

# Improving prenatal health behaviors: Implementing a blended model of prenatal care

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A key measure of the efficacy of prenatal care and childbirth education is whether or not they have a positive effect on health-promoting behaviors during and following pregnancy. The purpose of this study was to measure the performance of positive health behaviors prior to and following participation in a blended prenatal care (BPC) model (individual visits plus three group visits) versus traditional prenatal care (TPC) and to compare pregnancy outcomes between the BPC and TPC groups.

**KEY WORDS:** group prenatal care, blended prenatal care, pregnancy, health behaviors, childbirth education, pregnancy outcomes

Women's health behaviors during pregnancy may negatively or positively affect maternal and fetal/neonatal outcomes.<sup>1</sup> Health behaviors during pregnancy that are likely to lead to positive outcomes—that is, health-promoting behaviors—include obtaining early prenatal care; acquiring pregnancy/childbirth education; adhering to nutritional and weight-gain guidelines; getting regular exercise and adequate sleep; avoiding use of tobacco, alcohol, illicit drugs, and certain over-the-counter drugs; avoiding engaging in risky sexual behaviors; reducing stress; and avoiding exposure to communicable infections.<sup>1,2</sup> Might the type of prenatal care that a woman receives affect the likelihood that she will engage in health-promoting behaviors during pregnancy? And will these health-promoting behaviors then have a favorable impact on pregnancy outcomes?

## Traditional prenatal care versus group prenatal care

**Traditional prenatal care**  
Traditional prenatal care (TPC) occurs in a one-on-one setting between a patient and her health-care provider (HCP). The emphasis is usually on early detection and



intervention for health problems (e.g., hypertension, diabetes) that could adversely affect pregnancy outcomes.

### Group prenatal care

Over the past two decades, group prenatal care (GPC) has emerged as an effective alternative to TPC.<sup>3</sup> The CenteringPregnancy (CP) model, an evidence-based form of GPC, was developed by nurse-midwife Sharon Rising in 1998.<sup>3,4</sup> With CP, the emphasis is on education and peer support in addition to assessment.<sup>4,5</sup> At each CP visit, 8-12 participants who are at similar points in their pregnancies check their own weight and blood pressure (BP), see an HCP on an individual basis for assessment of fetal heart tones and fundal heights, and then attend an educational group session that lasts about 90 minutes. The group attends a total of 10 sessions together. Topics typically covered during these educational sessions include breastfeeding, common discomforts, comfort measures, family planning, mental health, personal goals, baby care and safety, intimate partner violence, and oral health.<sup>6</sup>

### Literature review

A review of the literature gleaned from the CINAHL database showed that GPC, when compared with TPC, provided for greater patient-HCP contact and equal or superior pregnancy health-promoting behaviors and birth outcomes.<sup>5</sup> GPC, versus TPC, fostered improved health behaviors such as taking prenatal vitamins, attending prenatal care visits,<sup>7</sup> and breastfeeding one's infant,<sup>5,8,9</sup> and extended the interpregnancy interval by reducing the number of acts of unprotected sex.<sup>10</sup>

Birth weight and gestational age

With blended prenatal care, group visits—typically 3 visits instead of the 10 with CenteringPregnancy—are integrated into the schedule of individual visits. Blended prenatal care has many logistical, financial, and practical advantages.

at delivery are important health indicators for newborns. When compared with TPC, GPC had a favorable impact on these birth outcomes. Group visits were associated with longer gestations<sup>11</sup> and fewer preterm births.<sup>5,8</sup> Ickovics et al<sup>5</sup> reported preterm birth rates of 9.8% among GPC participants and 13.8% among TPC participants. Grady and Bloom<sup>8</sup> reported 50% lower rates of preterm birth and low neonatal birth weight among adolescents receiving GPC versus TPC. One study showed that GPC participants, relative to TPC participants, were less likely to give birth to small-for-gestational-age infants, although the rate of preterm birth was not lower with group care.<sup>10</sup> GPC was also associated with higher overall birth weights and lower odds of very low neonatal birth weight and fetal demise.<sup>11</sup>

Hale et al<sup>12</sup> found that GPC, when compared with TPC, was associated with a higher participation rate in postpartum family planning services, although Shakespear et al<sup>13</sup> found that CP participants engaged in fewer health-promoting behaviors than did their TPC counterparts. Overall, no difference was found between CP and TPC groups regarding the number of behav-


iors changed during pregnancy.<sup>12</sup> Trudnak et al<sup>7</sup> found that, when compared with TPC participants, CP participants were more likely to obtain adequate prenatal care; however, these women were more likely to formula-feed their babies. Although GPC shows promising birth outcome results, some studies found no difference in birth weight or gestational age at delivery between women receiving GPC versus TPC.<sup>7,14,15</sup> Overall, the literature results have been mixed and studies have been limited by small sample sizes.

### Blended prenatal care

Studies have documented several barriers to implementing the CP model or other types of GPC in an office setting designed for TPC. These barriers include initial costs, training of staff, absence of institutional space, lack of educational resources, scheduling issues, and recruitment and retention of patients.<sup>16-18</sup> Implementing a blended model of prenatal care is one way to overcome some of these barriers.

With blended prenatal care (BPC), group visits—typically 3 visits instead of 10—are integrated into the schedule of individual visits.<sup>19</sup> Advantages of BPC are that facilitators





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can customize their own teaching topics to the group's demographics, the clinic can implement GPC with fewer staff members and lower costs than the CP model, and the group can include high-risk pregnant women because individual care is still provided. In 2014, Lathrop and Pritham<sup>20</sup> piloted a BPC model entitled Healthy Pregnancy, Healthy Childbirth, Healthy Parenting (HPCP). HPCP incorporates one 90-minute educational group visit in each trimester to advance maternal knowledge of self-care during pregnancy/childbirth and of infant care. Using a novel 8-item questionnaire, Lathrop and Pritham found that HPCP had a favorable impact on all outcome measures of maternal knowledge acquisition, self-efficacy, and satisfaction.

### The study

A key measure of the efficacy of prenatal care and childbirth education is whether they have a favorable effect on patients' health-promoting behaviors both during pregnancy and following childbirth. The purpose of this descriptive study, conducted from January 2017 to October 2017, was to ascertain how a BPC model compared with TPC in terms of the performance of health-promoting behaviors and in terms of pregnancy

outcomes among women in a large multisite obstetrics practice. Approval for this study was obtained from the University of Alabama Institutional Review Board.

### Methodology

Patients were recruited and enrolled for the study by various office staff members, including medical assistants, receptionists, and the researcher. Flyers advertising the study were placed in the waiting room and throughout the clinic. Once women consented to participate, simple random sampling was done to assign them to the BPC group (n = 36) or the TPC group (n = 39). Any pregnant woman aged 18-44 years who received prenatal care at the multisite clinic was eligible to participate in the research study. Exclusion criteria included first-trimester spotting, miscarriage, twin pregnancy, and acquisition of late prenatal care (defined as >14 weeks' gestation at the initial obstetric visit).

### Data collection

Data collected from participants included demographic information (e.g., age, race, marital status, highest educational level, gravida/parity status), maternal health behaviors during pregnancy, and gestational age and weight of the neonate at

birth. Additional maternal outcome data obtained were weight gain during pregnancy, attendance at a postpartum visit, feeding method, and postpartum contraceptive use.

Health behaviors during pregnancy were ascertained using the Health Practices in Pregnancy Questionnaire-II (HPQ-II), a valid and reliable 34-item self-administered instrument that measures health practices in pregnancy that are important to pregnancy outcomes.<sup>1</sup> The questionnaire addresses areas such as safety, rest, exercise, nutrition, avoidance of harmful substances, obtaining healthcare, and seeking prenatal and childbirth education. Each item on the HPQ-II has five potential response options indicating the frequency an activity is performed, ranging from 1 (never) to 5 (always). Items regarding harmful health behaviors are reverse coded. The sum of all item responses ranges from 34 to 170, with a higher score positively correlated with performance of health-promoting behaviors essential to favorable pregnancy outcomes.

### Intervention

The BPC model used in this study was guided by Lathrop and Pritham's pilot study.<sup>20</sup> This model consisted of three group prenatal visits (one per trimester) that were integrated into the TPC schedule of individual visits. TPC consisted of about 14 prenatal visits. BPC participants completed the HPQ-II at the beginning of the first group meeting and at the end of the third group meeting. TPC participants completed this questionnaire at their scheduled prenatal visits at 10-14 weeks' gestation and at 30-34 weeks' gestation.

The BPC participants met once each trimester in the waiting room

**Table 1.** Demographic characteristics of study population by group

| Group                 | TPC (n = 39) | BPC (n = 36) |
|-----------------------|--------------|--------------|
| Maternal age: M (SD)  | 27 (5.73)    | 26.2 (6.223) |
| Race: n (%)           |              |              |
| White                 | 22 (56.4)    | 20 (55.6)    |
| Black                 | 12 (30.8)    | 15 (41.7)    |
| Other                 | 5 (12.8)     | 1 (2.8)      |
| Marital status: n (%) |              |              |
| Single                | 15 (38.5)    | 20 (55.6)    |
| Married               | 24 (61.5)    | 15 (41.7)    |
| Divorced              | 0 (0)        | 1 (2.8)      |
| Education: n (%)      |              |              |
| High school           | 8 (20.5)     | 13 (36.1)    |
| Some college          | 18 (46.2)    | 10 (27.8)    |
| Associate degree      | 5 (12.8)     | 3 (8.3)      |
| Bachelor's degree     | 7 (17.9)     | 8 (22.2)     |
| Master's degree       | 1 (2.6)      | 2 (5.6)      |
| Parity: n (%)         |              |              |
| Nulliparous           | 15 (38.5)    | 14 (38.9)    |
| Multiparous           | 24 (61.5)    | 22 (61.1)    |

BPC, blended prenatal care; M, mean; SD, standard deviation; TPC, traditional prenatal care.

of the obstetrics practice. Because BPC participants could attend one of five different meetings during each trimester, the specific participants varied at each meeting. Group visits began with participants (typically, 5-8 per group) checking in at the front desk. The medical assistant obtained and recorded each woman's BP, urinalysis results, and weight. Fetal heart tones and fundal heights were assessed, as needed, by the nurse practitioner at each of the group visits. Classroom time, led by the researcher, consisted of 60 minutes of instruction provided by a PowerPoint video, handouts, and a guest speaker. An additional half hour was available for questions and discussion.

First-trimester group visits were offered on five different dates to women at 10-14 weeks' gestation. Topics for discussion included fetal development, nutrition, prenatal vitamins, weight gain, the relationship between a healthful

lifestyle and a healthy pregnancy, the importance of receiving adequate prenatal care, exercise, rest and stress management, alcohol and smoking cessation, avoidance of toxic substances, medications, common pregnancy discomforts and relief measures, and danger signs to report. Participants received pamphlets from the March of Dimes, including *Prenatal Care; Eating Healthy; Smoking and Pregnancy; and How Your Baby Grows*.

Second-trimester group visits were offered on five different dates to women at 22-26 weeks' gesta-

tion. Topics for discussion included fetal development, avoidance of harmful activities, appropriate weight gain, exercise, fetal kick counts, gestational diabetes screening, preterm labor precautions, relief of pregnancy discomforts, selecting a pediatrician, and hospital information. A physical therapist, who attended this visit as a guest speaker, reviewed ways to relieve back pain in pregnancy and the importance of exercise.

Third-trimester group visits were offered on five different dates to women at 30-34 weeks' gestation. Topics for discussion included fetal development and lung maturity, signs and symptoms of true versus false labor, pain control options, breastfeeding, contraception options, postpartum bleeding and danger signs, postpartum blues and depression, and infant car seat safety.

## Results

Table 1 provides demographic information about the two groups. Five women in the TPC group and four in the BPC group did not complete the third-trimester HPQ-II because of miscarriage, an out-of-state move, or a transfer of care. Therefore, a total of 66 women completed the first- and third-trimester HPQ-IIs. A mixed between-within ANOVA was performed to explore the effect of BPC on pregnancy health behaviors.

**Table 2.** HPQ-II mean scores by group and time

| Time | Group | Mean   | SD     | 95% CI        |
|------|-------|--------|--------|---------------|
| 1    | TPC   | 130.53 | 10.270 | 127.04-134.01 |
|      | BPC   | 132.53 | 10.051 | 128.94-136.12 |
| 2    | TPC   | 133.21 | 8.509  | 130.11-136.29 |
|      | BPC   | 135.31 | 9.546  | 132.12-138.50 |

BPC, blended prenatal care; CI, confidence interval; HPQ-II, Health Practices in Pregnancy Questionnaire-II; SD, standard deviation; TPC, traditional prenatal care.

**Table 3.** Pregnancy outcomes differences by group

| Outcomes  | TPC<br>(n = 35) | BPC<br>(n = 31) | P value |
|---|-----------------|-----------------|---------|
| <b>Prenatal/birth outcome: M (SD)</b>                   |                 |                 |         |
| Gestational weight gain (lb)                            | 26.8 (10.73)    | 26.9 (14.89)    | .972    |
| Gestational age (weeks)                                 | 37 (3.57)       | 38 (1.46)       | .247    |
| Birth weight (g)  | 3,041 (679.89)  | 3,203 (497.44)  | .279    |
| <b>Infant feeding method at 6 weeks: n (%)</b>          |                 |                 | .289    |
| Breast  | 12 (34.3)       | 13 (41.9)       |         |
| Bottle  | 14 (40.0)       | 13 (41.9)       |         |
| Breast and bottle                                       | 5 (14.3)        | 1 (3.2)         |         |
| <b>Contraception method of choice at 6 weeks: n (%)</b> |                 |                 | .782    |
| Oral contraceptive pill                                 | 11 (31.4)       | 9 (29)          |         |
| Long-acting reversible contraceptive                    | 14 (40)         | 11 (35.5)       |         |
| Bilateral tubal ligation                                | 4 (11.4)        | 3 (9.7)         |         |
| Condoms   | 3 (8.6)         | 1 (3.2)         |         |
| Medroxyprogesterone acetate                             | 1 (2.9)         | 2 (6.5)         |         |
| Vasectomy   | 0 (0)           | 1 (3.2)         |         |
| <b>Attended 6-week follow-up: n (%)</b>                 | 32 (91.4)       | 27 (87.1)       | .329    |

BPC, blended prenatal care; M, mean; SD, standard deviation; TPC, traditional prenatal care.

Table 2 lists mean scores, standard deviations, and confidence intervals for the HPQ-11s. Outcome variables were found to be normally distributed, and equal variances were assumed based on the results of Levene's test  $F(1, 64) = 0.406$  ( $P = .526$ ) for time 1 score and  $F(1, 64) = 0.223$  ( $P = .631$ ) for time 2 score. The interaction effect between performance of positive health behaviors and type of prenatal care was not significant,  $F(1, 1) = 1.038$  ( $P = .312$ ). There was a significant change in the performance of positive health behaviors over time for both groups based on Wilks' Lambda = .93,  $F(1) = 4.83$  ( $P = .032$ ), although the effect size was very small (multivariate partial  $\eta^2 = .070$ ).

Maternal and birth outcome data are presented in Table 3. The groups did not differ significantly with respect to maternal weight gain, gestational age at delivery, or birth weight. Eight preterm births occurred in the TPC group and one

in the BPC group (the significance of the preterm births was not analyzed as a part of this study). Preterm births in the TPC group occurred at 23-36 weeks' gestation; two women in this group were delivered at 23 or 30 weeks because of severe pre-eclampsia, resulting in infant death. The groups did not differ significantly with respect to 6-week postpartum outcome data (infant feeding method, contraceptive method of choice, attendance at a follow-up visit).

### Discussion

This study measured the performance of positive health behaviors prior to and following BPC versus TPC, and showed no significant difference between care models with respect to any health behavior scores. Both care models were found to be effective; significant and similar changes in health behavior scores occurred in both groups over time. From the first

trimester to the third trimester, a nominal 3-point increase in mean score occurred in both groups. Although the two groups did not differ significantly in terms of gestational age or birth weight of their infants, the BPC group had only one preterm birth whereas the TPC group had eight such births.

Study limitations were the small sample size, lack of a private room for group meetings, and limited scheduling options. Group sessions were offered only on Fridays because of scheduling conflicts within the clinic. Data not collected for this study included patient satisfaction, income level, smoking status, type of delivery, and cost. Item analysis of the HPQ-11, which could have provided some insight into which teaching topics had the greatest impact on health behaviors, was not done. Recommendations for future research include cost-effective analysis and more studies on the BPC model to improve the design



of the model and to document success of the prenatal outcomes.

## Implications

Group prenatal care has a host of benefits for pregnant women but can initially be overwhelming for a practice or clinic to set up and implement. Offering a blended approach to prenatal care may be a viable option for some clinics that serve a diverse population, including those with a large number of high-risk pregnancies. Although the research shows favorable to mixed reviews on the benefits of GPC compared with TPC, only a few studies on BPC exist. According to Ickovics et al,<sup>10</sup> *any intervention that shows promise to reduce preterm births warrants further clinical and empirical attention.*

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