

Management of Gestational Diabetes by Family Physicians and Obstetricians

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BACKGROUND. Studies suggest that there are differences between family physicians' (FPs) and obstetricians' (OBs) management of women with low-risk pregnancies. This study was conducted to examine outcomes in women with gestational diabetes mellitus (GDM) to see if similar patterns exist between those cared for by FPs and those cared for by OBs.

METHODS. A retrospective chart review was undertaken and analyzed by prenatal care provider. Eight hundred thirteen women were identified as having a pregnancy complicated by GDM. Management outcome data of FPs and OBs were compared.

RESULTS. Eighteen percent of patients were cared for by FPs. The percentage with a prior history of GDM did not differ between groups. Patient groups were similar demographically except that FPs cared for a significantly higher percentage of patients on public assistance (60% vs 38%, $P < .001$). Average prepregnancy weight and body mass index were equal, as were average weight gain, gestational week at entrance to care, and number of prenatal visits. Class instruction on diabetes was given to 83% of FP patients and 85% of OB patients. A greater percentage of OB patients were placed on insulin therapy (33% vs 24%, $P < .05$). Complications of pregnancy, labor, and delivery were equal, but a higher number of OB patients had a cesarean section (33% vs 11% for FPs). Despite the equal occurrence of preterm labor/delivery and low birthweight, OBs used tocolysis in significantly more women than did FPs (10.3% vs 4.7%, $P < .03$). Average birthweight of infants delivered by FPs and OBs (3259 g and 3356 g, respectively), macrosomia rate (12% and 13%, respectively), length of pregnancy, fetal complication rate, Apgar scores, and length of hospital stays were all equivalent.

CONCLUSIONS. Although there are variations in the care of women whose pregnancy is complicated by gestational diabetes mellitus, there are no significant differences in neonatal outcome. There is, however, an overall lower rate of both cesarean section and tocolysis use among women cared for by FPs.

KEY WORDS. Pregnancy; physicians, family; diabetes, gestational; treatment outcome. (*J Fam Pract* 1996; 43:383-388)

Many family physicians perform routine obstetrical care, including the management of pregnant women with gestational diabetes, yet the American Diabetes Association (ADA) has stated that women with gestational diabetes should be considered high risk and referred to physicians with expertise in dealing

with high-risk obstetrics and gestational diabetes.¹ There is little question that in caring for similar problems, there are variations between the practice styles of the generalist vs the specialist.² There have been several recent reports showing that the care provided by family physicians is of the same high quality³⁻⁵; however, most of these have dealt with low-risk pregnancies.⁶⁻⁸ There are few studies comparing the management of gestational diabetes by family physicians (FPs) vs obstetricians (OBs) and/or perinatologists, and none that we know of that evaluate variations in the management of women with gestational diabetes mellitus (GDM).

Gestational diabetes mellitus is defined as car-

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bohydrate intolerance of variable severity that begins or is first recognized during pregnancy. The condition occurs in approximately 5% of all pregnancies,⁹ although this percentage varies according to the population. Thus, GDM represents one of the most common complications of pregnancy. Many cases go untreated because of lack of screening or detection.¹⁰ Universal screening for GDM, which was recommended by the Third International Workshop on Gestational Diabetes, has been found to be practical, efficacious, and cost-effective within family practice programs.¹¹ The effects of GDM on the offspring include increased risk of mortality,¹²⁻¹⁴ macrosomia, trauma related to difficult labor and delivery, hypoglycemia, hypocalcemia, and hyperbilirubinemia.^{15,16}

There are approximately 150,000 births in Michigan each year, about 20,000 (13%) of which involve a family physician. It can be estimated, then, that 7500 mothers statewide suffer with gestational diabetes and that potentially 1000 of these patients will be managed by FPs. Considering the 1% to 3% perinatal mortality rate associated with gestational diabetes,^{17,18} there are 75 to 225 perinatal deaths that could be linked to gestational diabetes in Michigan each year. Compared with the national rate of perinatal, neonatal, and infant mortality, Michigan ranks poorly.¹⁹ If these findings are consistent among complications of pregnancy, it can be assumed that GDM contributes to these poor statistics. In particular, minorities (especially black and Hispanic) fare poorly with respect to perinatal, neonatal, and infant mortality. Nationally, it has been recognized that minorities suffer increased mortality and morbidity from diabetes, and in particular, there has recently been a decreased GDM detection rate and increased complications among minority groups.^{20,21} An abstract presented at a recent ADA meeting addressed current community standards in the care of pregnant women with diabetes in Indiana. According to this report, diabetes care provided to many pregnant women by primary care physicians does not conform to ADA standards; for example, 25% of FPs compared with 16% of OBs do not routinely screen pregnant patients for GDM.¹⁰

The purpose of this study was to examine outcome data from hospital charts of women with gestational diabetes and to analyze the data with respect to prenatal care provider to determine if there are

any differences in outcome between patients cared for by FPs and those cared for by OBs.

METHODS

Using the discharge diagnosis code for gestational diabetes, all charts were sorted for the years 1989 through 1992. This process resulted in the identification of 867 charts of patients who met the diagnostic criteria for GDM, defined as two or more abnormal values on a standardized 3-hour oral glucose tolerance test. Charts of patients who did not meet the strict definition of GDM were not included in this study. In 47 cases identified as having met the criteria for GDM, it was noted that the diagnosis was made after the use of tocolysis to prevent preterm labor and delivery. Since diabetes is one of the complications of the agents used as tocolytics, these charts were removed from the analysis. An additional seven charts were eliminated from the analysis because nurse midwives had managed the patients and therefore could not be categorized as providing either FP or OB care. Thus, 813 charts were available for analysis. Outcome data were retrospectively abstracted by a trained graduate assistant who was aware only that the study was about GDM care. All subjects in the chart review were obtained from a single hospital (Saginaw General Hospital). At the time of the study, it was the primary obstetrical hospital in Saginaw, and accurately represented the incidence and care of gestational diabetes in the Saginaw community.

Sorting by specialty was based on the specialty of the attending physician with whom the patient had begun prenatal care, rather than on the delivering physician's field of practice. This was possible because hospital charts had a copy of the prenatal office record included as part of the hospital record. For cases in which consultations or referrals had been sought, the chart was still assigned to the specialty group with which the patient initially sought care. Consultations were those in which assistance in caring for a patient was sought and referrals for transfer and assumption of any further care of the patient were made. Thus, intrapartum consultation from an FP to an OB for patients requiring cesarean section would have resulted in classifying the provider of care as an FP.

During the time frame of the study, there were four

groups of physicians: (1) private OBs, (2) private FPs, (3) obstetrical residents, and (4) family practice residents. All the private physicians had some teaching responsibilities and were part of the volunteer faculty for their respective residency program. The data were not sorted by practice setting, only by specialty. The numbers of practicing OBs were divided between two group practices of 6 physicians each and the obstetrical residency program of 8 residents and 4 faculty (2 of which were perinatologists). The FP group consisted of 7 solo practitioners and a single group practice of 3 physicians, along with the family practice residency of 22 residents and 4 faculty who cared for pregnant patients.

Information on the patient population was analyzed by age, marital status, race (defined as white, black, or other), payer, smoking behavior, prior history of GDM, and gravidity, parity, and abortion.

To examine management of the pregnancy, data on the number of prenatal visits, average weight gain, and entrance to care were obtained. Documentation of diabetic education and whether the patient was treated with diet alone or with insulin was recorded. For cases in which data were missing from the hospital chart, the office records of prenatal care were accessed.

Pregnancy outcome referred to type of delivery and complications to both mother and infant. Complications of pregnancy included preterm labor, premature delivery, preeclampsia, pregnancy-induced hypertension, and eclampsia. Delivery types were coded as normal spontaneous vaginal delivery, induction of labor, or augmentation of labor or cesarean section. It was also noted whether the cesarean was primary or repeat.

Birth complications that were evaluated included birthweight, 1- and 5-minute Apgar scores, length of hospital stay, and neonatal complications of hypoglycemia, jaundice, respiratory distress, and shoulder dystocia. We used the standard definition for low birthweight (<2500 g) and macrosomia (>4000 g). Data were entered and stored on a computerized database and analyzed by the SPSS for Windows software. Categorical data analysis was performed by chi-square, and means were compared using Student's *t* test. Significance was considered at the $P < .05$ level. Considering a 3.5-to-1 OB-to-FP sample size ratio, the calculated power to detect a 10% difference in the rates of macrosomia at the $P < .05$ was 89.3.

RESULTS

From 1989 through 1992, 16,371 births occurred at Saginaw General Hospital. Over the 4 years, a mean of 5.8% of these pregnancies were complicated by GDM (4.2%, 6.0%, 6.8%, 6.5%, respectively). Excluding cases ineligible for the study, there was a total of 813 patients whose pregnancies were complicated by GDM, 18% of whom were cared for by FPs and 82% of whom were cared for by OBs.

Only 15% of family practice patients (22 cases) were referred to OBs for assumption of care, although in 28% of these cases, FPs sought OB consults. However, 4% of the patients cared for by OBs were also referred (26 cases), and in 18%, consults were sought, usually with a perinatologist. The average age of patients was 26.9 years \pm 0.5 in the FP group and 29.0 years \pm 0.2 in the OB group. Marital status, racial composition, and percentage of smokers were not significantly different between the two groups. When analyzed for payment mix, FPs exhibited a higher percentage of patients on public assistance (60% vs 40% for OB) and, conversely, a lower percentage of privately insured ($P < .001$). Gravidity, parity, and abortions were not different between the two groups nor was the percentage of patients with a history of GDM (Table 1). Average prepregnancy weight and body mass index (BMI) were not significantly different between the two provider groups. The percentage of obese patients (BMI 30 to 39) was not different between the FP and OB groups (30% and 28%, respectively), but the percentage of morbidly obese patients (BMI >40) was 6% in the FP group and 12% in the OB group.

Based on medical chart documentation, 83% of all FP patients were referred to diabetes/nutrition class instruction and 85% of OB patients were referred for such education. OBs placed a greater proportion (33% vs 26%, $P = \text{NS}$) of their patients on insulin, while FPs were more likely to use nutritional approaches. The average gestational week at entrance to prenatal care and number of prenatal visits were not significantly different for the two groups, and length of pregnancy and average weight gain during pregnancy were similar. The average maternal weight gain was 25.7 lb \pm 1.1 for the FP patients and 26.5 lb \pm 0.6 for the OB patients (Table 1).

Complications of pregnancy were recorded in

TABLE 1

Characteristics of Patients with Gestational Diabetes Mellitus (GDM) (N=813)

Characteristic	Patients Receiving Prenatal Care From	
	Family Physician (n=146)	Obstetrician/Gynecologist (n=667)
Smoker, %		
Yes	28	28
No	72	72
Pregnancy history		
Gravida	2.7 ± 0.2	2.8 ± 0.1
Para	1.3 ± 0.1	1.3 ± 0.1
Abortion	0.5 ± 0.1	0.5 ± 0.03
History of GDM, %		
Yes	18	20
No	82	80
Consultation/referral, %		
Self-manage	57	79
Consult	28	18
Referred	15	4
Maternal care		
Entrance to care, wk*	12.0 ± 0.4	12.3 ± 0.2
Prenatal visits, n	10.9 ± 0.3	10.4 ± 0.2
Length of pregnancy, wk	38.4 ± 0.3	38.3 ± 0.1
Weight gain, lb	25.7 ± 1.1	26.5 ± 0.6

*Indicates week of pregnancy during which prenatal care was initiated.

32% of OB patients and 36% of FP patients. The most common complications were preeclampsia and pregnancy-induced hypertension. The percentage of patients with induced labor, augmented labor, or a forceps-assisted birth was not different, but a higher proportion of OB patients had a cesarean section (31.5% vs 14.9%, $P < .001$) (Table 2). The majority of the difference in cesarean section rates resulted from a fivefold difference in repeat cesarean sections (48.1% vs 9.1%, $P < .001$) (Table 2). This difference persisted even when data were analyzed using rates of obesity, macrosomia, hypertensive disorders, or maternal weight gain as covariants. OBs reported complications of labor and delivery in 25% of their patients; 16% of these complications were either premature labor or premature delivery. Family physicians reported complications in 22% of cases, 13% of which involved premature labor or premature delivery. The rates of low birthweight infants for FPs and OBs were 12.2% and 10.3%, respectively. Although the rates

of premature labor or delivery or low birthweight were not significantly different between the two groups, OBs used tocolysis in significantly more patients (10.3% vs 4.7%, $P < .03$) than did FPs.

There were two neonatal mortalities in the 813 patients studied. Both were associated with prematurity and occurred in the FP group. Fetal complications were noted in 42.6% of FP patients and in 46.1% of OB patients, a difference that is not significant. These complications included jaundice, shoulder dystocia, respiratory distress, congenital malformations, and hypoglycemia, with the most common fetal complication being hypoglycemia. Of note, the rates of shoulder dystocia were small, and equal between the two

groups. Apgar scores (1- and 5-minute) were virtually identical for the two groups, and average length of hospital stay for mother or baby was not significantly different between the two groups (Table 3).

Average birthweight in FP patients was 3259 g ± 57 g and was 3356 g ± 26 g in the OB patients (Table 3). In the FP group, 12.8% weighed over 4000 g, and in the OB group, 13.3% weighed over 4000 g. The rate of low birthweight was similar between the two groups (12.2% for FP vs 10.3% for OB).

DISCUSSION

There are variations in how FPs and OBs care for women whose pregnancies are complicated by GDM, eg, diet vs insulin, use of tocolysis, cesarean section rate, but no pregnancy outcome differences were found. Some might favor the FP group with respect to using diet over insulin and having lower rates of cesarean sections and less frequent

TABLE 2

Method of Delivery for Infants of Patients with Gestational Diabetes Mellitus (N=813)

Method of Delivery	Percentage of Patients Receiving Prenatal Care from	
	Family Physician (n=146)	Obstetrician/Gynecologist (n=667)
Vaginal	85.1	68.5
Normal	45.2	49.3
Induced	37.3	35.1
Forceps	3.2	4.2
Augmented	14.3	11.4
Cesarean section*	14.9	31.5
Primary	90.9	51.9
Repeat*	9.1	48.1

$P_{\leq .001}$ for the difference between family physicians and obstetricians/gynecologists.

use of tocolysis.

The two patient populations did not differ significantly; thus, it appears that not all "tough" cases are referred to OBs, which would skew the results. Referrals, usually to a perinatologist, occurred in a small number of cases but in both provider groups; routine care was continued throughout pregnancy by the original prenatal care provider except in a small fraction of cases. In general, it appears that the patient populations in both groups were very similar. Prepregnancy weight between the two groups was equal, which is important, considering the current theories that fetal macrosomia is most directly correlated with prepregnancy weight rather than maternal blood glucose levels during pregnancy.^{22,23}

The use of tocolysis was another interesting difference between the two provider groups. OBs used tocolysis twice as often as FPs, but the rates of preterm labor or delivery and low birthweight were not significantly different in the two groups. Combined with the increased use of insulin, it may be that OBs preferred pharmacological interventions, while FPs favored behavioral interventions, such as bedrest and diet. The differential use of these interventions appeared not to influence outcome in any way analyzed.

The rate of cesarean section

in patients with GDM was twice as high in those with GDM who were cared for by obstetricians. This difference persisted even when rates of obesity, macrosomia, hypertensive disorders, and maternal weight gains were considered as covariants. It is known, in general, that women with

gestational diabetes have a higher rate of cesarean section, which appears to correlate with hypertensive disorders and macrosomia.²⁴ For the general pregnant population, evidence in the literature suggests that FPs have lower rates of cesarean sections than OBs, but this difference cannot be explained by patient factors.^{25,26} It appears that the difference in cesarean section rates in our study may be attributable to a difference in the management of labor and delivery of these relatively high-risk women with GDM. It is also possible that the higher rate of repeat cesarean section reflects differences in practice style with respect to trials of vaginal birth after cesarean section vs a continued trend to follow the Cragin dictum, "Once a cesarean, always a cesarean."²⁷ It could also be argued that women who desired a repeat cesarean section chose physicians (OBs) who provide this service. Even after repeat cesarean sections are excluded,

TABLE 3

Pregnancy Outcome of Patients with Gestational Diabetes Mellitus (N=813)

Outcome Variable	Prenatal Care Provided by	
	Family Physician (mean \pm SD)	Obstetrician/Gynecologist (mean \pm SD)
Birthweight, g	3259 \pm 57	3356 \pm 26
Apgar scores		
At 1 min	8.1 \pm 0.1	8.2 \pm 0.1
At 5 min	8.8 \pm 0.1	9.0 \pm 0.0
Hospital stay, d		
Mother	3.3 \pm 0.2	3.3 \pm 0.1
Infant	4.0 \pm 1.0	3.8 \pm 0.3

however, OBs still had a cesarean section rate greater than the FP rate (19.4% OBs vs 13.5% FPs, $P=NS$).

A limiting consideration in this study is that the Saginaw medical community includes elements of graduate and postgraduate medical education, and a substantial number of patients in this study were cared for by residents, paid faculty, or volunteer faculty. The medical education climate may have direct bearing on the philosophy, management, and outcome of GDM patients in both family practice and obstetrics. Nevertheless, in this community, outcome does not vary by specialty of prenatal care providers. It has not been established whether differences in the management and outcome of GDM exist between FPs and OBs in nonmedical education sites or in rural sites, nor whether differences exist comparing FPs to FPs or OBs to OBs in the two different practice environments. Further studies are being planned to investigate these questions.

Gestational diabetes mellitus is one of the most common complications of pregnancy and, if not properly managed, can detrimentally affect outcome. Thus, optimum care of the pregnant patient with GDM is important to any physician who provides prenatal and obstetrical care. Our results indicate that the care provided by FPs for patients who have GDM results in similar outcomes compared with those of women cared for by obstetrical colleagues.

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