



Unmasking Barriers in the Delivery of Preconception Counseling and Contraception Provision for Patients With Type 1 or Type 2 Diabetes

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Suboptimal glycemic control among women with type 1 or type 2 diabetes before conception and during the early part of pregnancy is a powerful risk factor for fetal anomalies, macrosomia, and stillbirth. Major congenital anomalies occur in up to 25–30% of infants of women with type 1 or type 2 diabetes (1). Hyperglycemia during fetal organogenesis (5–8 weeks after the last menstrual period) is a considerable teratogen, and, consequentially, the risk of fetal anomalies related to preexisting maternal diabetes can be reduced to background risk when glycemic control is at goal.

Unfortunately, many women do not know they are pregnant during organogenesis, and efforts to improve glycemic control after 8 weeks' gestation are too late to reduce the risk of major malformations. Importantly, early glycemic control is also more predictive of fetal macrosomia than glycemic control in later gestation because the fetus begins secreting insulin by 14 weeks' gestation, resulting in a maternal-placental glucose gradient that delivers excess glucose to the fetus and stimulates fetal overgrowth for the remainder of pregnancy (2,3). Fetal macrosomia

increases the risks of Cesarean delivery, shoulder dystocia, neonatal birth injury, and maternal higher-order lacerations. There is also a marked increase in the risk of stillbirth—up to 30-fold—among women with diabetes, and especially for women with suboptimal glycemic control, fetal macrosomia, and associated comorbidities such as obesity, hypertension, and sleep apnea (4). Finally, early glycemic control improves placentation and decreases the maternal risk of preeclampsia (5).

There is perhaps no population of women in which effective preconception counseling can make a more dramatic impact on pregnancy outcomes than in those with pre-existing diabetes (6). The American Diabetes Association (ADA), the American College of Obstetricians and Gynecologists (ACOG), and the American Academy of Family Physicians strongly recommend the incorporation of preconception counseling into routine diabetes care (7–9). Interventions to optimize management of diabetes and its associated morbidities before pregnancy, delivered by endocrinologists and primary care physicians, can be highly effective (10). Up to two-thirds of pregnancies in women with diabetes are unplanned; this number is even higher in high-risk populations (11). For individuals who are not planning pregnancy, adequate contraception is strongly recommended.

Strikingly, less than 5% of women with type 1 or type 2 diabetes receive preconception counseling (12). Surprisingly, a smaller proportion of visits by women with diabetes, when compared with women without diabetes and after adjusting for the amount of time spent in the health care system, include preconception counseling and discussion of contraception. Women with diabetes are also less likely to receive highly effective long-acting reversible methods of contraception, despite the proven efficacy of these methods and the very low risk of contraception complications in the majority of women with diabetes (13). Many providers are unaware that all forms of contraception, even in high-risk women, are considerably safer than the risks associated with pregnancy.

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Endocrinologists who care for reproductive-aged women with diabetes are uniquely poised to reduce preventable adverse pregnancy outcomes through preconception counseling and contraception provision. This notion motivated our prospective research study, which aimed to highlight rates of these interventions at a single academic outpatient endocrinology practice before and after a comprehensive quality improvement (QI) initiative. After recognizing that the majority of women being referred to our obstetric diabetes clinic had unplanned pregnancies and were in poor glycemic control, we set a goal of this QI study to improve rates of preconception counseling and adequate contraception for this population. We hypothesized that our QI initiative would increase the percentage of reproductive-aged women with diabetes receiving preconception counseling, contraception, and referrals to obstetrician/gynecologists by ~20%. To this end, we implemented a multifaceted intervention to educate providers, facilitate referrals to obstetrician/gynecologists, provide recommended prescriptions for contraceptives, and streamline documentation and patient education materials in the electronic medical record (EMR). We performed pre- and post-intervention chart reviews to determine rates of contraception provision and preconception counseling. Finally, we surveyed providers to explore unresolved challenges in improving preconception counseling and contraception provision.

Research Design and Methods

This is a pre- and post-intervention cohort chart review. Biologic females between the ages of 18 to 45 years with type 1 or type 2 diabetes who were seen in person by an endocrinologist for an outpatient visit at our tertiary academic center between 2020 and 2021 were included. Patients who had previously undergone sterilization or hysterectomy or who were currently pregnant were excluded. The same patient was not included more than once. If a patient had more than one visit in the study period, all of the visits were reviewed.

Because of the comprehensive health care system at our center and insurance that favors care within the same institution, the vast majority of patients are seen by other subspecialty or primary care providers (PCPs) within our system and can be captured. If care with an obstetrician/gynecologist was obtained within our system, those records were also reviewed to verify applicable clinical information. A preselected target of 40 patients pre-intervention and 48 patients post-intervention was based on 80% power to detect an increase in preconception counseling from 0 to 9% and contraception from 25 to 54% with a significance level of $P < 0.05$.

Between the pre- and post-intervention periods, we performed a series of QI initiatives for endocrinologists. These included distribution of a series of distilled electronic messages with education about diabetes in pregnancy and contraceptive options (Supplementary Figure S1) and development of teaching materials about diabetes in pregnancy and contraception options that could be easily distributed to patients (Supplementary Figure S2). We also educated providers on the use of *International Classification of Diseases*, 10th Revision, code Z31.69 (preconception counseling) for billing purposes. Additionally, providers were given a list of oral contraceptive pill options that are safe for women with diabetes (Supplementary Figure S3), and the EMR system processes for ordering contraception or consultations with obstetricians/gynecologists were simplified. Finally, several EMR record tools were developed to serve as reminders to discuss contraception or preconception counseling and to simplify documentation for providers, including note templates for obtaining history, developing an assessment and plan, and providing patient information on preconception counseling (Supplementary Figure S4). These tools were highlighted in monthly endocrinology conferences and disseminated to endocrinologists who provided diabetes care.

After our intervention and post-intervention analysis, we conducted a confidential survey of all endocrinology providers at our center to better assess persistent barriers to the provision of contraception and preconception counseling. This survey was distributed electronically and consisted of several choices of barriers, of which any number could be selected. A free text box allowed providers to fill in their additional perspectives on persistent difficulties implementing contraception and preconception counseling for this population (Supplementary Figure S5).

All aspects of this research were approved by the University of Colorado Institutional Review Board.

Results

Participants

Fifty patients were included in the pre-intervention cohort, and another 49 were included in the post-intervention cohort. There were no differences in clinical characteristics between these cohorts (Table 1).

Pre-Intervention

Prior to our QI intervention, only 4% of patients had contraception specifically documented by their endocrinologist, although 62% were documented to be using contraception around the time of the visit based on our

TABLE 1 Demographic and Clinical Characteristics of Patients of Reproductive Age With Diabetes

	Pre-Intervention (n = 50)	Post-Intervention (n = 49)	P
Age, years	34.5 ± 6.7	33.6 ± 7.2	NS
Gravity	2 ± 2	1 ± 2	NS
Parity	1 ± 1	1 ± 1	NS
Diabetes type			NS
Type 1	33 (66)	34 (69)	
Type 2	16 (32)	16 (31)	
Other	1 (2)	0 (0)	
A1C, %	7.8 ± 2.1	7.9 ± 1.7	NS
Prescribed insulin	43 (86)	48 (98)	NS

Data are n (%) or mean ± SD. NS, not significant (P >0.05).

chart review. Table 2 summarizes the types of contraception patients were using. Endocrinologists did not specifically provide preconception counseling to any of these patients, although 14% of the patients had previously undergone counseling with a maternal-fetal medicine provider based on additional chart review. No referrals were placed to an obstetrician/gynecologist during the pre-intervention period.

Post-Intervention

After the QI intervention, contraception was specifically addressed by endocrinologists with 18% of patients, representing a significant increase from the pre-intervention rate of 4% (P = 0.03). Only one patient (2%) received a

prescription for contraception. Additionally, 52% of patients were elsewhere documented to be on contraception around the time of their endocrinology visit. Compared with 0% before the intervention, 6% underwent preconception counseling with their endocrinologist (Table 2). Despite the provision of EMR links for referrals, there were no referrals placed to an obstetrician/gynecologist for contraceptive or preconception needs, which was similar to the pre-intervention period.

Qualitative Survey on Barriers

We were frankly surprised by the modest improvement in preconception counseling and contraception provision after what we viewed to be a comprehensive intervention focused on education and EMR tools designed to directly facilitate these practices in a time-efficient manner. As a result, we designed a provider survey to interrogate perceived barriers.

We sent this survey out to the 43 providers in our adult endocrinology clinic (24 physicians, 11 advanced practice providers, and 8 fellows), of whom 31 see patients with diabetes. We received a total of 25 unique responses, all of which were providers who cared for patients with diabetes (81% response rate). Providers could select more than one barrier or write in their own rationale.

Among the choices of reasons why providers do not perform this care, an overwhelming 80% stated that there was inadequate time during visits. Thirty-two percent identified a lack of proper knowledge to provide this care, 24% noted that they could not easily navigate the EMR tools we provided, and 8% said that they forgot to bring

TABLE 2 Contraception Provision, Preconception Counseling, and Specialist Referrals Pre- and Post-Intervention

	Pre-Intervention (n = 50)	Post-Intervention (n = 49)	P
Discussed contraception at visit	2 (4)	9 (18)	0.03
Prescribed contraception at visit	0 (0)	1 (2)	NS
Already on contraception	31 (62)	26 (53)	NS
Pills	10 (32)	15 (58)	
Injections	3 (10)	0 (0)	
Intrauterine device	8 (26)	10 (38)	
Subdermal implant	2 (6)	0 (0)	
Other	8 (26)	1 (4)	
Preconception counseling performed	0 (0)	3 (6)	NS
Referred to obstetrician/gynecologist	0 (0)	3 (6)	NS

Data are n (%). NS, not significant (P >0.05).

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up these issues during visits. When queried about ways in which to improve contraception provision and preconception counseling, several respondents indicated that features of the EMR could be better used to this end. For example, an automatic advisory that requires relevant questions to be addressed before closing the EMR encounter was suggested. Other recommendations included education or links in the materials provided to patients at the conclusion of the visit and posted signs or provision of informational flyers in the clinic. Interestingly, some endocrinologists recommended that a dedicated telehealth clinic be created for this purpose and that it was more appropriate for diabetes educators, PCPs, and obstetrician/gynecologists to improve these aspects of care. Of all respondents after the intervention, only 8% stated that they faced no barriers to successfully providing contraception and preconception counseling to this population.

Discussion

We demonstrate extremely low rates of documentation of preconception counseling and contraception provision by endocrinologists for women of reproductive age with diabetes that improved only modestly after a series of multitargeted QI initiatives. Provider surveys indicated that the overwhelming barrier was lack of time during visits. Despite our multimodal attempts to disseminate key information, one-third of the providers responded that inadequate knowledge was still a major reason behind their inability to implement preconception and contraception counseling for these patients.

In our pre-intervention cohort, only 4% of patients had contraception specifically documented by their endocrinologist, similar to findings previously reported. Schwarz et al. (14) found that only 4% of U.S. ambulatory visits with women with diabetes included contraception counseling, which increased minimally to 6% after adjusting for time spent with these patients. When specifically looking at primary care practices, Magdaleno et al. (15) reported that 19% of women with diabetes received preconception counseling over a 3-year period. Our study resonated with similarly identified barriers—predominantly a lack of time and knowledge.

It is unclear whether preconception counseling rates are low in this population or whether reported rates are related to deficiencies in documentation. Recent data from a single institution showed that 25% of endocrinologists reported offering preconception counseling, although 55% of women with diabetes reported receiving preconception counseling, possibly from other sources (16). Interestingly, among the visits in which preconception counseling was

self-reported by an individual provider, this care was documented only 67% of the time (16). Similarly, Magdaleno et al. (15) showed that 39% of PCPs reported regularly providing preconception counseling, despite a low rate of documentation of only 19%. The low rate of preconception counseling did not appear to be the result of a lack of assigned value given that 89% of providers indicated that preconception counseling is important. These findings indicate a disconnect between provider priorities and values, implementation of practices, and documentation of practices.

Pregnant women with preexisting diabetes face increasing maternal, fetal, and neonatal morbidity and mortality. Women who met the inclusion criteria for our study had a mean A1C of 7.8% and 7.9% in the pre- and post-intervention cohorts, respectively, which is well above the upper threshold of 6.5% recommended by both the ADA and ACOG (7,8). This level of glycemic control indicates a substantially increased risk for major malformations and poor gestational outcomes and the need for contraception until adequate glycemic control is achieved. Only 62% and 53% of women who met inclusion criteria pre- and post-intervention, respectively, were using contraception. If those women not currently on effective contraception were to become pregnant, they would be at a markedly increased risk of poor, largely preventable outcomes.

Given the critical importance of glycemic control periconceptually and particularly during organogenesis, endocrinologists and PCPs have more power to reduce preventable adverse pregnancy outcomes in women with diabetes—especially major malformations—than do obstetricians, who often do not see these women until after 8 weeks of pregnancy, when organogenesis is completed. Given that approximately 50% of pregnancies are unplanned, ensuring adequate contraception until metabolic control and optimal treatment of underlying comorbidities is optimized is fundamental to improving pregnancy outcomes (17).

There is not only a continued need to raise awareness of the importance of preconception counseling in this population, but also a need to design better initiatives to improve competency through resident and provider professional training opportunities. A serious and substantial increase in public health funding for these important initiatives should drive future clinical research efforts.

Limitations of this study include that it was performed at a single subspecialty practice and center. The interventions were designed before assessing providers'

fundamental knowledge, acknowledgment of the problem, and readiness for change. Insight into provider attitudes and barriers toward preconception counseling and contraception provision was informally interrogated before the intervention and more formally afterward, through the post-implementation survey. Additionally, patients' knowledge, practices, and outcomes were not evaluated. Strengths of the study include its adequate power to detect an improvement in outcomes, the multifaceted approach of patient and provider education, provider outreach, and the provision of resources, including EMR tools to directly facilitate prescriptions, referrals, and documentation.

Future initiatives should focus on how to mitigate barriers to the provision of counseling and contraception, and particularly the lack of time and knowledge. These initiatives should include a multidisciplinary approach during medical training and in health care professionals in practice, including PCPs, obstetrician/gynecologists, and endocrinologists, as well as a wide array of other types of providers (e.g., advanced practice practitioners, nurses, certified diabetes care and education specialists, pharmacists, and community counselors) to assuage the time burden on one specialty or provider. More EMR tools built with input from all stakeholders will also improve the efficiency of counseling and facilitate documentation, prescriptions, and referrals. Informing providers that preconception counseling is a billable code can provide incentive as well. Public health efforts

at educating patients through different materials such as digital platforms and social networks may also empower them to ask questions of their providers and advocate for their reproductive needs and metabolic health.

Clearly, adequate resources directed to design innovative, multifaceted approaches are needed, particularly when taking into account the time constraints and baseline knowledge of providers in this arena. Figure 1 summarizes various interventions within the Institute of Healthcare Improvement QI impact-effort matrix (18) that might improve such efforts.

Conclusion

Our study shows that educational and documentation tools afford modest improvements in preconception counseling and contraception provision to reproductive-aged women with diabetes. The data and QI initiative presented here were from the endocrinology clinic at a single tertiary academic center, and one might assume a greater rate of adoption of professional organization guidelines within academic practices. However, our findings clearly showcase the global phenomenon of lack of preconception counseling and contraception provision for these patients, and the barriers endocrinology providers continue to face in this arena.

Our study serves as a call to action and incorporates elements that can serve as a road map for future, more effective efforts. Without renewed momentum, this

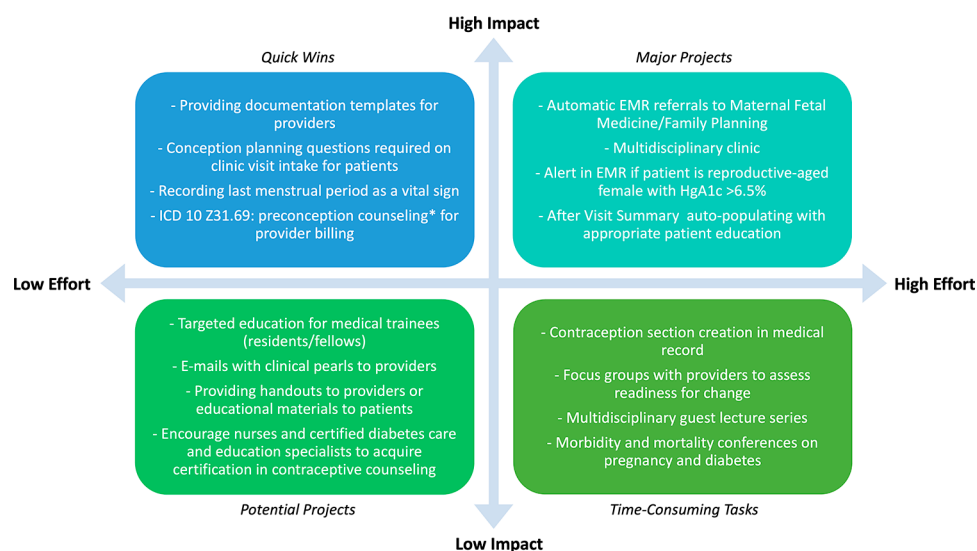


FIGURE 1 Prioritization matrix outlining QI initiatives regarding preconception counseling and contraception provision at our tertiary academic center. The extent of effort/impact is subjective and specific to our hospital and clinic. We suggest that other health care environments extrapolate their own QI projects based on available resources. Matrix adapted from ref. 18. *Note that our electronic medical record required input of “Pre-conception Counseling” (with a dash) to locate this specific ICD-10 code. HgA1c, glycated hemoglobin.

critical, yet persistently neglected, public health priority for women with diabetes will fail to avert the rise in adverse outcomes in this rapidly growing population of these women and their offspring.

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DUALITY OF INTEREST

No potential conflicts of interest relevant to this article were reported.

AUTHOR CONTRIBUTIONS

L.A.A., L.A.B., and A.Z. conceived the idea for this QI initiative. L.A.A., C.N., and A.Z. executed the initial interventions. L.S. and R.J. performed pre- and post-intervention chart review and analysis. L.A.A., L.S., L.A.B., and A.Z. wrote the manuscript. All authors reviewed and edited the manuscript and approved the final version for submission. L.S. is the guarantor of this work and, as such, had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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