

Did Publication of a Clinical Practice Guideline Recommendation to Screen for Type 2 Diabetes in Women With Gestational Diabetes Change Practice?

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OBJECTIVE— To determine whether women with previous gestational diabetes mellitus (GDM) were screened postpartum for type 2 diabetes according to the Canadian Diabetes Association (CDA) guidelines.

RESEARCH DESIGN AND METHODS— The 1998 CDA guidelines recommend that all women diagnosed with GDM be screened postpartum for type 2 diabetes using a 2-h 75-g oral glucose tolerance test (OGTT). The impact of and compliance with this expert opinion–based recommendation is unknown. All women who delivered at the Ottawa Hospital in 1997 (pre-guideline) and 2000 (post-guideline) with confirmed GDM were identified. Using population-based administrative databases, we determined the proportion of these women who had an OGTT, serum glucose test, or glycated hemoglobin (GHb) test in the first postpartum year. Women who had not undergone any blood work were excluded.

RESULTS— There were 131 women in 1997 and 123 women in 2000 with confirmed GDM. Of these, only 69 women in 1997 and 52 women in 2000 had blood work recorded in the database. None of these women had an OGTT performed in either period. We found a significant increase in the measurement of serum glucose (50 women pre-guideline [72.1%], 48 women post-guideline [92.3%], $P < 0.05$) and GHb (8 women pre-guideline [11.6%], 20 women post-guideline [38.5%], $P < 0.01$).

CONCLUSIONS— In our region, physicians are not following the CDA recommendations to screen women with GDM postpartum with an OGTT. However, we did find a significant increase in the measurement of serum glucose and GHb. Publication of expert opinion–based guidelines did not change the postpartum use of an OGTT in these women but may have increased the use of less reliable screening tests for type 2 diabetes.

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Of the general adult population, 3–5% has unrecognized type 2 diabetes (1,2). Screening high-risk populations for type 2 diabetes may avoid

future complications by facilitating lifestyle changes and earlier treatment (1,3–7). Gestational diabetes mellitus (GDM), the onset or recognition of carbohydrate

intolerance in pregnancy (1,2,8), is a risk factor for type 2 diabetes and impaired glucose tolerance (IGT). Up to 25% of women with GDM will develop type 2 diabetes within 10 years (1,9). In 1998, the Canadian Diabetes Association (CDA) recommended that women with GDM undergo a 75-g 2-h oral glucose tolerance test (OGTT) 6 weeks to 6 months postpartum (1,10). These guidelines were widely distributed through publication in the *Canadian Medical Association Journal* and continuing medical education (CME) events.

The CDA guideline was based on expert opinion alone because there were no randomized controlled trials or epidemiologic studies to support that early detection of IGT prevented type 2 diabetes. There were also no clear guidelines on how to manage patients with IGT, other than informing the patient of her heightened risk of developing type 2 diabetes and encouraging lifestyle changes. Finally, the CDA recommended that a fasting glucose, instead of an OGTT, be used to screen other high-risk patients for type 2 diabetes (1). For these reasons, physicians might not use an OGTT to screen for type 2 diabetes in women with previous GDM.

In this study, we determined whether women with GDM were screened for type 2 diabetes in the postpartum period. We compared such women in 1997 (pre-guideline) and 2000 (>1 year post-guideline) to determine whether publication of CDA guidelines changed screening rates and methods.

RESEARCH DESIGN AND METHODS

We identified all women who delivered at the Ottawa Hospital in 1997 (pre-guideline) and 2000 (post-guideline) and had an *International Classification of Diseases, Ninth Revision* (ICD-9) code for GDM in the discharge abstract database. The Ottawa Hospital is a 1,000-bed university-associated teach-

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Abbreviations: CDA, Canadian Diabetes Association; GDM, gestational diabetes mellitus; GHb, glycated hemoglobin; ICD-9, *International Classification of Diseases, Ninth Revision*; IGT, impaired glucose tolerance; OGTT, oral glucose tolerance test; OHIP, Ontario Health Insurance Plan; PSD, Physician's Services Database.

A table elsewhere in this issue shows conventional and Système International (SI) units and conversion factors for many substances.

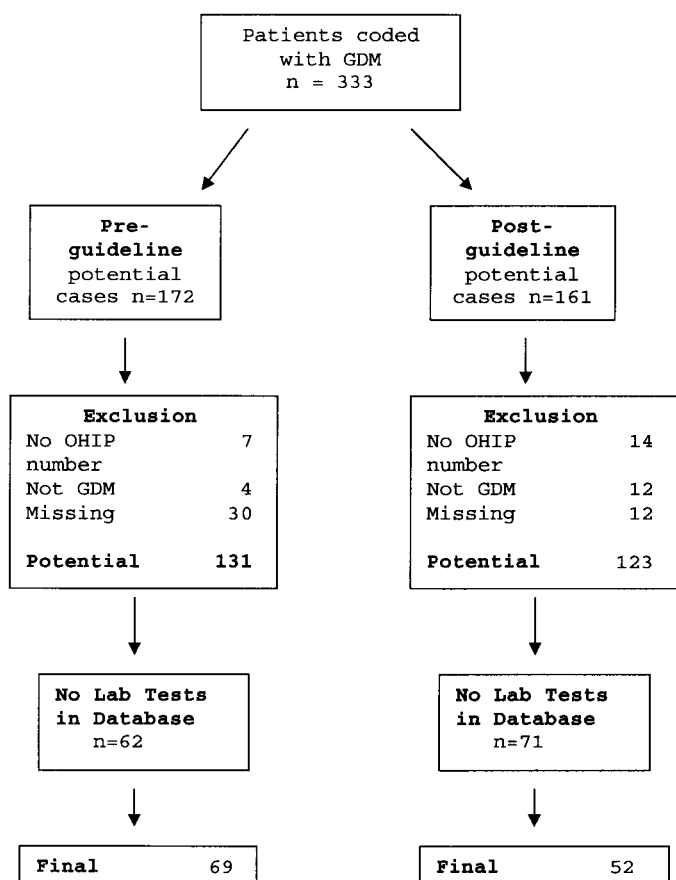


Figure 1—Flow diagram of the progress through selection of cases.

ing hospital with ~7,500 deliveries per year.

To determine the validity of these codes, we randomly selected 50 cases of GDM. For control subjects, we identified the next woman who delivered at the same hospital campus. The records of case and control subjects were reviewed to determine whether GDM was present. This required test results or a treating physician

citation that the patient met laboratory criteria for GDM (1,11). The diagnosis of GDM was confirmed in 79.1% of the charts with an ICD-9 code for GDM and in none of the control charts.

Women were excluded from the study if they did not meet the above criteria for GDM or did not have a valid Ontario Health Insurance Plan (OHIP) number (required for linking to adminis-

trative databases to evaluate whether blood tests were performed).

Maternal characteristics associated with increased risk for type 2 diabetes and neonatal outcomes were abstracted from the chart. We recorded the name of the family physician and whether he or she was sent a consultation letter or discharge summary citing the diagnosis of GDM.

The OHIP number of each patient was encrypted to permit linkage with the Physician's Services Database (PSD). This is a population-based database that includes all residents of Ontario and captures all blood work performed in non-hospital-based laboratories. Each claim in the PSD records the test, the patient, and the date. There are distinct codes in the PSD for OGTT, glycated hemoglobin (GHb), and serum glucose. Random and fasting glucose tests have the same code.

We linked our study patients with the PSD to determine who had a claim for any of these three tests between 2 and 52 weeks after delivery. Hospital-based tests are not recorded in the PSD. Therefore, women who had no commonly performed laboratory tests (including Hb, platelet count, thyrotropin, or creatinine) or any of the screening tests recorded in the PSD were excluded because they might have had their testing done at hospital-based laboratories.

Descriptive statistics for each test in each cohort were calculated. Differences between the 1997 and 2000 cohort were calculated using the McNemar χ^2 test. SAS 8.1 for UNIX was used for all calculations. The study was approved by the Research Ethics Board of the Ottawa Hospital.

RESULTS— In 1997 and 2000, 333 women delivered and had a diagnosis of GDM registered in their discharge abstract record. Women were excluded for the following reasons: missing chart ($n = 42$), no valid OHIP number ($n = 21$), and diagnosis of GDM not confirmed ($n = 16$). This left 131 and 123 potential cases from 1997 and 2000, respectively (Fig. 1). Excluding patients who had no blood tests recorded in the PSD left a final sample of 69 cases from 1997 and 52 cases from 2000.

Women from both groups were similar except that patients in the 2000 cohort were more likely to have a consult letter or discharge summary citing the di-

Table 1—Baseline characteristics of the patients

	1997 (pre-guideline)	2000 (post-guideline)
<i>n</i>	69	52
Age (years)	32.6 ± 4.7	32.4 ± 5.0
BMI (kg/m ²)	28.2 ± 7.6	30.2 ± 8.2
Gestational age of baby (weeks)	38.6 ± 2.2	38.4 ± 2.0
Weight of baby (g)	3,372 ± 675	3,437 ± 768
GDM treated with insulin	21 (30.4)	20 (38.5)
Previous history of GDM	11 (15.9)	11 (21.1)
Family history of type 2 diabetes	34 (49.2)	16 (30.7)
Family physician received consultation letter*	21 (30.4)	32 (61.5)

Data are means ± SD or *n* (%). **P* = 0.04.

Table 2—Type 2 diabetes screening rates

Test	1997 (pre-guideline) (n = 69)	2000 (post-guideline) (n = 52)	P
75-g 2-h OGTT	0 (0.0%)	0 (0.0%)	—
GHb	8 (11.6%)	20 (38.5%)	<0.01
Serum glucose	50 (72.5%)	48 (92.3%)	<0.05

agnosis of GDM sent to their family physician (Table 1).

Table 2 summarizes postpartum screening rates for type 2 diabetes before and after publication of the guideline. No women in either 1997 or 2000 were screened postpartum for type 2 diabetes using an OGTT. A total of 50 women (72.5%) had a serum glucose measured in 1997 compared with 48 women (92.3%) in 2000 (difference between two proportions was 20%, 95% CI 7–33%, $P < 0.05$). In 1997, 8 women (11.6%) had GHb measured compared with 20 women (38.5%) in 2000 (difference between two proportions was 27%, 95% CI 12–42%, $P < 0.01$).

CONCLUSIONS— We compared the screening patterns for type 2 diabetes in patients with a history of GDM in 1997 (pre-guideline) and 2000 (post-guideline) at our hospital to determine whether the recommended screening strategy of the CDA had been implemented. None of the women were screened with an OGTT either before or after the publication of the guidelines. However, patients were more likely to be screened for type 2 diabetes after the guidelines using a glucose or GHb level.

Our finding of increased utilization in these patients, presumably to screen for diabetes, is concerning. GHb is not recommended as a screening or diagnostic test by either the CDA or the American Diabetes Association for type 2 diabetes for several reasons (1,2): it is more costly relative to serum glucose (12), test performance is not standardized between laboratories, and a normal GHb does not exclude the diagnosis of diabetes because the test is relatively insensitive. In our study, we were unable to differentiate if the GHb was for screening purposes or was in response to an abnormal blood glucose value.

Most women before the guideline had a serum glucose test in the first postpartum year. This occurrence increased after

the guideline was published. In contrast to the recommendations for postpartum women with previous GDM, the CDA guidelines recommend a fasting plasma glucose to screen for type 2 diabetes in high-risk people (1). The ambiguity in the guideline recommendations may have contributed to the increased use of plasma glucose testing in this population instead of the adoption of the 2-h OGTT as the screening test in our population. However, the OGTT has a number of advantages over the serum glucose, including increased sensitivity and identification of IGT (13,14). Such patients can benefit from exercise and lifestyle modifications as well as metformin treatment (3,15,16).

Cabana et al. (17) have identified barriers to physician adherence of guidelines, which may account for why the OGTT is not being implemented according to the current clinical practice guidelines. These include physician-related barriers such as a lack of guideline awareness, lack of familiarity with the guideline, disagreement with the guideline, or inability to judge or trust the quality of the guideline development process and the quality of the recommendations. Davis and Taylor-Vaisey, in a systematic review, “Translating Guidelines Into Practice” (18), identified five attributes specific to the guideline that affect adoption: relative advantage, compatibility, complexity, “trialability,” and “observability” (18). The discrepancy between what is recommended for other high-risk groups (fasting glucose) and women with GDM (OGTT) contributes to the lack of adoption of this guideline. As well, an OGTT might be an onerous task for the new mother with a young infant. For example, Conway and Langer (19) found that only 17.6% of women with GDM completed the 2-h 75-g OGTT ($n = 179$) in their study to evaluate the impact of the new American Diabetes Association diagnostic criteria on the postpartum prevalence of type 2 diabetes and IGT. This response

occurred despite test requisitions being given to the women after delivery and again at the 6-week postpartum visit. Identifying who is responsible for postpartum screening may need to be clearly determined between the care providers for the pregnancy and the family physician (20).

There are limitations to our study. Our sample size was relatively small. Because the proportion of patients who were screened with an OGTT was identical for the pre- and post-guideline groups, we believe that it is highly unlikely that our study’s findings are a function of a type 2 error (21). Our relatively small sample size was partially due to our efforts to confirm the diagnosis of GDM in our patient population. Our study sample also included all cases of GDM seen at our institution during the two time periods, because the specificity of the diagnostic code in our re-abstraction study was 100%, thus avoiding selection bias (22). We could only identify those patients whose tests were completed at laboratories outside of a hospital. Therefore, any tests completed in the hospital laboratory postpartum would not have been picked up by our data collection strategy, thereby potentially representing missed screening tests. However, in general, postpartum care in our region is provided by family physicians and obstetricians whose offices and associated laboratories are located in the community sector and should therefore be identified by our coding strategy. As well, a previous analysis of the PSD for the year 2000 shows that 84.1% of all GHb tests in Eastern Ontario are done in non-hospital-based laboratories (C. van Walraven, personal communication).

Although there were little data to initially support these recommendations, more recent studies support the utility of identifying patients with IGT (3,15,16). The CDA guideline for screening patients with previous GDM with a 2-h OGTT would be facilitated if the ambiguity in the screening recommendation for various populations was removed. For example, screen all patients with a 2-h OGTT or use a two-step screening strategy, referring patients with impaired fasting glucose on the screening fasting plasma glucose test to continue on to have a 2-h OGTT. Further strategies aimed at increasing physician awareness of the importance of early identification of patients with IGT, man-

agement of this population, and appropriate screening are required.

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