

Impact of an Evidence Based Prenatal Care Model on Patient Outcomes

By: [Lynne Porter Lewallen](#), Cindy Jarrett-Pulliam, Kelly Herger Dixon

Lewallen, L.P., Jarrett-Pulliam, C., & Dixon, K.H. (2010). Impact of an evidence based prenatal care model on patient outcomes. *Journal of Primary Care & Community Health*, 1(3), 168-172.

Made available courtesy of Sage Publications:

<http://www.dx.doi.org/10.1177/2150131910378526>

*****© Sage Publications. Reprinted with permission. No further reproduction is authorized without written permission from Sage Publications. This version of the document is not the version of record. Figures and/or pictures may be missing from this format of the document. *****

Abstract:

Health care providers face many challenges when providing prenatal care. This article reports on a program called Prenatal Care: the Beginning of a Lifetime (PCBL), to implement standardized prenatal care in central North Carolina. The purpose of this pilot study was to determine if there were differences in patient outcomes between a control group and 3 groups (A, B, and C) of increasing levels of intervention in standardized prenatal care. A total of 150 patients were enrolled and followed through delivery. There were no significant differences between the groups in cigarette smoking status, weight gain, genetic screening, sexually transmitted infection screening, diabetes screening, domestic violence assessment, 17P candidacy assessment, gestational age at delivery, or infant birth weight. However, a significant difference was found in depression screening. An association between intervention group membership and likelihood of being screened for depression was found in each trimester. As the level of intervention increased, the number of participants screened for depression increased significantly.

Keywords: health outcomes | health promotion | primary care | prenatal care | pregnancy

Article:

Background

The United States has an infant mortality rate of 6.2 per 1000 births. Guilford County, North Carolina, has an overall infant mortality rate of 9.9, with 13.5 for African American babies.² Of all the babies born in North Carolina, 13.3% are premature. The state had a score of “F” on the March of Dimes 2009 Premature Birth Report Card.³

A Vermont initiative, called Improving Prenatal Care in Vermont (IPCV), was launched in 2006 with the goal of improving the quality of prenatal care through best practice guidelines, innovative approaches to implement prenatal care, and streamlined processes for efficiency.⁴

Prenatal Care: the Beginning of a Lifetime (PCBL) was a pilot program modeled after IPCV to implement standardized prenatal care in Guilford County, North Carolina. The care delivery model in PCBL aims to deliver comprehensive care to meet each individual patient's needs.

Study Design and Implementation

The purpose of this pilot study was to determine if there were differences in patient outcomes between a control group and 3 groups (A, B, and C) of increasing levels of intervention in standardized prenatal care.

A standardized prenatal care template (see Figure 1) model was introduced in 3 different prenatal care settings that were part of a large health care system. The first setting was a family practice center where primarily family medicine residents delivered care. The second was a hospital based high-risk clinic where patients were referred from the family practice center or community health department, and the third was a private practice office, both of which had physicians as the primary care providers. In the family practice setting, patient visits were typically slightly longer than in the other 2 sites, because of the resident physicians providing care.

Prenatal Care Checklist															
Gestational Weeks															
6 to 10	10 to 12	12 to 14	14 to 16	16 to 18	18 to 20	20 to 24	24 to 28	28 to 32	32 to 36	37	38	39	40	40-42	Postpartum
Initial OB Visit: Labs: Blood type and Antibody Screen, CBC, RPR, HBsAg, UA, Urine Culture, Pap Smear (if needed), HIV, Gonorrhea/Chlamydia. Cystic Fibrosis screening should be offered to all. Consider based on risk factors: Sickle cell trait, toxoplasmosis, varicella titer, Hepatitis C, dating US, early genetic testing *, and early 1 hr GTT. Assess the following: BMI/Nutrition Risk, Life stress/depression, tobacco/substance abuse, and domestic violence. Physical exam including dental assessment. Offer flu Vaccine (Oct- Mar). Discuss WIG/MCC referral															
Integrated Screen 11-13.6 wks		Quad test 15-20 weeks, ideally 16-18 weeks (not needed if integrated)				Reassess the following: wt gain, life stress/depression, tobacco/substance abuse, domestic violence									
17 P weekly injections if indicated, 16-36.6 weeks															
Ultrasound anatomy screen						1 hour GTT 26-28 weeks					Discuss PTL, Birth Control plans, Childbirth Class recommendations				
28 week antibody screen if Rh neg, Rhogam if indicated, Hemoglobin and										Reassess: wt gain, life stress, depression, tobacco, substance					
Discuss Breastfeeding, Safe Sleep, Labor															
GBS 36-37 wks, **GC/CT, see										Physical Exam. Discuss: Birth control, postpartum depression, safe sleep, and preventive care					
At every visit: Assess FHR (starting around 10-12 weeks), Fundal height (measure starting at 20 weeks), weight, B/P, and urine dip															
**State Law as of 4/08 states "pregnant women 25 years of age and younger shall be tested for chlamydia and gonorrhea in the third trimester or at delivery if the woman was not tested in the third trimester. High Risk Contract with GCHD reads "Gonorrhea screening will be done in the third trimester and Chlamydia Screening will be done in third trimester if less than 25 years of age"															
Ashenazi Jewish should be offered genetic counseling).															

Figure 1. Standardized prenatal care template.

A standardized prenatal care template (see Figure 1) model was introduced in 3 different prenatal care settings that were part of a large health care system. The first setting was a family practice center where primarily family medicine residents delivered care. The second was a hospital based high-risk clinic where patients were referred from the family practice center or community health department, and the third was a private practice office, both of which had physicians as the primary care providers. In the family practice setting, patient visits were typically slightly longer than in the other 2 sites, because of the resident physicians providing care.

After receiving IRB approval, 182 women were enrolled in the program: 32 in a control group of usual care, and 50 in each of intervention groups A, B, and C. Because of varied patient volumes, 48% of the sample was recruited from the family practice center, 35% from the private office, and 17% from the hospital-based clinic. Women signed an informed consent form at the time of enrollment. Women eligible for the intervention groups were in the first trimester of pregnancy, able to read English or Spanish, and receiving prenatal care from 1 of the 3 participating offices. Control group women also met these criteria except that they were enrolled at any point in their pregnancy, since they received no intervention, and their medical record after delivery would include documentation of their entire prenatal care experience. Participants were recruited in the waiting room during their regular prenatal care appointment, and enrolled if willing to participate. To avoid potential contamination of the groups, enrollment for group A was completed before enrollment for group B began, and group B enrollment was completed before enrollment for group C began. A control group of 32 women was enrolled simultaneously with group A.

The control group participants received usual care, with no intervention. The first level of the intervention for group A was the least expensive and easiest to implement in any office practice. Participants were given a notebook containing information that had been developed by clinician experts in pregnancy and prenatal care. The PCBL coordinator, a women's health nurse practitioner, discussed the contents of the notebook with participants and they were encouraged to ask questions. The information included an outline of standardized prenatal care, information about "empowerment during pregnancy," diabetic screening, nutrition, smoking cessation, infectious diseases, psychosocial issues (including substance abuse, domestic violence, and depression), genetic screening options, and preterm labor risk. These topics are all part of the standardized prenatal care protocol recommended by IPCV. The goal is to educate participants about health during pregnancy and the components of good prenatal care.

At the second level of intervention, group B participants received the same notebook and discussion as group A participants. Additionally, group B participants were invited to attend free monthly group discussion sessions that covered many topics pertaining to pregnancy. Also, paper forms outlining the screening, included in standardized prenatal care, were given to providers to assist them in assessing risk. These forms were as follows: Preterm Labor Screening for

Progesterone Therapy (17 P), 5 A's of Smoking Cessation, Prenatal Nutrition Risk Screening, Information About Cystic Fibrosis, Postpartum Depression Predictors Inventory-Revised (PDPI-R), and Combined Psychosocial Clinical Tool (life stress, depression, substance abuse, domestic violence). The PDPI-R has been shown to correlate positively with findings of structured clinical interviews to identify DSM-IV disorders, so it is a reliable measure of both prenatal and postpartum depression.⁵ The Combined Psychosocial Clinical Tool was developed by the Healthy Start Program of the Florida Department of Health. It has been widely used and adopted by the American College of Obstetricians and Gynecologists for psychosocial screening.⁶ The office staff (physician, RN, or medical assistant) was responsible for having these forms completed at the first prenatal visit. The group B intervention was designed to minimally increase time and expense to the practice by adding risk assessment forms to document comprehensive assessment and care. This intervention required more time on the part of the office, but was still relatively inexpensive and easy to implement.

Participants in group C, the third level of intervention, also received the notebook and discussion, and an invitation to attend monthly group discussion sessions. They also had additional interactions with the PCBL coordinator. The coordinator completed the risk assessment forms with each participant during her first visit. Any risks identified were communicated with the obstetrical provider. The coordinator also made recommendations and/or referrals to appropriate community resources. Additionally, the coordinator met with each participant twice more during the pregnancy: once between 14 and 28 gestational weeks to ensure that the second trimester psychosocial screening was completed, to address issues as needed, and to teach about preterm labor signs and symptoms, and once between 28 and 40 gestational weeks to ensure that the third trimester psychosocial screening was completed, to address issues as needed, and teach about postpartum depression and birth control options. The group C intervention was the most comprehensive, with a system of checks and balances to assure that standardized, comprehensive prenatal care was delivered. Since it required a considerable time commitment from the coordinator, this intervention would necessitate operational changes in office practices for implementation. Patient outcome data were collected after delivery by chart review.

Results

Because of the categorical nature of the data and the small convenience sample, chi-square analysis was used. Group sizes varied slightly from initial recruitment because of some women delivering early, transferring care to another facility, or incomplete data recording in the medical record, resulting in missing data. For each variable, the null hypothesis was assumed. Chi-square tests were performed using SPSS version 17.0, and there were no significant differences between the groups in cigarette smoking status, weight gain, genetic screening, sexually transmitted infection screening, diabetes screening, domestic violence assessment, 17P candidacy assessment, gestational age at delivery, or infant birth weight. However, a significant difference was found in depression screening. An association between intervention group membership and

likelihood of being screened for depression was found in each trimester: first trimester, $\chi^2(6, N = 155) = 41.0, P < .001$; second trimester, $\chi^2(6, N = 156) = 71.5, P < .001$; third trimester, $\chi^2(6, N = 153) = 72.2, P < .001$. As the level of intervention increased, the number of participants screened for depression increased significantly. The number of women identified as depressed also increased, but this difference was not statistically significant (see Table 1).

Table 1. Depression Screening and Identification^a

	Screened for Depression ^b	Identified with Depression
First trimester		NS
Control (N = 30)	15 (50%)	6 (20%)
Group A (N = 43)	19 (43%)	5 (12%)
Group B (N = 41)	36 (88%)	6 (15%)
Group C (N = 41)	39 (95%)	10 (24%)
Second trimester		NS
Control (N = 31)	9 (29%)	4 (13%)
Group A (N = 43)	4 (9%)	1 (2%)
Group B (N = 41)	15 (37%)	2 (5%)
Group C (N = 41)	39 (95%)	7 (17%)
Third trimester		NS
Control (N = 30)	12 (40%)	5 (17%)
Group A (N = 43)	4 (9%)	0 (0%)
Group B (N = 39)	18 (46%)	0 (0%)
Group C (N = 41)	38 (93%)	5 (12%)

^aNS, not statistically significant. ^b $P < .05$.

Discussion

The PCBL program significantly increased the rate of depression screening. The American College of Obstetricians and Gynecologists recommends that all pregnant women should be screened for depression each trimester.⁶ Although well intentioned providers generally plan to incorporate this screening into prenatal care, it is often difficult to assure that it has been done. In our pilot, as the number of women who were assessed for depression increased, so did the incidence of identified depression. If a woman has depression and it is identified, it can be managed appropriately. This is crucial since depression during pregnancy is associated with low birth weight and preterm birth.⁷ Although this study did not collect data about outcomes of screening (for example, were follow-up appointments with mental health professionals kept), problems must be identified before referrals can be made. Consistent screening is the first step to ensuring that mental health issues are identified early and successfully treated during pregnancy and postpartum.

These data show that it is valuable to have a system in place to assure that assessments are completed. The combined psychosocial screening form used in the pilot was introduced with group B to be completed by the office staff, but was used inconsistently. For group C, the PCBL

coordinator completed the form as part of the intervention for all but 2 participants, who delivered early, before the scheduled meeting could take place. As the screening became more systematic, the rate of screening increased.

Standardized prenatal care helps to individualize a woman's care during pregnancy by providing a template for assessment. Although many outcomes measured in this pilot did not significantly differ between groups, anecdotal information pointed to benefits. For example, one pregnant patient was able to discuss and receive help for a domestic violence situation, another patient decided to breastfeed when otherwise she would not have, and several patients were linked to various community resources that they never knew existed. Furthermore, a few patients were diagnosed with diabetes sooner than usual because they were tested early based on criteria used in the pilot program. A greater percentage of intervention group women than control group women were able to quit smoking during their pregnancy, and more women were also able to meet weight gain goals.

Limitations and Implications for Future Research

Because this was a pilot study with a convenience sample and unequal numbers in each group, it is possible that significant differences existed that were not identified because of the small nonrepresentative sample. Also, since this study was done in one health system, results cannot be generalized to all types of prenatal care settings. There may have been uncontrolled differences in the way that care was provided in the 3 sites that could have affected the findings. Further research is recommended with larger sample sizes, in varying care settings, and including financial analysis variables. Given our finding of significantly increased depression screening in our intervention groups, future research should also assess results of mental health referrals and include outcome measures of treatment success.

Implications for Practice

Providing the basic components of prenatal care for all women, risk assessment, health education/promotion, and medical and psychological interventions may seem overwhelming with so much to do and so little time.⁸ However, opportunities for improving prenatal care exist in every office. A written template, a well organized plan, and cooperation from an interdisciplinary team can result in greater efficiency and higher quality care.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interests with respect to the authorship and/or publication of this article.

Financial Disclosure/Funding

The authors received no financial support for the research and/or authorship of this article.

References

1. Institute of Medicine. *Crossing the Quality Chasm: A New Health System for the 21st Century*. Washington, DC: National Academy Press; 2001.
2. North Carolina State Center for Health Statistics. *2008 Infant Mortality Statistics for North Carolina*. www.schs.state.nc.us/SCHS/deaths/ims/2008. Accessed July 28, 2010.
3. March of Dimes. *2009 Premature Birth Report Cards*. www.marchofdimes.com/prematurity/index_map.asp. Accessed July 28, 2010.
4. Vermont Child Health Improvement Program. *State Guide to Improving Prenatal Care*. <https://www.med.uvm.edu/vchip/Downloads/IPCStateGuide.pdf>. Accessed July 28, 2010.
5. Oppo A, Mauri M, Ramacciotti D, et al. Risk factors for postpartum depression: the role of the Postpartum Depression Predictors Inventory-Revised (PDPI-R). *Women's Mental Health*. 2009;12:239-249.
6. American College of Obstetricians and Gynecologists. Psychosocial risk factors: perinatal screening and intervention. Committee opinion #343. *Obstet Gynecol*. 2006;108:469-477.
7. Bennett S, Indman P. *Beyond the Blues: A Guide to Understanding and Treating Prenatal and Postpartum Depression*. San Jose, CA: Moodswings Press; 2006.
8. American Academy of Pediatrics and American College of Obstetricians and Gynecologists. *Guidelines for Perinatal Care*. 6th ed. Washington, DC: American Academy of Pediatrics and American College of Obstetricians and Gynecologists; 2007.
9. Atrash H, Jack B, Johnson K, et al. Where is the "W"oman in MCH? *Am J Obstet Gynecol*. 2008;S259-264.
10. Cook-Carter M, Corry M, Delbanco S, et al. 2020 vision for a high quality, high value maternity care system. *Women's Health Issues*. 2010;20:S7-S17.
11. Dye T, Wojtowycz M. Organizational variation, satisfaction, and women's time investment in prenatal care. *Paediatr Perinat Epidemiol*. 1999;13:158-169.

Bios

Lynne Porter Lewallen, PhD, RN, CNE is an Associate Professor of Nursing at the University of North Carolina at Greensboro. Her clinical background is in maternal-child health nursing, and her research interests include prenatal care, breast feeding, and nursing education.

Cindy Jarrett-Pulliam, RN, MSN, FACHE is Vice President of Nursing and Patient Care Services for The Women's Hospital of Greensboro of the Moses Cone Health System. She is a Fellow with The American College of Healthcare Executives and certified in Nursing

Administration. She also serves as adjunct faculty at The University of North Carolina of Greensboro School of Nursing.

Kelly Herger Dixon, MSN, WHNP-BC is a Women's Health Nurse Practitioner at Central Carolina OB/GYN, a division of Piedmont Healthcare for Women, in Greensboro, NC.