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Barriers to Attendance of Prenatal and Well-Child Visits

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Abstract

Objective: Prenatal care (PNC) and well child visit (WCV) attendance are associated with improved health outcomes. We aimed to determine if the factors affecting maternal and child attendance are similar or different.

Methods: We conducted a retrospective case control study at Virginia Commonwealth University Health System. We used the Adequacy of Prenatal Care Utilization Index and the American Academy of Pediatrics recommendations to assess the adequacy of PNC and WCV attendance, respectively. Mothers with less than 50% visit adherence or initiation after 5 months gestation were eligible as cases and those with 80% or more adherence and initiation before 5 months were eligible as controls. Children in the lowest quintile of adherence were eligible as cases and those with 80% or more adherence were eligible as controls. Cases and controls were randomly selected at a 1:2 ratio from the eligible subjects and frequency matched on birth month.

Results: In adjusted analyses, mothers and children who were publicly insured or who were uninsured had higher odds of poor preventive visit attendance. Mothers who experienced intimate partner violence and had more living children were more likely to have poor attendance. Children whose mothers had younger age, greater number of pregnancies and transportation difficulties had poorer attendance.

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Conclusions: While lack of insurance and public insurance remained significantly associated with both poor PNC and WCV attendance, other factors varied between groups. Expanding eligibility requirements and streamlining enrollment and renewal processes may improve two generations of preventive visit attendance.

Keywords

attendance; well-child; prenatal

Background

Preventive care of expecting mothers and children entails monitoring of growth and development, screening for infectious diseases and administering life-saving vaccines. Prenatal care (PNC) attendance is associated with improved neonatal outcomes including: decreased prematurity,[1] decreased low birth weight,[2] and decreased mortality.[3] Well-child visit (WCV) attendance is associated with decreased emergency department utilization and hospitalizations.[4,5] Despite these well-established benefits, many mothers and children continue to miss preventive visits. Five to twelve percent of mothers in the U.S. continue to have either no PNC or late PNC initiation (defined as initiation in the third trimester)[6] and children miss between a third and half of recommended WCVs.[7]

Poor attendance of preventive visits is a two-generation problem – a mother's poor PNC attendance is associated with the poor WCV attendance of her child. Studies have found that a mother who has adequate PNC was almost twice as likely to have a child with adequate WCV attendance.[8] This could be because the same factors that decrease a mother's likelihood to attend her own PNC visit may also affect her ability to bring her child to his/her WCV.

Previous studies suggest that poverty, African-American race, Hispanic ethnicity, young maternal age, unmarried status greater parity, lower levels of education, mental health problems, transportation difficulties, and public insurance or lack of insurance are associated with poor PNC attendance and WCV attendance, individually.[7-19] Although IPV is associated with poor PNC attendance,[20] evidence on the association between IPV and WCV attendance has been mixed.[21,22]

Many of these studies use data that is over 15 years old,[8-19] are focused on a single risk factor[13,20,21] or include a single socioeconomic group.[17] There have been several transformations of the healthcare landscape over the past few decades, including changing Medicaid eligibility requirements, which may affect which factors impact attendance. Furthermore, no studies have examined factors impacting PNC and WCV attendance within the same study. Examining PNC and WCV attendance within the same study can help us understand the true distinctions between healthcare utilization of mothers and children. We aimed to determine if the risk factors for poor PNC and WCV attendance were similar or different. We hypothesized that most risk factors for poor PNC and WCV attendance would be shared between women and children.

Methods

We conducted a retrospective case control study at Virginia Commonwealth University Health System (VCUHS), an academic safety-net health system. Mothers delivering at VCUHS between May 2017 and May 2018 were included. Children 1-3 years of age at the time of data extraction (April 2019) with at least one WCV between 2 and 6 months of age who were born at VCUHS were included. Mothers who delivered at less than 23 weeks gestation, were incarcerated during their pregnancy, or had multiple fetuses were excluded. Children born at less than 35 weeks gestation or who stayed longer than 48 hours in the NICU were also excluded. These exclusions were based on possible unique factors dictating the frequency of their preventive care. Using two-sided tests with 5% significance and 80% power, we estimated that we would need about 890 women and 830 children to estimate odds ratios between attendance and each of the covariates listed above to within ±0.29.

Selection of Cases and Controls

We used the Adequacy of Prenatal Care Utilization Index (APCNU) to assess the adequacy of prenatal care attendance in relation to the recommendations from the American College of Obstetrics and Gynecology (Table 1). Cases and controls were randomly selected at a 1:2 ratio from the eligible cases and controls and frequency matched on birth month. WCV adherence was compared to the *American Academy of Pediatrics* (AAP) Bright Futures recommendations. Using methods described previously, we defined age-specific ranges for each WCV and assumed that a child did not receive care elsewhere after their last recorded WCV.[7] Cases and controls were randomly selected at a 1:2 ratio from the eligible subjects and frequency matched on birth month. Because this was a study about factors leading to poor attendance, we selected cases and controls based on attendance. Cases and controls or mothers and children were selected independently.

Data Collection

PNC attendance was collected via manual chart review of the electronic health record (EHR) including scanned-in records from outside facilities. We did this so that we could include PNC at health departments which are scanned-in paper records. Gravidity, number of living children, alcohol and substance use, housing instability/homelessness, mental health problems, IPV and transportation difficulties were collected via manual review of Obstetrics and Gynecology (ObGyn) and Social Work notes in the mother's electronic health record. Age, race, ethnicity, insurance type and WCV visits were collected electronically. Alcohol, marijuana, cocaine, methamphetamines, heroin and other opioids were included in the alcohol or substance abuse category. Depression (including post-partum depression), anxiety, bipolar disorder, schizophrenia, and other schizoaffective disorders were included as mental health problems. Either past or current association with each variable was included. To account for the possibility of a control receiving additional visits for a high-risk condition, we recorded whether or not the woman was followed in the High-Risk ObGyn Clinic.

Statistical Analysis

Unadjusted and adjusted logistic regression models were used to investigate the associations of the risk factors and case-control status with all analyses controlling for the matching variable birth month. In order to achieve model convergence, some categorical variables were included as binary variables (alcohol or substance use, homelessness, IPV, mental illness, and transportation difficulties). Odds ratios, their confidence intervals, and p-values were reported. All statistical analyses were conducted in SAS 9.4 (Cary, NC, USA) with a significance level of 0.05.

Ethical Approval

Our study was approved under expedited review by the Institutional Review Board of Virginia Commonwealth University.

Results

While 900 mothers (300 cases; 600 controls) and 900 children (300 cases; 600 controls) were initially selected based on attendance criteria, 9 mothers and 67 children were excluded based on exclusion criteria noted during chart review. This resulted in 891 mothers (297 cases and 594 controls) and 833 children (279 cases and 554 controls) being eligible for the analyses (Table 1). In our study, 7% of mothers who were cases (6% overall) and 8% of children who were cases (4% overall) were uninsured. There were 29 mother-child dyads in the dataset including 22 concordant dyads and 7 discordant dyads. There were 16 mother-child dyads that were both controls and 6 mother-child dyads that were both cases. There were 3 dyads in which the mother was a control and the child was a case and 4 dyads in which the child was a control and the mother was a case.

Prenatal Care Visits

In adjusted analyses, mothers who were publicly insured or who were uninsured had greater odds of poor PNC attendance than those who had commercial insurance (OR = 3.4, 95% CI: 2.0, 5.4) and (OR = 3.0, 95% CI: 1.5, 6.2), respectively. Those mothers who had experienced IPV had 2.9 (95% CI: 1.1, 7.2) times greater odds of poor PNC attendance compared to those who had not experienced IPV. For each additional living child, a mother had a 1.4 greater odds of poor PNC attendance (95% CI: 1.1, 1.7). Other characteristics such as race (with the exception of “other” race), substance abuse, mental illness, homelessness and transportation difficulties did not remain significant in the adjusted model. We conducted a sensitivity analysis, excluding mothers who were seen in the “high-risk” Ob/Gyn clinic, but this did not substantively change our results.

Well-Child Visits

In adjusted analyses, children who were publicly insured (OR 2.7, 95% CI: 1.6, 4.8) and uninsured (OR = 7.9, 95% CI: 3.4, 18.5) had higher odds of having poor attendance than those who had commercial insurance. Children whose mothers had transportation difficulties had higher odds (OR = 2.4, 95% CI: 1.5, 4.0) of having poor attendance compared to those children whose mothers did not have transportation difficulties. With each additional prior pregnancy of their mother, children had 1.2 (95% CI: 1.0, 1.5) greater odds of poor WCV

attendance. With each additional year of their mother's age, children were (OR = 0.9, 95% CI: 0.9, 1.0) *less* likely to have poor WCV attendance. Other characteristics such as race (with the exception of Asian), substance abuse, mental illness, homelessness, and IPV did not remain significant in the adjusted model.

Discussion

This is the first study to jointly examine risk factors for both PNC and WCV attendance to determine which risk factors were shared between women and children. We found that insurance status was the single factor that was associated with both poor PNC and WCV attendance. This finding was consistent with other studies showing an association between insurance status and poor attendance of mothers and children, individually.[7,23] The high infant mortality rate in the late 20th century prompted the U.S. to expand Medicaid for pregnant women to improve access to PNC. In the early 1980s, Medicaid covered pregnant women up 47% of the FPL. By the late 1990s, this was increased to 133% of the FPL.[24] Many states have continued to expand eligibility beyond these levels for pregnant women.[24] The major change in coverage for children during this time period was the creation of CHIP in 1997. CHIP provides federal funding to cover children whose families have incomes too high to qualify for Medicaid (up to 200% of the FPL), but who can't afford private coverage. [25] Despite these changes over the past 40 years, many women and children remain uninsured in the United States including 11% of women (11% in Virginia) and 5.5% of children (4% in Virginia). [26-28]

In this study, uninsured women were 3 times as likely (OR 3.0; 95% CI: 1.5, 6.2) to have poor PNC attendance and uninsured children were almost 8 times as likely (OR 7.9; 95% CI: 3.4, 18.5) to have poor WCV attendance compared with commercially insured patients. Lack of insurance is a particular problem in the U.S. compared with other high-income countries, many of which have universal coverage. One effect that lack of insurance can have is that patients tend to prioritize emergency care over preventive visits. This pattern has ramifications for all patients but particularly for expecting mothers and children who need to attend preventive visits with greater regularity. Lack of insurance can be a two-generation challenge: less than half of children with an uninsured parent have insurance themselves.[29]

There are several reasons why public insurance may be correlated with poor attendance. The APCNU, which we used to define poor PNC attendance, takes into account the trimester of PNC initiation. Only half of pregnant women are enrolled in Medicaid in their first trimester (0-12 weeks of pregnancy)[30] This is because there are major differences in eligibility requirements between non-pregnant adults and pregnant women. The *Pregnancy Risk Assessment Monitoring System (PRAMS),* found that even after implementation of the ACA, one in three women experienced a disruption in health insurance (or insurance "churn") from preconception to postpartum. [31] Prior to the expansion of Medicaid in Virginia in 2019 (the time period in which pregnant women were included in this study), single childless adults were not eligible for Medicaid whereas pregnant women were eligible up to 133% of the FPL. Recent additions of the Family Access to Medical Insurance Security (FAMIS program) have further expanded eligibility up to 200% of the FPL. Many women do not realize they are pregnant until 6 weeks of gestation, then it takes 4 or more

weeks for Medicaid enrollment to occur. Although Medicaid offers retroactive coverage, this may not be enough to encourage women to seek care early in their pregnancies. Expanding Medicaid in other states may offer the opportunity to reduce pre- and post-partum churn.

It is also challenging for patients to stay enrolled in Medicaid because of the cumbersome renewal processes and periodic eligibility checks. The Affordable Care Act made these eligibility checks less frequent for pregnant women and infants (no greater than 12 months) but eligibility checks may have played a role for WCV attendance of older children. Furthermore, publicly insured patients may experience bias from healthcare providers that discourages attendance.

Another explanation for the association of public insurance with poor attendance is that it may be *poverty itself* rather than insurance status that is driving attendance patterns. Public insurance is often used as a proxy for poverty since percentage of the FPL is used to assess eligibility. Poverty is often transmitted from one generation to the next. Poor families may have more limited options for childcare and have greater difficulty taking time off from work to attend doctor's appointments. Medicaid eligibility may also be a proxy for aggregate social needs and its inclusion may explain why other factors did not remain significant in the adjusted model.

Intra-family factors such as the number of living children and a history of IPV were significantly associated with PNC, but not WCV attendance. The association of number of living children with poor PNC attendance has previously been observed.[15] The association may reflect the fact that experienced mothers feel that PNC is not as necessary for later pregnancies or may reflect the competing demands of taking care of other children while trying to attend PNC appointments. Interestingly, higher gravidity was not similarly associated with poor PNC, perhaps because women with multiple spontaneous abortions or still births are considered "high risk" and typically seen with greater regularity by their obstetrician. It is unclear why the number of living children was not associated with poor WCV attendance. Perhaps experienced mothers continue to prioritize timely immunizations or other aspects of WCVs despite competing family demands.

There was a significant association between IPV and poor PNC attendance which has also been demonstrated in other studies.[20] Abused women may be hesitant to come to medical appointments out of fear that physical signs of violence could be identified by their provider. In contrast, we did not find that IPV was significantly associated with WCV attendance. This is despite the fact that IPV tends to abate during pregnancy then increase again after a child is born.[32] Some studies have found greater attendance of WCVs[21] for families experiencing IPV while others have found poorer attendance.[33] Possible explanations for the lack of association in our study include parental separation after birth or the fact that the WCV poses less of a chance of discovery of physical evidence of violence compared to the PNC visit.

Transportation difficulties were associated with poor WCV but not PNC attendance. This finding was similar to a survey of Minnesota parents whose children missed their last WCV[19] but in contrast to low-income women in California.[19] Parents repeatedly cite

transportation barriers as reasons for missed well-child visits.[19,34] Thirteen percent of American families report not having a car within the last year and 5% of families report long-term lack of car ownership.[35] Even if families do own one car, that car is typically used by the parent that works outside the home and who may not be available for the appointment. An alternative to transportation by private vehicle is use of Medicaid transportation. However, one recent report estimated that less than 10% of Virginia Medicaid enrollees used Medicaid transportation.[36] Low uptake of this option may be result from long mandatory reservation times, late pick-ups and sudden cancelations. Pregnant women may not experience the same difficulties attending PNC visits if they are able to access local health departments. There may be ways to overcome transportation barriers to WCVs by creating more satellite clinics, providing clinic-specific transportation or improving Medicaid transportation.

Limitations

There were several limitations to the study. The first limitation is that since the study was retrospective, we relied on Ob/Gyn and Social Work documentation to gather information on alcohol or substance use, homelessness, IPV, mental illness and transportation difficulties. Post-partum depression, IPV, and alcohol and substance use are routinely screened for throughout the health system. The other risk factors are queried on an as needed basis. We may have missed “positives” on these characteristics if the subject was not asked about them by either the Ob/Gyn or Social Work provider. The second related concern is that women with poor PNC are more likely to have social work consults and be queried about these aspects of their lives. This may have biased our results towards finding a statistically significant difference between these characteristics and poor PNC attendance. Despite this potential bias, we did not find an association between many of these manually recorded characteristics (substance use, homelessness, mental illness) and poor attendance. However, the lack of association may have been due to the relatively small sample sizes in some of these characteristics. The small sample sizes did not provide us with sufficient power to investigate differences of race/ethnicity, insurance type or other variables between the groups. The third limitation is that because there were only 29 mother-child dyads in the sample (22 concordant and 7 discordant) we did not have sufficient power to study the association between dyad concordance and other characteristics. Finally, because we recorded risk factors from the mother’s chart at the time of birth, this limited our ability to examine the changing of potential risk factors over the study period.

Conclusions

Understanding what factors impact two generations of preventive visit attendance can have practical as well as theoretical implications. Policy makers may be interested in targeting factors that affect multiple generations in order to have a greater impact on public health. In this study, we found that lack of insurance and public insurance were associated with poor preventive attendance of mothers and children. Health insurance supports access to medical care, shields families from unaffordable medical costs, and promotes healthy pregnancies and children. Strategies to improve insurance coverage and reduce insurance churn for publicly-insured families could include: 1) expansion of eligibility requirements for non-

pregnant adults to reduce churn before and after pregnancy,[37] 2) continuation of coverage for longer periods post-partum,[38] and 3) streamlining of enrollment and renewal processes.[39] Screening for and addressing social of determinants of health, including transportation challenges, may also lead to increased attendance.

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Abbreviations:

APCNU	Adequacy of Prenatal Care Utilization Index
AAP	American Academy of Pediatrics
CHIP	Children’s Health Insurance Program
EHR	Electronic Health Record
FPL	Federal Poverty Level
IPV	Intimate Partner Violence
ObGyn	Obstetrics and Gynecology
PNC	Prenatal Care
VCUHS	Virginia Commonwealth University Health System
WCV	Well-Child Visit

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What's New: Insurance status, particularly lack of insurance, was associated with poor PNC and WCV attendance. Other factors varied between groups. Expanded insurance eligibility requirements and streamlined enrollment and renewal processes may improve the delivery of preventive services for women and children.

Table 1.

Eligibility Criteria for Cases and Controls

	Mothers	**Children**
Cases	Prenatal care initiated after 4th month and <50% recommended attendance[1]	Lowest quintile attendance[2] in study population
Controls	Prenatal care initiated by 4th month and ≥ 80% recommended attendance[1]	≥ 80% recommended attendance[2]

[1]Recommended by the American College of Obstetrics and Gynecology

[2]Recommended by the American Academy of Pediatrics

Table 2.

Characteristics of cases and controls for prenatal care and well-child visit attendance

Variable	Mothers		Children	
Number (percent) unless otherwise specified	**Cases (n = 297)**	**Controls (n = 594)**	**Cases (n = 279)**	**Controls (n = 554)**
Age (years) *	30 (4)	31 (4)	2.2 (0.7)	2.2 (0.7)
Race/Ethnicity				
White	54 (18%)	172 (29%)	33 (12%)	183 (33%)
Black	114 (38%)	157 (26%)	119 (43%)	179 (32%)
Hispanic	107 (36%)	152 (26%)	105 (38%)	140 (25%)
Asian	0 (0%)	7 (1%)	6 (2%)	9 (2%)
Other	22 (7%)	106 (18%)	16 (6%)	43 (8%)
Insurance Group				
Commercial	44 (15%)	235 (40%)	35 (13%)	234 (42%)
Public	232 (78%)	326 (55%)	223 (80%)	306 (55%)
Uninsured	21 (7%)	33 (6%)	21 (8%)	14 (3%)
Gravidity *	3.0 (1.9)	2.7 (1.7)	2.9 (1.8)	2.4 (1.5)
Number of Living Children *	2.5 (1.5)	2.1 (1.2)	2.2(1.4)	1.8 (1.1)
History of alcohol or substance use?				
Yes	100 (34%)	205 (35%)	80 (29%)	156 (28%)
No	197 (66%)	389 (65%)	199 (71%)	398 (72%)
History of homelessness or housing instability?				
Yes	5 (2%)	3 (0.5%)	9 (3%)	12 (2%)
No	292 (98%)	591 (99.5%)	270 (97%)	542 (98%)
History of intimate partner violence?				
Yes	15 (5%)	9 (1.5%)	34 (12%)	41 (7%)
No	282 (95%)	585 (98.5%)	245 (88%)	513 (93%)
History of mental Illness?				
Yes	44 (15%)	58 (10%)	58 (21%)	105 (19%)
No	253 (85%)	536 (90%)	221 (79%)	449 (81%)
Transportation difficulties?				
Yes	15 (5%)	30 (5%)	57 (20%)	37 (7%)
No	282 (95%)	564 (95%)	222 (80%)	517 (93%)

* Mean (SD) reported

Table 3.

Results of univariable and multivariable regression analyses. Odds ratios represent odds of being a case (worse attendance).

		Prenatal Care Attendance		Well-Child Visit Attendance	
		Unadjusted	Adjusted[1]	Unadjusted	Adjusted[1]
Characteristic		**Odds Ratio (95% CI)**	**Odds Rati (95% CI)**	**Odds Ratio (95% CI)**	**Odds Ratio (95% CI)**
Race/Ethnicity[2]	Hispanic	2.3 (1.6, 3.5)	1.1 (0.6, 1.8)	4.2 (2.7, 6.7)	1.6 (0.9, 3.0)
	Black	2.4 (1.6, 3.5)	1.2 (0.8, 2.0)	3.8 (2.4, 5.8)	1.2 (0.7, 2.1)
	Asian	<0.01 (<0.01, >99.9)	<0.01 (<0.01, >99.9)	3.8 (1.3, 11.6)	4.6 (1.4, 15.1)
	Other	0.7 (0.4, 1.2)	0.4 (0.2, 0.8)	2.0 (1.0, 4.0)	1.3 (0.6, 2.8)
Insurance type[3]	Public	4.0 (2.8, 5.7)	3.4 (2.0, 5.4)	5.0 (3.4, 7.4)	2.7 (1.6, 4.8)
	Uninsured	3.5 (1.9, 6.7)	3.0 (1.5, 6.2)	10.7 (4.9, 23.5)	7.9 (3.4, 18.5)
Alcohol or Substance Use		1.0 (0.7, 1.3)	1.2 (0.8, 1.8)	1.0 (0.7, 1.4)	1.5 (1.0, 2.2)
Homelessness		1.2 (0.7, 2.8)	2.2 (0.5, 10.3)	1.5 (0.6, 3.7)	0.7 (0.3, 1.9)
Intimate Partner Violence		3.5 (1.5, 8.3)	2.9 (1.1, 7.2)	1.8 (1.1, 2.9)	1.0 (0.5, 1.8)
Mental Illness		1.6 (1.1, 2.5)	1.2 (0.7, 1.9)	1.1 (0.8, 1.6)	0.8 (0.5, 1.3)
Transportation Difficulties		1.0 (0.5, 1.9)	0.5 (0.3, 1.1)	3.8 (2.4, 6.0)	2.4 (1.5, 4.0)
Maternal Age at Delivery (years)		1.0 (1.0, 1.0)	1.0 (1.0, 1.0)	0.9 (0.9, 1.0)	0.9 (0.9, 1.0)
Gravidity (one unit increase)		1.1 (1.0, 1.2)	0.9 (0.7, 1.0)	1.2 (1.1, 1.3)	1.2 (1.0, 1.5)
Number of Living Children (one unit increase)		1.2 (1.1, 1.4)	1.4 (1.1, 1.7)	1.3 (1.2, 1.5)	1.1 (0.9, 1.3)

[1] Adjusted for all of the co-variates

[2] Reference group was non-Hispanic whites

[3] Reference group was commercially insured