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Effects of the North Carolina Prematurity Prevention Program among Public Patients Delivering at New Hanover Memorial Hospital

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Abstract: Twelve per cent of the 847 women who delivered in one hospital prior to implementation of the North Carolina Prematurity Prevention Program had low-birthweight births compared with 9.5 per cent of the 748 women who delivered during the program. Controlling for known risk factors, both low- and very-low birthweight births among Whites (Odds Ratio 2.0 and 3.7 respectively) and very-low-birthweight births among Blacks (OR 2.9) were reduced. (*Am J Public Health* 1988; 78:1493–1495.)

Introduction

In 1984, there were 8.2 neonatal deaths per 1,000 live births in North Carolina compared with 7.3 neonatal deaths per 1,000 live births in the United States in 1983.[1] Because premature delivery and low birthweight are major contributing factors to neonatal mortality,[2,3] the North Carolina Department of Human Resources initiated a statewide program to reduce the risk of prematurity; in January 1985 the obstetric clinic at New Hanover Memorial Hospital implemented this program.

Adapted from programs developed by Papiernik, Creasy, and Hobel,[4–6] the North Carolina Prematurity Prevention Program includes three components: patient identification, patient education, and staff education. Patient identification includes the use of a standardized risk assessment to identify women at risk of preterm labor. Patient education includes intensive education for all patients both on the signs and symptoms of preterm labor and on the need to seek early treatment if preterm labor occurs. Staff education includes in-service training for all staff on the importance of responding promptly to patient complaints of signs and symptoms of preterm labor. Staff are advised to freely admit and observe women suspected to be in preterm labor and, when appropriate, to treat these women using tocolytic agents.

New Hanover Memorial Hospital is a 520-bed community hospital with a university medical center affiliation. It is a regional referral center serving seven counties in the southeastern coastal area of North Carolina. Within the hospital, an obstetric outpatient clinic is staffed by University of North Carolina Medical School faculty, obstetric residents, staff nurses, and County Health Department personnel. Women seeking prenatal care at this facility are mainly young, poorly educated, economically disadvantaged, live in rural as well as urban areas, and about half are Black.

The purpose of this study is to evaluate the effectiveness of the Prematurity Prevention Program in reducing low-birthweight births in the population of women seeking prenatal care at this clinic.

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TABLE 1—Exclusion Criteria for the Two Study Groups

	Program Group	Pre-Program Group
Total registered for prenatal care	854	[a]
Aborted, ectopic, or molar pregnancy	31	—
Moved out of region	18	—
Transferred to private physician	11	—
Total delivered[b]	794	910
No prenatal care	32[c]	39
Twin gestation	6	11
Stillbirth	6	11
Livebirth <454 grams	2	2
Total included in analysis	748	847

a) Data on clinic registrants were not available prior to the Prematurity Prevention Program.
b) Labor and Delivery room statistics show that there were 98 fewer clinic staff deliveries in 1986 than in 1984. This could account for the difference between the two groups in the number of deliveries.
c) These women registered for the program, but did not return for prenatal care.

Methods

The study population included 854 women registering for prenatal care at the New Hanover Memorial Hospital obstetric clinic from July 1, 1985 to June 30, 1986.* One hundred and six women were excluded for reasons outlined in Table 1. Data for the 748 women included in the study were obtained by medical record and by birth certificate review.

To obtain comparison data, we used hospital records and birth certificate information for 910 New Hanover Memorial Hospital obstetric clinic patients who delivered prior to initiation of the program, from July 1, 1983 to June 30, 1984.** Using delivery records, we selected only women who received all their prenatal care and were delivered by New Hanover Memorial Hospital clinic staff, but excluded women who aborted, had ectopic pregnancies, or were referred for high-risk deliveries. A total of 847 women were included in the pre-program study group.

We compared the two groups with regard to the percentage of women who had low-birthweight (<2500 grams) and very-low birthweight births (<1500 grams). We used a logistic regression model to determine the independent effect of the program on decreasing low- and very-low-birthweight births while controlling for known risk factors.

*Although the program began in January 1985, the first six months was a trial period. Therefore, we began collecting data six months after program start-up.

**Because staff training took place prior to program start-up, we allowed a six-month interval to control for staff awareness and training effects.

Results

Table 2 compares the two study groups with regard to low birthweight and selected risk factors for low birthweight. With the exception of births less than 2500 grams among Blacks, women in the program were less likely to have a low- or a very-low-birthweight birth than women in the pre-program group. In both racial groups, there were differences in available risk factors between the pre-program and program groups.

Controlling for the potential confounding effects of the risk factors listed in Table 2, a logistic regression model showed that women in the pre-program group were 1.3 times more likely to have a low-birthweight birth than women in the program and 3.2 times more likely to have a very-low-birthweight birth (Table 3). Stratifying the logistic regression analysis by race, we found that White women in the pre-program group were 2.0 times more likely than women in the program group to have a low-birthweight birth and 3.7 times more likely to have a very-low-birthweight birth. Black women in the pre-program group were 2.9 times more likely to have a very-low-birthweight birth than those in the program group. The only other factor contributing to low and very-low birthweight in the logistic regression model was age less than 18 years (OR 1.6, 95% CI=1.2, 2.1 and OR 2.1, 95% CI=1.1, 3.2, respectively).

Discussion

In the initial phase of the Prematurity Prevention Program, results suggest that the program was effective in reducing low- and very-low-birthweight births. We speculate that the reason there was little difference in the percentages of low-birthweight births from pre-program to program group for Black women was that very-low-birthweight births were being delayed by program intervention, but not necessarily being delayed to term. Very-low-birthweight babies tend to have the highest rates of mortality, morbidity, and medical care costs. Delaying very-low-birthweight births even to low

TABLE 2—Low Birthweight and Selected Risk Factors for Low Birthweight by Group and by Race

	Program Group			Pre-Program Group		
	Total[a]	White	Black	Total[b]	White	Black
Number of Births	748	365	374	847	369	468
Low Birthweight	%	%	%	%	%	%
<2500 grams	9.5	6.6	12.5	12.3	12.2	12.2
<1500 grams	0.8	0.6	1.1	2.7	2.2	3.0
Risk Factors						
Black	50.0	—	—	55.3	—	—
Unmarried	57.6	39.2	75.6	50.6	28.0	68.4
Under age 18	12.2	11.5	12.6	13.4	12.2	14.5
Fewer than 12 years of education	44.2	48.2	38.9	49.3	57.9	42.9
Initiated prenatal care after first trimester	77.8	73.2	82.3	80.7	77.7	83.1

a) Includes nine cases categorized racially as "other".
b) Includes eight cases categorized racially as "other" and two as "unknown".

TABLE 3—Relative Odds of Having a Low-Birthweight Birth and Very-Low-Birthweight Birth for Women in the Pre-Program Group by Race Controlling for Certain Risk Factors[a]

		Low Birthweight (<2500 grams)		Very Low Birthweight (<1500 grams)	
	Number of Cases[b]	Odds Ratio	95% CI	Odds Ratio	95% CI
Total[c]	1578	1.3	(1.0, 1.7)	3.2	(2.3, 4.1)
White	728	2.0	(1.5, 2.6)	3.7	(2.2, 5.2)
Black	841	1.0	(0.6, 1.4)	2.9	(1.8, 3.9)

a) Risk factors controlled in the logistic regression model include less than 18 years of age, fewer than 12 years of schooling, initiation of prenatal care after the first trimester of pregnancy, single marital status, and for the total, Black race. Complete data available from author.
b) Cases with missing data were excluded from the analysis.
c) Includes cases categorized racially as "other" or unknown.

birthweight status both decreases mortality and morbidity and reduces the cost of infant care and the drain on critical care nursery resources.

A limitation of our study design is the use of historical controls to evaluate the program. We could not use a prospective randomized design because the program mandated that all women registering for prenatal care in the institution be included in the program; for this reason, we could not use women from the area in and out of the program during the same time period.

Another limitation of our study may be in the selection process. The Prematurity Prevention Program provided us with sufficient identifying information on each clinic registrant with which to select the program group. We had no such information prior to the program and therefore had to use delivery records to select the pre-program group. From these delivery records, we selected only women who had prenatal care at New Hanover Memorial Hospital obstetric clinic and who were delivered by clinic staff. This selection process should yield comparable groups; however, a caveat concerning selection bias seems warranted.

Finally, even though we controlled for certain known risk factors in the analysis, the two groups may differ on other factors for which we could not control.

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Johnson Foundation Funds New Program to Enhance Care for Elderly

The Robert Wood Johnson Foundation has launched a new program intended to develop model hospital systems of inpatient geriatric care in the United States. The initial grant of $392,000 was recently awarded to the Veterans Administration Medical Center in Denver — the first of four pilot projects to be funded under a $1.6 million national initiative. The Denver-based pilot will utilize the VA Medical Center's expertise in geriatrics, and also involve the participation of several major hospital and health provider organizations in Colorado.

Many elderly lack access to physicians trained in geriatrics. This program is designed to develop models to help community physicians and hospitals provide better care for the growing numbers of elderly patients in need of special attention. Interdisciplinary teams of medical personnel will be formed to address the varied and interrelated needs of the high-risk elderly patients.

A major focus of the Denver project will be to:

- Identify, upon admission, those elderly patients who are most at risk of functional decline during their hospitalization;
- Develop clinical management strategies to prevent problems that may arise during the hospital stay of these high-risk patients;
- Educate and enhance awareness of the special needs of the elderly patient in each participation institution and in the local community.

For further information, contact the RWJ Foundation, College Road, P.O. Box 2316, Princeton, NJ 08543-2316.