Journal of Midwifery & Women's Health www.jmwh.org
Original Research

Gestational Diabetes Mellitus and Postpartum Care Practices of Nurse-Midwives

Jean Y. Ko, PhD, Patricia M. Dietz, DrPH, Elizabeth J. Conrey, RD, PhD, Loren Rodgers, PhD, Cynthia Shellhaas, MD, MPH, Sherry L. Farr, PhD, Cheryl L. Robbins, PhD

Introduction: Postpartum screening for glucose intolerance among women with recent histories of gestational diabetes mellitus (GDM) is important for identifying women with continued glucose intolerance after birth, yet screening rates are suboptimal. In a thorough review of the literature, we found no studies of screening practices among certified nurse-midwives (CNMs). The objectives of our study were to estimate the prevalence of postpartum screening for abnormal glucose tolerance and related care by CNMs for women with recent histories of GDM and to identify strategies for improvement.

Methods: From October through December 2010, the Ohio Department of Health sent a survey by mail and Internet to all licensed CNMs practicing in Ohio. We calculated prevalence estimates for knowledge, attitudes, clinical practices, and behaviors related to postpartum diabetes screening. Chi-square statistics were used to assess differences in self-reported clinical behaviors by frequency of postpartum screening.

Results: Of the 146 CNMs who provided postpartum care and responded to the survey (62.2% response rate), 50.4% reported screening women with GDM-affected pregnancies for abnormal glucose tolerance at the postpartum visit. Of CNMs who screened postpartum, only 48.4% used fasting blood sugar or the 2-hour oral glucose tolerance test. Although 86.2% of all responding CNMs reported that they inform women with recent histories of GDM of their increased risk for type 2 diabetes mellitus, only 63.1% counseled these women to exercise regularly and 23.3% reported referring overweight/obese women to a diet support group or other nutrition counseling. CNMs reported that identification of community resources for lifestyle interventions and additional training in postpartum screening guidelines may help to improve postpartum care.

Discussion: CNMs in Ohio reported suboptimal levels of postpartum diabetes testing and use of a recommended postpartum test. Providing CNMs with additional training and identifying community resources to support needed lifestyle behavior change may improve care for women with recent GDM-affected pregnancies.
J Midwifery Womens Health 2013;00:1–8

Keywords: gestational diabetes mellitus, glucose tolerance test, postpartum care, nurse-midwives, women's health

A related patient education handout can be found at the end of this issue and at www.sharewithwomen.org

INTRODUCTION

Gestational diabetes mellitus (GDM) affects 2% to 10% of pregnancies in the United States.[1] Approximately 30% of US women with GDM continue to have glucose abnormalities after birth.[2–4] A systematic review of studies that followed women with GDM for 1 or more years after birth documented that up to 50% of women developed type 2 diabetes within 5 years of a GDM pregnancy and up to 70% of women developed type 2 diabetes within 10 years.[5] Currently, an estimated 8.3% of the US adult population has diabetes[6]; by 2050, the prevalence of diabetes is expected to rise to 21% to 33%.[7] The onset of type 2 diabetes can be prevented or delayed through good nutrition, exercise, maintenance of a healthy weight, and breastfeeding.[8–10] The American Diabetes Association (ADA), the American College of Obstetrics and Gynecologists, and the World Health Organization recommend that women with GDM pregnancies be tested for abnormal glucose tolerance 6 to 12 weeks postpartum.[11–13] In addition, the ADA recommends that all women with a history of GDM be educated about lifestyle modification, whereas the American College of Obstetricians and Gynecologists recommends women with additional risk factors such as obesity receive diet, exercise, and weight management counseling.[12]

Although postpartum testing is needed to diagnose type 2 diabetes, a recent systematic review of studies based on medical chart records or practitioner self-report found that only 34% to 73% of women with GDM received postpartum screening,[14] and other studies found 20% to 74% of obstetrician-gynecologists reported providing postpartum screening.[15,16] Certified nurse-midwives (CNMs) provide care to women before, during, and after pregnancy, and care for a substantial portion of uninsured and Medicaid-insured patients.[17,18] In 2009, CNMs attended 7.6% of total births in the United States,[19] yet their postpartum care practices for women with recent histories of GDM are unknown.

To assess the need for improving early detection and preventing type 2 diabetes among women in Ohio with a history of GDM, the Ohio Department of Health, in conjunction with the Centers for Disease Control and Prevention (CDC)

Address correspondence to Jean Y. Ko, PhD, Division of Reproductive Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, 4770 Buford Hwy, Mailstop K-22, Atlanta, GA 30341. E-mail: JeanKo@cdc.gov

1526-9523/09/$36.00 doi:10.1111/j.1542-2011.2012.00261.x

Quick Points

- This study assessed the screening and counseling that Ohio certified nurse-midwives (CNMs) provide for postpartum women who have had gestational diabetes.
- Only half of responding CNMs reported screening their postpartum patients for glucose tolerance after a gestational diabetes mellitus (GDM) pregnancy.
- Among CNMs who screen postpartum, only half reported using one of the recommended postpartum glucose tolerance tests.
- About two-thirds of CNMs counseled women with recent histories of GDM to exercise regularly; however, only one-quarter of CNMs referred overweight or obese women with recent GDM histories to diet support groups or other nutrition counseling.
- Midwives need to consistently screen postpartum women who have had a GDM pregnancy for glucose tolerance using either a fasting blood sugar or a 2-hour oral glucose test and to encourage these women to exercise regularly and lose weight if they are overweight or obese.

surveyed CNMs to estimate the prevalence of postpartum diabetes screening and lifestyle modification counseling for women with a recent history of GDM. In addition, we gathered information on resource and training needs to improve care.

METHODS

A team from the Ohio Department of Health and the CDC developed a 37-item questionnaire that assessed providers' knowledge, attitudes, and postpartum practices regarding diabetes prevention for women with a history of GDM. The questionnaire required approximately 15 to 20 minutes per respondent to complete, was reviewed for face validity, and was piloted with 5 CNMs. The pilot test identified questions that were confusing, problems with skip patterns, additional response choices, and grammatical errors. The questionnaire was revised to address each of these issues.

The population-based study sample included all CNMs with current certificates of authority listed in public access state licensure files (n = 280). From October through December 2010, we mailed surveys to CNMs using a dual-mode (mail and Internet) approach to optimize response rates.[20] Postcards were first mailed to the CNMs to notify them of the forthcoming survey. The paper questionnaire was then mailed with options to complete online or by return mail. Reminder postcards were sent a week later, followed in one week by mailed duplicate surveys to nonresponders. Reminder e-mails were sent to nonresponders if the duplicate survey was not returned within 2 weeks.

A database was created for respondents' responses. Surveys completed online were directly entered into this database; surveys returned by mail were entered into the database via Teleform software (Autonomy, 2009). All data were analyzed using Stata 10.0 (StataCorp, 2007). Questions regarding knowledge and attitudes were assessed on a 5-item Likert scale, with responses "strongly agree," "somewhat agree," "unsure," "somewhat disagree," and "strongly disagree." Responses of "strongly disagree" and "somewhat disagree" were grouped together as "disagree." Questions related to postpartum screening and care practices were assessed on a 5-item Likert scale. The responses of "always" and "most of the time" were grouped as positive responses. The responses "sometimes," "rarely," and "never" were grouped as negative responses. We used chi-square tests to assess statistical differences by clinical behaviors for categorical variables. The findings were considered significant at P less than or equal to .05. The survey was determined to be public health practice and was exempted from institutional review board approval.

RESULTS

Characteristics of the Certified Nurse-Midwives

Of 280 practicing CNMs in Ohio, 31 CNMs were excluded from participation in this study because they had participated in the pilot testing (n = 5) or because they had declined participation, retired, moved out of state, or indicated they practiced in a different specialty (n = 26). Of the remaining eligible 249 CNMs, 155 responded to the survey, yielding a response rate of 62.2% (n = 155/249). Among respondents, 146 CNMs (94.2%) indicated that they provided postpartum care. All CNMs were female, and mean years in practice was 13.3 years (Table 1). Less than half the CNMs reported working in a private practice (48.0%). More than half of CNMs (55.2%) reported that the majority of their patients were Medicaid-insured. Almost three-quarters of CNMs (71.9%) saw 6 to 20 new pregnant patients per month. Approximately 87% of CNMs reported that their patient population mainly resided in urban and suburban areas.

Knowledge and Attitudes of Certified Nurse-Midwives

The majority of CNMs (86.5%) stated that type 2 diabetes screening for women with histories of GDM was a low (54.6%) or moderate (31.9%) priority in their practice, and approximately one-third (35.0%) correctly identified that more than 40% of women with GDM during pregnancy will progress to type 2 diabetes within 10 years (Table 2). Three-fourths of CNMs (74.1%) strongly agreed that GDM has long-term implications for a woman's health, and 65.0% strongly agreed

Table 1. Characteristics of Certified Nurse-Midwives (N = 146)[a]

Characteristics	n (%)
Years in practice, mean (SE)	13.3(8.2)
Sex	
Female	146(100)
Male	0(0)
Primary practice type	
Private group	70(48.0)
Government-funded clinic	30(20.6)
Hospital	37(25.3)
University	5(3.4)
Other (includes HMO)	4(2.7)
Percentage of patients insured by Medicaid	
0%-25%	19(14.2)
26%-50%	41(30.6)
51%-75%	33(24.6)
>75%	41(30.6)
New pregnancies typically seen each month	
1-5	12(9.4)
6-10	44(34.4)
11-20	48(37.5)
≥21	24(18.8)
Primary patient residence	
Urban	74(51.0)
Suburban	52(35.9)
Rural	19(13.1)

Abbreviations: HMO, health maintenance organization; SE, standard error.
[a]Sample included 146 certified nurse-midwives who provided postpartum care; however, because of missing data, some columns do not sum up to 146 respondents.

Table 2. Knowledge and Attitudes Among Certified Nurse-Midwives Regarding Gestational Diabetes Mellitus (N = 146)[a]

Question	n (%)
Screening for type 2 diabetes among nonpregnant women with a history of GDM is a _ priority in my practice	
High	19 (13.5)
Moderate	45 (31.9)
Low	77 (54.6)
Percentage of women with GDM pregnancies who will progress to type 2 diabetes within 10 years?	
>40%	50 (35.0)
≤40%	77 (53.9)
Unsure	16 (11.2)
GDM has long-term implications for a woman's health	
Strongly agree	106 (74.1)
Somewhat agree	34 (23.8)
Disagree	2 (1.4)
Unsure	1 (0.7)
There is a need for periodic screening for type 2 diabetes among women with a history of GDM	
Strongly agree	93 (65.0)
Somewhat agree	41 (28.7)
Disagree	3 (2.1)
Unsure	6 (4.2)

Abbreviation: GDM, gestational diabetes mellitus.
[a]Sample included 146 certified nurse-midwives who provided postpartum care; however, because of missing data, some columns do not sum up to 146 respondents.

that periodic screening for type 2 diabetes is needed among women with a history of GDM.

Clinical Practices

Although 73.2% of CNMs reported that they discuss a woman's plan for postpartum testing if she has GDM, only 50.4% stated that they screen for abnormal glucose tolerance after a GDM pregnancy at the postpartum visit (Table 3). There were no differences in postpartum screening rates by number of years in practice, practice type (eg, private group, hospital), percentage of practice that was Medicaid-insured, primary population race/ethnicity, or location (rural/suburban/urban); P greater than .05 for each (data not shown). The majority of CNMs (86.2%) reported telling their patients with recent histories of GDM that they have an increased risk for type 2 diabetes, but fewer CNMs (63.9%) reported telling women with recent histories of GDM that they should be tested for diabetes when considering or becoming pregnant in the future. Counseling women with recent histories of GDM to exercise regularly was reported more frequently (63.1%) than referring overweight or obese women with recent histories of GDM to diet support groups or other nutrition counseling (23.3%). The majority of CNMs encouraged women with recent GDM pregnancies to breastfeed (96.1%).

The most common strategy reported for ensuring postpartum screening for abnormal glucose tolerance after a GDM pregnancy was discussing the need for postpartum testing with patients (61.0%; Figure 1). CNMs less frequently offered educational material to patients, called or mailed reminders to patients, or used alerts in the electronic medical record to remind the provider of their patients' GDM histories.

The CNMs who always/most of the time screened for abnormal glucose tolerance at the postpartum visit were more likely to discuss the need for postpartum testing for type 2 diabetes compared with CNMs who screened less often (89.2% vs 46.9%; $P < .001$). Similarly, the CNMs who always/most of the time screened, reviewed a woman's plan for postpartum testing more often than did the CNMs who screened less often (90.3% vs 57.6%; $P < .001$). They also were more likely to

Table 3. Clinical Practices of Certified Nurse-Midwives (N = 146)[a]

	n (%)
If a woman has GDM, I discuss her plans for follow-up postpartum care for testing of type 2 diabetes.	
Always/most times	93 (73.2)
Some of the time	20 (15.8)
Never/rarely	14 (11.0)
At the postpartum visit, women are screened for abnormal glucose tolerance after a GDM pregnancy.	
Always/most times	65 (50.4)
Some of the time	30 (23.3)
Never/rarely	34 (26.4)
Postpartum women with a recent history of GDM are told that they are at an increased risk for type 2 diabetes.	
Always/most times	112 (86.2)
Some of the time	13 (10.0)
Never/rarely	5 (3.9)
In addition to routine screening, postpartum women with a recent history of GDM are told that they should be tested for diabetes when becoming pregnant in the future.	
Always/most times	83 (63.9)
Some of the time	27 (20.8)
Never/rarely	20 (15.4)
Postpartum women with a recent history of GDM are counseled to exercise regularly.	
Always/most times	82 (63.1)
Some of the time	35 (26.9)
Never/rarely	13 (10.0)
Overweight or obese postpartum women with a recent history of GDM are referred to a diet support group or other nutrition counseling.	
Always/most times	30 (23.3)
Some of the time	40 (31.0)
Never/rarely	59 (45.7)
I encourage women with a recent GDM pregnancy to breastfeed.	
Always/most times	123 (96.1)
Some of the time	1 (0.8)
Never/rarely	4 (3.1)

Abbreviation: GDM, gestational diabetes mellitus.
[a]Sample included 146 certified nurse-midwives who provided postpartum care; however, because of missing data, some columns do not sum up to 146 respondents.

counsel women to exercise regularly (75.0% vs 53.1%; $P = .03$) and to have clinical systems or materials in place that supported postpartum testing such as having clinical protocols that address postpartum type 2 diabetes screening (54.0% vs 10.0%; $P < .001$), appointment reminders for patients (12.3% vs 0%; $P < .004$), and patient educational materials (18.5% vs 1.6%; $P = .001$).

CNMs who always/most of the time and CNMs who sometimes/rarely/never screen for postpartum glucose intolerance did not differ in the following clinical practices: telling postpartum women that they were at increased risk for type 2 diabetes, telling women that they should be tested for diabetes when considering having another child or becoming pregnant in the future, encouraging women with a recent GDM pregnancy to breastfeed, and referring overweight or obese postpartum women with a recent history of GDM to a diet support group or other nutrition counseling (all $P > .05$). In addition, there were no differences by frequency of postpartum screening in the use of electronic alerts to remind a provider of the need for a postpartum glucose test ($P > .05$).

Among CNMs who always/most of the time screened for abnormal glucose tolerance at the postpartum visit, the 2-hour oral glucose tolerance test (OGTT) was the most common type of postpartum glucose tolerance test used (45.2%; Figure 2). Fewer than half of CNMs (48.4%) reported using a recommended postpartum test for glucose intolerance: fasting blood sugar (FBS) or the 2-hour OGTT test.

Resources Needed for Improved Care

Approximately half of all responding CNMs (49.3%) reported a need for improved GDM patient education, and 71.9% reported a need for increased patient responsibility for self-preventive care. Almost half the CNMs reported needing additional training on postpartum screening recommendations

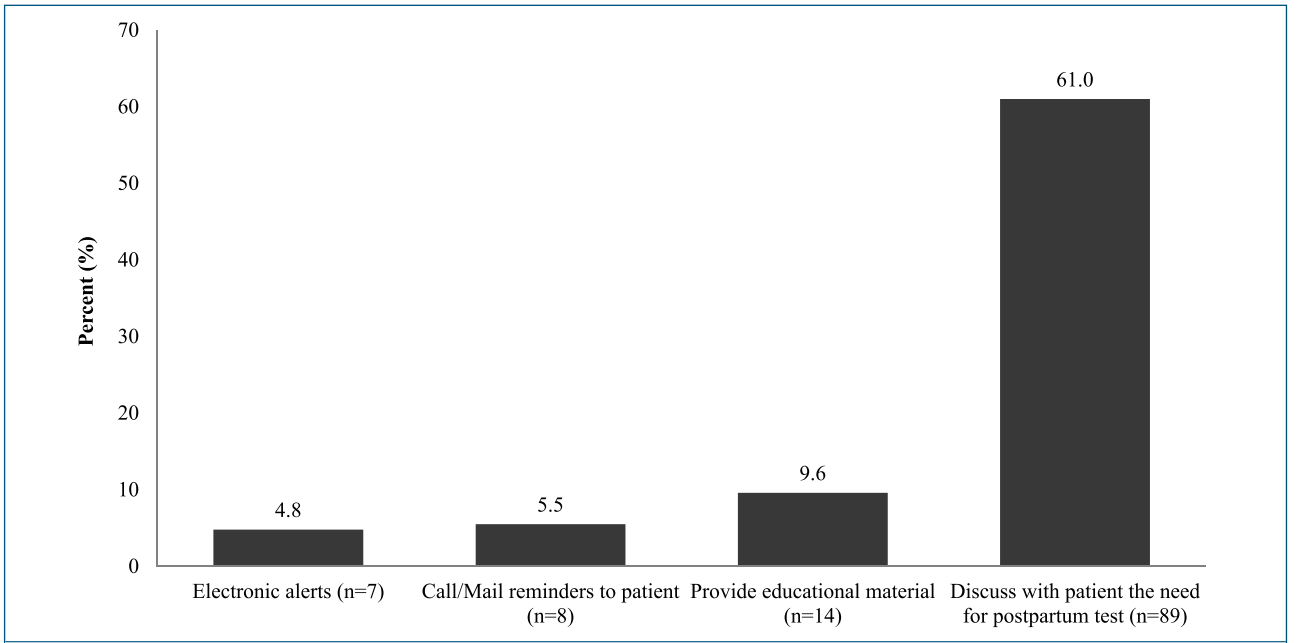

Figure 1. Activities of Certified Nurse-Midwives' Practices to Ensure Women with Gestational Diabetes Mellitus Receive a Postpartum Test (N = 146)[a]

[a]Respondents could select more than one activity, thus percentages do not add up to 100%. Of the 146 respondents, 36.9% ($n = 54$) did not report use of any of the above activities to ensure women receive a postpartum test.

(45.2%). CNMs who sometimes, rarely, or never screened for type 2 diabetes were more likely to state they needed training related to postpartum screening recommendations ($P < .001$; data not shown). Fewer than a third of responding CNMs reported needing additional training in risk factor identification/modification (28.8%). CNMs also reported that a listing of community-based programs that target risk factor modification (65.1%), automatic reminders in patient charts or in electronic medical records to alert providers to order postpartum tests for GDM patients (46.6%), and increased

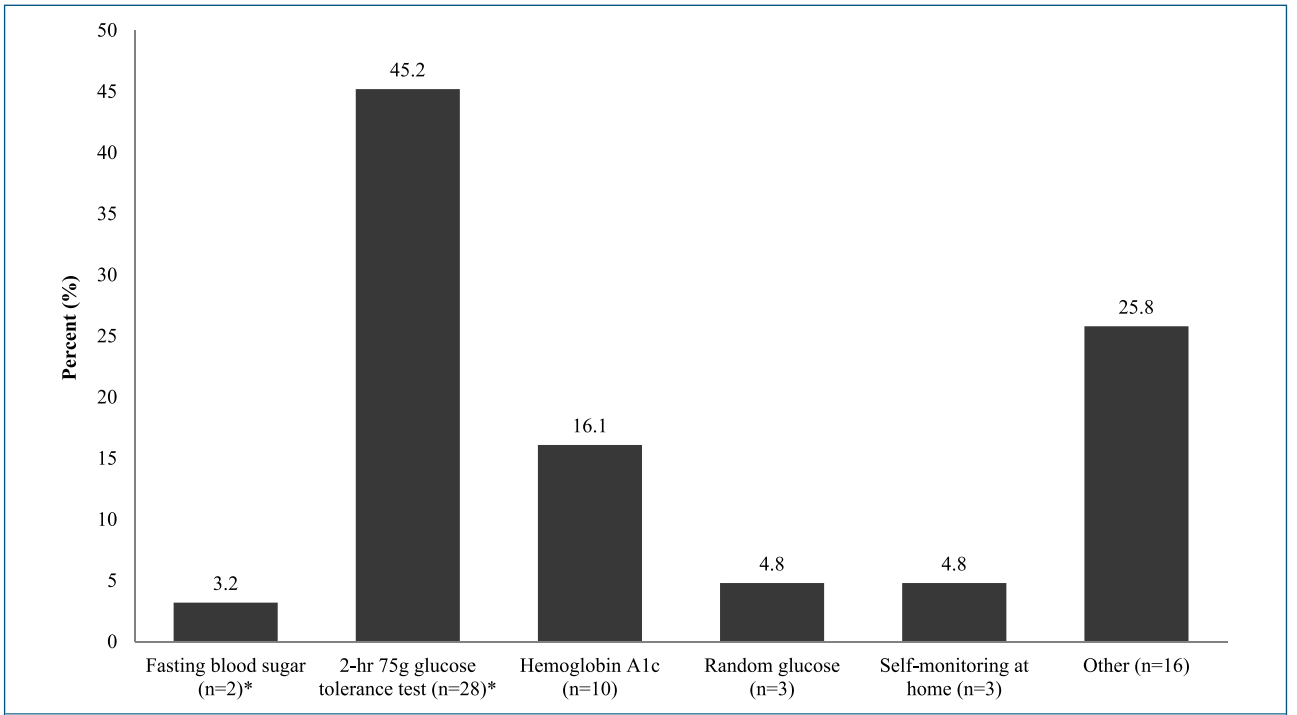

Figure 2. Glucose Tolerance Tests Used by Certified Nurse-Midwives who Provide Postpartum Screening Always/Most of the time (n = 65)

[a]Recommended postpartum glucose tolerance tests by the American College of Obstetricians and Gynecologists and the American Diabetes Association.[10,11]

communication between the obstetrician-gynecologist and the primary care physician (31.5%) would be beneficial.

DISCUSSION

Only half of responding Ohio CNMs reported screening their postpartum patients for glucose tolerance after a GDM pregnancy always or most of the time. Most CNMs understood that GDM poses risks for a woman's long-term health and informed their patients of this risk; however, approximately two-thirds underestimated or were unaware that greater than 40% of women with GDM pregnancies ultimately develop type 2 diabetes. CNMs most frequently suggested patient- and system-level strategies for improved care, but also indicated a desire for additional training in postpartum screening recommendations. Although we found no other studies that reported postpartum diabetes screening rates among CNMs only, studies that combined obstetrician-gynecologists and CNMs[21] or that focused on obstetrician-gynecologists[16] described wide variation in reported screening rates. For example, a statewide survey in North Carolina found that collectively only 27% of responding obstetrician-gynecologists, nurse-midwives, and primary care practitioners screened for type 2 diabetes during postpartum visits for patients with recent histories of GDM.[21] In contrast, a national survey of American College of Obstetricians and Gynecologists fellows and junior fellows found that approximately 74% of obstetricians routinely perform postpartum evaluations of glucose tolerance in patients diagnosed with GDM.[16]

Studies have documented that postpartum screening rates can improve with patient education and counseling,[22] mailed reminders to the patient and her health practitioner,[23] and use of a case-manager nurse to follow up with patients during and after pregnancy.[24] Use of reminders in electronic medical records or automated telephone reminder systems have been shown to improve patient compliance with screening for other types of tests such as mammography and colon cancer and would likely improve postpartum diabetes screening as well.[25,26] Given the low percentages of CNMs reporting the use of educational materials, reminder calls or mailings, and electronic alerts in this survey, increased use of these strategies may improve postpartum type 2 diabetes screening in Ohio.

Only 48% of CNMs who screen women at the postpartum visit reported using either of the 2 recommended tests (OGTT or the FBS) for postpartum screening,[12,27] which is similar to estimates from other studies that found 54% of obstetrician-gynecologists, nurse-midwives, and primary care practitioners in North Carolina[21] and 50.8% of American College of Obstetricians and Gynecologists fellows who provide postpartum screening used the OGTT.[16] Although both the American College of Obstetricians and Gynecologists and the ADA endorse the OGTT and FBS as acceptable postpartum glucose tolerance tests,[12,27] the American College of Nurse-Midwives (ACNM) has not put forward specific postpartum glucose tolerance testing guidelines. Increased use of recommended postpartum tests can be achieved with ongoing provider education.

Although the primary focus of this study was on postpartum diabetes screening, there are some additional clinical implications to note. CNMs serve a patient population that is disproportionally vulnerable to poor health care access and at risk for poor pregnancy outcomes.[17,18] Thus, the postpartum visit is an opportunity not only to screen for glucose tolerance and educate women with recent GDM pregnancies on their increased risk of type 2 diabetes, but also to provide counseling on the importance of physical activity and referrals to appropriate nutrition resources. Although the ADA recommends that all women with a history of GDM be educated about lifestyle modification,[27] only 63% of responding CNMs in this study counseled women with recent histories of GDM to exercise regularly, and fewer than one-third of CNMs referred overweight/obese postpartum women with recent GDM histories to a diet support group or other nutrition counseling. This may reflect a lack of services available in the community or that the clinics do not have a referral list for these types of services. Guidelines from the American College of Obstetricians and Gynecologists recommend that women with recent GDM pregnancies who have additional risk factors for type 2 diabetes such as obesity receive diet, exercise, and weight management counseling.[12] One-third of CNMs in this study desired additional training in risk factor identification and modification, which could increase counseling and referral of women to lifestyle modification services.

Our study has some limitations. First, these data are based on self-report and could be subject to social desirability bias; thus, respondents may have overestimated their frequency of postpartum screening and lifestyle modification counseling. In addition, CNMs who completed the survey may be more interested in and aware of GDM than those who did not participate and were therefore more likely to follow recommended guidelines in their care of women with recent histories of GDM. Thus, results from this survey may not fully represent the practices of all CNMs in Ohio. Despite these limitations, this study's use of a dual-mode survey design allowed us to capture more respondents than would be reached by exclusively phone- or mail-based methodologies. Although the response rate was moderate, at 62.2%, it was relatively high compared with surveys of physicians, which typically have response rates of 40% or less.[16,21] This is the first study, to our knowledge, to provide prevalence estimates for knowledge, attitudes, clinical practices, and behaviors related to postpartum diabetes screening specific to CNMs. Because these CNMs practice across the state in a variety of clinical settings, we were able to capture clinical practices in many locations, instead of only one medical center or academic institution. Findings from this study may be generalizable to other states with similar patient and CNM populations.

CONCLUSION

In summary, CNMs in Ohio reported suboptimal levels of postpartum diabetes testing for their GDM patients, with fewer than 50% of responding participants reporting that they use a recommended test, educate patients on their future risk of type 2 diabetes, and provide referrals to lifestyle interventions. Effective strategies at multiple levels may be needed to improve care for women with GDM-affected pregnancies. At the patient level, improved education and self-preventive care may improve outcomes. The Ohio Department of Health is conducting focus group research to learn about women's

barriers and to test educational messages. At the provider level, training on screening recommendations and risk factor identification and modification should be well accepted by CNMs; the Ohio Department of Health is developing Web-based training for nursing continuing education credits. Such provider education should also be offered by ACNM on a national level. As CNMs indicated a need for community-based programs and for automatic reminders in electronic medical records to ensure completion of the postpartum test, the Department of Health may explore collaborations in the community and with clinical providers to develop these improvements. At the system level, improving continuity of care and continued access to health insurance after birth are needed.

AUTHORS

Jean Y. Ko, PhD, is an Epidemic Intelligence Service Officer, Scientific Education and Professional Development Program Office, Office of Surveillance, Epidemiology, and Laboratory Services at the Centers for Disease Control and Prevention in Atlanta, GA, USA. Dr. Ko is assigned to the Division of Reproductive Health at the Centers for Disease Control and Prevention in Atlanta, Georgia.

Patricia M. Dietz, DrPH, is an Epidemiologist with the Division of Reproductive Health at the Centers for Disease Control and Prevention in Atlanta, Georgia.

Elizabeth J. Conrey, RD, PhD, is a Maternal and Child Health Epidemiology Assignee from the Division of Reproductive Health, Centers for Disease Control and Prevention, to the Ohio Department of Health, in Columbus, Ohio.

Loren Rodgers, PhD, is an Epidemic Intelligence Service Officer, Scientific Education and Professional Development Program Office, Office of Surveillance, Epidemiology, and Laboratory Services at the Centers for Disease Control and Prevention in Atlanta, Georgia. Dr. Rodgers is assigned to the Ohio Department of Health in Columbus, Ohio.

Cynthia S. Shellhaas, MD, MPH, is the Medical Director for the Bureau of Child and Family Health Services at the Ohio Department of Health in Columbus, Ohio. Dr. Shellhaas is also an Associate Professor in the Division of Maternal-Fetal Medicine at the Ohio State University College of Medicine.

Sherry L. Farr, PhD, is an Epidemiologist with the Division of Reproductive Health at the Centers for Disease Control and Prevention in Atlanta, Georgia.

Cheryl L. Robbins, PhD, is an Epidemiologist with the Division of Reproductive Health at the Centers for Disease Control and Prevention in Atlanta, Georgia.

DISCLOSURE OF FUNDING

Some authors are employees of the Centers for Disease Control and Prevention (Ko, Dietz, Conrey, Rodgers, Farr and Robbins). No outside funds were used to conduct this research. The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

ACKNOWLEDGMENTS

Andrew Wapner, DO; Norma Ryan, PhD, RN; Amy Dunn, RN; Gwen Stacey, RD; Thomas Joyce, MA; Ryan Kofran, MSSA, CNM; Karen Foster; Jessica Londeree; Kat Meagley; and Case Western Reserve University Prevention Research Center.

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