Screening for type 2 diabetes following gestational diabetes

Family physician and patient perspectives

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ABSTRACT

OBJECTIVE To explore primary care provider (PCP) and patient perspectives on postpartum screening for type 2 diabetes (T2DM), including reasons for not completing oral glucose tolerance tests (OGTTs) specifically, preferred provider for organizing screening, and value of reminder letters for facilitating screening.

DESIGN A follow-up survey, administered by fax or telephone, to PCPs and patients who participated in a randomized controlled trial assessing effectiveness of postpartum postal reminders to enhance screening for T2DM in women with gestational diabetes mellitus (GDM).

SETTING The Ottawa Hospital, a university-affiliated tertiary centre in Ottawa, Ont.

PARTICIPANTS A total of 223 female patients with previously identified GDM and their respective PCPs were surveyed; 173 PCPs and 140 patients participated.

MAIN OUTCOME MEASURES Whether or not the patient was screened for T2DM post partum, the test used for screening, the factors contributing to the patient not being screened, perspectives on the importance of screening post partum, and opinions about which care provider should be responsible for screening in the postpartum period.

RESULTS Response rates were 78% (173 of 223) for PCPs and 63% (140 of 223) for patients. Only 37% of the PCP responders had their patients complete OGTTs, while 85% of patient responders reported that they had completed OGTTs. The most common reason PCPs gave for not screening was no postpartum visit from the patient for any reason. Time pressures were the most common reason provided by patients for not being screened. More than 95% of patients and providers agreed that screening for T2DM was important. Patients and PCPs agreed that PCPs should be responsible for screening. Reminder letters were perceived as helpful by more than 85% of patients and PCPs.

CONCLUSION This follow-up survey demonstrates that PCPs and patients value the importance of screening for diabetes, identify the PCP as pivotal to screening, and appreciate a reminder strategy. There continue to be barriers that affect screening rates, despite the perceived importance of screening by PCPs and patients.

TRIAL REGISTRATION NUMBER NCT00212914 (ClinicalTrials.gov).

EDITOR'S KEY POINTS

- Women with gestational diabetes mellitus (GDM) are at increased risk of developing type 2 diabetes mellitus (T2DM) after giving birth; therefore, the Canadian Diabetes Association 2008 Clinical Practice Guidelines recommend an oral glucose tolerance test (OGTT) 6 weeks to 6 months post partum.
- Rates of postpartum screening using OGTTs remain low in routine clinical practice, owing to perceptions about the complexity of the test, time required, difficulty for the patient, and costs, as well as fragmentation of care in the postpartum period. However, OGTTs are the most effective method of identifying glucose intolerance and the most cost-effective way to diagnose new cases of T2DM in the postpartum state if performed every 3 years.
- Patients and physicians both agreed that screening for T2DM for women with GDM was important; reminder letters contributed to adherence to screening recommendations and were considered beneficial by more than 85% of survey respondents.
- Patients and physicians surveyed strongly agreed that primary care providers should be responsible for T2DM screening post partum.

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Dépistage du diabète de type 2 à la suite d'un diabète gestationnel

Points de vue des médecins de famille et des patientes

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RÉSUMÉ

OBJECTIF Établir l'opinion des intervenants de première ligne (IPL) et des patientes à propos du dépistage postpartum du diabète de type 2 (DT2), incluant les raisons de ne pas faire des épreuves d'hyperglycémie provoquée par voie orale (HGPO), les meilleurs intervenants pour organiser le dépistage et la valeur des lettres de rappel pour promouvoir le dépistage.

TYPE D'ÉTUDE Enquête de suivi par télécopieur ou téléphone auprès des IPL et des patientes qui participaient à un essai clinique randomisé mesurant l'efficacité d'une lettre de rappel destinée à promouvoir le dépistage du DT2 chez les femmes après un diabète gestationnel (DG).

CONTEXTE L'hôpital d'Ottawa, un centre de soins tertiaires avec affiliation universitaire.

PARTICIPANTS L'enquête a été adressée à 223 femmes ayant déjà présenté un DG et à leurs IPL respectifs; 173 IPL et 140 patientes ont participé.

PRINCIPAUX PARAMÈTRES À L'ÉTUDE Le fait que la patiente avait ou n'avait pas subi le dépistage postpartum, l'examen de dépistage utilisé, les facteurs contribuant à l'omission du test, les opinions sur l'importance du dépistage postpartum et sur le choix de l'intervenant qui devrait en être responsable.

RÉSULTATS Les taux de réponse étaient de 78% (173 sur 223) pour les IPL et de 63% (140 sur 223) pour les patientes. Seulement 37% des IPL avaient réussi à convaincre leur patiente d'avoir une HGPO, tandis que 85% des patientes ont déclaré avoir passé une HGPO. La raison la plus fréquemment invoquée par les IPL pour ne pas avoir fait le dépistage était que la patiente n'avait pas consulté durant le postpartum. Les contraintes de temps étaient les raisons le plus fréquemment invoquées par les patientes pour ne pas avoir subi de dépistage. Plus de 95% des patientes et des IPL convenaient que le dépistage du DT2 était important. Tous étaient d'avis que le dépistage devrait relever des IPL. Plus de 85% des patientes et des IPL jugeaient les lettres de rappel importantes.

CONCLUSION Cette enquête de suivi montre l'importance que les IPL et les patientes attribuent au dépistage du diabète, le rôle-clé des IPL dans ce dépistage et l'utilité d'une stratégie de rappel.. Malgré l'importance attribuée au dépistage par les IPL et les patientes, il persiste des obstacles à cet examen.

NUMÉRO D'ENREGISTREMENT DE L'ÉTUDE NCT00212914 (ClinicalTrials.gov).

POINTS DE REPÈRE DU RÉDACTEUR

- Les femmes victimes de diabète gestationnel (DG) sont plus susceptibles de développer un diabète de type 2 (DT2) après l'accouchement; c'est pourquoi l'Association canadienne du diabète recommande une hyperglycémie provoquée par voie orale (HGPO) entre 6 semaines et 6 mois après l'accouchement.
- Dans la pratique clinique courante, les taux de dépistage par HGPO dans le postpartum demeurent faibles, parce qu'on estime que l'épreuve est complexe, exige du temps, est difficile pour la patiente, et aussi à cause des coûts et de la fragmentation des soins durant la période postpartum. Toutefois, une HGPO à tous les 3 ans est la méthode la plus efficace pour identifier une intolérance au glucose et aussi la façon la plus rentable de diagnostiquer des nouveaux cas de DT2 après un accouchement.
- Les patientes et les médecins reconnaissaient l'importance du dépistage du DT2 chez les femmes ayant présenté un DG; les lettres de rappel contribuaient à l'adhésion aux recommandations de dépistage et étaient jugées utiles par plus de 85% des répondants.
- Patientes et médecins consultés s'entendaient pour dire que les intervenants de première ligne devraient être responsables du dépistage postpartum au moyen de l'HGPO.

Cet article a fait l'objet d'une révision par des pairs.
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Gestational diabetes mellitus (GDM), a carbohydrate intolerance that develops during pregnancy, occurs in 3% to 12% of Canadian women, depending on ethnicity.[1,2] Numbers are expected to increase as obesity rates in women of childbearing age continue to climb. Although GDM and gestational impaired glucose tolerance are associated with poor obstetric outcomes,[3] the primary public health reason for diagnosing GDM should be the identification of women at high risk of developing type 2 diabetes (T2DM).[4-6] The Canadian Diabetes Association 2008 Clinical Practice Guidelines recommend a 2-hour 75-g oral glucose tolerance test (OGTT) 6 weeks to 6 months post partum.[7] Fasting glucose tests alone miss approximately 30% of those with diabetes and fail to identify those with impaired glucose tolerance.[8-10] However, despite the known prevalence of T2DM within 10 years of delivery in women with GDM (20% to 60%),[4,11] the rates of postpartum screening using OGTTs remain disappointingly low in routine clinical practice.[12-17] Further, women who do return for testing might be less severely affected, suggesting the true prevalence is even higher.[18]

Barriers to implementing the recommended postpartum screening for T2DM in patients with GDM include multiple care providers with fragmentation of care, underestimation of risk, uncertainty of benefits, and the inconvenience of an OGTT.[19,20] In response to low screening rates in our population, we sought to determine whether reminders sent post partum to a patient, her primary care physician (PCP), or both would increase screening according to the Canadian Diabetes Association guidelines.[13,17] We launched a 2×2 factorial randomized controlled trial (RCT) at the Ottawa Hospital in Ontario, a university-affiliated tertiary centre.[17] Women seen between August 29, 2002, and March 31, 2005, for management of GDM were considered for participation. Patients were excluded if they did not have PCPs, if their PCPs already had patients enrolled, if they were already enrolled from previous pregnancies, if they had not delivered at the Ottawa Hospital, or if they did not have live births.

Eligible patients were randomized into 1 of 4 groups: 1) reminders sent to both PCP and patient, 2) reminders sent to the PCP but not the patient, 3) reminders sent to the patient but not the PCP, or 4) no reminders (usual care). The PCP reminder included patient-specific recommendations from the GDM physician team to screen for T2DM with an OGTT. The patient reminder included a letter highlighting the importance of screening and a requisition for an OGTT. Postal reminders were sent once to the patient, the PCP, or both approximately 3 months post partum. The usual care group did not receive any information in the postpartum period. The primary outcome was the number of women receiving OGTTs. If physician survey, patient survey, or laboratory results were unavailable, testing could not be confirmed, and these subjects were removed from the analysis. The results of the primary outcome have been reported elsewhere.[17] Briefly, there was a 4-fold increase in number of women screened with OGTTs within 1 year post partum when a reminder was sent to the patient (42 of 76 [55.3%]), her physician (6 of 31 [51.6%]), or both (49 of 81 [60.5%]) compared with usual care (5 of 35 [14.3%]; $\chi^2=22.3$, $P<.05$).

As part of this RCT, patient and physician surveys were used to gather information on the primary outcome (whether or not screening tests were done) and to explore PCP and patient perspectives on screening for T2DM after GDM, including factors contributing to the patient not being screened, preferred provider for organizing screening, and the value of reminder letters for facilitating screening. This study reports the results of the PCP and patient surveys.

METHODS

Study design and participants

We conducted a fax and telephone survey of the 233 female patients and their respective PCPs who participated in the RCT. The design of the RCT required that participating PCPs have only 1 of their patients enrolled in the trial.

Survey tool

Survey items were identified through consensus among investigators. The PCP survey asked each physician about his or her patient enrolled in the RCT. The survey included questions on whether or not the patient was screened, the test used for screening, the rationale for choice of screening test used, the factors contributing to the patient not being screened, the importance of screening post partum, and which care provider should be responsible for testing in the postpartum period. For those PCPs whose patients were randomized to physician reminder groups, the perceived value of the reminders was elicited. For those who did not receive reminders, the PCPs were asked if they would like to receive one for their patients.

The patient survey included questions on whether or not they were screened, which test was done, difficulty in doing the test, factors contributing to not being screened, the importance of screening for T2DM, and which provider they thought should be responsible for arranging screening. For those who did receive reminders, the perceived usefulness was elicited. Those who did not receive reminders were asked if they thought reminders would be helpful.

All eligible PCPs and patients were contacted 3 times for the poststudy survey, the physician by fax, telephone, and mail and the patient by telephone.

The protocol was approved by the Ottawa Hospital ethics committee and registered with **ClinicalTrials.gov** (identifier number NCT00212914).

Statistical analysis

Categorical variables were compared among groups using χ^2 tests for proportions, and continuous variables were compared among groups using *t* tests.

RESULTS

From August 2002 to March 2005, 490 patients agreed to participate in the study. Of these, 234 were excluded based on enrolment criteria and an additional 33 patients were lost during follow-up and excluded from the analysis, leaving a study sample size of 223 trial subjects (ie, 223 patients and 223 PCPs). Seventy-eight percent (173 of 223) of PCPs and 63% (140 of 223) of patients completed their respective surveys. Surveys were available from both the PCPs and patients for 97 trial subjects, only the PCPs for 76 subjects, and only the patients for 43 subjects; 7 trial subjects had neither survey available (primary outcome confirmed by receipt of copies of laboratory tests performed).

Survey responders

There was no difference in survey completion rates between those PCPs who received reminders to screen their patients (81 of 112 [72%]) and those who did not (92 of 111 [83%]). Canadian graduates and female PCPs were more likely to complete the survey than other PCPs were ($P<.05$). There was no difference in year of graduation between responders and nonresponders.

Patients who received reminders to be screened were more likely to answer the survey (118 of 157 [75%]) than patients who did not receive reminders (22 of 66 [33%]). There was no difference in age, ethnic background, education level, body mass index, parity, or insulin requirements between responders and nonresponders. Data from survey respondents are summarized in **Table 1.**

Table 1. Baseline demographics of study participants, comparing survey responders with nonresponders: *A) physicians, B) patients.*

A)

CHARACTERISTIC	RESPONDERS, N (%) N = 173	NONRESPONDERS, N (%) N = 50	TOTAL, N (%) N = 223
Sex,*			
• Female	115 (66.5)	21 (42.0)	136 (61.0)
• Male	58 (33.5)	29 (58.0)	87 (39.0)
Year of graduation			
• Before 1985	80 (46.2)	29 (58.0)	109 (48.9)
• In or after 1985	93 (53.8)	21 (42.0)	114 (51.1)
Canadian graduate			
• Yes	144 (83.2)	31 (62.0)	175 (78.5)
• No	29 (16.8)	19 (38.0)	48 (21.5)
Received a reminder			
• Yes	81 (46.8)	31 (62.0)	112 (50.2)
• No	92 (53.2)	19 (38.0)	111 (49.8)

B)

CHARACTERISTIC	RESPONDERS N = 140	NONRESPONDERS N = 83	TOTAL N = 223
Mean (SD) age, y	32.9 (4.2)	33.3 (4.8)	NA
Primigravida, n (%)			
• Yes	43 (30.7)	27 (32.5)	70 (31.4)
• No	97 (69.3)	56 (67.5)	153 (68.6)
Mean (SD) BMI, kg/m^2	27.9 (7.09)	29.9 (8.9)	
Some postsecondary education, n (%)			
• Yes	115 (82.1)	67 (80.7)	182 (81.6)
• No	25 (17.9)	16 (19.3)	41 (118.4)
White, n (%)			
• Yes	82 (58.6)	55 (66.3)	137 (61.4)
• No	58 (41.4)	28 (33.7)	86 (38.6)
Requiring insulin, n (%)			
• Yes	56 (40.0)	35 (42.2)	91 (40.8)
• No	84 (60.0)	48 (57.8)	132 (59.2)
Baby weight > 4000 g, n (%)			
• Yes	16 (11.4)	16 (19.3)	32 (14.3)
• No	124 (88.6)	67 (80.7)	191 (85.7)
Received a reminder, n (%)			
• Yes	118 (84.3)	39 (47.0)	157 (70.4)
• No	22 (15.7)	44 (53.0)	66 (29.6)

BMI—body mass index, NA—not applicable, SD—standard deviation.
*$P<.05$, χ^2 test.

Survey results

Of the 173 PCPs who answered the survey, 110 (64%) reported screening their patients for diabetes. Fasting glucose tests were used by 44 physicians (25%), random glucose tests by 9 (5%), glycated hemoglobin A_{1c} tests by 27 (16%), and OGTTs by 64 (37%). Some physicians used more than 1 test. Of the 140 patient responders, 101 (72%) reported being screened—20 had fasting glucose tests, 8 had random glucose tests, 2 had hemoglobin A_{1c} tests, 86 had 2-hour OGTTs, and 2 were unsure which test had been performed. For the 97 trial subjects for whom both PCPs and patients answered the survey, there was 77.3% agreement (κ 0.59, $P<.05$) on whether OGTTs were done. Reasons PCPs provided for not screening the specific patients enrolled in the study are outlined in **Table 2.** The most common reason (23 of 63 [37%]) was lack of patient visit for any reason in the postpartum period. Those who received reminders were more likely to have arranged testing that was not completed by the patients. Time pressure was the primary reason patients gave for not completing the OGTTs (**Table 3**). Only 11 of the 86 patients who had OGTTs agreed the test was difficult to complete.

The importance of screening was recognized by both physicians and patients—162 of 170 PCPs (95%) agreed or strongly agreed that patients with GDM should be screened post partum, and 129 of 136 patients (95%) agreed screening was important to them. Both PCPs and patients strongly believed that PCPs should be the providers responsible for postpartum screening (**Table 4**).

For those physicians who received reminder letters and answered the related survey question, 54 of 62 (87%) felt the reminder was useful and 39 of 61 (64%) agreed that the letter contributed to their decisions to screen. For those who did not receive reminder letters, 78 of 94 (83%) thought they would benefit from receiving one. Of the patients who answered the question about whether the letter was useful, 67 of 78 (86%) thought that it was useful, and 51 of 68 (75%) agreed it contributed to their decisions to get screened.

DISCUSSION

Rates of screening for diabetes remain low in the postpartum period with usual care; however, reminder letters sent to PCPs or patients (or both) improve adherence to screening guidelines. This follow-up survey study demonstrates that physicians and patients value the importance of screening for diabetes, identify the PCP as pivotal to screening, and appreciate a reminder strategy. However, there continue to be barriers in the health care system to screening for T2DM in new mothers with previous GDM, despite the self-reported perceived importance of screening.

There is widespread reluctance to order OGTTs, not only for those in the postpartum state but also in the nonpregnant population.[21] The complexity and time required for an OGTT, the uncertain value of intervening when impaired glucose tolerance is identified, and the perceived cost all might influence the use of OGTTs. Up to 30% of women with previous GDM will be misdiagnosed using fasting glucose tests alone, and such tests will not identify glucose intolerance, limiting opportunities for intervention to prevent T2DM.[8,10] An OGTT every 3 years might also be the most cost-effective way for diagnosing new cases in the postpartum period.[22] The difficulties of completing an OGTT with a new infant, especially if breastfeeding, should not be minimized. However, only 9 of the 86 patients who took the test in our study found it difficult.

There is often fragmentation of care delivery during pregnancy and in the postpartum period. Women have their GDM screening through their obstetrics care providers, see internists or endocrinologists if their test results are abnormal, then return to their PCPs post partum. A diagnosis of GDM might not be communicated to the PCP, which precludes any proactive intervention. Patients strongly endorse the role of the PCP in postpartum screening, yet many do not visit their PCPs for their own care within the first year of giving birth.

Perception of personal risk is a critical factor in adherence to recommended health behaviour. Those

Table 2. Reasons physicians provided for not screening their patients for T2DM post partum: *N=63.**

REASON	RECEIVED REMINDER (N = 22)	DID NOT RECEIVE REMINDER (N = 40)
Did not see patient in the postpartum period	10	13
Saw patient in postpartum period, but did not arrange testing	2	19
Arranged testing, but it was not completed by the patient	9	3
Patient declined testing	1	1
Did not know the patient had GDM	0	3

GDM—gestational diabetes mellitus, T2DM—type 2 diabetes mellitus.
*Number of physician respondents who did not screen patients for T2DM.

Table 3. Reasons patients gave for not completing screening for T2DM using OGTTs post partum: *N=36.**

REASON	N
Time pressures	20
Lost requisition	7
Did not know it was necessary	2
Pregnant again	1
Did self-glucose monitoring instead	1
Physician did not think it necessary	1
Physician did not suggest	1
Breastfeeding	1
Moved	1
Did not want to do it	1

OGTT—oral glucose tolerance test, T2DM—type 2 diabetes mellitus.
*Number of patient respondents who were not tested.

Table 4. Physician and patient perspectives on who should provide screening post partum

WHO SHOULD PROVIDE SCREENING	PHYSICIANS, N (%) N = 170*	PATIENTS, N (%) N = 136†
PCP	110 (64.7)	104 (76.4)
Obstetrician	20 (11.8)	12 (8.8)
Internist treating GDM	16 (9.4)	16 (11.8)
PCP and obstetrician	9 (5.3)	2 (1.5)
PCP and internist	9 (5.3)	2 (1.5)
No answer or anyone	6 (3.5)	NA

GDM—gestational diabetes mellitus, NA—not applicable, PCP—primary care provider.
*Number of physician respondents who answered the question.
†Number of patient respondents who answered the question.

most at risk might be least likely to return for screening.[18] In US studies, women who had postpartum screening were more likely to attend their routine postpartum 6-week visits, have less severe GDM, and have lower body mass indexes.[10,12,18] However, we did not identify these disparities in our study population. There are important differences between the Canadian and US health care systems, such as the discontinuation of Medicaid coverage 60 days after delivery in the United States, which limits generalizability of results across the border.[12] Little is known about women's risk perception of T2DM following GDM and its influence on postpartum screening. In our survey, both patients and PCPs recognized the importance of screening; however, patients who responded might have been those most interested in their health. In a 5- to 9-year follow-up study at our centre, only 1 out of 3 of women with previous GDM correctly identified her risk of T2DM as being substantially elevated.[23] It might be that women recognize the association between GDM and T2DM, but do not perceive themselves to be at elevated risk.[24]

Evidence-based interventions are required to translate knowledge into action. Our delayed-reminder approach increased postpartum screening and was appreciated by patients and providers. Although not studied systematically, 1 article reported that rates of postpartum screening with OGTTs increased from 17% to 72% with introduction of a case manager system.[10] There are no other studies assessing the effects of innovative methods to increase screening. With expansion of electronic health records and diabetes registries, the potential of automated reminders should be examined.

Limitations

Our survey study is limited by the number and type of individuals who responded. Patients who did not receive reminders were less likely to answer the survey and are underrepresented in our sample, although the overall patient response rate was adequate (63%). Receiving a screening reminder might have increased awareness and thus interest in participating. Patients without PCPs were ineligible for the study; individuals without access to primary care face additional hurdles in receiving screening care. Further studies are required to examine the generalizability of our results.

Conclusion

Gestational diabetes presents a unique opportunity to predict future diabetes occurrence. There is an urgent need for effective screening and intervention strategies in this high-risk population. Primary care providers and patients value the importance of screening for diabetes, identify the PCP as pivotal to screening, and appreciate a reminder strategy.

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Contributors

All the authors contributed to concept and design of the study; **Drs Keely, Clark,** and **Karovitch** contributed to the data gathering, analysis, and interpretation; and all the authors contributed to preparing the manuscript for submission.

Competing interests

None declared

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References

1. Aljohani N, Rempel BM, Ludwig S, Morris M, McQuillen K, Cheang M, et al. Gestational diabetes in Manitoba during a 20 year period. *Clin Invest Med* 2009;31(3):E131-7.
2. Dyck R, Klomp H, Tan LK, Turnell RW, Boctor MA. A comparison of rates, risk factors, and outcomes of gestational diabetes between aboriginal and non-aboriginal women in the Saskatoon health district. *Diabetes Care* 2002;25(3):487-93.
3. HAPO Study Cooperative Research Group; Metzger BE, Lowe LP, Dyer AR, Trimble ER, Chaovarindr U, et al. Hyperglycemia and adverse pregnancy outcomes. *N Engl J Med* 2008;358(19):1991-2002.
4. Feig DS, Zinman B, Wang X, Hux JE. Risk of development of diabetes mellitus after diagnosis of gestational diabetes. *CMAJ* 2008;179(3):229-34.
5. England LJ, Dietz PM, Njoroge T, Callaghan WM, Bruce C, Buus RM, et al. Preventing type 2 diabetes: public health implications for women with a history of gestational diabetes. *Am J Obstet Gynecol* 2009;200(4):365.e1-8. Epub 2008 Aug 8.
6. Retnakaran R, Qi Y, Sermer M, Connelly PW, Zinman B, Hanley AJ. Isolated hyperglycemia at 1 hour on oral glucose tolerance test in pregnancy resembles gestational diabetes mellitus in predicting postpartum metabolic dysfunction. *Diabetes* Care 2008;31(7):1275-81. Epub 2008 Mar 20.
7. Thompson D, Capes S, Feig DS, Kader T, Keely E, Kozak S, et al. Diabetes and pregnancy. *Can J Diabetes* 2008;32(Supplement 1):S168-80. Available from: **www.diabetes.ca/files/cpg2008/cpg-2008.pdf.** Accessed 2010 Apr 8.
8. Reinblatt SL, Morin L, Meltzer SJ. The importance of a postpartum 75 g oral glucose tolerance test in women with gestational diabetes. *J Obstet Gynaecol Can* 2006;28(8):690-4.
9. Kitzmiller JL, Dang-Kilduff L, Taslimi MM. Gestational diabetes after delivery. Short-term management and long-term risks. *Diabetes Care* 2007;30(Suppl 2):S225-35.
10. Ferrara A, Peng T, Kim C. Trends in postpartum diabetes screening and subsequent diabetes and impaired fasting glucose among women with histories of gestational diabetes mellitus: a report from the Translating Research Into Action for Diabetes (TRIAD) Study. *Diabetes Care* 2009;32(2):269-74. Epub 2008 Nov 4.
11. Kim C, Newton KM, Knopp RH. Gestational diabetes and the incidence of type 2 diabetes: a systematic review. *Diabetes Care* 2002;25(10):1862-8.
12. Russell MA, Phipps MG, Olson CL, Welch HG, Carpenter MW. Rates of postpartum glucose testing after gestational diabetes mellitus. *Obstet Gynecol* 2006;108(6):1456-62.
13. Clark HG, Van Walraven C, Code C, Karovitch A, Keely E. Did publication of a clinical practice guideline recommendation to screen for type 2 diabetes in women with gestational diabetes change practice? *Diabetes Care* 2003;26(2):265-8.
14. Smirnakis KV, Chasan-Taber L, Wolf M, Markenson G, Ecker JL, Thadhani R. Postpartum diabetes screening in women with a history of gestational diabetes. *Obstet Gynecol* 2005;106(6):1297-303.
15. Almario CV, Ecker T, Moroz LA, Bucovetsky L, Berghella V, Baxter JK. Obstetricians seldom provide postpartum diabetes screening for women with gestational diabetes. *Am J Obstet Gynecol* 2008;198(5):528.e1-5. Epub 2008 Jan 14.
16. Dietz PM, Vesco KK, Callaghan WM, Bachman DJ, Bruce FC, Berg CJ, et al. Postpartum screening for diabetes after gestational diabetes mellitus-affected pregnancy. *Obstet Gynecol* 2008;112(4):868-74.
17. Clark HD, Graham ID, Karovitch A, Keely E. Do postal reminders increase postpartum screening of diabetes mellitus in women with gestational diabetes mellitus? A randomized controlled trial. *Am J Obstet Gynecol* 2009;200(6):634.e1-7. Epub 2009 Mar 9.
18. Hunt KJ, Conway DL. Who returns for postpartum glucose screening following gestational diabetes mellitus? *Am J Obstet Gynecol* 2008;198(4):404.e1-6. Epub 2008 Feb 1.
19. Bentley-Lewis R, Levkoff S, Stuebe A, Seely EW. Gestational diabetes mellitus: postpartum opportunities for the diagnosis and prevention of type 2 diabetes mellitus. *Nat Clin Pract Endocrinol Metab* 2008;4(10):552-8. Epub 2008 Sep 9.
20. Kim C, Berger DK, Chamany S. Recurrence of gestational diabetes: a systematic review. *Diabetes Care* 2007;30(5):1314-9. Epub 2007 Feb 8.
21. Wilson SE, Lipscombe LL, Rosella LC, Manuel DG. Trends in laboratory testing for diabetes in Ontario, Canada 1995-2005: a population-based study. *BMC Health Serv Res* 2009;9:41.
22. Kim C, Herman WH, Vijan S. Efficacy and cost of postpartum screening strategies for diabetes among women with histories of gestational diabetes mellitus. *Diabetes Care* 2007;30(5):1102-6. Epub 2007 Feb 23.
23. Malcolm JC, Lawson ML, Gaboury I, Lough G, Keely E. Risk perception and unrecognized type 2 diabetes in women with previous gestational diabetes mellitus. *Obstet Med* 2009;2(3):107-10.
24. Kim C, McEwen LN, Piette JD, Goewey J, Ferrara A, Walker EA. Risk perception for diabetes among women with histories of gestational diabetes mellitus. *Diabetes Care* 2007;30(9):2281-6. Epub 2007 Jun 15.