EVALUATION OF A REDUCED-FREQUENCY PRENATAL VISIT SCHEDULE FOR LOW-RISK WOMEN AT A FREE-STANDING BIRTHING CENTER

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ABSTRACT

Objective: to evaluate the effectiveness of a reduced-frequency prenatal visit schedule by comparing perinatal outcomes, anxiety and maternal satisfaction with prenatal care.
Methods: pregnancy outcomes of infant and maternal morbidity and mortality, anxiety and satisfaction for 81 women receiving prenatal care at a free-standing birthing center according to either an alternative prenatal care visit schedule (APCVS) (n = 43) or the traditional prenatal care visit schedule (TPCVS) (n = 38) were examined in this prospective randomized study. Upon entry into prenatal care, all women were of low obstetrical risk status.
Results: major findings revealed no significant differences in selected perinatal outcomes between the two study groups. Women in the APCVS group reported significantly higher levels of satisfaction than women in the TPCVS group on both the satisfaction with provider subscale ($F = 5.74$, $P = .02$) and the satisfaction with the prenatal care system subscale ($F = 2.01$, $P = .04$). There were no statistically significant differences found in anxiety scores between women in the two study groups.
Conclusions: low-risk women who followed the reduced-frequency visit schedule experienced no difference in perinatal outcomes or anxiety. Women in the reduced-frequency (APCVS) group reported an increased level of satisfaction with both provider and the prenatal care system. © 1997 by the American College of Nurse-Midwives.

Although the current prenatal care visit schedule widely followed by health care providers in the United States is accepted as providing the highest quality care, little empirical evidence exists to validate visit frequency. Research has demonstrated the benefits of early and frequent prenatal care visits for women with complicated pregnancies (1). However, less is known about the benefits or value of prenatal care visits for healthy, low-risk women. An important question facing clinicians in this era of cost-containment then, is whether a "critical threshold" of prenatal care visits exists that may affect perinatal outcomes significantly.

In 1986, the United States Department of Health and Human Services Low Birthweight Prevention Work Group convened an Expert Panel to assess the content of prenatal care scientifically and systematically. The panel also examined effective and efficient approaches for enhancing maternal, infant, and family outcomes. A visit schedule for prenatal care largely derived from the literature was developed indicating when specific diagnostic tests should be optimally performed and when behavioral modification was most likely to have the greatest affect (2). Ten prenatal visits were proposed for low-risk women experiencing their first pregnancy and eight visits for women with subsequent pregnancies, not including the preconceptional visit and depending on the gestational age when the birth occurs. The schedule currently recommended by the American College of Obstetrics and Gynecologists (ACOG) (3) includes 14 prenatal visits for a full-term pregnancy.

Few studies, to date, have prospectively examined alternative prenatal care visit schedules. However, three recent studies have been published examining a reduced-frequency visit schedule (4–6). Binstock and Wolde-Tsadik (4) investigated the affect of a schedule of focused alternative prenatal care visits for low-risk patients (N = 549) receiving care in a large health maintenance organization (HMO) in southern California. The sample included low-risk, well-educated, mostly middle class women who were nonrandomly allocated to a reduced-frequency treatment group or traditional care group on the basis of their birth dates. The treatment group averaged eight prenatal visits in comparison to approximately 13 visits by women in the traditional group; no significant differences in maternal or perinatal outcomes were found between the groups. However, a higher level of satisfaction concerning continuity of care ($P < .0001$) was reported in the treatment group. Patient satisfaction parameters overall were either maintained or improved with alternative prenatal care.

McDuffie et al. (5) evaluated a reduced-frequency visit schedule in a randomized controlled trial in a similar HMO setting in Denver, CO. A total of 2,764 low-risk, primarily Caucasian, pregnant women followed either a nine-visit experimental schedule or the traditional schedule of 14 visits. Women in the experimen-

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tal group attended a mean of 2.7 fewer visits with no significant differences in the perinatal outcomes of preterm delivery, preeclampsia, cesarean delivery, and low birth weight. In addition, there were no differences found in patient satisfaction between the two study groups.

Sikorski et al. (6), in another prospective, randomized trial, compared perinatal outcomes and satisfaction with prenatal care for low-risk women (N = 2,794) attending the traditional British model of prenatal care (13 visits) versus a reduced-frequency schedule (seven visits for nulliparous and six for multiparous women) (6); no significant differences were found in terms of the perinatal outcomes as determined by the cesarean section rate, hypertensive disorders, labor patterns, and maternal or perinatal morbidity. Women in the experimental group had fewer day admissions to the hospital during their prenatal course, fewer ultrasounds, and a lower incidence of suspicion for intrauterine growth retardation (IUGR) with no difference in correct diagnosis of IUGR between the two groups.

Psychosocial outcomes for the experimental group were not as positive as cited in the two previous studies (4,5). Women attending the "new style" care demonstrated more negative attitudes toward their babies, worried more about their babies prenatally and how they would care for them postnatally, and were more dissatisfied with the number of visits they received when compared with the traditional group. The investigators speculated that some of the dissatisfaction may have come from the fact that the new style of care was not the expected norm.

Because of the scarcity of additional research on prenatal care delivery systems in a variety of settings and with diverse populations, concerns continue to exist about the efficacy of reduced-frequency visit schedules and the psychosocial effects of these approaches. Use of an alternative prenatal care schedule places additional responsibilities on pregnant women because the approach assumes that individuals are capable of overseeing their own health status between visits.

The primary purpose of the current study was to evaluate the effectiveness of an alternative (reduced-frequency) prenatal care visit schedule (APCVS) with an ethnically diverse, largely indigent population of low-risk pregnant women receiving care at a university-affiliated free-standing birthing center. Differences in perinatal outcomes, anxiety, and maternal satisfaction were examined between pregnant women receiving the APCVS and those receiving the traditional prenatal visit schedule (TPCVS).

MATERIALS AND METHODS

This prospective randomized study was conducted between July, 1993 and October, 1994 at a free-standing birthing center affiliated with a tertiary care university medical center in southern California. The birthing center was staffed by seven faculty certified nurse-midwives (CNMs) who provided full-scope care for women and their newborns from entry into prenatal care through the postpartum/neonatal period. Medical consultation with obstetric/gynecologic and pediatric physicians was available on an as-needed basis and at regularly scheduled patient care conferences.

Women meeting the eligibility criteria for care at the birthing center were invited to participate in the study upon entry into care. Study inclusion criteria consisted of 1) low-risk pregnancy, 2) beginning prenatal care before 26 weeks' gestation, 3) older than 18 years of age, and 4) ability to speak or read Spanish or English. Low-risk pregnancy status was defined as those women who met the eligibility requirements for care at the birthing center (ie, without evidence of diabetes, hypertension, cardiac conditions, seizures, lupus, asthma requiring medication, chronic infections, multiple gestation, previous stillbirth, previous preterm birth, previous cesarean section, and prepregnancy weight less than 250 pounds).

Women who met the low-risk criteria (N = 183) were given an information sheet describing the study followed by a verbal explanation and an opportunity to ask questions regarding the study. Those who volunteered gave informed consent and were enrolled in this investigation, which was performed under the auspices of the Institutional Review Board of Human Subjects for the University of California, Irvine. A total of 122 women agreed to participate in the study. There was no difference in the fees for pregnancy care to the patient, whether in the APCVS or TPCVS group from the fees charged for the usual pregnancy care.

Participants were randomly assigned to the APCVS or to the TPCVS using a computerized software program (7) in which data from demographic and personal char-

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acteristics were used to perform the randomization procedure. This program offers the advantage of stratification to improve random assignment balance. Variables employed in the randomization procedure included 1) parity, 2) body mass index, 3) gestational age at entry into prenatal care, 4) transfer of care from another provider, 5) health insurance type, 6) smoking status, 7) socioeconomic status, 8) history of illicit drug use, 9) history of alcohol use, 10) ethnicity, and 11) marital status.

The APCVS employed in this investigation represents an adaptation of the United States Department of Health and Human Services' (USDHHS) Expert Panel's recommended visit schedule (2); instead of having separate visit schedules for multiparous and primiparous women, all women in the APCVS group followed one visit schedule, regardless of parity. Women assigned to the APCVS group were scheduled to attend eight prenatal visits (an initial visit, and subsequent visits at 15–19 weeks, 24–28 weeks, 32 weeks, 36 weeks, 38 weeks, and weekly until delivery). After the initial visit, women in the APCVS group were given an appointment to return for care at the next designated time (weeks of pregnancy). For example, if a woman had an initial visit at 10 weeks of pregnancy, her next visit was scheduled at 15–19 weeks; thereafter, she followed the alternative visit schedule, unless a complication developed requiring more frequent care. Women in the TPCVS group followed the ACOG guidelines for prenatal care visits (3); after the initial visit, they returned for care every 4 weeks until 28 weeks, every two weeks until 36 weeks, and then weekly until delivery. Women in the TPCVS group also were scheduled for visits more frequently, if needed.

Each woman was primarily cared for by one CNM during her pregnancy. Length of time allotted for outpatient prenatal visits for both groups was 45 minutes for an initial evaluation and 15 minutes for a return prenatal visit. At each return prenatal visit blood pressure, weight, fetal heart rate, and fundal height measurements were taken, and the urine was tested for glucose and protein.

The educational content of the prenatal care was the same for both study groups. The ACOG prenatal forms served as a reminder for the topics to be covered according to trimester. Instruction was included on topics such as nutrition, maternal serum α-fetoprotein, weight gain, drug use, exercise, fetal movement, preeclampsia, preparation for labor and birth, signs and symptoms of preterm labor, possible complications and/or increased risk factors, and infant feeding methods and care of the infant.

Risk status was continuously assessed at each participant contact during prenatal care in both groups. Data, such as perinatal outcomes, were maintained on women experiencing a change in risk status, which necessitated transfer to physician care and women who transferred care for other reasons. If such a risk status change occurred, perinatal outcomes were assessed according to initial group assignment.

The timing of routine prenatal laboratory tests and other diagnostic tests and examinations was not altered by the study protocol. Initial tests included the Papanicolaou test, routine laboratory blood analysis, and gonorrhea and chlamydia cultures when indicated. Subsequent laboratory tests (maternal serum α-fetoprotein at 15–19 weeks, 1-hour glucose screening at 26–28 weeks, and antibody screening at 28 weeks for Rh-negative women), other diagnostic tests, examinations, and further education was provided as indicated according to the women's health status (in either group) and the clinical practice guidelines followed by the nurse-midwives at the birthing center. These data were recorded and examined as part of the data analysis.

Data collection measures administered to all women upon enrollment included the State and Trait Anxiety instrument (STAI) (8) and a Demographic and Personal Variables questionnaire developed by the investigator. At approximately 36–38 weeks of pregnancy, women again completed the State portion only of the STAI as well as the Patient Satisfaction with Prenatal Care instrument (9). Those instruments not available in Spanish were translated and pilot tested to assess reliability and validity. After the birth of the baby, perinatal and prenatal care outcome data were collected by chart review.

Anxiety

Anxiety generally is characterized by subjective feelings of tension, apprehension, nervousness, and worry. It can manifest itself through two modes: state anxiety and trait anxiety (8). State anxiety is that which occurs on a transitory basis, whereas trait anxiety refers to the tendency to perceive stressful situations as dangerous or threatening and to respond to such situations with elevations in the intensity of state anxiety (8). Both state and trait anxiety were measured at entry into the study (Time 1), with only state anxiety measured at 36–38 weeks gestation (Time 2). The state anxiety rating scale is a Likert-type scale with responses ranging from 1 (not at all) to 4 (very much so). Two examples from the state anxiety scale are "I feel self-confident" and "I am jittery." The trait anxiety rating scale is a Likert-type scale ranging from 1 (almost never), to 4 (almost always). Two sample items from the trait anxiety score are "I have disturbing thoughts" and "I feel satisfied with myself." Reported Chronbach-α coefficient for the Trait Anxiety instrument range from 0.81 to 0.91 and from 0.90 to 0.92 for the State Anxiety instrument (8).

Satisfaction with Prenatal Care

Satisfaction was measured using the Patient Satisfaction with Prenatal Care (PSPC) instrument (9), which was

designed to assess women's satisfaction with prenatal care services. Items are rated from 1 (strongly agree) to 6 (strongly disagree) for each of the five PSPC subscales. A lower sum score equates to a higher degree of satisfaction. The five Satisfaction subscales are 1) motivation to obtain prenatal care, 2) expectations about prenatal care, 3) satisfaction with provider, 4) satisfaction with the health care staff subscale, and 5) satisfaction with the prenatal care delivery system. Chronbach-α coefficients for the subscales range from 0.26 to 0.95.

Data management and statistical analyses were performed using computer software (10). Descriptive statistics were given for maternal age, months/years lived in the United States, years of regular schooling, body mass index, number of weeks pregnant at entry into study, number of pregnancies, ethnicity, language spoken, marital status, type of health insurance, and place of birth for the APCVS, the TPCVS, and for the entire sample. Pearson's correlations were conducted, where appropriate, to describe the relationships between the variables. All tests were two-tailed with an α level of 0.05. The sample size was selected to provide 80% power to detect a difference of 250 g between the mean birth weights of the two groups using a two-tailed T-test with an α level of .05 under the assumptions of normally distributed error with a standard deviation (SD) of about 350 g (SD estimated from previous data). A difference of this magnitude would be clinically significant and would fall between what Cohen (11) defines as a medium-sized effect and a large effect. Cohen's tables indicated that the study needed 33 patients per group to obtain this power. The obtained sample sizes (38 plus 43) and SD (415) were both larger than anticipated, and they ended up providing a power of 76% to detect a difference in birthweight of 250 g (11).

RESULTS

Of the 122 women who consented to randomization during the 15-month study period (61 in each group), 37 (30%) voluntarily withdrew from the study (19 in the TPCVS, 18 in the APCVS). Reasons given for dropping out of the study varied. The most common reason cited was transferring care to another medical provider (n = 12, 32%), followed by personal preference (n = 9, 24%), a desire or requirement for care not provided by the birthing center such as epidurals and home birth (n = 8, 22%). Others dropped out due to a change in insurance type (n = 3, 8%) and relocation to another area (n = 3, 8%). Two women (6%) gave birth at another hospital in the area after receiving prenatal care at the birthing center. No statistically significant differences were found between dropouts and retained participants on selected demographic variables using analysis of variance (ANOVA) and χ^2 analysis.

Pregnancy losses were experienced by four women after signing the study consent form and being randomized into the traditional care group based on their demographic information. Three had first trimester spontaneous abortions and the fourth experienced an intrauterine fetal loss at 19 weeks' gestation.

Eighty-one (66%) women completed the study; 38 in the traditional group and 43 in the experimental group. Nine (11%) participants (five in the TPCVS group and four in the APCVS group) followed the assigned study visit schedule but were transferred late in their pregnancies prior to the onset of labor; they received the remainder of their prenatal care and intrapartum care at the tertiary care medical center. Eleven women (14%) were transferred to the medical center while in labor (six in the TPCVS group and five in the APCVS group), with one of these women (TPCVS) self-referring to the medical center for the birth of her baby. In all, 61 (75%) of the participants gave birth at the birthing center, whereas 20 women (25%) were delivered at the tertiary care medical center. There were no statistically significant differences between the two study groups in terms of women who were transferred either antepartally ($F = 0.35$, $P = .56$) or intrapartally ($F = 0.06$, $P = .80$) on χ^2 analysis.

No significant differences were found between the two study groups in age, race, parity, years of education, gestational age at entry into the study, body mass index (BMI), marital status, insurance type, ethnicity, origin, or length of stay in the United States using ANOVA and χ^2 procedures (Table 1). The mean age of participants at entry into the study was 25.29 (SD = 5.25) years. Of those participants who were not born in the United States, the mean length of stay in the United States was 77 months (SD = 76.42). Seventy-four percent (n = 60) of the women were Hispanic, 22% (n = 18) Caucasian, and 1.2% (n = 1) Asian-American. Sixty-seven percent (n = 54) of the participants were born outside of the United States. Fifty-six percent (n = 45) of participants spoke Spanish only, 25% (n = 20) spoke English, and 16% (n = 13) responded that they spoke both Spanish and English. Most participants (60%, n = 48) were not employed, whereas 17% (n = 14) were employed part time and only 14% (n = 11) were employed full time. Eighty-two percent (n = 66) of the participants reported their health insurance as being MediCal (Medicaid), 10% (n = 8) were covered by some form of private insurance, and 3% (n = 2) had no health care insurance coverage.

Significant differences were found in the number of prenatal visits between women in the TPCVS group (10.84, SD = 2.33) and women in the APCVS group (7.65, SD = 1.62) ($F = 50.78$, $P = .0001$). No statistically significant differences were found between groups on the numbers of unscheduled appointments, appointments missed, telephone calls, evaluation room visits, "no-show" appointments, or emergency room visits (Ta-

TABLE 1

Demographic Characteristics of Women Completing the Study (N = 81)	*TPCVS (n = 38)*	*APCVS (n = 43)*
	Mean (SD) Range	Mean (SD) Range
Maternal age (yrs)	26.17 (5.41) 19.8–39.9	24.49 (5.04) 18.3–35.70
Months lived in the United States	65.91 (56.02) 9–240	74.63 (64.29) 15–252
Years of regular schooling	9.24 (3.77) 2–15	9.82 (3.49) 2–15
Number of weeks pregnant at entry into study	14.29 (4.59) 7–25	14.58 (5.20) 5–25
Number of pregnancies, including current pregnancy	2.64 (1.31) 1–5	2.12 (1.21) 1–5
Body mass index	24.36 (4.53) 17.75–36.01	24.72 (5.67) 16.34–44.38
	N (%)	*N* (%)
Ethnicity		
White	9 (23)	9 (20.9)
Hispanic	28 (73.7)	32 (74.4)
Asian-American	0	1 (2.3)
Missing	1	1
Born in the United States		
Yes	11 (28.9)	10 (23.3)
No	24 (63.2)	30 (69.80)
Missing	3 (7.9)	3 (7.00)
Language spoken		
English	9 (23.7)	11 (25.6)
Spanish	23 (60.5)	22 (51.2)
English and Spanish	5 (13.2)	8 (18.6)
Missing	1 (2.6)	2 (4.7)
Marital status		
Single	4 (10.5)	6 (14.0)
Married	20 (52.6)	27 (62.8)
Living together, not married	11 (28.9)	7 (16.3)
Divorced, separated, or widowed	2 (5.2)	1 (2.3)
Type of health insurance		
Medicaid	33 (86.8)	33 (76.7)
Private insurance	3 (7.9)	5 (11.6)
Self-pay	1 (2.6)	1 (2.3)
Missing	1 (2.6)	4 (9.3)

TPCVS, traditional prenatal care visit schedule; APCVS, alternative prenatal care visit schedule; SD, standard deviation.

ble 2). Overall, women in the experimental group attended 3.2 visits fewer than those in the traditional group ($P = .0001$).

Results of ANOVA and χ^2 statistical procedures demonstrated no significant differences ($P < .05$) in perinatal outcomes between the two study groups in gestational age at birth (from the maternal prenatal record), Ballard score, birthweight, average weekly maternal weight gain, type of birth, days in the newborn nursery or neonatal intensive care unit (NICU), neonatal complications, or maternal complications (Table 3). No significant differences were found between the two study groups on maternal outcomes. Preterm birth (less than 37 completed weeks' gestation according to the maternal prenatal record) occurred in 11.6% ($n = 5$) of the women in the experimental group and 5.3% ($n = 2$) in the traditional group ($P = .49$). By Ballard Score, however, no infant in either group was determined to be less than 37 weeks' gestation. Rates of preeclampsia were not different. No cesarean deliveries were performed in the experimental group, but cesarean delivery was performed on 7.9% of the women in the traditional group ($P = .13$). Antepartum and intrapartum transfer rates did not differ significantly between study groups.

Neonatal outcomes of days spent in the newborn nursery or NICU, birthweight, gestational age by Ballard score, and neonatal complications did not differ significantly between groups (Table 3). Nineteen infants were cared for at the tertiary care medical center. Five infants were admitted to the NICU and 14 to the newborn nursery. Of the 19 infants cared for at the medical center, nine were due to maternal intrapartum transfer, nine were born at the medical center to mothers whose care had been transferred prenatally, and one baby was transferred after birth due to fetal anomalies requiring a 9 day NICU stay.

TABLE 2
Adherence to Prenatal Care Visit Schedule

	TPCVS (n = 38) Mean (SD) Range	*APCVS (n = 43) Mean (SD) Range*
Regularly scheduled prenatal visits	10.84 (2.33) 6–16	7.65 (1.62) 3–11
Documented phone calls	0.47 (0.86) 0–4	0.51 (0.80) 0–3
Missed "no show" prenatal visits	0.26 (0.55) 0–2	0.28 (0.59) 0–2
Birthing center evaluation room visits	1.76 (1.55) 0–7	1.65 (1.27) 0–7
Unscheduled "drop in" office visits	0.08 (0.27) 0–1	0.23 (0.57) 0–3
Emergency room visits	0.03 (0.16) 0–1	0.09 (0.29) 0–1

TPCVS, traditional prenatal care visit schedule; APCVS, alternative prenatal care visit schedule; SD, standard deviation.

Anxiety scores on both state and trait scales did not differ significantly between the two study groups at Time 1 and Time 2, nor was the change in state anxiety scores different.

Women in the APCVS group were significantly more satisfied with both the provider and prenatal care system than women in the TPCVS group. Analysis of variance of the Patient Satisfaction with Prenatal Care instrument demonstrated significant differences in satisfaction with prenatal care provider ($F = 5.74$, $P = 0.02$) and satisfaction with prenatal care system ($F = 4.31$, $P = 0.04$) subscales. Participants reported moderate levels of expectations of prenatal care ($M = 2.80$, $SD = 0.48$) and motivation to obtain prenatal care ($M = 2.23$, $SD = 0.78$); however, satisfaction with prenatal care providers and staff was high ($M = 1.75$, $SD = 0.53$) and satisfaction with the prenatal care system was moderately high ($M = 2.03$, $SD = 0.48$).

DISCUSSION

This study is the first United States randomized controlled trial specifically comparing different prenatal visit schedules with an ethnically diverse, largely Medicaid population. The major findings support the limited available research that demonstrate no significant differences on selected perinatal outcomes for low-risk women receiving care according to a reduced-frequency prenatal schedule versus those following the ACOG schedule. Moreover, there were significant differences in satisfaction with the prenatal care provider and prenatal care system between women in the two groups. This finding is consistent with the two studies done in the United States (4,5) but differs from the United Kingdom study in which women in the reduced-frequency group were more likely to be dissatisfied both with the number of visits received and with their prenatal care overall (6). Nevertheless, a statistically significant number of women in the reduced-frequency group in the British study (6) indicated that they would choose the same schedule in a future pregnancy.

Participants in both groups attended fewer visits than the 13 visits that ACOG considers "sufficient" prenatal care for a full-term pregnancy (3). Women in the experimental group attended a mean of 7.6 visits, which ACOG considers "insufficient" prenatal care for women having a full-term pregnancy. Women in the traditional group attended a mean of 10.8 visits, which also is below the ACOG standard but not considered insufficient (3). Using the Kessner (12) or GINDEX (13) index of prenatal care, women in both study groups received an intermediate level of prenatal care. Previous retrospective studies have reported increased perinatal morbidity when women attend less than sufficient or "adequate" prenatal care (14–17). Findings from the current study as well as the three reduced-frequency visit studies previously discussed (4–6) indicate that it may be possible for low-risk women to attend fewer visits than stated in the literature and still experience healthy perinatal outcomes.

Women in this study received care from CNMs throughout their pregnancy, labor, birth, and postpartum and neonatal period. Studies have demonstrated that nurse-midwives are effective caregivers in the prevention of low birthweight babies and premature births (18–30). These studies indicate favorable outcomes in infant birth weight, gestational age, Apgar scores, and perinatal mortality for patients managed by nurse-midwives. Several reasons for these positive outcomes have been proposed: 1) nurse-midwives have been shown to be particularly effective in managing the care of pregnant women at high social and economic risk due to an emphasis on education, support, and patient satisfaction (24); 2) the increased length of time spent with patients in their prenatal visits compared to other providers (28,29); and 3) nurse-midwifery patients may be more compliant with visit and treatment recommendations (30). When interpreting the results of this study, consideration should be given to the influence of provider type.

The majority of participants in the study ($n = 54$, 67%) were foreign born and Hispanic (predominantly from Mexico). Data suggests that maternal birth in Mexico is a marker for the persistence of Hispanic cultural orien-

TABLE 3
Perinatal Outcomes and Prenatal Care Indices

Demographic Characteristics of Women Completing the Study (N = 81)	*TPCVS (n = 38)*	*APCVS (n = 43)*	*ANOVA*
	Mean (SD) Range	Mean (SD) Range	*P*
Number of prenatal visits attended	10.84 (2.33) 6–16	7.65 (1.62) 3–11	.0001*
Gestational age at birth (wk)	38.66 (1.12) 36–40	38.09 (1.46) 34–42	.06
Birthweight (g)	3506.92 (400.75) 2761–4370	3356.81 (429.37) 2680–4880	.11
Average weekly maternal weight gain (lb)	1.13 (0.42) 0.25–1.96	0.3 (0.43) −0.23–2.16	.34
	N (%)	*N* (%)	χ^2
Type of birth			.13
Normal spontaneous vaginal delivery	33 (86.8)	42 (97.7)	
Cesarean section	3 (7.9)	0	
Vacuum extraction	2 (5.3)	1 (2.3)	
Forceps	0	0	
Ballard score			.43
<37 weeks	0	0	
37 weeks	0	3 (7)	
38 weeks	3 (8.1)	6 (14)	
39 weeks	6 (16.2)	5 (11.6)	
40 weeks	20 (54.1)	17 (39.5)	
41 weeks	6 (16.2)	10 (23.3)	
42 weeks	2 (5.4)	2 (4/7)	
Days in the newborn nursery			.64
None	28 (73.7)	37 (86.1)	
One	4 (10.5)	3 (7.0)	
Two	4 (10.5)	2 (4.7)	
Three	1 (2.6)	1 (2.3)	
Four	1 (2.6)	0	
Days in the neonatal intensive care unit			
None	37 (97.4)	39 (90.7)	.35
One	1 (2.6)	1 (2.3)	
Five	0	2 (4.7)	
Nine	0	1 (2.3)	
Neonatal complications			
Sepsis	0	1	
Hyperbilirubinemia	1	1	
Respiratory distress	0	3	
Fetal anomalies	0	1	
Other	1 (syphillis)	1 (Lung cyst, craniosynotosis)	
Maternal complications			
Preterm labor	3	1	
Intrauterine growth restriction	1	0	
Anemia	1	1	
Recurrent urinary tract infection	1	1	
Pregnancy induced hypertension	1	2	
Fetal malposition (nonvertex)	1	2	
Substance abuse	0	1	
Post dates	2	2	
Other	6 (ie, hyperemesis, tuberculosis test, syphillis, rule out pneumonia)	8 (ie, cervical intraepithelial neoplasia, Pyelonephritis, gonorrhea culture and syphillis)	

TPCVS, traditional prenatal care visit schedule; APCVS, alternative prenatal care visit schedule; SD, standard deviation.
* Based on two-way analysis of variance.

tation. Although limited data are available, findings from a few studies (31–34) suggest that factors associated with Hispanic cultural orientation may be beneficial to pregnancy outcomes. Hispanic women born in the United States had a 60% greater risk for low birth weight than foreign-born Hispanics (31). Similarly, the results of a study by Ventura & Taffel (32) indicate that the incidence of low birth weight is lower in Mexican infants of foreign-born mothers rather than U.S.-born mothers, regardless of age, marital status, education, and trimester of prenatal care initiation. Why this occurs is not clear, however, it is thought to be due to the poor health habits acquired by Hispanic women in the United States (33). Foreign-born Hispanic women had better self-care practices, such as not drinking alcohol, smoking, or using illicit drugs (33). It is possible, therefore, that the large number of current study participants who were foreign-born may have contributed to the fact that no low birth weight baby (< 2500 g) was born to any of the participants independent of the visit schedule followed.

A notable finding is the absence of adverse perinatal findings in this sample of participants who largely enrolled in prenatal care in the second trimester of pregnancy (M = 14.4, SD = 4.89). Enderlein et al (35) similarly observed that women who are healthy and without a history of medical and obstetrical complications are more likely to delay seeking prenatal care. This sample was composed of women who were low risk obstetrically and medically, predominantly low income, Hispanic, and using Medicaid as their health insurance. The lengthy time required to process Medicaid applications may have contributed to the delay in the initiation of prenatal care to some extent.

On the other hand, a recent study showed that Hispanic women delayed initiation of prenatal care regardless of early enrollment in Medicaid, with 78% of the Hispanic women enrolled in Medicaid by the first trimester; yet, only 51% initiated care in the first trimester (36). In the current study, women reported applying for Medicaid at a mean of 9 weeks' gestation, but initiation of prenatal care occurred at a mean of 14.4 weeks. The delay in initiation of care may only be partially attributed to waiting for a prenatal appointment because the wait for a first prenatal appointment was, at most, 1–2 weeks during the study period.

This study's findings are consistent with the previously cited studies in demonstrating that although Hispanic women delay prenatal care, they experience a low incidence of adverse pregnancy outcomes and low birth weight babies. With the paucity of sound scientific evidence to support the current (ACOG) visit schedule and recommendations of early initiation of prenatal care, conflicting study findings, and the growing body of evidence that certain groups of women may initiate prenatal care later without adverse consequence, reexamination of the current visit schedule recommendations should be considered.

Limitations of this study include the small sample size. In studies where nonsignificance is a significant finding, the risk of not rejecting the null hypothesis when it is false (Type II error) is greater with a smaller sample size. Additional limitations include the homogeneity of the sample, and the inability to eliminate the selection bias of women who select to receive their care in a free-standing birthing center setting. Future studies should use a larger, more diverse sample in a variety of settings. Because the majority of the participants were Hispanic, medically and obstetrically low-risk, and from lower socioeconomic groups, the results cannot be generalized beyond conditions that existed in this study.

Overall, the findings of this study suggest that a reduced-frequency prenatal visit schedule may be an effective alternative pattern of care for low-risk Hispanic women. Further research is needed, employing more culturally diverse populations of pregnant women from both urban and rural settings.

Use of a reduced-frequency visit schedule, without increasing perinatal complications, has the potential for considerable cost savings. Not only would a savings be found in direct medical costs by women attending fewer visits during their pregnancies but in indirect costs such as work absence, travel time, and child care.

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REFERENCES

1. Enkin M, Chalmers I. Effectiveness and satisfaction in antenatal care. London: Spastics International, 1982.

2. Public Health Service Expert Panel on Prenatal Care. Caring for our future: the content of prenatal care. Washington (DC): Public Health Services, U.S. Department of Health and Human Services, 1989.

3. American College of Obstetricians and Gynecologists. Standards for obstetric-gynecologic services. 7th ed. Washington (DC): ACOG, 1989.

4. Binstock MA, Wolde-Tsadik G. Alternative prenatal care: impact of reduced visit frequency, focused visits and continuity of care. J Reproduc Med 1995;40:507–12.

5. McDuffie RS, Beck A, Bischoff K, Cross J, Orleans M. Effect of frequency of prenatal care visits on perinatal outcome among low-risk women: a randomized controlled trial. JAMA 1996;27:847–51.

6. Sikorski J, Wilson J, Clement S, Das S, Smeeton N. A randomised controlled trial comparing two schedules of antenatal visits: the antenatal care project. Br Med J 1996;312:546–53.

7. Conlon M, Anderson GC. Three methods of random assignment: comparison of balance achieved on potentially confounding variables. Nurs Res 1990;39:376–9.

8. Spielberger CD, Gorsuch RL, Lushene RE. Manual for the State-Trait Anxiety Inventory. Palo Alto (CA): Consulting Psychologists Press, 1980.

9. Omar M, Schiffman R. Patient Satisfaction with Prenatal Care instrument. East Lansing (MI): Michigan State University, 1992.

10. Statistical package for social services-PC+, version 4.01. Chicago: SPSS Inc., 1990.

11. Cohen J. Statistical power analysis for the behavioral sciences. 2nd ed. Hillsdale (NJ): Lawrence Erlbaum Associates, 1988.

12. Kessner DM, Singer J, Kalk CW. Infant death: an analysis by maternal risk and health care. In: Contrasts in Health Status. Washington (DC): National Academy of Sciences, 1973.

13. Alexander GR, Cornely DA. Prenatal care utilization: its measurement and relationship to pregnancy outcome. Am J Prev Med 1987;3:243–53.

14. Moore TR, Origel W, Key TC, Resnick R. The perinatal and economic impact of prenatal care in a low socioeconomic population. Am J Obstet Gynecol 1986;154:29–33.

15. Tyson J, Guzick D, Rosenfeld CR. Prenatal care evaluation and cohort analyses. Pediatrics 1990;85:195–204.

16. Showstack JA, Budetti PP, Minkler D. Factors associated with birthweight: an exploration of the roles of prenatal care and length of gestation. Am J Public Health 1984;74:1003–8.

17. Hulsey TC, Patrick CH, Alexander GR, Ebeling M. Prenatal care and prematurity: is there an association in uncomplicated pregnancies? Birth 1991;18:146–50.

18. Sakala C. Midwifery care and out-of-hospital birth settings: how do they reduce unnecessary cesarean section births? Soc Sci Med 1993;37:1233–50.

19. McLaughlin FJ, ALtemeier WA, Christensen MJ, Sherrod KB, Dietrich MS, Sterm DT. Randomized trial of comprehensive prenatal care for low-income women: effect on infant birth weight. Pediatrics 1992;89:128–32.

20. Cavaro CM, Fullerton JT, Bartlome JA. Assessment of the process and outcomes of the first 1,000 births of a nurse-midwifery service. J Nurse Midwifery 1991;36:104–10.

21. Heins HC, Nance NW, McCarthy BJ, Efird CM. A randomized trial of nurse-midwifery prenatal care to reduce low birthweight. Obstet Gynecol 1990;75:341–5.

22. Knoll K. Prenatal care providers. In: Merkatz IR, Thompson JE, eds. New perspectives on prenatal care. New York: Elsevier, 1990:621–3.

23. Keleher KC, Mann LI. Nurse-midwifery care in an academic health center. J Obstet Gynecol Nurs 1986;15:369–72.

24. Institute of Medicine. Preventing Low Birthweight. Washington (DC): National Academy Press, 1985.

25. Brucker M, Mueller M. Nurse-midwifery care of adolescents. J Nurse Midwifery 1985;30:277–9.

26. Scupholme A. Nurse-midwives and physicians: a team approach to obstetrical care in a perinatal center. J Nurse Midwifery 1982;27:21–7.

27. Sharp ES, Lewis LE. A decade of nurse-midwifery practice in a tertiary university-affiliated hospital. J Nurse Midwifery 1984;29:353–65.

28. U.S. Congress Office of Technology Assessment. Nurse practitioners, physician assistants, and certified nurse-midwives: a policy analysis. Washington (DC): U.S. Government Printing Office, 1986.

29. Lehrman E. Nurse-midwifery practice: a descriptive study of prenatal care. J Nurse Midwifery 1981;26:27–41.

30. Slome C, Wetherbee H, Daly M, Christensen K, Meglen M, Thiede H. Effectiveness of CNMs: a prospective evaluation study. Am J Obstet Gynecol 1976;124:177–82.

31. Guendelman S. Fetal deaths in Mexican-American black, and white non-Hispanic women seeking government-funded prenatal care. J Community Health 1994;19:319–30.

32. Ventura S, Taffel S. Childbearing characteristics of U.S.-born and foreign-born Hispanic mothers. Public Health Report 1985; 100:647–52.

33. Collins JW, Shay DK. Prevalence of low birth weight among Hispanic infants with U.S.-born and foreign-born mothers: the effect of urban poverty. Am J Epidemiol 1994;139:184–192.

34. Scribner R, Dwyer J. Acculturation and low birth weight among Latinos in the Hispanic HANES. Am J Public Health 1989;79:1263–7.

35. Enderlein MC, Stephenson PA, Holt VL, Hickok D. Health status and timing of onset of prenatal care: is there an association among low-income women? Birth 1994;21:71–6.

36. Moore P, Hepworth JT. Use of perinatal and infant health services by Mexican-American Medicaid enrollees. JAMA 1994;272:297–304.