Frequency, Timing, and Diagnoses of Antenatal Hospitalizations in Women with High-Risk Pregnancies

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Abstract

OBJECTIVE—To examine the frequency, time of gestation, and reasons for antenatal hospitalizations in women with medically high-risk pregnancies.

STUDY DESIGN—This secondary analysis reports all antenatal hospitalizations from a clinical trial testing transitional care to women with high-risk pregnancies. Data were collected from 1992 to 1996. Pregnant women with pregestational ($n = 16$) or gestational diabetes ($n = 21$), hypertension ($n = 29$), and diagnosed ($n = 47$) or at high risk for preterm labor ($n = 37$) were included. Diagnoses for each hospitalization and lengths of stay were collected from chart review and validated by attending physicians. Gestation was determined via ultrasonography. The sample ($N = 150$) consisted of predominately African-American women, never married, between the ages of 15 and 40 with Medicaid insurance.

RESULTS—Eighty-three percent ($n = 125$) of the women had one or more antenatal hospitalization with a mean length of stay of 123 hours. All women with diabetes were hospitalized at least once. Women with pregestational diabetes had the greatest number of hospitalizations whereas those with gestational diabetes had the least. Major reasons for hospitalizations were preterm labor, glucose control, premature cervical dilation, and preeclampsia.

CONCLUSION—Some hospitalizations could potentially be avoided or reduced through expanded patient education, improved screening, and more aggressive monitoring for early signs and symptoms of impending complications.

National strategies to control health care costs have resulted in reduced hospitalizations and increased use of home care services for many high-risk, high-cost patient groups. Women at high risk of delivering low birth weight (LBW) infants represent such a group. Currently, more than 287,000 LBW <2500 gm) infants are born annually in the United States with 52,000 born with very LBW (<1500 gm).[1] Compared with normal weight infants, LBW infants are twice as likely to suffer one or more handicaps such as mental retardation, deafness, blindness, cerebral palsy, or chronic lung problems and are three times as likely to have adverse neurologic sequelae.[2] Lengthy hospitalization and complex care needed for LBW infants result in iatrogenic problems, increased stress on families, and mean initial hospital charges that are among the most costly of any patient group.[3,4]

Understanding of the basic causes of LBW (preterm labor and intrauterine growth retardation) is limited. Associated factors include previous preterm birth, abruption placenta,

placenta previa, preeclampsia, multiple pregnancy, diabetes, hypertension, cardiac disease, smoking, and substance abuse.[5] Such conditions complicate pregnancy and can result in significant consumption of health care resources including frequent and/or prolonged hospital stays. Preventing or minimizing hospitalizations for women with high-risk pregnancies is important for many reasons. Hospitalization holds the potential for introducing iatrogenic infections. Hospitalized pregnant women with diabetes find it difficult to satisfy dietary preferences. Changed activity levels and eating patterns subsequently result in difficulty regulating blood glucose levels. Hospitalization is stressful for families and increases financial obligations and maternal depression.[6] Data on frequency, diagnosis, and pattern of antenatal hospitalizations in women at high risk for delivering LBW infants are valuable for prevention of hospitalizations, delivery of home care services for this group, and discharge planning to avoid repeat hospitalizations. The purpose of this study was to examine the frequency, reasons, and time of gestation for antenatal hospitalizations in women with medically high-risk pregnancies. Subjects included women with pregestational and gestational diabetes, chronic hypertension, and women diagnosed or at high risk for preterm labor.

METHODS

The study was a secondary analysis of data from a randomized clinical trial which tested a model of advanced practice nurse transitional care provided to women with high-risk pregnancies. In the intervention group, half of usual physician-delivered prenatal care provided in the office or clinic was substituted with care delivered in the woman's home by masters' prepared advanced practice nurses. A control group of women with high-risk pregnancies received routine prenatal care. Women were enrolled in the main study during pregnancy once they were diagnosed as having a medically high-risk pregnancy. Data on subjects in both groups were collected throughout pregnancy to delivery and included all antenatal hospitalizations, both pre and post enrollment in the study. These data were used for this analysis. Data on primary and secondary diagnoses for hospitalization and length of all antenatal hospitalizations (in hours) were collected from hospital chart review and validated by attending physicians. Time of gestation was determined by results of ultrasonography.

Sample

The sample ($N = 150$) consisted of women with high-risk pregnancies. The primary diagnoses on enrollment were as follows: 16 women with pregestational diabetes, 21 with gestational diabetes, 29 with hypertension, 47 with diagnosed preterm labor, and 37 at high risk for preterm labor. Women with uterine fibroids, previous preterm labor, multiple pregnancies, or scoring 10 or above on Creasy's screening tool for preterm labor were considered at high risk for preterm labor. Sociodemographic characteristics of the sample are presented in Table 1. The women were predominantly African American, never married, and ranged in age from 15 to 40 years. Most women had at least a high school education and had public health (Medicaid) insurance. Most women (66%) fell under the federal poverty guidelines.

RESULTS

One hundred twenty-five women (83%) had one or more antenatal hospitalizations with a mean length of stay of 123 hours (SD ± 167). All of the women with diabetes were hospitalized at least once during their pregnancies; however, only half of the women with chronic hypertension required hospitalization. Women with pregestational diabetes had the greatest number of hospitalizations per subject, averaging more than two hospitalizations

each; whereas, women with gestational diabetes had the fewest hospitalizations per subject (Table 2). Average number of weeks pregnant at hospitalization was 27 weeks (SD ± 7.8).

Mean length of stay was highest for hospitalizations of women at high risk for preterm labor, followed by hospitalizations for women with pregstational diabetes (Table 2). Mean length of stay was shortest for the hospitalizations of women with gestational diabetes. Most hospitalizations of women with chronic hypertension (89%) were under 7 days; 76% of hospitalizations of women with pregestational diabetes and 73% of women at high risk for preterm labor were less than 7 days. All hospital lengths of stay for women with pregestational diabetes were under 3 weeks, while lengths of stay for six hospitalizations (12%) of women at high risk for preterm labor were greater than 3 weeks. For three of the five diagnostic groups, most hospitalizations were in the third trimester (Table 3). However, women at risk for preterm labor experienced twice as many of their hospitalizations during the second trimester.

The most frequent reasons for antenatal hospitalization (using primary diagnosis) varied by diagnostic group (Table 4). Hospitalizations of women with diagnosed preterm labor or at high risk for preterm labor were most often for preterm labor and premature cervical dilation; 12 women had cervical incompetence and 11 of the 12 had cerclage early in their pregnancies. Hospitalizations of women with chronic hypertension were most often for preterm labor and hypertension. Hospitalizations of women with diabetes (gestational and pregestational) were most often for glucose control. In the category of "other," reasons for hospitalization included attempted induction, amniocentesis, fever, second trimester bleeding, asthma, cholecystectomy, and thrombocytopenia. For 83 (38%) of the hospitalizations, women had at least one additional comorbidity.

DISCUSSION

The study findings have important implications for defining resource requirements to prevent or minimize hospitalizations in these groups of women with high-risk pregnancies. Eighty-three percent of the study sample had one or more antenatal hospitalization, reflecting the high health care resource consumption of this group. All of the women with diabetes, both pregestational and gestational, were hospitalized at least once during their pregnancy, making them a target group for potential reduction in frequency of hospitalization. In the study group, women diagnosed with preterm labor or at high risk for preterm labor comprised 59% of the total antenatal hospitalizations, reflecting the magnitude of this problem in overall pregnancy complications. The study group rate compares to rates of 46.5% and 41.9% of antenatal admissions for preterm labor in a sample of African-American and white women reported by Adams et a1.[7] The Adams et al.[7] study, however, was comprised of women with both normal and high-risk pregnancies, which may account for the study differences.

Study results indicate somewhat longer average lengths of antenatal hospital stay for all but one of the study groups of women compared to nationally reported figures. Women with diabetes mellitus, hospitalized antenatally, had a nationally reported 5.3-day mean length of stay.[8] This compares to a mean antenatal hospital length of stay of 4.8 days and a SD of 3.7 days for the study group women with pregestational diabetes. Study group women with gestational diabetes had a 3.7-day mean length of hospital stay with a 2.5-day SD compared to a nationally reported 3.2-day average length of stay. Women with essential hypertension had a nationally reported 3.3-day average length of antenatal hospital stay while study group women had a mean 4.2-day length of stay with a 5.8-day SD. Women with early or threatened preterm labor have a nationally reported average length of stay of 2.8 days. However, it is difficult to compare the study groups categorized as at high risk and

diagnosed with preterm labor with nationally reported figures because diagnostic categories reported nationally in these two study groupings are numerous and very discrete, thus making comparisons difficult. Differences in antenatal hospital length of stay may reflect continuing changes to shorten hospital length of stay, changes in reimbursement policies by health care insurers, changes in health care practices, and geographic differences.[9] In addition, most study group women lived in poverty. Poverty status may account for some of the difference between national data and study findings, because it is well documented that patients living in poverty seek care later and have greater severity of illness episodes.[10]

Based on the reasons for hospitalization, some hospitalizations in the study group could potentially have been avoided. Hospitalization for glucose control can potentially be avoided through patient education which emphasizes the importance of adhering to diet, problem solving, and making lifestyle changes where needed. Such education combined with continued contact with knowledgeable providers who can monitor and assist the woman in managing her blood sugar before problems occur is important in the management of this group of women. In work with pregnant women with diabetes, Robbins et al.[11] emphasize assessing the woman's ability to monitor her blood sugar; identify and act on episodes of hypoglycemia or hyperglycemia; self-administer insulin safely; adhere to a prescribed diet; and monitor fetal activity, signs of complications, and signs of labor. They also advocate monitoring the stress level in this group of women noting the association of increased stress and increases in blood sugar in this group.

Brooten et al.,[12] reporting on rehospitalization and acute care visits in seven high-risk patient groups including women with high-risk pregnancies, make a number of important points in avoiding hospitalizations in these groups. They note that teaching patients during regular visits for care what to expect and what to monitor in the course of their management should be combined with printed handouts and when possible audio or video cassettes that can be reviewed at home. Assessing the woman's ability to reduce her activity level and household and child care responsibilities at home is often critical in stabilizing presenting problems.

Assessing demands of transportation for care is also important. Many women with high-risk pregnancies, living in urban settings, are required to spend long hours and make several bus transfers to arrive at the site of care. In other situations, women may have access to free hospital vans for transportation. However, these vans may not accommodate children, require prohibitive advanced scheduling, and require a wait of several hours to be picked up. Patients also should be clear on whom to call should they detect problems. Provider teaching and patient learning are difficult following an acute episode often because of patient discomfort, anxiety, and the need to rest and recover particularly if complications persist. Telephone outreach and availability of knowledgeable providers who are familiar with the patient's past progress are both important in preventing and minimizing further acute episodes as well as increasing patient satisfaction and potentially reducing health care costs.

Hospitalizations for preterm labor might be reduced through aggressive monitoring and treatment of infections,[13] use of fetal fibronectin screening, and evaluation of cervical length combined with education on self-uterine palpation and, where necessary, home uterine monitoring. Work by McGregor et al.,[14] for example, demonstrated that women with bacterial vaginosis and trichomoniasis, treated with clindamycin, had a 17% reduction in preterm birth. In work by Iams et al.,[15] cervicovaginal expression of fetal fibronectin was found to be far more predictive (93%) of delivery within 7 days when compared to more traditional methods, including evaluation of cervical dilation, contraction rate, and vaginal bleeding. Such screening may allow practitioners to make more informed decisions regarding the probability of imminent delivery or expectant management augmented with

careful uterine monitoring. Education on monitoring of blood pressure, signs and symptoms of impending preeclampsia, and dietary restrictions could also reduce hospitalizations for those women prone to hypertensive episodes.

It may not be possible to reduce average length of antenatal hospital stays much further without increasing the risk of untoward pregnancy outcomes. It may, however, be possible to reduce the frequency of hospitalizations for some women through expanded patient education, improved screening, and more targeted provider and patient monitoring for early signs and symptoms of impending complications in the groups most frequently hospitalized.

Acknowledgments

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Table 1

Sample Characteristics (N = 150)

Maternal age (yr)	
Mean	27 (SD = 6.4)
Range	15-40
Race	
African American	141 (94%)
White	6(4%)
Other	3(2%)
Education	
<High school	53 (35%)
High school graduate	52 (35%)
>High school	45 (30%)
Marital status	
Never married	115 (77%)
Married	18 (12%)
Separated/divorced/widowed	17 (11%)
Annual reported income	
≦$5000	52 (35%)
$5001-$12,499	47(31%)
$12,500-$19.999	24 (16%)
≧$20,000	27 (18%)
Type of health insurance	
Public	130 (94%) [*]
Private	9(6.9%) [*]

[*] Calculated from an N of 139.

Table 2

Frequency and Length of Antenatal Hospitalization by Antenatal Diagnosis ($N = 150$)

	Diagnosed preterm labor ($n = 47$)	High risk for preterm labor ($n = 37$)	Chronic hypertension ($n = 29$)	Gestational diabetes ($n = 21$)	Pregestational diabetes ($n = 16$)
No. of subjects hospitalized	45	28	15	21	16
Total no. of hospitalizations	76	52	28	24	37
Mean no. of hospitalizations per subject	1.7	1.9	1.9	1.1	2.3
Mean length of stay (hours)	99 (SD ± 99)	190 (SD ± 284)	100 (SD ± 138)	88 (SD ± 59)	116 (SD ± 88)
Median length of stay (hours)	68	73	77	68	96

Table 3

Antenatal Hospitalizations by Antenatal Diagnoses and Trimester Hospitalized (N = 150)

	Diagnosed preterm labor ($n = 47$)	High risk for preterm labor ($n = 37$)	Chronic hypertension ($n = 29$)	Gestational diabetes ($n = 21$)	Pregestational diabetes ($n = 16$)	Total
Trimester hospitalized						
First (12 wk)	1	1	0	2	7	11
Second 03–27 wk)	31	34	8	4	15	92
Third (28 wk)	43	17	20	18	15	113

Table 4

Reasons for Antenatal Hospitalizations by Antenatal Diagnosis ($N = 150$)

	Diagnosed preterm labor ($n = 47$)	High risk for preterm labor ($n = 37$)	Chronic hypertension ($n = 29$)	Gestational diabetes ($n = 21$)	Pregestational diabetes ($n = 16$)	Total
Preterm labor	51	27	7	1	3	89
Premature rupture membranes	4	3	0	0	2	9
Premature cervical dilation	9	9	0	1	0	19
Glucose control		0	3	16	26	46
Hypertension	0	0	6	0	0	6
Hypertension with preeclampsia	0	0	2	0	2	4
Preeclampsia	1	0	2	0	0	3
Cerclage	3	9	1	0	1	14
Infections	4	0	2	1	0	7
Fetal distress	0	0	0	1	1	2
Other	3	4	5	4	2	18