (1.993, 2.252)**	**95%**	**1.699 (1.113, 2.594)**	**95%**
ZIP RADIUS FROM UVMMC) (REF < 25 miles)											NS	
Zip 25												
Zip >25 mi	**0.404 (0.246, 0.662)**	**95%**	**0.569 (0.367, 0.884)**	**95%**	1.121 (1.001, 1.256)	P<0.10	**0.617 (0.398, 0.955)**	**95%**	**0.348 (0.198, 0.612)**	**95%**		

DEMOGRAPHICS	ANY LPP		PCP LPP		Preventive Care PCP LPP		Non-PCP Outpatient LPP		Emergency or Urgent Care LPP		Inpatient Admission LPP	
	OR	**CI**	**OR**	**CI**	**OR**	**CI**	**OR**	**CI**	**OR**	**CI**	**OR**	**CI**
RACE (REF WHITE)	NS				NS		NS				NS	
White												
			0.538						1.381			
Nonwhite			**(0.351, 0.824)**	**95%**					(0.911, 2.093)	NS		
			0.829						0.848			
Asian			(0.421, 1.632)	NS					(0.438, 1.638)	NS		
			0.274						**2.598**			
Black			**(0.135, 0.557)**	**95%**					**(1.279, 5.281)**	**95%**		
			0.311						6.055			
Hawaiian-Pacific Islander			(0.019, 4.988)	NS					(0.628, 58.403)	NS		
			0.622						1.010			
Native American			(0.056, 6.884)	NS					(0.091, 11.179)	NS		
			0.674						1.179			
Multiracial			(0.254, 1.789)	NS					(0.460, 3.019)	NS		
MARITAL STATUS (REF MARRIED)	NS						NS				NS	
			0.682		**0.601**				**2.795**			
Single			**(0.511, 0.910)**	**95%**	**(0.443, 0.816)**	**95%**			**(2.136, 3.657)**	**95%**		
Married												

Table 10 Bivariate analysis clinical characteristics and LPP visits among women with UVM-affiliated PCP

CLINICAL CHARACTERISTICS	ANY LPP		PCP LPP		Preventive Care PCP LPP		Non-PCP Outpatient LPP		Emergency or Urgent Care LPP		Inpatient Admission LPP	
	OR	CI	OR	CI	OR	CI	OR	CI	OR	CI	OR	CI
GESTATIONAL AGE (REF >37wk)	NS		NS		NS		NS		NS			
GA <24wk											11.933 (0.740, 192.38)	NS
GA 24-31w6d											1.705 (0.207, 14.009)	NS
GA 32-36w6d											1.989 (0.951, 4.159)	P<0.10
GA >37												
MODE OF DELIVERY (REF SVD)	NS				NS		NS				NS	
Spontaneous Vaginal												
Cesarean Section			0.858 (0.641, 1.148)	NS	0.991 (0.676, 1.453)	NS			**1.544 (1.182, 2.016)**	**95%**		
Operative Vaginal			**2.103 (1.025, 4.315)**	**95%**	1.524 (0.644, 3.607)	NS			1.160 (0.687, 1.959)	NS		
DELIVERY OUTCOME (REF ALIVE)	NS		NS				NS		NS		NS	
Alive												
Demise (Fetal or neonatal)					**0.445 (0.227, 0.871)**	**95%**						
BMI AT FIRST PRENATAL VISIT (REF 18-24)	NS		NS		NS		NS					
BMI 18-24												
BMI 25-29									1.382 (0.926, 2.065)	NS	**0.407 (0.175, 0.944)**	**95%**
BMI 30-34									**1.828 (1.149, 2.907)**	**95%**	0.368 (0.127, 1.069)	P<0.10
BMI >35									**2.113 (1.350, 3.309)**	**95%**	0.795 (0.366, 1.725)	NS

CLINICAL CHARACTERISTICS	ANY LPP		PCP LPP		Preventive Care PCP LPP		Non-PCP Outpatient LPP		Emergency or Urgent Care LPP		Inpatient Admission LPP	
	OR	CI	OR	CI	OR	CI	OR	CI	OR	CI	OR	CI
Chronic Medical Comorbidities	NS		NS		NS		NS		NS		NS	
OB condition in current Pregnancy	NS		NS		NS		NS		NS		NS	
PN PROVIDER TYPE (REF UVM)					NS		NS				NS	
Private	**0.686**		0.777						**0.687**			
	(0.481, 0.977)	**95%**	(0.591, 1.022)	P<0.10					**(0.524, 0.885)**	**95%**		
CHC	0.302		**0.215**						0.678			
	(0.057, 1.591)	NS	**(0.047, 0.972)**	**95%**					(0.130, 3.525)	NS		
UVM												
UVM PROVIDER SUBTYPE (REF UOM)							NS		NS		NS	
MFM	0.771		0.721		0.685							
	(0.365, 1.629)	NS	(0.409, 1.272)	NS	(0.380, 1.235)	NS						
UOM (general UVM OB)												
Family Medicine	**5.434**		**8.039**		1.595							
	(1.552, 19.031)	**95%**	**(3.040, 21.258)**	**95%**	(0.957, 2.658)	P<0.10						
CNM	0.985		1.061		0.823							
	(0.520, 1.867)	NS	(0.655, 1.717)	NS	(0.519, 1.305)	NS						

.

Table 11 bivariate analysis of PCP characteristics and EPP visits with LPP visits among women with UVM-affiliated PCP

	ANY LPP		PCP LPP		Preventive Care PCP LPP		Non-PCP Outpatient LPP		Emergency or Urgent Care LPP		Inpatient Admission LPP	
	OR	**CI**	**OR**	**CI**	**OR**	**CI**	**OR**	**CI**	**OR**	**CI**	**OR**	**CI**
PCP Characteristics												
PCP= Delivering provider	**4.252 (1.714, 10.549)**	**95%**	**3.741 (2.038, 6.866)**	**95%**	**1.742 (1.206, 2.515)**	**95%**	0.819 (0.570, 1.178)	NS	1.040 (0.713, 1.516)	NS	0.868 (0.326, 1.444)	NS
PCP established before PN course	**2.068 (1.214, 3.524)**	**95%**	**1.684 (1.106, 2.566)**	**95%**	0.930 (0.616, 1.404)	NS	1.199 (0.817, 1.760)	NS	1.185 (0.798, 1.759)	NS	1.198 (0.582, 2.466)	NS
Pre-preg PCP visit	**3.011 (2.154, 4.208)**	**95%**	**4.367 (3.342, 5.706)**	**95%**	**1.460 (1.133, 1.881)**	**95%**	**1.573 (1.250, 1.980)**	**95%**	1.254 (0.984, 1.598)	P<0.10	1.494 (0.967, 2.310)	P<0.10
PCP visit during PN time	**3.363 (2.319, 4.875)**	**95%**	**3.741 (2.823, 4.957)**	**95%**	**1.459 (1.147, 1.856)**	**95%**	**1.528 (1.224, 1.906)**	**95%**	**1.331 (1.055, 1.680)**	**95%**	0.44 (0.565, 1.261)	NS
EPP VISITS												
EPP ED		NS		NS	**0.402 (0.215, 0.755)**	**95%**	**1.701 (1.061, 2.726)**	**95%**	**3.127 (1.943, 5.032)**	**95%**		NS
EPP IP		NS		NS		NS		NS		NS		NS
EPP PCP	**5.098 (2.469, 10.526)**	**95%**	**8.561 (4.607, 15.910)**	**95%**	1.329 (0.985, 1.794)	P<0.10	**1.698 (1.277, 2.259)**	**95%**	**1.380 (1.031, 1.848)**	**95%**		NS
EPP Non-PCP OP		NS		NS	0.833 (0.617, 1.125)	NS	**1.423 (1.084, 1.868)**	**95%**	**1.335 (1.010, 1.766)**	**95%**		NS

Discussion

In this study we have summarized health visit patterns in the late postpartum period for women who had one, singleton pregnancy. Women with a UVM-affiliated PCP were evaluated for their interactions with PCP services in the twelve months prior to pregnancy through 730 days after delivery. In comparison to the general 'singleton mothers' population, these women had markers of lower risk pregnancy (delivered >37wks, fewer had MFM as a prenatal provider). They were also older, had private health insurance, lived closer to the hospital, and married. Understanding the visit patterns in these women with established primary care will help relate future work on identifying characteristics of women who have not reconnected with the system after pregnancy.

In comparison to Bryant's LPP visit findings, the prevalence of non-PCP types of LPP visits for our UVMPCP population were different(our study, Bryant's): ED LPP (33.5%, 13.9%), other non-PCP (45.4%, 72.6%), inpatient admission (8.4%, 3.0%) (12). These differences may require further investigation but may be attributed due to geographic location, including fewer specialty services. The general singleton population in our study had an overall decreased prevalence of LPP visits (60.8%) which may be accounted for by increased distance from UVMMC or use of providers outside UVM network.

Our findings on PCP service interactions are consistent with other data. In our study, 62.5% of patients had a PCP visit in the 12 months prior to pregnancy. The national PRAMS survey in 2017 (2) reported 67.7% of women reported having a health care visit in the 12 months prior to pregnancy. These data appear similar, but it is important to note that the PRAMS survey does not specify type of healthcare visit. Our EPP (21.0%) and LPP (75%) PCP visit attendance was similar to Bryant's findings (14.4%, 80.7%). Our data points around PCP visits in prenatal course (distinct from prenatal visits) and preventive visits in the LPP are unique data points, which may encourage further work on the interaction between primary care and obstetrical care services during and after pregnancy. Preventive PCP LPP visits prevalence was much lower (29.9%) which suggests it is important for PCPs to do regular preventive health screenings at any visit. In addition, the association between operative vaginal delivery (OR 2.103) and EPP PCP visits may be reflective of gap in care between services and patient expectations about symptoms, similar to findings in Martin 2014 (7).

While our hypothesis of having an established PCP prior to pregnancy would be associated with an increased likelihood of having a preventive PCP visit LPP was rejected, it was seen in any PCP LPP visit attendance (OR 1.684). In addition, multiple other factors were associated with preventive PCP LPP visits. Positive factors including having the same delivering provider as PCP (OR 1.742), a pre-pregnancy PCP visit (OR 1.460), a PCP visit during prenatal time (OR 1.459). Negative factors included a documented ED EPP visit (OR 0.402), a fetal or neonatal demise (OR 0.445), being single (0.601), and with public health insurance (OR 0.489). These relationships will require a further multivariable analysis to control for confounding variables, but they may help identify women who are at risk in the immediate and EPP of not re-engaging with care.

The data in this study and Bryant's is important to help inform strategies to improving access and utilization of primary care and preventive care services in the months to years after delivery. Capitalizing on the regular frequency of well child visits in the first two years, Centering Parenting is one model that is integrating postpartum and well child visits(18, 19). Additional work has been done on openness to parents and pediatricians on individual contraceptive counseling during well child visits (20, 21). While these models focus primarily on maternal health in the EPP, routine screening of parental primary care

access at well child visits could be incorporated into social determinants of health assessments. The medical home is another model that decreases geographic barriers to care if both pediatric and well woman health can occur at the same site. In our study, women with family medicine prenatal providers were significantly more likely to engage in PCP LPP care (OR 8.039), and often family medicine providers practice within an integrated medical home.

This study adds to the limited pool on health visit pattern data in the months to years after pregnancy. It has begun to delineate some associations with increased engagement in primary care services and preventive medicine among patients. To strengthen the findings in this report, a multivariable analysis should be completed to control for confounding variables. Additional beneficial analyses that should be done with this dataset include understanding clinical characteristics and demographics of patients who do not have a designated PCP in the EMR and those who did not attend a LPP visit. These are patients who may be at increased risk for increased utilization of emergency services for health. Also, further investigation into specific medical comorbidities or obstetrical comorbidities and visit attendance would be important. This data may provide a foundation for teams working to implement systems improving transition of care from obstetric to primary care. QI projects with integration in the EMR could be an ideal model for quickly testing strategies to increase communication between providers and also patients and providers about current access to primary care.

This study has notable limitations. First, its data source in the EMR relies on billing data and diagnostic codes which may not be reflective of accurate type of visit. For example, it is possible preventive screenings were done at a PCP visit that did not have an associated preventive billing code. In addition, generalizing utilization of the general singleton population should be cautioned as it is possible patients received care out of network or transferred care during the course of the study. It is also important to note that UVMMC is the primary academic institution in Vermont and therefore the obstetric population may be at higher risk than the rest of the state. As mentioned above, this study is currently limited in its analysis as it is bivariate and a multivariate analysis is still pending.

Conclusion

In summary, we have reported the healthcare visit patterns in the LPP of women who had a singleton pregnancy with a particular focus on primary and preventive care use in the LPP. Prevalence of PCP visits in the LPP is high among patients with an established PCP (75.0%) but much lower preventive PCP LPP visits (29.9%). Associations with increased preventive PCP LPP visits included including having the same delivering provider as PCP (OR 1.742), a pre-pregnancy PCP visit (OR 1.460), a PCP visit during prenatal time (OR 1.459, documented ED EPP visit (OR 0.402), a fetal or neonatal demise (OR 0.445), being single (0.601), and with public health insurance (OR 0.489). Further work in understanding these associations will be important in developing improved transition of care models and increasing overall engagement in women's preventive medicine.

References

1. Firoz T, McCaw-Binns A, Filippi V, et al. A framework for healthcare interventions to address maternal morbidity. *Int J Gynaecol Obstet*. 2018;141 Suppl 1(Suppl Suppl 1):61–68. doi:10.1002/ijgo.12469
2. CDC, National Center for Chronic Disease Prevention and Health Promotion. Prevalence of Selected Maternal and Child Health Indicators for all PRAMS sites, Pregnancy Risk Assessment

Monitoring System (PRAMS), 2016-2017. https://www.cdc.gov/prams/prams-data/mch-indicators/states/pdf/2018/All-PRAMS-Sites-2016-2017_508.pdf
3. ACOG Committee Opinion No. 736: Optimizing Postpartum Care. *Obstet Gynecol*. 2018;131(5):e140–e150. doi:10.1097/AOG.0000000000002633
4. DiBari JN, Yu SM, Chao SM, Lu MC. Use of postpartum care: predictors and barriers. *J Pregnancy*. 2014;2014:530769. doi:10.1155/2014/530769
5. Danilack VA, Brousseau EC, Paulo BA, Matteson KA, Clark MA. Characteristics of women without a postpartum checkup among PRAMS participants, 2009-2011. *Matern Child Health J*. 2019;23(7):903–909. doi:10.1007/s10995-018-02716-x
6. Tully KP, Stuebe AM, Verbiest SB. The fourth trimester: a critical transition period with unmet maternal health needs. *Am J Obstet Gynecol*. 2017;217(1):37–41. doi:10.1016/j.ajog.2017.03.032
7. Martin A, Horowitz C, Balbierz A, Howell EA. Views of women and clinicians on postpartum preparation and recovery. *Matern Child Health J*. 2014;18(3):707–713. doi:10.1007/s10995-013-1297-7
8. Fahey JO, Shenassa E. Understanding and meeting the needs of women in the postpartum period: the Perinatal Maternal Health Promotion Model. *J Midwifery Womens Health*. 2013;58(6):613–621. doi:10.1111/jmwh.12139
9. Verbiest S, Bonzon E, Handler A. Postpartum Health and Wellness: A Call for Quality Woman-Centered Care. *Matern Child Health J*. 2016;20(Suppl 1):1–7. doi:10.1007/s10995-016-2188-5
10. Hamilton N, Stevens N, Lillis T, Adams N. The fourth trimester: toward improved postpartum health and healthcare of mothers and their families in the United States. *J Behav Med*. 2018;41(5):571–576. doi:10.1007/s10865-018-9969-9
11. Walker LO. Promoting Maternal Health Through the First Postpartum Year. *J Obstet Gynecol Neonatal Nurs*. 2019;48(2):119–120. doi:10.1016/j.jogn.2019.01.002
12. Bryant A, Blake-Lamb T, Hatoum I, Kotelchuck M. Women's Use of Health Care in the First 2 Years Postpartum: Occurrence and Correlates. *Matern Child Health J*. 2016;20(Suppl 1):81–91. doi:10.1007/s10995-016-2168-9
13. American College of Nurse-Midwives and the National Association of Nurse Practitioners in Women's Health; American College of Obstetricians and Gynecologists and the Society for Maternal–Fetal Medicine, Louis JM, et al. Interpregnancy Care. *Am J Obstet Gynecol*. 2019;220(1):B2–B18. doi:10.1016/j.ajog.2018.11.1098
14. Fabiyi CA, Reid LD, Mistry KB. Postpartum Health Care Use After Gestational Diabetes and Hypertensive Disorders of Pregnancy. *J Womens Health (Larchmt)*. 2019;28(8):1116–1123. doi:10.1089/jwh.2018.7198
15. 15. McCorry, N. K., Hughes, C., Spence, D., Holmes, V. A., & Harper, R. (2012). Pregnancy planning and diabetes: A qualitative exploration of women's attitudes toward preconception care. Journal of Midwifery Women's Health, 57(4), 396–402.
16. 16. Power, M. L., Wilson, E. K., Hogan, S. O., Loft, J. D., Williams, J. L., Mersereau, P. W., et al. (2013). Patterns of preconception, prenatal and postnatal care for diabetic women by obstetriciangynecologists. Journal of Reproductive Medicine, 58(1–2), 7–14.
17. 17. Ringholm, L., Mathiesen, E. R., Kelstrup, L., & Damm, P. (2012). Managing type 1 diabetes mellitus in pregnancy—From planning to breastfeeding. Nature Reviews Endocrinology, 8(11), 659–667. doi:10.1038/nrendo.2012.154.
18. 18. Bloomfield J, Rising SS. Centering Parenting: an innovative dyad model for group mother-infant care. *J Midwifery Womens Health*. 2013;58(6):683–689. doi:10.1111/jmwh.12132

19. Srinivasan S, Schlar L, Rosener SE, et al. Delivering Interconception Care During Well-Child Visits: An IMPLICIT Network Study. *J Am Board Fam Med*. 2018;31(2):201–210. doi:10.3122/jabfm.2018.02.170227
20. Sijpkens MK, Lagendijk J, van Minde MRC, et al. Integrating interconception care in preventive child health care services: The Healthy Pregnancy 4 All program. *PLoS One*. 2019;14(11):e0224427. Published 2019 Nov 6. doi:10.1371/journal.pone.0224427
21. Congdon JL, Trope LA, Bruce JS, Chung PJ, Dehlendorf C, Chamberlain LJ. Meeting the Needs of Postpartum Women With and Without a Recent Preterm Birth: Perceptions of Maternal Family Planning in Pediatrics. *Matern Child Health J*. 2020;24(3):378–388. doi:10.1007/s10995-019-02829-x