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# APN-Physician Collaboration in Caring for Women With High-Risk Pregnancies

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## APN-Physician Collaboration in Caring for Women With High-Risk Pregnancies

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### Abstract

**Purpose**—To examine: (a) frequency and focus of APN-physician collaborations in a clinical trial in which half of physician prenatal care for women with high-risk pregnancies was substituted with APN prenatal care delivered in women's homes; and (b) characteristics of women requiring greater numbers of collaborations.

**Design and Methods**—Descriptive study with secondary analysis of data from 83 of the original trial's 85 intervention participants followed by APNs prenatally through 8 weeks postpartum. APN practices, recorded in logs, included APN interactions with the women and the physician, and type of APN contact (e.g., home visit, telephone call). Each APN-physician collaboration was coded for type, timing, and focus.

**Findings**—Total number of APN-physician collaboration contacts was 351, with a mean of 4.5 and a range of 1 to 16 per woman. Focus of collaborations was: status updates (59%), new physical findings (21%), change in treatment (8%), patient concerns (7%) and medication adjustment (5%). No significant differences in numbers of collaborations were found according to age, primary diagnosis, marital status, type of health insurance, race, or income. Women with high school education received more collaborations than did those not completing high school or those with some postsecondary education. Prenatally, women with a first pregnancy required more collaborations than did multipara participants.

**Conclusions**—Most APN-physician collaborative contacts were focused on monitoring women's physical and emotional status and discussing new physical findings. These collaborations were important in the original trial's successful pregnancy and infant outcomes and savings in health care dollars.

## Keywords

APN-physician collaboration; high-risk pregnancy; transitional care; advanced practice nurses

Of the 4 million births in the United States (US) in 2000, 7.8% were low birthweight (LBW, <2500 gms) and 12.1% were preterm (<37 completed weeks gestation; Martin et al., 2003). Many LBW and preterm births are the result of high-risk pregnancies. The human, health care, and educational costs of LBW and preterm births are great, initially and over the lives of these children. More than half of the \$10 billion spent annually on newborn care is spent on preterm infants. Prenatal interventions that result in normal weight at birth (>2500 gms) instead of a very low birthweight result in cost savings of approximately \$59,700 per infant in 1st-year medical costs (Morrison, Bergauer, Jacques, Coleman, & Hayashi, 2001; Rogowski, 1998; St. John, Nelson, Cliver, Bishnoi, & Goldenberg, 2001). Preventing LBW and prolonging pregnancies for greater fetal maturity remain priorities for families, providers, insurers, and the nation.

Women with high-risk pregnancies present many care challenges. Problems identified in the literature include adherence to specific medical treatment plans (bedrest, monitoring blood sugar, uterine activity), overall health, and reduction of risk behaviors, and problems in attending early and continuous prenatal care (Hatmaker & Kemp, 1998; Josefsson, Berg, Nordin & Sydsjo, 2001; Maloni, Cohen, & Kane, 1998; Pomerleau, Brouwer, & Jones, 2000; Stringer, 1998; Youngblut et al., 2000). Research to analyze problems of women with high-risk pregnancies, based on the Omaha Classification System showed a total of 12,761 problems from 44 high-risk pregnant women (Brooten, Youngblut, Deatruck, Naylor, & York, 2003). The greatest numbers of women's problems were physiologic (46.8%), followed by problems of health-related behaviors (40.6%), psychosocial problems (11.4%) and environmental problems (1.1%).

Research on provider practices in caring for women with high-risk pregnancies has been focused largely on specific medical treatments for diabetes, hypertension, preterm labor and other pre-existing medical conditions. Uterine activity monitoring, adequate fluids, medication, and bedrest remain major elements in giving care to women with preterm labor (Josefsson et al., 2001; Maloni et al., 1998). For women with diabetes in pregnancy, care is centered on blood sugar monitoring and use of insulin (Ray, Vermeulen, Shapiro, & Kenshole, 2001; Schirmer, 1997). Women with chronic hypertension during pregnancy receive medication and a focus on stress relief (DeMier et al., 2000; Henriksen, 1998; Kurdas, 2001). In research to analyze APN interventions, the most frequent intervention was surveillance (48.1%), followed by teaching, guidance, and counseling (35.8%), case management (15.6%), and treatments and procedures (0.5%; Brooten et al., 2003). The development and testing of interventions to enroll and retain women in early and continuous prenatal care remains a major focus of provider practices (Muender, Moore, Chen, & Sevick, 2000; Olds et al., 1999; York, Grant, Gibeau, Beecham, & Kessler, 1996). However, none of these reports have indicated the content and frequency of APN-physician collaboration important in the care to this group. This analysis was conducted to address the need for that information.

## Background

In caring for women with high-risk pregnancies, especially in a managed care environment, collaboration is necessary for effective patient care. Programs to increase prenatal care, optimize healthy behaviors, and carefully monitor for pregnancy complications for women at risk of LBW have been tested with mixed results (Brooten et al., 2001; Dawson et al.,

1999; Dyson et al., 1998; Klerman et al., 2001; Norbeck, DeJoseph, & Smith, 1996; Olds, Henderson, Kitzman, Eckenrode, Cole, & Tatelbaum, 1999; Villar et al., 1992; York et al., 1997). Despite the multidisciplinary nature of these studies, none have included the content and frequency of APN-physician collaborative contacts.

Although many definitions of collaboration exist, common elements include communication, shared expertise, and shared decision making focused on a common goal of optimal patient care. The literature on nurse-physician collaboration has indicated barriers to collaboration including turf issues, reimbursement, perceived hierarchy of roles, differences in educational preparation, culture, gender, and role socialization (Copnell et al., 2004; Hojat et al., 2001; Minarik, Zeh, & Johnson, 2001; Munding, 1994; Shannon, Mitchell, & Cain, 2002; Thomas, Sexton, & Helmreich, 2003; Wells, Johnson, & Salyer, 1998). Research by Hammond, Bandak, and Williams (1999) and Grumbach and Coffman (1998) indicated that physicians desire to retain full authority for health care decisions, but nurses, social workers, psychologists, consumers and hospital administrators prefer collaborative practice. Collaboration is a requirement for reimbursement of APNs, under Medicare.

The American Nurses Association (2004) defined advanced practice nurses (APNs) as registered nurses (RNs) who have met advanced educational and clinical practice requirements beyond the 2 to 4 years of basic nursing education required of all RNs. Four types of APNs are nurse practitioners, clinical nurse specialists, certified nurse midwives, and certified registered nurse anesthetists (American Nurses Association, 2004). In most other countries, the title APN does not exist or has only recently been introduced.

In 1998, the U.S. Health Care Financing Administration (HCFA) proposed rules that a physician need not be present or make an independent evaluation of each patient who is seen by an APN. Where APNs practice collaboratively under state law, HCFA requires nothing beyond whatever the state requires. Where APNs practice under noncollaborative state practice acts, independently or under supervision, HCFA requires APNs to document their scope of practice and indicate their relationships with physicians to deal with problems outside their scope of practice (Herrick, 2000; Minarik, 2000; Price & Minarik, 1999).

Although the literature on collaboration is focused on barriers to nurse-physician collaboration and outcomes of APN versus physician care, little research has been reported on the content and effects of nurse-physician collaboration on patient outcomes (Afflito, 1997; Zwarenstein & Reeves, 2002). Jackson and colleagues (2003) found more vaginal deliveries and less epidural anesthesia in low-income women with low-risk pregnancies when care was provided in a collaborative birth center compared to traditional physician care. Adamson, Baldwin, Sheehan, and Oppenberg (1997) found that malpractice claims were lower for surgeons with nurse practitioners working in their offices. The classic study by Knaus and colleagues (1986) of 5,030 patients in 13 intensive care units indicated that the most powerful determinant of reduced mortality was better communication and collaboration in patient care between physicians and nurses. Similarly, a study of patients in medical intensive care by Baggs and colleagues (1992) showed that patients had a 5% chance of death or readmission when nurses perceived they had worked successfully with medical residents; the risk more than tripled when medical residents made decisions about patient care without adequate nurse consultation. In these limited studies, the association between nurse-physician collaboration and patient outcomes was powerful. However, the actual content of nurse-physician collaboration remains unclear. Thus, the purpose of this study was to add to this body of knowledge by examining (a) the frequency and focus of APN-physician collaboration in caring for women with high-risk pregnancies; and (b) the characteristics of women whose care required more APN-physician collaboration.

## Methods

### Original Clinical Trial

The present descriptive study was a secondary analysis of data from a randomized clinical trial to test the effects of substituting half of usual physician prenatal care with prenatal care delivered by APNs in women's homes on patient outcomes and health care costs (Brooten et al., 2001). The framework for the study was the Quality Cost Model of APN Transitional Care (Brooten et al., 2002). Women in the original trial were recruited from a large university hospital in the eastern US at the time of diagnosis of the high-risk pregnancy. The control group received usual physician pre-natal and postpartum care. The intervention group received APN prenatal care in their homes to replace half of the usual physician office or clinic prenatal visits (e.g., for weekly visits, every other visit was an APN home visit). The intervention group also received one postpartum home visit by the APN. Study results showed lower infant and fetal mortality compared to usual care (2 vs. 9), 11 fewer preterm infants, more twin pregnancies carried to term (77.7% vs. 33.3%), fewer prenatal hospitalizations (41 vs. 49), fewer infant re-hospitalizations (18 vs. 24), and a savings of more than 750 total hospital days and approximately \$2,500,000.

Prenatal care delivered in women's homes by the APNs was documented routinely in patients' records for review by physicians and other health care team members. In addition, the process of APN practices in caring for women in the intervention group were recorded for each participant in interaction logs by the APNs. All APN interaction logs contained APN interventions, type of APN contact (e.g., home visit, telephone call), total APN time per contact, and APN interactions with the woman and the physician.

The three study APNs were masters-educated high-risk-perinatal clinical nurse specialists with advanced knowledge and skills appropriate for the patient population. In providing care, the APNs practiced as a team, under general guidelines. The study did not include any mandated collaborative contacts with physicians. All APN-physician collaborative contacts were based on standard practice at the study site and professional judgment required in their legal scope of practice. The APNs were employed for the study within 1–7 years of graduation from their master's programs. Two of the three APNs had more than 5 years perinatal nursing experience and one had 1 year of perinatal nursing experience before entering the master's program.

### Present Study

**Sample**—The sample for this secondary analysis consisted of 83 of the original study's 85 intervention participants with high-risk pregnancies who were followed by the APN from enrollment in the study prenatally through 8 weeks post-partum. Two of the women in the intervention group in the original study were omitted from the analysis for this study because of neonatal death. The mean maternal age was 26.6 years ( $SD = 6.39$ ). Ninety-four percent of the women were African American, 2.4% were Caucasian, and 3.6% were Asian or racially mixed. Seventy-eight percent of the women were unmarried, 12% married, and 9.6% separated or divorced. Thirty-seven percent of the women had less than a high school education, 27.7% were high school graduates, and 34.9% had more than high school education. Eighty-three percent had public health care insurance and 8.4% reported private health insurance. Self-reported annual income was as follows: 34% had less than \$5,000; 33.7% between \$5,000 and \$14,999; 18.1% between \$15,000 and \$24,999; and 7.2% \$25,000 or more. The women's diagnoses included pregestational diabetes (9.6%), gestational diabetes (13.3%), chronic hypertension (21.7%), at high risk for preterm labor (26.5%), and diagnosed with preterm labor (28.9%).

**Measure of APN-physician collaboration**—An APN-physician collaborative contact was defined as an episode of communication and shared decision making. A worksheet was constructed to indicate characteristics of each collaborative contact. Collaborative contacts were coded for type of collaboration (by telephone or in person in the clinic, hospital, or other place; none of the collaborations were by e-mail), timing of the collaboration (antenatal or postpartum), and focus of the collaboration. The categories for the focus of the collaboration (status update, medication adjustment, patient concern, change in treatment, new physical finding) were derived from content analysis of five APN logs from a previous study of APN care of women with high-risk pregnancies (York et al., 1997).

**Data collection**—Data for this secondary analysis were collected from the APN interaction logs by two graduate (MSN) nursing students who reviewed each log line-by-line to score the collaborative contacts. Interrater reliability was established and maintained at or above 85% by having both data collectors review every 10th log independently and compare coding.

## Results

### Frequency of Collaborations

In their interaction logs, APNs documented a minimum of one collaborative contact with physicians by telephone or in person during the women's hospital or clinic visits for 76 of the 83 women (92%). The total number of collaborative contacts was 351, with a mean of 4.5 ( $SD = 3.50$ ) and a range of 1 to 16 per participant.

### Focus of Collaborations

The largest number of collaborations were focused on status updates, followed by reports of new physical findings, changes in treatment, patient concerns, and medication adjustment. The focus of the collaborations was not significantly different between the prenatal and postpartum periods (see Table 1).

**Status updates**—Collaborations included discussing laboratory results (e.g., blood sugar, cultures, 24-hour urine, amniocentesis), EKG results, need for ultrasound and non-stress testing, wound evaluation before removal of stitches and staples, cerclage status, fainting and allergic reactions, and women's personal, family, and financial challenges affecting adherence to treatments.

**New physical findings**—Collaborations included cervical changes and signs of preterm labor, bleeding, increased blood pressure, blurred vision, edema, and signs and symptoms of superimposed preeclampsia, and changes in blood sugar. Collaborations were focused on concerns about fetal status included fetal arrhythmia, poor fetal heart rate variability, decreased fetal growth, and decreased fetal activity. Other new physical findings prompting collaboration included chest pain, urinary tract infections, and upper respiratory tract infections.

**Change in treatment**—Collaborations included beginning the use of insulin, changes in types of insulin, start of medications for uterine irritability, need to continue dexamethasone, need for more frequent hydration checks, need to treat syphilis, and changes in wound care.

**Patient concerns**—Collaborations included exposure to chickenpox, women's concerns about Rhogam<sup>®</sup>, newly diagnosed gestational diabetes, the meaning of premature uterine contractions, financial ability to obtain and continue to take medications, and family obligations while hospitalized or on bedrest.



**Medication adjustment**—Collaborations included changes in medication for pain management, doses of already prescribed insulin, medications for hypertension, and antibiotics.

Of the 351 collaborations, 325 (93%) were initiated by the APN. The most common reason for the collaborative contacts initiated by the APN was status update, followed by new physical findings. The most common reason for the physician to initiate a collaborative contact was treatment change, followed by status update. Although APNs initiated 25 collaborations to discuss patient concerns, none of the physician-initiated collaborations was for this reason.

The largest number of APN-physician collaborations occurred during clinic visits, followed by telephone, during hospitalizations, and in person in other settings. Most collaborative contacts (88%) occurred in the prenatal period, with only 12% occurring postpartum (Table 2).

### Women Requiring Greater Numbers of Collaborations

Women whose care required a greater number of APN-physician collaborative contacts were compared with women requiring fewer collaborative contacts (Table 3). The “upper half” group and the “lower half” group were created based on a median split of the total number of collaborations (prenatal and postpartum). Women requiring three or fewer collaborative contacts (48.2%; lower half) and women requiring four or more collaborative contacts (51.8%; upper half) were not significantly different in age, primary diagnosis, marital status, type of health insurance, race, income, or whether this was a first pregnancy. However, women with high school education were more likely to be in the upper half (requiring more collaboration contacts) than were women who had not graduated from high school or those who had some postsecondary education.

When the upper- and lower-half groups were constituted based on number of prenatal collaborations only, no significant differences were found related to age, primary diagnosis, marital status, education, type of health insurance, race, or income. However, women pregnant for the first time were more likely to be in the upper half (requiring more collaborations) than were women who had a previous pregnancy,  $\chi^2=4.07$ ,  $df=1$ ,  $p=.04$ . Eight (72.7%) of the 11 women in their first pregnancies were in the upper half, compared to 29 (40.3%) of the 72 women who had previous pregnancies.

### Discussion

Women with pregnancies complicated by diabetes, chronic hypertension, and preterm labor required care that was complex, involving multidisciplinary collaboration. Results showed that APNs perceived a need to collaborate to keep physicians informed of the women’s status, including the need for ultrasounds to check fetal growth, status of cervical cerclages, women’s problems in adhering to treatment, and other challenges to successful pregnancy and infant outcomes. The APNs frequently found new physical findings that were threats to a woman or fetus, including bleeding, signs of impending preterm labor, fetal arrhythmia, poor fetal heart rate variability, and decreased fetal growth and activity.

Study findings indicated that to improve the outcomes of women with high-risk pregnancies and their infants, APNs must possess knowledge and excellent clinical skills to individualize care and prevent problems, identify problems early, be able to negotiate health and social systems to provide women with the supports they need to stay healthy or to minimize effects of health problems, be able to collaborate effectively with physicians, families, and other



health providers in providing and often coordinating complex therapeutic regimes that are both effective and acceptable to women.

The findings from this secondary analysis are consistent with findings about the functions of APNs in five clinical trials based on the model of APN transitional care (Brooten et al., 2003). The original trial from which this secondary analysis was drawn included a modification of that model of care (Brooten et al., 2001). Findings from the five clinical trials with low birth weight infants, women with abdominal hysterectomy, women with high-risk pregnancies, women after unplanned cesarean delivery, and elders with cardiac conditions showed that surveillance was the predominant APN function in providing care to these groups, followed by teaching, guidance, and counseling (Brooten et al., 2003). Findings of APN monitoring of the women's current status and new physical findings as the top two categories of APN physician collaboration in this secondary analysis are consistent with the main APN function of surveillance found in the previous five trials.

Study findings are also consistent with the findings of Knaus and associates (1986) and Baggs and colleagues (1992) who found that communication and collaboration between physicians and nurses was a powerful determinant in reducing morbidity and mortality. Such communication and collaboration were important in the original trial's successful pregnancy and infant outcomes.

## Conclusions

Study findings indicated that APNs frequently collaborated with physicians in caring for women with high-risk pregnancies. The APNs kept the physicians current on the physical and emotional status of the women, identified and intervened when new physical findings potentially threatened the women and fetuses, and provided a level of care that resulted in improved outcomes.

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**Table 1**

Topic of APN-MD Collaboration by Timing and Initiator

	Status update <i>n</i> (%)	New physical finding <i>n</i> (%)	Change in treatment <i>n</i> (%)	Patient concern <i>n</i> (%)	Medication adjustment <i>n</i> (%)	$\chi^2$
Timing of collaboration						8.35(ns)
Prenatal ( <i>n</i> = 307)	183 (59.6%)	65 (21.2%)	27 (8.8%)	18 (5.9%)	14 (4.6%)	
Postpartum ( <i>n</i> = 44)	23 (52.3%)	8 (18.2%)	2 (4.5%)	7 (15.9%)	4 (9.1%)	
Total = 351	206 (59%)	73 (21%)	29 (8%)	25 (7%)	18 (5%)	
Initiator of collaboration						8.20(ns)
APN	186 (57.2%)	72 (22.2%)	26 (8.0%)	25 (7.7%)	16 (4.9%)	
MD	20 (9.7%)	1 (3.8%)	3 (11.5%)	0 (0%)	2 (7.7%)	

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**Table 2**

Type of Collaboration by Timing

	Clinic <i>n</i> (%)	Telephone <i>n</i> (%)	Hospital <i>n</i> (%)	In person <i>n</i> (%)	Other <i>n</i> (%)	$\chi^2$
Timing of collaboration						22.4*
Prenatal ( <i>n</i> =307)	139 (45.3%)	87 (28.3%)	49 (16.0%)	29 (9.4%)	3 (1.0%)	
Postpartum ( <i>n</i> =44)	6 (13.6%)	21 (47.7%)	15 (34.1%)	2 (4.5%)	0 (0%)	
Total= <i>n</i> =351	145 (41%)	108 (31%)	64 (18%)	31 (9%)	3 (1%)	

\*  $p < .01$

**Table 3**

Comparison of Lower-Half and Upper-Half Groups in APN-Physician Collaborations

Variable	Lower half ( 3 collaborations) <i>n</i> =40 <sup>a</sup>	Upper half ( 4 collaborations) <i>n</i> =43 <sup>a</sup>	Statistic
Maternal age <i>M</i> ( <i>SD</i> )	25.9 (6.74)	27.3 (6.05)	<i>t</i> =1.00
Education			
< High school	18 (45%)	13 (30.2%)	$\chi^2=6.28^*$
High school graduate	6 (15%)	17 (39.6%)	
> High school	16 (40%)	13 (30.2%)	
Marital status			
Never married	30 (75%)	35 (81.4%)	$\chi^2=.68$
Married	6 (15%)	4 (9.3%)	
Divorced or separated	4 (10%)	4 (9.3%)	
Race			
African American	38 (95%)	40 (93.0%)	$\chi^2=2.28$
Caucasian	0 (0%)	2 (4.7%)	
Other	2 (5%)	1 (2.3%)	
Health insurance <sup>a</sup>			
Public	39 (95.1%)	30 (85.7%)	$\chi^2=2.00$
Private	2 (4.9%)	5 (14.3%)	
Income <sup>a</sup>			
<\$5000	14 (37.8%)	15 (36.6%)	$\chi^2=.56$
\$5000–14,999	14 (37.8%)	14 (34.1%)	
\$15,000–24,999	7 (18.9%)	8 (19.5%)	
\$25,000	2 (5.4%)	4 (9.8%)	
Maternal diagnosis			
Gestational diabetes	4 (10%)	7 (16.3%)	$\chi^2=7.84$
Pregestational diabetes	2 (5%)	6 (14.0%)	
Diagnosed preterm labor	17 (42.5%)	7 (16.3%)	
At risk for preterm labor	9 (22.5%)	13 (30.2%)	
Chronic hypertension	8 (20%)	10 (23.3%)	
First pregnancy			
Yes	3 (7.5%)	8 (18.6%)	$\chi^2=2.22^*$
No	37 (92.5%)	35 (81.4%)	

<sup>a</sup>Note. Numbers do not add to column total because of missing data.\**p*<.05