Why Don't Women With Diabetes Plan Their Pregnancies?

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OBJECTIVE — To determine why women with diabetes generally do not plan their pregnancies, consequently entering their pregnancies with poor blood glucose control and greatly increasing the risk of birth defects in their infants.

RESEARCH DESIGN AND METHODS — A population-based sample of 85 women with diabetes diagnosed before the index pregnancy were recruited within 6 months postpartum from 15 hospitals in the state of Washington. Women with planned and unplanned pregnancies were compared using qualitative and quantitative analysis of personal interviews, self-administered questionnaires, and medical record review.

RESULTS — Although most women (79%) knew they should optimize their blood glucose levels before conception, fewer than half (41%) of their pregnancies were planned. Women with planned pregnancies had significantly higher income and more education; were more likely to have private health insurance, to see an endocrinologist before pregnancy, to be happily married, and to be Caucasian; and were less likely to use tobacco. Most unplanned pregnancies were not contraceptive failures, but may have been consciously or subconsciously intended. Women with planned pregnancies generally described an ongoing and positive relationship with their health care providers. Women who felt that their doctors discouraged pregnancy were more likely to have an unplanned pregnancy than were women who had been reassured they could have a healthy baby.

CONCLUSIONS — Many women with diabetes still perceive negative messages about pregnancies and become pregnant without optimal planning. We believe there are many opportunities for increasing the proportion of women with diabetes who plan their pregnancies, particularly in the areas of prepregnancy information, support that women are given, and the quality of the relationships they experience within the health care system. It is crucial that couples be reassured that with pre-conception glucose control, almost all women with diabetes can have healthy babies.

Elevated blood glucose during early pregnancy is associated with a greatly increased risk of birth defects in infants of mothers with established diabetes (1–5). Although advances in fetal surveillance and neonatal care over the past several decades have produced dramatic reductions in perinatal mortality among infants of mothers with diabetes, with mortality in these infants now approaching that of the general population, major congenital malformations remain the leading cause of morbidity and mortality among these infants (2,6). The prevention of birth defects depends on the willingness and ability of women to maintain optimal blood glucose levels before they conceive and throughout the early weeks of pregnancy (6–19). Unfortunately, the majority of diabetic women do not plan their pregnancies and enter pregnancy with inadequate blood glucose control (20–25).

The purpose of this study was to learn from women with diabetes what factors and circumstances promote or discourage effective pregnancy planning. For women with diabetes, effective pregnancy planning must incorporate careful attention to glucose control. Women with planned and unplanned pregnancies were compared using quantitative and qualitative analysis of self-administered questionnaires, medical record data, and in-depth personal interviews. In developing the interview tool, questions were generated to examine in depth the following eight themes: *1*) contraceptive use, 2) pregnancy planning behavior, 3) desire for motherhood, 4) partner relationships, 5) health locus of control, 6) knowledge about diabetes and pregnancy, 7) medical advice received, and 8) relationships with health care providers. In addition to obtaining a detailed understanding of these underlying issues, we also hoped to identify opportunities where health care professionals might increase the level of timely pregnancy planning in women with diabetes.

RESEARCH DESIGN AND METHODS

— Using birth certificate data for 1987–1991, we identified 52 hospitals in Washington that had deliveries of women with preexisting diabetes. Sixteen hospitals accounted for 80% of the diabetic deliveries and were asked to participate in the study; 15 agreed. These hospitals, located across the state, represented a broad socioeconomic and geographic sampling. The number of births to women with preexisting diabetes in the 15 hospitals ranged from 1 per year at the smaller community hospitals to 31 per year at a university medical center. Hospitals were enrolled in the study between June and October 1994, and subjects were recruited from each hospital for 12 consecutive months.

A staff person from each hospital monitored all births to women with diabetes and identified potential subjects. English-speaking women aged ≥16 years old who had diabetes diagnosed before the onset of their most recent pregnancy were recruited. The Washington State Human Subject Review Board asked that women be excluded if their infants experienced unfavorable perinatal outcomes (stillbirth, neonatal death, or birth defects that were life-threatening or required surgery). A staff person at the hospital identified these

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infants before discharge. Within 6 months of their infant's birth, potential subjects were mailed an introductory letter explaining the study, followed by a phone call in 2 weeks to invite participation. After informed consent, information was collected for each woman from three sources: medical record review, a self-administered questionnaire, and an in-person interview.

Medical record review

Medical records were reviewed after the questionnaires and interviews were completed. Glycohemoglobin levels on entry into prenatal care were collected as a measure of blood glucose control in early pregnancy. To compare data based on different assays from different laboratories, glycohemoglobin values are reported in this study in terms of units of standard deviations from the mean. Each laboratory defined its normal "nondiabetic" range as the mean ± 2 SD from the mean for its assay. For diabetic pregnancies, most studies have reported a low frequency of major malformations when the initial glycohemoglobin is <4 SD above the mean (19). Infant charts were reviewed for neonatal outcomes. Demographic data were collected from the charts of nonparticipants for comparison with participants.

Questionnaire

The self-administered questionnaire elicited information on demographics, medical financial coverage, access to health care, type of diabetes provider, and frequency of visits. Subjects were asked to check whether or not they had the following diabetic complications before the pregnancy: retinopathy, retinopathy requiring laser treatment, nephropathy, peripheral neuropathy, and gastroparesis. Contraceptive behavior was ascertained through checklists asking for types of contraception used, frequency of use in the month before pregnancy, and the reasons for non-use.

The Marital Satisfaction Scale assessed partner satisfaction (26). Responses to each of 24 items are made on a five-point Likert scale. Sample questions included: "I am definitely satisfied with my relationship" and "My partner usually understands the way I feel." Cronbach's α has been reported as 0.97 (26).

The Multidimensional Health Locus of Control Scale (27) was used to measure subjects' perceptions of their internal control and the control of powerful others or of chance over the health events of their lives. The scale consists of 18 statements arranged in a six-point Likert format. Sample questions included: "If I become sick, I have the power to make myself well again" (internal); "Regarding my health, I can only do what my doctor tells me to do" (powerful others); and "Most things that affect my health happen to me by accident" (chance). The Cronbach's α of the subscales has been reported as 0.67–0.76 (27).

Interview

Interviews conducted by one of five trained interviewers ranged from 60 to 150 min and were tape-recorded and transcribed in their entirety. Open-ended questions were used with prompts, if necessary, to elicit responses on a range of topics potentially related to pregnancy planning behavior (e.g., "What had you heard about diabetes and pregnancy before you became pregnant with your most recent child?" and "Did anyone ever encourage you or discourage you about pregnancy?"). Interview topics were selected based on issues identified in the diabetes, health psychology, and family planning literature and in clinical practice. Although the interview was topically guided and the same general questions were asked of all participants, the goal was to allow women to speak freely of their experience without introducing preconceived ideas. The conversation was intended to be informal and flexible enough to facilitate the emergence of new and unanticipated information (28,29).

Definitions

A planned pregnancy was defined as a pregnancy that was desired before conception and in which contraception was stopped or avoided for the purpose of becoming pregnant and in which the woman stated that she attempted to achieve optimal blood glucose control before becoming pregnant. All other pregnancies were defined as unplanned. Pregnancies were rated as planned or unplanned based on interview responses. All pregnancies were rated by the primary investigator and by the researcher who interviewed the subject. When the primary investigator was the interviewer, another researcher reviewed and rated the transcript. Interrater reliability was 97.6%.

Data analysis

The χ^2 test or Fisher's exact test was used for between-group comparisons of categorical variables and Student's t test was used for comparisons of continuous variables. For the two standardized scales (Marital Satisfaction Scale and Health Locus of Control Scale), logistic regression was used to measure the impact of these variables on pregnancy planning.

For analysis of the interview data, content analysis was used to compare women with planned and unplanned pregnancies in the following topic areas: contraceptive behavior, desire for motherhood, knowledge about the risk of birth defects, advice about pregnancy given by health care provider, and relationship with provider. Verbatim transcripts of the interviews were analyzed line by line, response categories for each content area were identified and defined, and coding rules were developed to code subject responses into the categories. By examining the relationships and interactions within categories across subjects, patterns of pregnancy planning behavior were identified. After all interviews were completed, the primary investigator coded each interview. A second researcher, trained in the coding rules, independently coded 50% of the interviews, selected randomly. Interrater reliability on the topic areas ranged between 83 and 98% agreement. After interrater reliability was calculated, the two coders discussed discrepancies and agreed on a final coding.

RESULTS

Background characteristics of the study population

During the study period, there were 122 births to women with diabetes at the 15 participating hospitals. Of these, 85 (70%) women participated in the study. Nonparticipants included 11 (9%) refusals, 3 (2.5%) who were non–English speaking, 10 (8.2%) who were lost to follow-up, and 13 (10.7%) who were excluded because of an adverse pregnancy outcome. In addition to the adverse outcomes of the nonparticipants, there were three babies with birth defects not identified in the immediate postpartum period born to participants. Therefore, of 122 births, there were 16 (13.1%) adverse outcomes: 11 (9.1%) birth defects, 4 (4.1%) stillbirths, and 1 (0.8%) neonatal death.

Compared with participants, nonparticipants were more likely to be Medicaid recipients (47 vs. 16%, P = 0.003) and were more likely to be Hispanic or nonwhite (38 vs. 24%, P = 0.002). Participants and nonparticipants did not differ in age, marital status, or duration of diabetes.

Table 1—*Background characteristics and pregnancy planning*

	Planned pregnancy	Unplanned pregnancy	*P* value
n	35	50	
Glycohemoglobin at 1st prenatal visit*	3.1	5.8	0.004
Glycohemoglobin 3rd trimester*	1.5	2.6	0.04
Age (years)†	31.5	28.3	0.003
Married	35 (100)	24 (48)	0.001
Annual income >$20,000	32 (94)	17 (40)	<0.0001
>12 years of education	29 (83)	31 (63)	0.05
Race: non-Hispanic white	32 (91)	33 (66)	0.007
Medical coverage			
None	0 (0)	14 (28)	<0.001
Medicaid	2 (6)	12 (24)	
Private insurance	33 (94)	24 (49)	
Type of provider before pregnancy			
Endocrinologist or diabetologist	20 (59)	20 (40)	0.03
Non–diabetes specialist	12 (35)	17 (34)	
None	2 (6)	13 (26)	
Provider seen within 6 months before conception			
For diabetes care	33 (94)	31 (67)	0.003
For care other than diabetes	25 (76)	28 (61)	0.165
At least 1 visit with perinatologist or obstetrician regarding pregnancy planning	14 (40)	1 (2)	<0.001
Smoker before pregnancy	2 (6)	21 (42)	<0.001
Duration of diabetes (years)†	14.5	11.2	0.06
Age at diabetes onset (years)†	17.1	17.2	0.72
Presence of ≥1 diabetic complication before pregnancy	10 (29)	15 (30)	0.91
Prior pregnancy with preexisting diabetes	17 (49)	28 (56)	0.50

Data are *n* (%). *SDs from the mean. †Data are means.

Of the 85 pregnancies in this sample, 35 (41%) were planned and 50 (59%) were unplanned (Table 1). The average SD above the laboratory mean for glycohemoglobin at the first prenatal visit was significantly lower in planned (3.1) than in unplanned (5.8) pregnancies ($t[60] = 2.98$, $P = 0.004$). Women with planned pregnancies were significantly more likely to have an early glycohemoglobin <4 SD above the mean (58 vs. 32%). All of the women with planned pregnancies were married, compared with 48% of the women with unplanned pregnancies. Women with planned pregnancies were also older, were more likely to have an annual income above $20,000, had more education, and were more likely to be non-Hispanic whites. They were more likely to have seen a health care provider for diabetes care during the 6 months before pregnancy (94 vs. 67%), to have seen a diabetes specialist for their diabetes care (59 vs. 40%), and to have private insurance (94 vs. 49%). Women with planned pregnancies were far more likely to have had at least one visit with a perinatologist or obstetrician (40 vs. 2%). They were less likely to have used tobacco (6 vs. 42%). Women with planned and unplanned pregnancies did not differ significantly in duration of diabetes (14.5 vs. 11.2 years) or in the presence of one or more diabetic complications before pregnancy (29 vs. 30%).

Contraceptive behavior

Among the women with unplanned pregnancies, 35 (70%) used contraception less than half of the time (Table 2). Of these, 17 (49%) said they did not use contraception because they did not think they could get pregnant. Reasons for this belief varied: three women were told by their partner that he was sterile; five women thought diabetes made it more difficult to conceive; and nine women said they did not think they could get pregnant because in spite of not using contraception on prior occasions, they had not conceived. None of these women had undergone a fertility evaluation or had been given a medical diagnosis of infertility. Five (10%) of the women with unplanned pregnancies said they were hoping to get pregnant but paid no attention to their diabetes control. By our definition, these pregnancies were classified as unplanned because improving blood glucose levels is a paramount goal for a planned diabetic pregnancy. Of these women, three said they didn't watch their blood glucose because they were not sure they could get pregnant and two said they were unaware of the risks.

Contraception failure as a cause of unplanned pregnancy was reported by 15 (30%) women: 6 women reported occasional lapses in use but no intention to conceive and 9 insisted that contraception was always used. Of these nine, however, only one of the contraceptive failures was a method with high reliability (birth control pills).

Desire for motherhood

Of the 50 women with unplanned pregnancies, 35 (70%) said they were very happy when they found out they were pregnant. Becoming a mother appeared to be an integral part of the self-identity for most of the women interviewed. Women were asked "How would you have felt if you had never been able to have children?" The responses of 86% of the women ranged from feelings of discouragement and sadness to expressions of complete loss. As one woman said, "My life would be empty. I would have been devastated. It was what I wanted more than anything in the world." Another said, "Wouldn't make me feel like a woman. It's what I was meant to do. It probably never would be O.K."

Partner relationship

Women with planned pregnancies were more satisfied with their partner relationship than were women with unplanned pregnancies. Logistic regression analysis showed a highly significant association between scores on the Marital Adjustment Scale and pregnancy planning (odds ratio = 3.86, $P = 0.0002$). Because all women with planned pregnancies were married, a second analysis was conducted on married women only. The association between partner satisfaction and pregnancy planning remained significant for married women (odds ratio = 2.78, $P = 0.01$).

Women were asked about their relationship with the father of the baby before

Table 2—*Contraceptive behavior in unplanned pregnancies*

Pregnancy intention	Subjects (n = 50)	Contraceptive behavior
Pregnancy desired but no effort made to improve blood sugars	5 (10)	No contraception used
No conscious intention to conceive	30 (60)	No contraception or used less than half the time
No intention to conceive	6 (12)	Contraception used most of time
No intention to conceive: contraception method failure?	9 (18)	Contraception used always*

Data are n (%). *Five used condoms, three used rhythm, one used oral contraceptive pills.

and during pregnancy, his desire for the pregnancy, and his perceptions of pregnancy risks because of diabetes. Of the 35 women with planned pregnancies, 28 (80%) believed their partners were well informed about diabetes and pregnancy issues before the pregnancy. Many couples had attended educational seminars or doctor's appointments together. In almost all cases, women with planned pregnancies expressed a feeling of being supported. "He knew everything. He was totally involved."

In contrast, only 8 (16%) of the 50 women with unplanned pregnancies felt their partners were informed about diabetes and pregnancy before the pregnancy. Although 34 (68%) believed their partners wanted the pregnancy, most felt that their partners did not understand the risks or the enormity of effort required to achieve good diabetes control. As one woman complained, "He didn't really understand the risks. He didn't want to get it. He wanted everything to be O.K. but he didn't help." Another stated, "I don't think he really understood it. He thought I was just blowing this thing out of proportion."

Knowledge about birth defect risks

Women were asked what they knew about the diabetes-related risks of pregnancy before they became pregnant with their most recent pregnancy, when they had first heard about the risks, and how frequently the topic was discussed with their health care provider. If a woman did not mention birth defects as a risk, she was asked specifically if and when she had heard about this risk, what she understood about the stage of pregnancy in which the risk to the fetus is the greatest, and what she had been told about the relationship between blood glucose levels in early pregnancy and birth defect risks. Subjects' knowledge about birth defect risks were coded into one of five categories (Table 3).

Nearly all women (94%) with planned pregnancies and 68% with unplanned pregnancies knew they should be in good diabetes control before conception. However, women with planned pregnancies were far more likely than women with unplanned pregnancies to understand the specific association between high blood glucose levels and birth defects (83 vs. 30%). Eight women (all with unplanned pregnancies) could not recall hearing any information before conception about diabetes and pregnancy.

We reasoned that women who had been pregnant before with diabetes would have personal knowledge about the risks and would be more likely to plan the subsequent pregnancy. Contrary to prediction, these women were no more likely to plan their next pregnancy than women who had not experienced a pregnancy with diabetes (Table 1). Twenty-eight (56%) of the women with unplanned pregnancies and seventeen (49%) of the women with planned pregnancies had previously been pregnant with diabetes. Of these 45 prior pregnancies, 34 (76%) were unplanned. Women with an unplanned pregnancy were unlikely to plan the subsequent pregnancy, regardless of the outcome of the previous pregnancy. Of the 34 women with prior unplanned pregnancies, 28 (82%) did not plan the next pregnancy. Of these, 12 (43%) had a good outcome with the prior pregnancy and 16 (57%) had a poor outcome (i.e., miscarriage or birth defect) that may have been secondary to poor blood glucose control.

Locus of control

Women with unplanned pregnancies were significantly more likely to attribute their health outcomes to the control of powerful others than were women with planned

Table 3—*Knowledge about birth defects and glycemic control, type of pre-conception advice, and relationship with health care provider among women with planned versus unplanned pregnancies*

	Pregnancy planning	
	Yes	No
n	35	50
Knowledge of birth defects and glycemic control		
Aware that pre-conception blood glucose control reduces birth defects	29 (83)	15 (30)
Aware that pre-conception blood glucose control is important but unsure why	4 (11)	19 (38)
Aware that blood glucose control is important during pregnancy, but unaware that risks begin at conception	1 (3)	2 (4)
Aware of increased risks in diabetic pregnancies but unaware of risks associated with blood glucose levels	1 (3)	6 (12)
No knowledge about diabetes and pregnancy	0 (0)	8 (16)
Prepregnancy advice from health care provider		
Positive, encouraging; reassured that women with diabetes can have healthy babies	26 (75)	7 (14)
Neutral or mixed	4 (11)	16 (32)
Negative; told of high risks and/or advised not to get pregnant	4 (11)	19 (38)
Never discussed	1 (3)	8 (16)
Relationship with prepregnancy health provider		
Positive; bond beyond medical advice	25 (71)	14 (29)
Neutral or mixed; no sense of bond	8 (23)	17 (35)
Negative; felt judged or disliked	2 (6)	17 (35)

Data are n (%).

pregnancies (odds ratio = 2.28, $P < 0.004$). There was no association between pregnancy planning and the belief that health outcomes are largely under one's own control (internal locus of control) or the belief that health is due to luck or fate (chance locus of control).

Advice from health care providers

Each woman was asked how she felt when she heard about pregnancy risks and if her health care provider either discouraged pregnancy or reassured her that she could have a healthy pregnancy. The counseling that women recalled from their diabetes doctor or most recent health care provider regarding pregnancy was coded into one of four categories (Table 3).

Twenty-six (75%) of the thirty-five women with planned pregnancies felt they had received reassuring and encouraging advice from their providers before pregnancy. Pre-conception blood glucose control was emphasized as the means to a healthy child. "I told my GP I was thinking about pregnancy. He wanted me to. He thought it would be great—just to get my blood sugars in control first." In contrast, only 7 (14%) of the 50 women with unplanned pregnancies perceived reassuring advice. Sixteen (32%) of these women felt that the message was mixed, but without any sense of encouragement, and nineteen (38%) recalled that pregnancy was discouraged or they were advised not to get pregnant. One woman stated, "The doctors tried to scare me out of getting pregnant. They told me I could have a deformed baby, that I could lose my kidneys, that I could die." Another recalled, "I told the doctor I was planning on pregnancy. He said I was a fool to try this because I had too many complications and diabetes [for] too long. He told me I should get a tubal. I went home in tears."

Relationship with health care provider

Women were asked "How would you describe your relationship with the health care provider who helped you manage your diabetes before you became pregnant?" The open-ended question was followed by probing questions, including "How comfortable were you with him/her?" and "Did you feel you could be honest about your blood sugar levels, even if they weren't good?" Subjects' responses were coded into one of three categories (Table 3).

A positive relationship was described by 25 (71%) of the 35 women with planned pregnancies and only 14 (28%) of the 50 women with unplanned pregnancies. Positive relationships were typically described as caring and supportive, often built over time and extending beyond strictly medical advice. "I feel like he cares about me as a person. I've cried in his office before. Over the years, our relationship has evolved into more of a friendship than just doctor-patient." These women also felt it was important that their doctor understood the difficulty of living with diabetes and not judge them for their blood glucose control. "I know he understands. He never makes me feel bad about myself or points a finger. I don't write down phony numbers. I might have in the beginning when I was first getting to know him, but now I don't."

Negative feelings about their providers were expressed by 35% of the women with unplanned pregnancies and by only 6% of the women with planned pregnancies. Women who described a poor relationship often felt judged and/or disliked by their provider. For example, one woman declared, "If you didn't do everything exactly the way he wanted, he would get an attitude, make you feel like you were stupid." Another said, "I felt he was judging me. I felt he might have thought I was diabetic because I was fat."

CONCLUSIONS — In this population-based statewide sample, 59% of the women failed to fully plan their pregnancies. Our sample, however, included only women who gave birth; it did not include women with unplanned pregnancies that were electively aborted or pregnancies ending in miscarriage. Furthermore, nonparticipants were more likely to be Medicaid recipients and to be non-white—two variables associated with unplanned pregnancies in this and other studies (30). Therefore, the actual rate of unplanned pregnancies in women with diabetes is likely to be even higher than that reported for this sample. In addition, 13 pregnancies were excluded from the study (per the human subject review board recommendations) because of adverse perinatal outcomes. It is likely that this subset would have had poorer glycemic control periconceptually and, possibly, a greater proportion of unplanned pregnancies than those included in the study. The 9.1% malformation rate found in our study compares with the 9.0% rate of major malformations reported among the late-entry diabetic women in the Diabetes and Early Pregnancy Study (15).

No single factor can account for the complex set of life circumstances, stresses, motivations, and experiences that result in timely and conscientious pregnancy planning. What we do find is an interconnected web of circumstances associated with poor pregnancy planning. These include poverty, poor education, unresolved desires to become pregnant, lack of marital support, poor relationships with health care providers, and a perception of discouraging advice from health professionals.

This research differed from studies that have compared women who attended specialized prepregnancy programs with women who made their first prenatal visit without having received pre-conception care (19,21,23). A criticism of prepregnancy programs is that they self-select highly motivated women (31). An advantage of identifying women at delivery is that nearly all diabetic deliveries occur in a hospital setting. This enabled women to be recruited regardless of where they received prepregnancy care, including those who have little contact with the health care system when they are not pregnant.

Women with unplanned pregnancies in this study were more likely to be disadvantaged: they were poorer, less educated, more likely to belong to a racial or ethnic minority, and less likely to have private health insurance. They were less likely to be married, less likely to see an endocrine specialist, and more likely to smoke before pregnancy. Higher socioeconomic status has similarly been identified among women with diabetes seeking pre-conception care (24) and consistently using contraception (23). These situational, demographic, and behavioral factors may all contribute to a deficit in the knowledge, motivation, and support necessary to fully plan pregnancy. However, more advantaged women were not immune to unplanned pregnancies. Over half of the unplanned pregnancies were in Caucasian women with education beyond high school; nearly half were married, had private insurance, and saw an endocrinologist for their prepregnancy care.

State and federally funded diabetes programs as well as specialized prepregnancy clinics have made widespread efforts to educate diabetic women and health care providers about the importance of pre-conception glucose control (20,25). Janz et al. (25) found that women who sought pre-conception care were far more likely than women who entered care after conception to have discussed pre-conception care with

their health care providers. We found that women who had at least one visit with a perinatologist or obstetrician to discuss diabetes and pregnancy were far more likely to plan their pregnancies. However, these may have been motivated women who sought specialty advice as part of the planning process. We do not know how many women may have been encouraged by their health care providers to seek prepregnancy care but failed to do so.

Our research sought to deepen our understanding of what women hear about diabetes and pregnancy, the guidance provided, and their responses to the information. Our findings suggest that knowledge of the risks is not enough. Most women in this sample had been told by their health care providers to improve their blood glucose control before conception. Half had even had a prior diabetic pregnancy. Because our study is based on subjects' perceptions, we cannot know how providers actually counseled their patients. It would be useful to know precisely what information women were given and how they were followed. For example, were they given the tools and support necessary to improve blood glucose control? What we do know, however, is that many women perceived a preponderance of negative information, not only from the lay public (for example, in movies such as *Steel Magnolias*) but from their health care providers as well. There are a few situations (for example, coronary artery disease and severe nephropathy) in which pregnancy may be contraindicated. However, in our sample, there were no accounts of cardiac disease, and only six women reported kidney disease (three each in the planned and unplanned pregnancy groups). Nevertheless, nearly one-third of the women in our sample felt that their doctors had discouraged pregnancy. This advice may reflect a dated understanding of pregnancy risks in diabetes. Our findings suggest that the quality and delivery of information are crucial. Discouraging pregnancy may sever good communication between patient and provider. If a woman feels that her provider is opposed to pregnancy, a mutual plan for improving blood glucose control before conception may not be developed.

Our data suggest that the relationship a woman has with her health care provider plays an important role in pregnancy planning. Women who feel a positive bond with their provider may be more likely to perceive advice as constructive rather than as judgmental, may be more motivated to follow recommendations, and may be more likely to continue follow-up care. Women reported that such rapport developed over time, highlighting the need for provider consistency and regular visits. Almost all of the women in our sample, including those with unplanned pregnancies, were able to achieve normal or near-normal glycohemoglobin levels during their pregnancies, demonstrating that poor glycemic control in early pregnancy was not simply due to more difficult diabetes. Improved compliance and blood glucose control may have been due in part to the frequent contact and the quality of the relationships many women developed with their providers during a high-risk pregnancy.

Our finding that unplanned pregnancies were associated with a locus of control attributed to powerful others differs from Schlenk and Hart (32), who found that patients who attributed their health outcomes to powerful others, such as doctors, were more compliant with diabetes regimen tasks. They suggested that patients who believe their doctors are largely responsible for their health are more amenable to medical recommendations. They felt this was consistent with a positive patient-provider relationship, whereas women with unplanned pregnancies in our sample reported largely unsatisfactory relationships with their providers. We wonder, therefore, whether individuals who attribute control of their health outcomes to their doctors may especially benefit from a supportive and positive relationship.

To have a maximal effect on pregnancy planning, pregnancy counseling should include the woman's partner. Planned pregnancies in this sample tended to occur in relationships where the partner was actively involved in the decision to "take on" a high-risk pregnancy. Because a woman typically sees her health care provider alone, her partner is often not included until after she becomes pregnant. It should also be recognized that couples with unstable relationships may be particularly vulnerable to an unplanned pregnancy.

Pregnancy planning is typically measured as a dichotomous variable. Our data strongly suggest degrees of pregnancy planning; some pregnancies may actually be "subplanned," characterized by a variety of conflicting or ambivalent emotions. St. James et al. (23) found that two factors influencing effective use of contraception among women with diabetes were attitudes toward contraception and the extent to which significant others wanted the woman to use contraception. We found that a crucial factor may be a woman's conscious or subconscious desire to be pregnant and that some unplanned pregnancies may not be unexpected. Most women in our sample who said their pregnancies were unplanned were using contraception less than half of the time and were happy to learn they were pregnant. For some women, the difficulties in fully planning and preparing for pregnancy may be outweighed by the desire to have a child; these women may subconsciously "let it happen." The strong desire for motherhood expressed by most women in this study echoes the observation made by Priscilla White: "To many, to nearly all of these women, life lacks meaning, and may even be unendurable without successful childbearing" (33). Therefore, pregnancy issues should be discussed with all women of childbearing age. Women who say they are not currently planning pregnancy may be the most vulnerable; not only are they often in poor diabetes control but also they may not be using consistent contraception.

Unplanned diabetic pregnancy remains a major problem. There is no simple solution; the situational and emotional factors associated with unplanned pregnancy are complex and deeply rooted (30). Many contributing circumstances, such as socioeconomic disadvantages and inadequate marital support, may not be changeable. However, these red flags should alert practitioners to the need for careful counseling and referral to appropriate resources if indicated. Regardless of the chain of causation, there is considerable room for improvement in the prepregnancy information and support diabetic women receive and in the quality of the relationships they experience within the health care system. In spite of innumerable reports documenting outstanding pregnancy success for women with well-controlled diabetes, many women still perceive the message that pregnancy should not occur. In addition to the content and consistency of care, the nature of the interaction may be crucial. It is vital that couples be supported and reassured that with pre-conception glucose control, almost all women with diabetes can have healthy babies; the essential step is planning the pregnancy.

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