Introduction of CenteringPregnancy in a Public Health Clinic

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CenteringPregnancy is a promising group visit prenatal care innovation that provides substantial health promotion content. Elements unique to group care include peer support and self-management training and activities. CenteringPregnancy was introduced at a large public health clinic serving predominantly low-income African American pregnant women. All prenatal care at this clinic was provided by certified nurse-midwives, and all providers were trained in the CenteringPregnancy model. One hundred and ten women received prenatal care in CenteringPregnancy groups. Focus groups of pregnant women, providers, and health center staff reported that the program benefited women despite implementation challenges such as scheduling changes. Compared to women in individual care, women in CenteringPregnancy had significantly more prenatal visits, increased weight gain, increased breast feeding rates, and higher overall satisfaction. This pilot project demonstrated that CenteringPregnancy can be implemented in a busy public health clinic serving predominantly low-income pregnant women and is associated with positive health outcomes. J Midwifery Womens Health 2009;54:27–34 © 2009 by the American College of Nurse-Midwives.

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INTRODUCTION

There is widespread recognition of the need for innovative models of prenatal care to address our national failure to reach the Healthy People 2000 and 2010 goals for increasing prenatal care use and reducing the long-standing racial/ethnic disparities in pregnancy outcomes.[1,2] CenteringPregnancy, a group prenatal care model, is a promising innovation which challenges the standard model of prenatal care which has been in place in the United States for more than a century.[3–5] CenteringPregnancy replaces the individual prenatal care visit with a group model for obstetrically low-risk women, and this model provides substantially more health promotion content than the traditional one-on-one prenatal care model. Elements unique to group care include group peer support and self-management training and activities.[5]

This program evaluation examined the acceptability of CenteringPregnancy to the providers, clinic staff, and participants in a neighborhood public health clinic. A retrospective medical record review was used to compare outcomes for women enrolled in CenteringPregnancy and women who received individual care in this clinic.

BACKGROUND

The setting for this study is a public health clinic that serves a predominantly African American population. It is well documented that perinatal outcomes are poorer for African Americans than any other group in the United States. In 2004, low birth weight (LBW), prematurity, and infant mortality rates for non-Hispanic black infants were at least twice as high as for non-Hispanic whites.[6–8] The causal mechanisms that account for this disparity are complex, incompletely understood, and widely debated. Poorer preconceptional health, late entry into prenatal care, poverty, higher general and racism-related stress, and other socioeconomic and health disadvantages are widely acknowledged as contributing factors.[2,9–14]

Despite a steady rise in prenatal care use rates between 1990 and 2004, the national goals for prenatal care (90% of all women to have early first trimester and at least adequate prenatal care)[1] remain unmet overall and especially for African Americans.[14,15] According to the 2010 Healthy People goals, in 2004, only 76% of non-Hispanic black women entered care in the first trimester, compared to 88% of non-Hispanic white women. Only 75% of all women received "at least adequate" prenatal care[7] based on Kotelchuck's measure of prenatal care adequacy.[1]

Prenatal care content is less studied than prenatal care use. There has been no reconsideration of the content of prenatal care since the 1989 guidelines developed by the multidisciplinary Expert Panel on Prenatal Care Content.[16] Two recent reviews by Moos[17] and Gregory et al[18] found little new evidence to validate or refute the recommended health promotion content with the exception of specific content areas, such as smoking cessation.

Evidence suggests that health promotion content may affect perinatal outcomes and health behaviors during pregnancy. Earlier work by Kogan et al[19–21] suggested that African American women were less likely to receive critical health promotion content on topics such as substance abuse and breastfeeding, while at the same time experiencing poorer pregnancy outcomes. More recently, Vonderheid et al[22] found that only 10% of

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women reported discussing all 22 health promotion content topics during their prenatal care by certified nurse-midwives (CNMs) and physicians in an urban hospital-based clinic. These topics, developed from the Expert Panel on Prenatal Care recommendations, included nutritional information, danger signs in pregnancy, seat belt use, substance abuse cessation, and safer sex practices. Healthier behaviors during pregnancy were associated with discussing more health promotion topics ($r = 0.25$; $P = .001$), using fewer substances ($r = 0.37$; $P = .000$), and having a more positive attitude towards pregnancy ($r = 0.35$; $P = .01$).[22] While some evidence suggests that discussing health promotion content is an important aspect of prenatal care that may lead to healthier maternal behaviors, more evidence is needed to determine which content may be most beneficial to targeted at-risk populations.[23]

Prenatal care models that provide comprehensive services and address women's psychosocial and medical needs are increasingly recognized as important public health interventions that should be strengthened.[24] Prenatal care has important benefits beyond its expected effects on perinatal outcomes, including improved maternal health,[18,25] the appropriate use of pediatric care,[26] and serving as an entry point into the health care system for women at social or economic risk.[27] Pregnancy is a time of transition when women are motivated to make changes in their health behaviors and when repeated contact with providers offers an unparalleled opportunity to encourage healthful behaviors.[28,29] Prenatal interventions focused on specific behaviors, such as substance use, nutritional behaviors, and general health promotion interventions, have been documented to foster positive behavior change.[30–33]

Group delivery of health care holds promise as a model that can increase both health promotion content and social support and lead to behavior change.[34] CenteringPregnancy, a group prenatal care model, consists of ten 2-hour visits beginning at 16 to 18 weeks of gestation and continuing until birth, following the recommended schedule for prenatal care. At each group, women perform self-care skills, such as weight and blood pressure, have a short assessment with their provider in the group space, and then use the remaining time as a group to discuss their concerns, ask questions, and explore with other women the new roles of pregnancy, parenting, and motherhood. They also learn about necessary health information to keep themselves safe and healthy in pregnancy and beyond.

Thus far, five studies of CenteringPregnancy have been published.[4,35–39] Rising[4] reported the initial development of CenteringPregnancy and found high rates of prenatal care use (86%), low rates of preterm delivery (4.5%) and LBW (5.4%), and fewer emergency visits in the third trimester when compared to a convenient clinic control group.[4] In a prospective matched cohort design (N = 458), there was a statistically significant increase in birth weight for preterm infants. CenteringPregnancy infants were larger (2398 g vs. 1990 g; $P < .05$), related to an average 2-week lengthening of gestation.[35] A study of CenteringPregnancy for adolescents that used a retrospective and concurrent comparison group found significantly lower preterm (10.5%) and LBW (8.9%) rates and high satisfaction among young women in groups.[36] Preterm births were significantly higher in the concurrent (25.7%; $P < .02$) and retrospective (23.2%; $P < .05$) comparison groups. Similarly, the rates of LBW were 22.9% ($P < .02$) in the concurrent and 18.3% ($P < .05$) in the retrospective comparison group.[36] Baldwin,[37] in a pre-/post-test design with 108 women, found that women in CenteringPregnancy groups had significantly higher prenatal knowledge scores.[37]

The only randomized controlled trial of Centering Pregnancy conducted to date compared the outcomes of three groups: CenteringPregnancy, enhanced CenteringPregnancy (focused on HIV/sexually transmitted disease prevention), and individual care (control group). Participants in the study included 1047 African American, Latina, and white women and ranged in age from 14 to 25 years. This clinical trial found that women in the CenteringPregnancy groups had a 33% reduction in preterm birth (9.8 vs. 13.8; $P = .45$; odds ratio [OR], 0.67; 95% confidence interval [CI], 0.44–0.98) as well as significant improvements in breast feeding initiation and maternal prenatal knowledge. Participants in group prenatal care were significantly more satisfied with their care and were more prepared for labor and delivery.[38] African American group participants realized even greater benefits from CenteringPregnancy, with a 41% reduction in preterm births (10.0 vs. 15.9; $P = .02$; OR, 0.59; 95% CI, 0.38–0.92) when compared to African Americans who were enrolled in individual care.[38] Taken together, these five studies of CenteringPregnancy suggest that the CenteringPregnancy group model of prenatal care has a positive impact on pregnancy and health-related outcomes. In addition, a study of the productivity and cost of CenteringPregnancy found that it was more productive in

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that this model can serve twice as many women and reduce cost in the setting studied.[39]

Although the existing evidence to date suggests that CenteringPregnancy is beneficial, most low-income women in the United States do not have the opportunity to receive CenteringPregnancy as an alternative to individual prenatal care. This mixed-method study examined the feasibility of implementing CenteringPregnancy in the challenging environment of a large, urban, public health clinic and also explored the associated outcomes.

METHODS

The setting for this study was an urban public health clinic in the Midwest where all low-risk prenatal care is provided by CNMs from a practice in a large, urban university medical center. All clients are eligible for Medicaid, and 98% are African American. The clinic serves more than 700 pregnant women per year, although not all women attend this clinic for prenatal care throughout pregnancy. A heavy caseload and large number of walk-in clients contribute to the long waiting times experienced by many women attending the clinic. The University medical center provides intrapartum care for approximately one-half of the clients at the health clinic. Over the course of the project, 29 CenteringPregnancy groups were started, 22 groups were completed, and 7 groups were cancelled because of limited enrollment. Groups ranged in size from 4 to 10 members, with an average group size of 5.5 members.

All providers and staff who wanted to be involved in group care were trained at a workshop sponsored by the national Centering Pregnancy and Parenting Association. Each group was facilitated by a CNM provider and a cofacilitator, either the project assistant or a clinic support staff person.

After the clinic providers and staff had been trained, the clinic staff began to invite women into CenteringPregnancy groups. All women were eligible to participate in group care if they planned to continue prenatal care at the site and were less than 18 weeks pregnant upon entry into care. Women who declined group care continued to receive individual care from CNMs in the clinic. Women who began prenatal care after 18 weeks' gestation, were not going to continue prenatal care at the clinical site, or had high-risk obstetric conditions were excluded from participation in group care. Program staff called patients 2 to 4 days before the group met; reminder postcards were also sent 1 week before each group session.

Implementation of CenteringPregnancy at this urban health clinic was evaluated in three ways. First, qualitative focus groups were conducted to evaluate the feasibility and acceptability of the program. Second, a small client satisfaction survey was completed. Lastly, a medical record review of maternal and infant outcomes was completed for both women in CenteringPregnancy groups and individual care who delivered at the university hospital.

The evaluation was approved by the Institutional Review Board of the University of Illinois at Chicago and the Research Committee of the Chicago Department of Public Health. The medical record review was granted a waiver of informed consent because all patient data were de-identified.

Focus Groups

Three focus groups to evaluate feasibility and acceptability of CenteringPregnancy were conducted with: five participants in CenteringPregnancy, four of the six CNMs who facilitated groups, five health center staff and five administrators. The focus groups for the participants and the staff and administrators occurred at the clinic site; the CNM focus group took place in the hospital.

Women who participated in the focus group were selected from lists of women who had completed CenteringPregnancy groups. An effort was made to select at least one woman from each group provider. They were contacted by the project assistant and asked if they would participate. Informed consent was discussed and obtained from women participating in the focus group and those women who completed the satisfaction survey. Once six women agreed to participate, recruitment was stopped.

During the participant focus group, two members of the research team used a discussion guide to explore women's experiences in CenteringPregnancy, what they saw as the advantages and disadvantages, what they liked best and least, and whether they felt prepared for labor. The staff/administrator focus groups were conducted by members of the research team and an organizational consultant. The CNM focus group was facilitated by members of the research team. The staff and administrators participated in separate focus groups so that staff would feel free to discuss their experiences without their supervisors present. Feedback from support staff was shared with administrators so that they could comment on staff perspectives. The providers, staff, and administrators were asked what they saw as the overall effect, advantages and disadvantages of CenteringPregnancy for the participants as well as the providers, staff and clinic. They were also asked their views about sustainability of the model. Two note takers attended the staff and administrator focus groups; the remaining focus groups were audio taped. Transcripts and notes were analyzed using content analysis by the research team until consensus was reached regarding key themes.

Satisfaction

The 11-item satisfaction scale used in this study was derived from a 30-question prenatal care satisfaction

scale used previously by Handler et al.[40,41] The 30-item scale was validated with low-income African American and Latina women obtaining prenatal care in a variety of clinical sites.[42–44] In the current study, Dr. Handler shortened the scale to reduce respondent burden. Eleven questions about aspects of care likely to distinguish Centering Pregnancy care from individual care included: the technical quality of care (four items), art of care (four items), availability of care (two items), and efficacy (one item). Each item was rated on a Likert-type 5-point scale ranging from excellent to poor. Because a few surveys had missing data, we divided the sum of the scores by the number of items. Thus, the individual score had a possible range of 1 to 5. Surveys with more than two missing items were not included in the analysis. The scores ranged from 1.82 to 5.00. The scale had high total reliability ($\alpha = 0.93$).

Thirty-five women in the third trimester of pregnancy completed the survey (21 in group care and 14 in individual care). Women in CenteringPregnancy received the survey from a research assistant not involved in their prenatal care immediately after a group session; the women receiving individual care received the survey and completed it in the waiting room. No demographic information was collected on these anonymous surveys.

Outcomes

A prenatal and postpartum medical record review was used to ascertain maternal and infant health outcomes for all women from the clinic who delivered at the university hospital during the period of project implementation (December 2004 to October 2006). Data regarding maternal age, infant birth weight, gestational age, and breastfeeding at discharge came from the hospital records, while information regarding the number of prenatal visits and weight gain was abstracted from the clinic prenatal record.

RESULTS

One hundred and ten women completed CenteringPregnancy groups during the study period, 65 of whom delivered at the university hospital. The comparison group (n = 207) consisted of all women receiving individual care who delivered at the university hospital during the study period. Women were excluded from the outcome analysis if they had a fetal demise before 28 weeks' gestation or delivered before the completion of at least four individual or group visits. The final outcome analysis included 61 women in CenteringPregnancy groups who delivered at the university hospital between December 2004 and October 2006; 207 women enrolled in individual care during the same time period.

The participants were exclusively African Americans. The age range was 14 to 38 years, with a mean age of 21.8 years. The mean age of participants in CenteringPregnancy was significantly lower than the mean age of the women in individual care (20.8 vs. 22.1 yrs; $P < .05$). There was no significant difference in the percent of adolescents in both groups (19.7 % in CenteringPregnancy vs. 21.3% in individual care).

Focus Group Results

Focus group's themes are listed in Table 1. Although the women had only positive comments, the CNMs and staff expressed concerns related to the feasibility and sustainability of the model in this setting. Women reported that they enjoyed sharing their pregnancy experience with other women and appreciated that group members "were like them." Many remarked that they felt they learned about pregnancy by sharing similar experiences and concerns. Women in groups reported that they felt well prepared for pregnancy and birth as a result of the educational component of CenteringPregnancy. Women described enhanced relationships with their providers and the ability to build relationships with other women.

In CNM focus groups, four themes emerged. First, the CNMs identified that CenteringPregnancy increased opportunities to provide the educational and support components of prenatal care. Second, the providers uniformly related that women who participated in group care were happier and seemed to want to come for prenatal care. They stated that women also appreciated not having to wait for their visits, a common issue in this crowded clinic.

Third, the CNMs also spoke of the challenges they encountered in implementing and conducting group care in a busy public health clinic. They described institutional barriers, such as improper scheduling for groups and lack of adequate recruitment into groups, both of which affected their participation and satisfaction with the model. Similarly, receiving medical records in a timely manner and coordinating lab services were identified as challenges by a number of the CNMs. Finally, the CNMs also noted that it is challenging to learn group facilitation skills, and noted that skills varied among providers and depended upon facilitative leadership experience and personal styles. A few of the providers expressed a sense of loss of individual time with clients.

While the staff and administrator focus groups were conducted separately, their responses were combined as the staff comments were shared (without identifying information) with administrators for comments. The staff and administrators identified five themes regarding the implementation, acceptability, and sustainability of the model. They recognized that women in CenteringPregnancy had the advantage of not having to wait for their visit because groups start and end on time, while other prenatal clients often experienced long delays. Group participants were perceived as

Table 1. Themes Expressed in CenteringPregnancy Focus Groups

Group	Themes	Participant's Words
Participants	1. Enjoyed sharing their pregnancies 2. Well prepared for labor and birth 3. Enhanced relationships with their providers and other pregnant women	"I loved the program because every time you come you can share your story" "I learned a lot about the pluses of breastfeeding . . . I changed my mind . . . I'm still breastfeeding him." "I get more attention and get more out of the group than a one-on-one." ". . . The good thing about [CenteringPregnancy] is that you turn out to have friends."
Certified nurse-midwives	1. Enhanced the educational components of prenatal care—women better informed 2. Increased participation and satisfaction with prenatal care 3. Challenges with implementation in a large, public health clinic 4. Challenges for provider to facilitate group, "give up" one-on-one time with client	"[CenteringPregnancy] is truly empowering for women who participated because they learn more things about themselves and their health, their family's health, and the health care system." "There is certainly a lot of interaction in group and even the quieter ones are involved." "Concern that deeper issues could not be addressed in groups and the individual model was stronger for this." "There is no system for scheduling, while one provider does group the other provider gets dumped on."
Staff and administrators	1. Successfully addressed waiting time issues for the clinic 2. Women were enthusiastic about group care 3. Brought recognition to the site 4. Women more engaged in prenatal and pediatric care 5. Challenges with implementation and sustainability in a large, public health clinic	"Mothers enjoy CenteringPregnancy because they don't wait for their appointments and they leave at a certain time." "Some girls have to wait all day." "Participants are 'really happy about the program,' want to come to prenatal care, and recommend group care to their friends." "Girls are on time, they're really happy with the program." "They take their own blood pressures and say, 'We can do this ourselves.'" "[Participants are] more into care for their babies." "They seek out our resources, like breastfeeding support." "Taking a provider away for CenteringPregnancy hinders clinic flow."

being more independent and involved in their prenatal care, kept appointments more than those in individual care, and took the initiative to reschedule a visit if they missed a group visit. Group participants were seen as bonding with each other and having camaraderie. CenteringPregnancy was viewed as "group rap" that allowed participants to talk and let go of their thoughts and ideas in a safe environment. Providers were seen as facilitators of discussion allowing the participants to elaborate on topics they were interested in. One staff member described CenteringPregnancy as "discovery learning" that was reinforced by the group. The staff noted that group participants were more involved in pediatric care, had better communication with the providers, and were more likely to seek out clinic resources because group care participants "hear more about what resources" the clinic offers. The clinic as a whole also benefited, because the staff were commended by the Commissioner of Public Health for introducing this innovative program. The staff also commented that late entry into care is common at the clinic and was a barrier to participation in this project. They hoped that CenteringPregnancy could be adapted to meet the needs of women entering prenatal care later in pregnancy.

The staff and administrators also reported challenges in implementing CenteringPregnancy. Scheduling issues persisted throughout the project related to walk-ins and to the over-scheduling of individual visits during group time. A few staff members felt that two clinic staff (facilitator and cofacilitator) were "taken away" from individual care appointments to conduct group care.

Administrators discussed barriers to sustainability. The administrators felt that CenteringPregnancy was an external program that could only be continued with outside funding and support. In particular, they felt dependent upon having an assistant to maintain the group care model. While refreshments and program materials could be budgeted for, a dedicated staff person to assume a leadership position in maintaining CenteringPregnancy was not feasible. Integrating and training new staff into the CenteringPregnancy program was difficult. Finally, they expressed difficulty in the integration of groups into the established scheduling system of the clinic. The large volume of walk-in patients that were seen in addition to the regularly scheduled appointments created challenges for providers and staff. To reduce scheduling issues, one idea was to make CenteringPregnancy the primary model of prenatal care at the clinic.

Satisfaction Survey

Based on the satisfaction with prenatal care scale, women in group care had higher satisfaction than women in individual care. The CenteringPregnancy group had a mean score of 3.9 (standard deviation = 0.7), while women in individual care had a mean score of 3.4 (standard deviation = 1.0; $P < .05$ [1-tailed t test of significance]).

Perinatal Health Outcomes

There was no statistically significant difference between the CenteringPregnancy and individual care groups in mean gestational age at birth or mean birth weight. There were also no significant differences in the percent of infants born prematurely (<37 weeks' gestation) or the percent of LBW infants (<2500 g). Given the small number of cases, the lack of statistical significance for birth outcomes was not surprising.

Women in CenteringPregnancy attended significantly more prenatal visits (9.7 vs. 8.3) and gained significantly more weight during pregnancy (32.2 lbs vs. 28.5 lbs; $P = .05$). Women in CenteringPregnancy were significantly more likely to have initiated at least some breastfeeding during hospitalization (59% vs. 44%; $P = .05$). Forty-four percent were exclusively breastfeeding at hospital discharge, compared to only 31.2% of the women in individual care (Table 2).

Table 2. Perinatal Outcomes for CenteringPregnancy and Individual Care Participants

	CenteringPregnancy (n = 61)	Individual Care (n = 207)	P^a
No. of prenatal visits, mean (SD)	9.7 (2.7)	8.3 (3.4)	<.05
Weight gain during pregnancy (lbs), mean (SD)	32.2 (13.6)	28.5 (15.6)	<.05
Exclusive breastfeeding at discharge[a] (%)	44.3%	31.2%	<.05
Any breastfeeding at discharge[a] (%)	59.0%	43.6%	<.05

[a]Independent t test for continuous variables, χ^2 for percentages.

There were eight premature births in the CenteringPregnancy group (13.1%) and 23 premature births in the individual care group (11%). Health outcomes were examined separately for women whose infants were born prematurely to provide important descriptive information. Women in the CenteringPregnancy group had infants who were born at a later mean gestational age (35.6 vs. 34.8 wks) and were nearly 200 g heavier (2486 vs. 2292 g) on average. Of the eight mothers of premature infants in CenteringPregnancy, six (75%) breastfed their infant, compared to only five (26%) of the 19 mothers receiving individual care for whom data were available. Given the small number of cases, none of these differences reached statistical significance.

DISCUSSION

This program evaluation documented the feasibility and acceptability of implementing CenteringPregnancy among pregnant women, providers, and staff in a busy public health clinic. The implementation of CenteringPregnancy was successful, and while challenges exist, many positive outcomes were realized. It provides encouraging evidence that women in CenteringPregnancy may be more likely to have healthier pregnancies, higher rates of prenatal care attendance, and higher rates of breastfeeding than their counterparts in individual care. Because all providers in this clinic are from the same midwifery practice, the type of provider and prenatal care protocols were uniform for both women in CenteringPregnancy and those in individual care. This suggests that differences between the groups were not likely caused by differences in provider type.

The results reported here are consistent with the outcomes and trends identified in previously reported research on the CenteringPregnancy model of care. Ickovics et al[38] reported increased rates of breastfeeding initiation (66.5% vs. 54.6; $P = .001$); this study found similar increases, especially among women who delivered prematurely. Staff in the current study commented that breastfeeding is not common in their patients' community, but in CenteringPregnancy, participants discuss breastfeeding with their peers and this may influence their decision to breastfeed.

Group participants in this study were also described as being more independent, taking the initiative to self-schedule missed visits, and were more involved in their prenatal care and in their infants' pediatric care. These behaviors suggest that group participants may feel more empowered, which is consistent with other studies of group prenatal care that showed more knowledge related to pregnancy[37,38] and feeling prepared for labor and delivery.[38]

Higher satisfaction with prenatal care among CenteringPregnancy participants is consistent with findings of Ickovics et al.[38] While one prospective study found that satisfaction was not associated with prenatal use,[41] more prospective studies are still needed to examine the relationship between satisfaction and prenatal attendance among CenteringPregnancy participants.

This study was limited by the lack of a randomized control group. Because women self-selected to be in CenteringPregnancy rather than individual care, we cannot rule out the possibility that the women who chose group care were also more committed to attending prenatal care, more likely to engage in healthier behaviors, and more interested in breastfeeding. The small

sample size and the use of only one clinic also limited our ability to generalize these results to other settings and meant that we did not have adequate power to detect the impact of CenteringPregnancy on the relatively rare infant outcomes of prematurity and LBW. While appropriate maternal weight gain remains an important recommendation for pregnancy, high rates of maternal obesity suggest the needs to tailor weight gain recommendations to the maternal prepregnancy weight. Because medical record data was limited to total maternal weight gain, it is difficult to determine if reported weight gain was appropriate for all participants.[45]

Both the administrators and the staff reported benefits in offering CenteringPregnancy both for their clients and for their clinic in general. Importantly, the model was able to virtually eliminate the issue of waiting time for those women attending group. If the model is expanded to include more women, it is likely that this significant problem for both clients and health center could be drastically reduced.

Finally, this research also highlights the important role of training and skills building for those offering group prenatal care. Group facilitation skills are challenging to learn and the providers in this study identified that ongoing training is critical to the success of a group prenatal care program.

CONCLUSION

Increased satisfaction with care and the pregnancy experience coupled with improved outcomes, especially for an at-risk population, points to the potential for CenteringPregnancy to effectively meet the needs of pregnant women whose needs are not adequately met in individual care. Further evaluation of CenteringPregnancy is needed using more rigorous designs and larger samples to explore and document the effect of group care on maternal/infant outcomes, satisfaction with care, and potential long-term effects on mothers and their families.

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REFERENCES

1. Department of Health and Human Services. Healthy People 2010, conference edition. Available from: *www.health.gov/healthypeople/Document/tableofcontents.htm* [Accessed June 2, 2008].

2. Misra DP, Guyer B, Allston A. Integrated perinatal health framework. A multiple determinants model with a life span approach. Am J Prev Med 2003;25:65–75.

3. Novick G. CenteringPregnancy and the current state of prenatal care. J Midwifery Womens Health 2004;49:405–11.

4. Rising SS. Centering pregnancy. An interdisciplinary model of empowerment. J Nurs Midwifery 1998;43:46–54.

5. Rising S, Kennedy H, Klima C. Redesigning prenatal care through CenteringPregnancy. J Midwifery Womens Health 2004; 49:398–404.

6. Hoyert DL, Heron MP, Murphy SL, Kung H. Death: Final data for 2003. Natl Vital Stat Rep 2006;54:1–120.

7. Martin JA, Hamilton BE, Sutton PD, Ventura SJ, Menacker F, Kirmeyer S. Births: Final data for 2004. Natl Vital Stat Rep 2006;55:1–101.

8. MacDorman MF, Martin JA, Mathews TJ, Hoyert DL, Ventura SJ. Explaining the 2001–02 infant mortality increase: Data from the linked birth/infant death data set. Natl Vital Stat Rep 2005;53:1–22.

9. Lu MC, Halfon N. Racial and ethnic disparities in birth outcomes: A life-course perspective. Matern Child Health J 2003; 7:13–30.

10. Culhane J, Rauh V, McCollum K, Elo I, Hogan V. Exposure to chronic stress and ethnic differences in rates of bacterial vaginosis among pregnant women. Am J Obstet Gynecol 2002;187: 1272–6.

11. Hobel CJ. Stress and preterm birth. Clin Obstet Gynecol 2004;47:856–82.

12. Parker DT, Dunkel-Schetter C, Mancuso R, Rini C, Hobel C. Stress in African-American pregnancies: Testing the roles of various stress concepts in prediction of birth outcomes. Ann Behav Med 2005;29:12–21.

13. Fiscella K. Racial disparity in infant and maternal mortality: Confluence of infection and microvascular dysfunction. Matern Child Health J 2004;8:45–54.

14. Healy AJ, Malone FD, Sullivan LM, Porter TF, Luthy DA, Comstock CH, et al. Early access to prenatal care: Implications for racial disparity in perinatal mortality. Obstet Gynecol 2006;107: 625–31.

15. Hogan VK. Addressing perinatal health disparities: Another place for a paradigm shift. N C Med J 2004;65:159–63.

16. Public Health Service Expert Panel on the Content of Prenatal Care. Caring for our future, the content of prenatal care: A report of the Public Health Service Expert Panel on the Content of Prenatal Care. Washington, DC: Public Health Service, Department of Health and Human Services; 1989.

17. Moos M. Prenatal care: Limitations and opportunities. J Obstet Gynecol Neonatal Nurs 2006;35:278–84.

18. Gregory KD, Johnson C, Johnson T, Entman S. The content of prenatal care update 2005. Womens Health Issues 2006;16: 198–215.

19. Kogan MD, Alexander GR, Kotelchuck M, Nagey DA. Relation of the content of prenatal care to the risk of low birth weight. Maternal reports of health behavior advice and initial prenatal care procedures. JAMA 1994;271:1340–5.

20. Kogan MD, Alexander GR, Kotelchuck M, Nagey DA, Jack BW. Comparing mothers' reports on the content of prenatal care

received with recommended national guidelines for care. Public Health Rep 1994;109:637–46.

21. Kogan MD, Kotelchuck M, Alexander GR, Johnson WE. Racial disparities in reported prenatal care advice from health care providers. Am J Public Health 1994;84:82–8.

22. Vonderheid SC, Norr KF, Handler AS. Prenatal health promotion content and health behaviors. West J Nurs Res 2007;29: 258–76.

23. Alexander GR, Kotelchuck M. Assessing the role and effectiveness of prenatal care: History, challenges, and directions for future research. Public Health Rep 2001;116:306–16.

24. Vintzileos AM, Ananth CV, Smulian JC, Scorza WE, Knuppel RA. The impact of prenatal care in the United States on preterm births in the presence and absence of antenatal high-risk conditions. Am J Obstet Gynecol 2002;187:1254–7.

25. Barash J, Weinstein L. Preconception and prenatal care. Prim Care Clin Office Pract 2002;29:519–42.

26. Kogan MD, Alexander GR, Jack BW, Allen MC. The association between adequacy of prenatal care utilization and subsequent pediatric care utilization in the United States. Pediatrics 1998;102(1 Pt 1):25–30.

27. Kogan MD, Martin JA, Ventura SJ, Alexander GR, Kotelchuck M, Frigoletto FD. Benefits and limitations of prenatal care. JAMA 1998;280:2071–2.

28. American College of Nurse-Midwives. Standards for the practice of nurse-midwifery. Descriptive documents: Standards for the practice of nurse-midwifery 2002. Available from: *www.midwife.org/prof* [Accessed June 2, 2008].

29. Rising SS, Lindell SG. Symposium on maternal and newborn nursing. The childbearing childrearing center: A nursing model. Nurs Clin N Am 1982;17:11–21.

30. Chang G, Goetz MA, Wilkins-Haug L, Berman S. A brief intervention for prenatal alcohol use: An in-depth look. J Substance Abuse Treat 2000;18:365–9.

31. Kramer MS. Nutritional advice in pregnancy. Cochrane Database Syst Rev 2000;2:CD000149.

32. Manwell LB, Fleming MF, Mundt MP, Stauffacher EA, Barry KL. Treatment of problem alcohol use in women of childbearing age: Results of a brief intervention trial. Alcohol Clin Exp Res 2000;24:1517–24.

33. Windsor RA, Woodby LL, Miller TM, Hardin JM, Crawford MA, Diclemente CC. Effectiveness of agency for health care policy and research clinical practice guideline and patient education methods for pregnant smokers in medicaid maternity care. Am J Obstet Gynecol 2000;182(1 Pt 1):68–75.

34. Sadur CN, Moline N, Costa M, Michalik D, Mendlowitz D, Roller S, et al. Diabetes management in a health maintenance organization. Efficacy of care management using cluster visits. Diabetes Care 1999;22:2011–7.

35. Ickovics JR, Kershaw TS, Westdahl C, Rising SS, Klima C, Reynolds H, et al. Group prenatal care and preterm birth weight: Results from a matched cohort study at public clinics. Obstet Gynecol 2003;102(5 Pt 1):1051–7.

36. Grady MA, Bloom KC. Pregnancy outcomes of adolescents enrolled in a CenteringPregnancy program. J Midwifery Womens Health 2004;49:412–20.

37. Baldwin KA. Comparison of selected outcomes of ConteringPregnancy versus traditional prenatal care. J Midwifery Womens Health 2006;51:266–72.

38. Ickovics JR, Kershaw TS, Westdahl C, Magriples U, Massey Z, Reynolds H, et al. Group prenatal care and perinatal outcomes: A randomized controlled trial. Obstet Gynecol 2007;110:330–9.

39. Cox JR, Obichere T, Knoll F, Baruwa EM. A Study to Compare the Productivity and Cost of the CenteringPregnancy Model of Prenatal Care with a Traditional Prenatal Care Model. Final Report to March of Dimes; 2006.

40. Handler A, Rosenberg D, Raube K, Lyons S. Prenatal care characteristics and African-American women's satisfaction with care in a managed care organization. Womens Health Issues 2003; 13:93–103.

41. Handler A, Rosenberg D, Raube K, Lyons S. Satisfaction and use of prenatal care: Their relationship among African-American women in a large managed care organization. Birth 2003;30: 23–30.

42. Raube K, Handler A, Rosenberg D. Measuring satisfaction among low-income women: A prenatal care questionnaire. Matern Child Health J 1998;2:25–33.

43. Handler A, Raube K, Rosenberg D, Kelley MA. Prenatal satisfaction questions. Matern Child Health J 1998;2:31–2.

44. Handler A, Rosenberg D, Raube K, Kelley MA. Health care characteristics associated with women's satisfaction with prenatal care. Med Care 1998;36:679–94.

45. American College of Obstetricians and Gynecologists. ACOG Committee Opinion number 315, September 2005. Obesity in pregnancy. Obstet Gynecol 2005;106:671–5.