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Compliance with Postpartum Diabetes Screening Recommendations for Patients with Gestational Diabetes

Joshua I. Rosenbloom, MD, MPH,¹ and May Hsieh Blanchard, MD²

Abstract

Background: The role of provider type and level of training have not been examined in regard to impact on postpartum testing for patients with gestational diabetes mellitus (GDM).

Objective: We sought to determine rates of testing in urban GDM patients and to determine factors associated with diabetes screening compliance, focusing especially on provider type.

Methods: Class A1 or A2 GDM patients were identified by chart review. Outcomes included ordering and/or performance of postpartum testing for diabetes mellitus. Chi-squared and multivariate logistic regression analyses were performed.

Results: Of the 118 patients identified (55% class A1), 58% were African American, 52% had medical assistance insurance, and 83% attended the postpartum visit. Diabetes testing was discussed at 68% of all postpartum visits, but was only ordered at 55% of visits. The 2-hour glucose tolerance test was ordered at 42 of the 98 (43%) of postpartum visits; however, only 16 tests were completed. Patients seeing resident physicians or midwives were more likely to be tested.

Conclusions: Rates of postpartum testing for GDM patients are low. Provider and patient compliance with diabetes screening recommendations are inadequate. Increased education and training of providers and patients may improve screening for diabetes among GDM patients.

Keywords: gestational diabetes, postpartum, medical education

Introduction

GESTATIONAL DIABETES MELLITUS (GDM) complicates nearly 7% of pregnancies in the United States.¹ Women with GDM have a sevenfold increased risk of developing diabetes mellitus type II (DM2) after their pregnancies.² Also, up to a third of women diagnosed with GDM actually have DM2 or similar disorders at the time of diagnosis.¹ It is important to test women with GDM after they deliver to assess if they have DM2 or impaired glucose tolerance. This testing usually consists of an oral glucose tolerance test 6–12 weeks after delivery, typically linked to the routine postpartum visit. However, studies have shown that many women do not complete this test and therefore may not be able to initiate appropriate treatment and follow-up care.^{3,4} The American College of Obstetricians and Gynecologists (ACOG) recently pro-

posed that rates of completion of postpartum GDM testing should be used as a performance measure.¹

In an urban teaching hospital setting, prenatal care may be provided by faculty physicians, faculty midwives, or resident physicians. At the University of Maryland, patients typically complete their prenatal and postnatal outpatient visits exclusively in one of these practices. All patients seen by residents are presented to an attending physician before the patient leaves the office.

To date, no studies of compliance with postpartum testing have specifically focused on provider level of training. However, provider level of training has been shown to influence other medical outcomes. For instance, Barsuk et al. compared attending and resident performance on placement of central lines and found that residents outperformed attendings in simulated sessions.⁵ In another example, knowledge of

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cholesterol screening guidelines varied by level of training.⁶ On the contrary, in a Canadian study, adherence to guidelines for routine inpatient diabetic care was higher with senior residents and attendings compared with junior residents.⁷ Correct management of gestational diabetes is an important learning goal for any resident in obstetrics and gynecology and is specifically mentioned in the Accreditation Council for Graduate Medical Education's Milestones for Obstetrics and Gynecology Residents.⁸

Therefore, the purpose of this study was to determine factors that influence whether women with GDM receive postpartum diabetes testing, focusing especially on provider type. By assessing rates of testing, as well as factors that influence these rates in our population, programs or strategies to increase these rates may be implemented.

Materials and Methods

This was a retrospective cohort study. The electronic medical record from our institution from August 2012 to June 2014 was searched for ICD-9 diagnosis codes for GDM, and all patients receiving prenatal care and delivering at our medical center who were diagnosed with Whites' Classification A1 (diet-controlled) or A2 (medication controlled) GDM were included. We did not perform an *a priori* sample size calculation as all patients were included in this retrospective study.

At our medical center, gestational diabetes is diagnosed in a two-step process, as per ACOG guidelines.¹ Patients first underwent a 1-hour 50 g glucose challenge test, typically between 24 and 28 weeks of gestation. Patients who had a result ≥ 135 mg/dL then underwent a 3-hour 100 g glucose tolerance test. The Carpenter–Coustan cutoffs were used (normal being ≤ 95 , 180, 155, and 140 mg/dL for the fasting, 1-hour, 2-hour, and 3-hour laboratory draw values, respectively), and patients who had two or more abnormal values were diagnosed with gestational diabetes.¹ Patients were excluded if they did not receive prenatal care and deliver at our medical center or if they had pregestational diabetes. Women who had abnormal glucose tolerance tests in the first trimester were included. Women who did not attend postpartum visits were included in the study, but were excluded from final analysis as it was not possible to order postpartum testing for these women.

Clinical and demographic data, including age, race, family history of diabetes, gravidity, parity, prenatal care provider type, insurance type, medical comorbidities, prepregnancy body mass index, gestational age at GDM diagnosis, specific results of prenatal GDM testing, antenatal consultations for diabetes teaching (such as diabetic education or endocrinology), medications used to manage GDM, number of office prenatal visits attended, delivery characteristics (mode of delivery, shoulder dystocia, infant birth weight, admission to neonatal intensive care unit [NICU]), attendance at postpartum visit, documentation of postpartum diabetes screening recommendations (either during antepartum or postpartum office visits), participation in postpartum glucose tolerance testing, and results of postpartum glucose tolerance testing were abstracted from the electronic medical record. Insurance type (public or private) was used as a surrogate for socioeconomic status.

As part of routine discharge instructions, all patients with GDM are instructed to make a 6-week postpartum visit with

their provider and are told before discharge that they will need diabetes testing at that visit. Most patients with GDM are seen either by resident or faculty physicians; however, midwives do see a small proportion of GDM patients in our practice. Most patients see only one type of provider throughout their pregnancy.

The primary outcome was provider ordering of the 2-hour 75 g oral glucose tolerance test (2H-OGTT) at the 6-week postpartum visit in patients who attended the postpartum visit. Secondary outcomes included patient performance of the 2H-OGTT and provider ordering of alternate testing modalities such as random glucose fingersticks or serum hemoglobin A1c.

Descriptive statistics were used for univariate analysis of the study population and outcomes. Normality of data was checked using the Shapiro–Wilk test. Next, bivariate analysis with appropriate statistical methods (*t*-tests for normally distributed continuous variables, Mann–Whitney *U* test for nonparametric continuous variables, Chi-squared for categorical variables) was used to examine specific associations

TABLE 1. BASELINE CHARACTERISTICS

Characteristic	Patients (N=118) Mean (range) or n (%)
Demographic characteristics	
Age (years)	30.8 (19 to 44)
Race	
White	36 (30)
Black	68 (58)
Asian	7 (6)
Other	7 (6)
Gravidity	3 (1 to 11)
Nulliparous patients	49 (42)
Prepregnancy body mass index (kg/m ²)	32.6 (18.3 to 64)
Weight gain during pregnancy (lbs)	19.9 (–12.0 to 74.0)
Prenatal visits attended	10 (2 to 16)
Medical assistance insurance	61 (52.7)
Primary provider	
Attending physician	55 (47)
Resident physician	53 (45)
Midwife	10 (8)
Clinical characteristics	
Chronic hypertension	19 (16)
Antenatal diabetes consultation obtained	40 (34)
Diabetic class	
Class A1	65 (56)
Class A2	53 (45)
Glyburide prescribed ^a	38 (32)
Metformin prescribed ^a	12 (11)
Insulin prescribed ^a	13 (11)
Delivery characteristics	
Gestational age at birth (weeks)	37.8 (29.9 to 41.1)
Birth weight (g)	3155 (1330 to 4479)
Mode of delivery	
Vaginal	63 (53)
Cesarean	55 (47)
Shoulder dystocia	2 (2)
NICU admission	45 (39)

^aSome patients were prescribed more than one medication. NICU, neonatal intensive care unit.

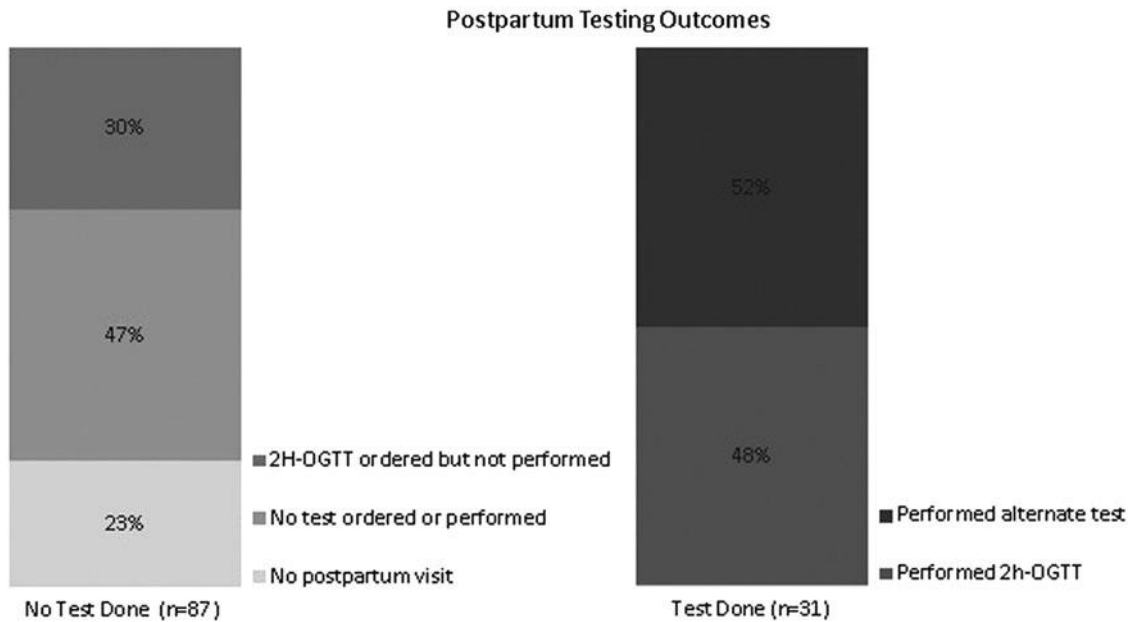


FIG. 1. Postpartum testing outcomes.

between demographic/clinical information and ordering and performance of the 2H-OGTT. Finally, multivariable analysis logistic regression was used to further characterize these associations. Variables entered into the model were age, history of GDM in a prior pregnancy, GDM class, mode of delivery, number of prenatal visits, type of provider, insurance type, race, and adverse neonatal outcome (composite of NICU admission or neonatal demise). SAS Studio was used for analysis. A *p*-value of <0.05 was considered statistically significant. There was no adjustment for multiple comparisons. Cases with missing data were dropped from multivariate analysis. The study was approved by the University of Maryland, Baltimore, Institutional Review Board.

Results

During the study period, there were 2764 deliveries of registered University of Maryland Medical Center patients. Of these, 118 patients (4.3%) had GDM. Characteristics of the GDM patients are shown in Table 1. African Americans made up 58% of the study population, and 52% of patients had medical assistance insurance. The postpartum visit was attended by 98 patients (83%).

Outcomes are seen in Figure 1 and Table 2. Documentation of a diabetes testing discussion occurred in 67 (68%) of the 98 postpartum visits, but only 42 out of the 98 patients (43%) had a 2H-OGTT ordered. Of the 42 2H-OGTTs, 16 were

completed, and 38% of these were abnormal. Considering the entire cohort, including those who did not attend the postpartum visit, testing was ordered in 42 out of 118 patients (36%). Information was not available as to why the remaining 26 patients did not complete the ordered 2H-OGTT. An additional 15 patients had a different follow-up plan documented. These included testing of hemoglobin A1c (three patients), checking home fingersticks for a short duration of time (five patients), referral to other providers such as primary care physicians or endocrinologists (six patients), and instructions to follow-up in 6 months (one patient).

Table 3 presents results of the bivariate analyses between patient characteristics and ordering and performance of the 2H-OGTT. There were no associations between any clinical characteristics and ordering of the 2H-OGTT. However, GDM patients seen by residents or midwives were more likely to have their 2H-OGTT completed (*p*=0.01). There was no association between provider type and ordering of one of the alternative screening methods (*p*=0.60).

Two patients were excluded from the multivariable analysis due to missing data. In multivariable analyses, there were no significant associations between the demographic and clinical variables and ordering of the 2H-OGTT. Provider type was significantly associated with performance of the 2H-OGTT: midwife patients and resident patients were more likely to complete the 2H-OGTT than patients seeing attending physicians (aOR for midwife patients 20.7, 95% CI 1.7–254.3; for resident patients aOR 15.4, 95% CI 1.8–135.5). Finally, when looking at any method of screening, patients with GDM A2 were more likely to be screened than A1 patients (aOR 2.82, 95% CI 1.1–7.3), and patients with adverse neonatal outcomes were also more likely to have any screen ordered (aOR 3.0, 95% CI 1.1–8.1).

Discussion

Rates of postpartum testing for patients with GDM were low, regardless of the treating clinician, but patients seeing

TABLE 2. OUTCOMES

Outcome	N=118 n (%)
Attended postpartum visit	98 (83)
2H-OGTT ordered	42 (36)
2H-OGTT completed	16 (14)
Other postpartum testing done	15 (13)

2H-OGTT, 2-hour oral glucose tolerance test.

TABLE 3. ASSOCIATIONS BETWEEN PATIENT CHARACTERISTICS AND ORDERING AND COMPLETION OF 2-HOUR ORAL GLUCOSE TOLERANCE TEST

Category (N)	2H-OGTT ordered by provider, N (%)	p ^a	2H-OGTT completed by patient, N (%)	p ^a
Race		0.56		0.28
Black	25 (46)		7 (13)	
Other	17 (40)		9 (21)	
Medical assistance		0.18		0.18
Yes	23 (50)		10 (22)	
No	19 (37)		6 (12)	
Primary provider		0.21		0.01 ^b
Resident	21 (54)		10 (26)	
Midwife	3 (38)		3 (38)	
Attending	18 (35)		3 (6)	
Chronic hypertension		0.94		0.73
Yes	7 (44)		3 (19)	
No	35 (43)		13 (16)	
Antenatal diabetes consultation		0.37		0.59
Yes	18 (49)		7 (19)	
No	24 (40)		9 (15)	
Diabetic class		0.10		0.24
A1	20 (36)		7 (13)	
A2	22 (53)		9 (21)	
Delivery mode		0.22		0.10
Cesarean	18 (37)		5 (10)	
Vaginal	24 (50)		11 (22)	
NICU admission		0.81		0.34
Yes	17 (42)		8 (20)	
No	22 (40)		7 (13)	

^ap-Value from chi-square or Fisher exact test bivariate analyses.

^bStatistically significant.

resident physicians or midwives were more likely to undergo postpartum testing. These results point to an overall systems failure to ensure adequate follow-up for patients with GDM.

Unfortunately, our finding of low rates of testing are consistent with other studies to date, although none has focused specifically on provider level of training.⁴ Eggleston et al. recently reported on over 32,000 commercially insured patients with GDM and found overall testing rates were 23.9% within 1 year.⁴ A recent report from a similar patient population in Boston reported that only 23.4% of patients received any testing by 6 months postpartum.⁹ Overall, published testing rates vary from 23.9% to 73% in the United States, with older, nulliparous, and more educated patients more likely to complete testing in some studies.^{3,4} There are no predictive factors for postpartum testing that have been consistently reported in the literature.^{3,4,10,11} For instance, some studies show increased testing rates in patients with A2 GDM, while others show increased testing in patients with A1 GDM.^{10,12} Other characteristics that may improve testing rates include Asian race or Hispanic ethnicity or seeing a physician younger than 40 years old, as we found in this case.^{13,14}

The low rates of postpartum follow-up in our and other studies may be due to the burdensome nature of the 2H-OGTT:

postpartum patients must arrive fasting and stay for 2 hours, often accompanied by a newborn infant. Therefore, efforts are underway to find a more palatable substitute. A recent study from the United Kingdom investigated the utility of a fasting fingerstick along with an Hgb A1c at the 6-week postpartum visit and found that Hgb A1c $\geq 6.5\%$ is sensitive and specific for a diagnosis of type 2 diabetes and could obviate the need for a 2H-OGTT, although a similar study from Spain found that in that population an Hgb A1c was not an adequate replacement because of low sensitivity and specificity.^{15,16} Other methods have been investigated to improve compliance. These include text message reminders to patients, provider-specific reminders in the electronic medical record, and combination provider/patient education methods, although no optimum method has been found.^{17–21}

No comparisons between residents and attending physicians regarding postpartum testing for patients with GDM have been published to date. One possible explanation for our findings is that resident physicians may be more likely to follow practice guidelines as opposed to independent clinical judgment. Alternatively, the fact that our resident physicians were supervised by attending physicians at each visit may have acted as a stop-gap to increase the number of tests ordered. In our setting, each patient seen by the resident is presented to the attending preceptor in the office before the discharge of the patient. Thus, there is additional scrutiny of plan of care and opportunity to “catch” inadvertent omissions of standard testing.

Strengths of our study include its specific comparison of different practice settings and provider types within an urban academic practice and its inclusion of patients from a variety of socioeconomic backgrounds as seen in the varying patient insurance types. In addition, we were able to abstract detailed clinical and demographic data for our analyses.

However, our study is limited by the small sample size and the fact that it is based on a retrospective chart review. In particular, the results must be interpreted with caution since they are based on a very small number of patients. Furthermore, due to its retrospective nature, we were unable to follow up with patients or providers to determine reasons for (non-) compliance. Although all the patients had prenatal care and delivery at the University of Maryland, it is possible that some of the patients who did not attend the postpartum visit at our institution had a postpartum visit elsewhere, although this would seem unlikely.

Finally, we also do not have information on glycemic control during pregnancy. It is possible that patients with poor glycemic control or who were diagnosed in the first trimester may not have been recommended to have the 2H-OGTT, as they were assumed to be type 2 diabetics. Of note, patient compliance with prenatal care (as measured through number of prenatal visits attended) was not associated with ordering or completion of the 2H-OGTT.

Conclusions

In an urban, academic setting, we found rates of postpartum testing for patients with GDM to be low but on par with national averages. Resident physicians and midwives tended to have higher rates of testing of their patients, although our numbers were limited. Education for providers of all levels of training, patient-centered follow-up, and testing methods are needed to improve the care of patients in this population.

Author Disclosure Statement:

No competing financial interests exist.

References

1. Committee on Practice Bulletins-Obstetrics. Practice Bulletin No. 137: Gestational diabetes mellitus. *Obstet Gynecol* 2013;122(2 Pt 1):406–416.
2. Bellamy L, Casas JP, Hingorani AD, Williams D. Type 2 diabetes mellitus after gestational diabetes: A systematic review and meta-analysis. *Lancet* 2009;373:1773–1779.
3. Tovar A, Chasan-Taber L, Eggleston E, Oken E. Postpartum screening for diabetes among women with a history of gestational diabetes mellitus. *Prev Chronic Dis* 2011;8:A124.
4. Eggleston EM, LeCates RF, Zhang F, Wharam JF, Ross-Degnan D, Oken E. Variation in postpartum glycemic screening in women with a history of gestational diabetes mellitus. *Obstet Gynecol* 2016;128:159–167.
5. Barsuk JH, Cohen ER, Nguyen D, Mitra D, O'Hara K, Okuda Y, et al. Attending physician adherence to a 29-component central venous catheter bundle checklist during simulated procedures. *Crit Care Med* 2016;44:1871–1881.
6. Sisson SD, Rice TN, Hughes MT. Physician knowledge of national cholesterol guidelines before and after an interactive curriculum. *Am J Cardiol* 2007;99:1234–1235.
7. Alkhiari R, Alzayer H, Aljazeera J, Vanniyasingam T, Punthakee Z. Adherence to guidelines for inpatient pharmacologic management of type 2 diabetes and glycemic outcomes. *Can J Diabetes* 2017;pii:S1499-2671(17)30170-3.
8. Accreditation Council for Graduate Medical Education. The Obstetrics and Gynecology Milestone Project 2015 [cited 2017 July 5]. Available at: www.acgme.org/Portals/0/PDFs/Milestones/ObstetricsandGynecologyMilestones.pdf Accessed November 28, 2017.
9. McCloskey L, Bernstein J, Winter M, Iverson R, Lee-Parritz A. Follow-up of gestational diabetes mellitus in an urban safety net hospital: Missed opportunities to launch preventive care for women. *J Womens Health (Larchmt)* 2014;23:327–334.
10. Hunt KJ, Conway DL. Who returns for postpartum glucose screening following gestational diabetes mellitus? *Am J Obstet Gynecol* 2008;198:404 e1–e6.
11. Hunt KJ, Logan SL, Conway DL, Korte JE. Postpartum screening following GDM: How well are we doing? *Curr Diab Rep* 2010;10:235–241.
12. Ogonowski J, Miazgowski T. The prevalence of 6 weeks postpartum abnormal glucose tolerance in Caucasian women with gestational diabetes. *Diabetes Res Clin Pract* 2009;84:239–244.
13. Dietz PM, Vesco KK, Callaghan WM, Bachman DJ, Bruce FC, Berg CJ, et al. Postpartum screening for diabetes after a gestational diabetes mellitus-affected pregnancy. *Obstet Gynecol* 2008;112:868–874.
14. Gabbe SG, Gregory RP, Power ML, Williams SB, Schulkin J. Management of diabetes mellitus by obstetrician-gynecologists. *Obstet Gynecol* 2004;103:1229–1234.
15. Katreddy MV, Pappachan JM, Taylor SE, Nevill AM, Indusekhar R, Nayak AU. Hemoglobin A1c in early postpartum screening of women with gestational diabetes. *World J Diabetes* 2013;4:76–81.
16. Picon MJ, Murri M, Munoz A, Fernandez-Garcia JC, Gomez-Huelgas R, Tinahones FJ. Hemoglobin A1c versus oral glucose tolerance test in postpartum diabetes screening. *Diabetes Care* 2012;35:1648–1653.
17. Benhalima K, Verstraete S, Muylle F, Decochez K, Devlieger R, Crombrugge PV, et al. Implementing a reminder system in the northern part of Belgium to stimulate postpartum screening for glucose intolerance in women with gestational diabetes: The “sweet pregnancy” project. *Int J Endocrinol* 2017;2017:3971914.
18. Middleton P, Crowther CA. Reminder systems for women with previous gestational diabetes mellitus to increase uptake of testing for type 2 diabetes or impaired glucose tolerance. *Cochrane Database Syst Rev* 2014:CD009578.
19. Van Ryswyk EM, Middleton PF, Hague WM, Crowther CA. Postpartum SMS reminders to women who have experienced gestational diabetes to test for Type 2 diabetes: The DIAMIND randomized trial. *Diabet Med* 2015;32:1368–1376.
20. Vesco KK, Dietz PM, Bulkley J, Bruce FC, Callaghan WM, England L, et al. A system-based intervention to improve postpartum diabetes screening among women with gestational diabetes. *Am J Obstet Gynecol* 2012;207:283.e1–e6.
21. Zera CA, Bates DW, Stuebe AM, Ecker JL, Seely EW. Diabetes screening reminder for women with prior gestational diabetes: A randomized controlled trial. *Obstet Gynecol* 2015;126:109–114.

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