Screening for Gestational Diabetes Mellitus: Are the Criteria Proposed by the International Association of the Diabetes and Pregnancy Study Groups Cost-Effective?

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OBJECTIVE—The International Association of the Diabetes and Pregnancy Study Groups (IADPSG) recently recommended new criteria for diagnosing gestational diabetes mellitus (GDM). This study was undertaken to determine whether adopting the IADPSG criteria would be cost-effective, compared with the current standard of care.

RESEARCH DESIGN AND METHODS—We developed a decision analysis model comparing the cost-utility of three strategies to identify GDM: *1*) no screening, 2) current screening practice (1-h 50-g glucose challenge test between 24 and 28 weeks followed by 3-h 100-g glucose tolerance test when indicated), or 3) screening practice proposed by the IADPSG. Assumptions included that *1*) women diagnosed with GDM received additional prenatal monitoring, mitigating the risks of preeclampsia, shoulder dystocia, and birth injury; and 2) GDM women had opportunity for intensive postdelivery counseling and behavior modification to reduce future diabetes risks. The primary outcome measure was the incremental cost-effectiveness ratio (ICER).

RESULTS—Our model demonstrates that the IADPSG recommendations are cost-effective only when postdelivery care reduces diabetes incidence. For every 100,000 women screened, 6,178 quality-adjusted life-years (QALYs) are gained, at a cost of $125,633,826. The ICER for the IADPSG strategy compared with the current standard was $20,336 per QALY gained. When postdelivery care was not accomplished, the IADPSG strategy was no longer cost-effective. These results were robust in sensitivity analyses.

CONCLUSIONS—The IADPSG recommendation for glucose screening in pregnancy is cost-effective. The model is most sensitive to the likelihood of preventing future diabetes in patients identified with GDM using postdelivery counseling and intervention.

G estational diabetes mellitus (GDM) affects 2–5% of pregnant women in the U.S., a prevalence that is increasing rapidly in the face of an obesity epidemic (1). These pregnancies are at risk for a host of obstetric complications including preeclampsia, preterm labor, cesarean delivery, neonatal hyperbilirubinemia, shoulder dystocia, and birth injury (2–5). Recent studies have demonstrated that screening for and managing GDM mitigates many of these pregnancy complications and improves perinatal outcomes (6–9).

The current screening criteria for GDM were initially chosen to identify patients at risk for developing diabetes after pregnancy and therefore identify a population that has a subsequent 50% risk (1). However, the current application of screening during pregnancy is principally used to identify pregnant women at risk for adverse perinatal outcomes. Some groups have demonstrated that current screening protocols fail to identify many at-risk pregnancies (2,3).

The Hyperglycemia and Adverse Pregnancy Outcome (HAPO) group sought to identify new screening values that would better identify pregnancies at risk for perinatal complications. The HAPO study demonstrated a positive linear relationship between screening glucose values and adverse perinatal outcomes. Moreover, the study authors found that perinatal risks began to increase in women with glucose values previously considered "normal" (2). Similar findings have been demonstrated by others (3,7). As a result, the International Association of the Diabetes and Pregnancy Study Groups (IADPSG) has recommended a new screening strategy for GDM incorporating the data provided by the HAPO study and others. However, such a modification of screening criteria remains controversial because there is no randomized controlled trial to support the change and the predicted prevalence of an "abnormal test" would increase from 2–5% in the U.S. to beyond 16% (1,10). As such, there is significant discordance in the adoption of the IADPSG recommendation between the American Diabetes Association, which has embraced these recommendations, and the American College of Obstetricians and Gynecologists, which has not.

The hesitation in accepting the IADPSG guidelines in the U.S. may be because of the size of the cohort that would now be labeled as "at-risk" for future diabetes. Health care costs would initially increase because these at-risk

See accompanying brief report, p. 526, and commentary, p. 461.

patients will require additional counseling on behavior modification and frequent screening for progression to diabetes. However, by identifying these patients, there may also be long-term cost savings. Multiple studies, including several from the Diabetes Prevention Program Research Group, demonstrate that intense life-style modification can reduce the incidence of future diabetes by as much as 50% in women previously diagnosed with GDM (11).

Given the many changes that adopting a new strategy for GDM screening may have on our health care system, it is critical to assess the costs and effects of the approach, especially given the magnitude of an endeavor that would impact over 4 million pregnant women and result in over 500,000 additional diagnoses of GDM annually in the U.S. alone. To explore this problem, we developed a cost-utility model with three glucose screening strategies in pregnancy: 1) no screening, 2) current screening practice (screening 1-h 50-g glucose challenge test [GCT] between 24 and 28 weeks followed by a 3-h 100-g glucose tolerance test [GTT] when indicated), or 3) screening practice proposed by the IADPSG (first prenatal visit fasting glucose, followed by a 2-h 75-g GTT between 24 and 28 weeks when indicated). We chose to include a no-screening strategy because universal GDM screening has never been endorsed by U.S. Preventative Services Task Force. Additionally, we wanted to simultaneously compare both screening options to no screening to determine when no screening may be cost-effective.

RESEARCH DESIGN AND METHODS

—We developed a decision tree model that compared the expected costs and health outcomes of three possible screening strategies for GDM in pregnant women without a prior diagnosis of diabetes using TreeAge Pro 2011 (TreeAge Software, Williamstown, MA). These three strategies are outlined in Fig. 1. In the first strategy, we assumed that all screening for GDM was deferred. In the second strategy, a common standard of current care, women universally received a 50-g 1-h GCT between 24 and 28 weeks. Women who failed the initial screening GCT received a diagnostic 3-h 100-g GTT. Women with at least two elevated values based upon the Carpenter and Coustan diagnostic criteria were classified as having GDM (cGDM) (1). GDM women received interventions including nutritional counseling, instruction and supplies for home glucose monitoring, antenatal surveillance (including fetal ultrasound in the third trimester and nonstress testing), as well as insulin therapy when needed. After pregnancy, GDM women received postpartum screening for diabetes as well as intensive exercise and nutrition counseling. If they were found to not have diabetes at their initial postpartum screening, their glycemic status was evaluated every 3 years. In strategy 3, proposed by the IADPSG, clinicians obtained a fasting plasma glucose value at the first prenatal visit; if this value was greater than or equal to 92 mg/dL, women were diagnosed with GDM (iGDM). If the value was less than 92 mg/dL, pregnant women underwent a follow-up 75-g 2-h

GTT between 24 and 28 weeks. In this strategy, only one elevated glucose value (fasting ≥92 mg/dL, 1 h ≥180 mg/dL, or 2 h ≥153 mg/dL) was required to make a GDM diagnosis. We assumed that all women identified as having GDM received similar interventions as strategy 2.

The base-case estimates were chosen from data in the published literature. To obtain these estimations, a bibliographic survey in PUBMED was performed using the following search terms: gestational diabetes, pregestational diabetes, pregnancy complications, preeclampsia, preterm birth, shoulder dystocia, cesarean section, diabetes reduction, cost, utility, and combinations of these terms. Point estimates were determined from meta-analyses, randomized controlled trials, and prospective cohorts when possible. Retrospective cohorts, expert opinions, or internal data from our institution were used when no other sources of information were available. The probability estimates and references used in support of our model are reported in Table 1. Because much of the data were garnered from randomized controlled trials, patient compliance was incorporated in the source data.

We stratified the risk of pregnancy complications by the severity of glucose intolerance. Although all women diagnosed for the first time during pregnancy are classified as having GDM, women may have overt diabetes, cGDM, or iGDM. We estimated in our analyzed cohort that 1.6% had overt diabetes (preexisting type 2 diabetes that was not diagnosed prior to pregnancy), 3.8% had
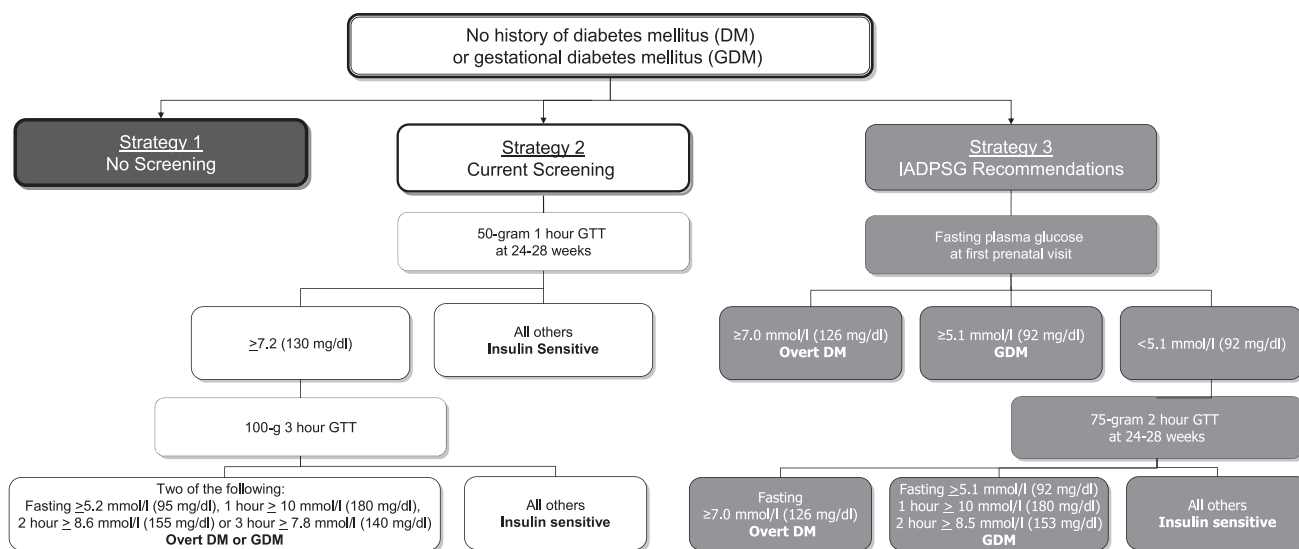

Figure 1—*Gestational diabetes screening strategies.*

Table 1—*Probability and utility estimates*

	Base case	Range	Reference
Probability of			
Diabetes diagnosed in pregnancy	1.6	1.2–1.9	(2,12)
cGDM	3.8	2.5–7	(10)
iGDM*+cGDM	16.2	5.2–17.8	(2)
Risk of preeclampsia			
With euglycemia	4.8	1.4–11.4	(2)
With iGDM	5.8	4.8–12	(2,3)
With cGDM	8.9	4.8–20.4	(5,7)
With diabetes	20.4	8.9–40	(5)
Relative risk reduction of preeclampsia			
with glucose control	0.65	0.44–0.88	(9)
Risk of shoulder dystocia			
With euglycemia	1.3	0.1–3.4	(2)
With iGDM	1.5	1.3–2.5	(2,3)
With cGDM	2.7	1.4–4	(6,7)
With diabetes	5	2.5–10	(15)
Relative risk reduction of shoulder			
dystocia with glucose control	0.4	0.21–0.75	(6)
Risk of permanent brachial plexus			
injury if shoulder dystocia	6.7	3.4–10.1	(31)
Risk of death if shoulder dystocia	0.1	0.05–0.15	(32)
Risk of preterm birth			
With euglycemia	6.9	3.9–12.7	(2)
With iGDM	7.2	6.9–12.7	(2)
With cGDM	11.6	6.9–19.2	(5,7)
With diabetes	26	19.2–38	(5,13)
Relative risk reduction of preterm			
birth with glucose control	1	0.53–1.23	(7)
Risk of cesarean delivery			
With euglycemia	17.5	12.8–30	(2,33)
With iGDM	23.7	20–40	(2,6)
With cGDM	32	31.5–33.8	(6)
With diabetes	60.2	38–71	(5,14,15)
Relative risk reduction of cesarean			
with glucose control	1	0.72–1.02	(6)
Risk of stillbirth			
With euglycemia	0.62	0–1	(17)
With iGDM	0.62	0.05–1.9	Assumed
With cGDM	0.62	0.05–1.9	(15)
With diabetes	1.9	1.4–2.5	(14)
Relative risk of cesarean with stillbirth	0	0–0.2	Assumed
Risk of NICU admission			
With euglycemia	8	3–28.8	(2)
With iGDM	8	7.5–8.4	(2)
With cGDM	10	8–61	(6)
With diabetes	35.2	15.2–83.7	(14)
Relative risk reduction of NICU			
admission with glucose control	1	0.5–1.06	(6)
1-h GTT sensitivity	0.90	0.73–1	(1)
1-h GTT specificity	0.87	0.76–1	(1)
Probability of GDM being diagnosed			
by fasting blood glucose	0.017	0–0.025	(34)
Utilities of			
Neonatal death	0		(18)
Permanent brachial plexus injury	0.87		(24)
Preterm birth	0.96		(23)

cGDM, and 16.2% had GDM based on the IADPSG criteria (cGDM+iGDM) (2,10,12). We also assumed that the 1-h GTT was imperfect with a sensitivity of 90% (1).

Pregnancies diagnosed with GDM are at a higher risk for complications including preeclampsia, preterm birth, cesarean section, and shoulder dystocia (2,3,5–7,13–15). The odds ratios from the HAPO study group were used to estimate the complication rates for the iGDM population because no other prospective studies are available. Preeclampsia and shoulder dystocia rates directly correlate with rising screening glucose values. We estimated the frequency of preeclampsia at 20.4, 8.9, 5.8, and 4.8% for diabetes, cGDM, iGDM, and euglycemic women, respectively (2,3,5,7). We estimated the frequency of shoulder dystocia at 5, 2.7, 1.5, and 1.3%, respectively (2,3,6,7,15). We assumed no risk of shoulder dystocia in women who delivered preterm. Similar to preeclampsia and shoulder dystocia, the risk of cesarean delivery and preterm birth is assumed to increase with glucose values. The risk of cesarean delivery was further increased if the delivery was preterm because preterm birth is an independent risk factor for cesarean delivery (16). Stillbirth is known to be more prevalent in pregnancies complicated by diabetes, but the literature is mixed regarding GDM. Thus only pregnancies with overt diabetes were assumed to have an increased risk of stillbirth compared with euglycemic patients (1.9% compared with 0.62%) (14,17). We assumed all pregnancies complicated by stillbirth delivered vaginally in the base case.

On the basis of several studies, we assumed that identifying and managing women with GDM improved perinatal outcomes. Specifically, we assumed a reduced incidence of both preeclampsia (35% reduction) (9) and shoulder dystocia (60% reduction) (6). Given a fixed risk of birth injury after shoulder dystocia, subsequent temporary and permanent birth injury would be reduced by GDM management (6). Because randomized trials have produced discordant results, we assumed that the rates of cesarean delivery, preterm birth, and stillbirth were unchanged by GDM or overt diabetes intervention in our base case. However, in our sensitivity analyses, we explored a reduction in cesarean delivery rate and preterm birth rate by using the confidence intervals calculated in prior studies to identify any impact upon our results.

Table 1—Continued

	Base case	Range	Reference
Maternal diabetes	0.65		(19,20)
Neonatal or maternal health	1		(18)
Progression to diabetes in 15 years			
With iGDM	0.257	0.05–0.4	(11)
With cGDM	0.384	0.2–0.5	(1,11)
Reduction in progression to			
diabetes with intervention	0.34	0–0.5	(11,21)
Life expectancy (years)			
Healthy	78	76–79	(20,25)
With untreated diabetes	69	62–73	(20,26)
With treated diabetes	70	63–74	(20,26)

Data are percent unless otherwise indicated. NICU, neonatal intensive care. *Population diagnosed with GDM by IADPSG criteria but not by the current screening strategy.

Separate utilities were assigned to each pregnant woman and her offspring. Utilities are a means to evaluate the relative quality of life as compared with health unfettered by disease (18). The utility for each health state was then multiplied by the time spent in that state to obtain the quality-adjusted life-years (QALYs) for both mothers and their offspring. These QALYs were summed as has been done in other maternal/fetal cost-utility studies (19,20).

For the mothers, normal health and asymptomatic diabetes were assigned the same utility (utility 1.0) (18). Once diabetes was symptomatic, the utility was decreased (utility 0.65) (21). This utility was compared with the utilities typically sited for complications associated with diabetes and was felt to be an appropriate composite (i.e., 0.14 for end-stage renal disease requiring dialysis, 0.19 for amputation, 0.59 for chronic renal disease, 0.68 for mild vision impairment, 0.7 for myocardial infarction, and 0.82 for hypertension) (18). Death was given a utility of 0.0 (18).

In order to determine QALYs, we calculated the average time that women would be in each health state. Assuming no intervention, women with cGDM have a 38.4% likelihood of progressing to overt diabetes within 15 years. Similarly, women with iGDM have a 25.7% likelihood of progressing to overt diabetes within 15 years (1,11). In the base-case model, we assumed that women with normal glucose in pregnancy did not develop diabetes later in life. Once women were diagnosed with diabetes, they maintained a healthy utility for an average of 10.5 years, at which point they progressed to clinically symptomatic disease (22). Thus women who developed diabetes following a diagnosis of GDM had 25.5 years with a health utility of 1.0 before transitioning to symptomatic diabetes with a health utility of 0.65.

The Diabetes Prevention Program found that intensive lifestyle modification in high-risk individuals reduced the incidence of diabetes by 34% over 10 years (23). This reduction could be as high as 53% in individuals with GDM (11). Intervention included one-to-one counseling for 16 weeks followed by monthly sessions with a case manager. The curriculum included diet, exercise, and behavior modification with a goal of a 7% weight loss (23). In our model, we assumed that diagnosing cGDM and iGDM in pregnancy could reduce the likelihood of developing diabetes by the more conservative diabetes risk reduction of 34%. Published cost data from this same study protocol was used assuming 10 years of follow-up (24).

Offspring utilities were determined from the literature and include four health states: normal health (utility = 1), preterm birth (utility = 0.96), permanent brachial plexus injury (utility = 0.87), and death (utility = 0) (18,19). These utilities did not change during the offspring's lifetime. Because no utility for permanent brachial plexus injury was found in the literature, we used an equivalent health state of mild cerebral palsy. Mild cerebral palsy is described as "limited use of his/her right arm and hand….He/she would be able to use the right arm to hold some things, like holding a paper still while he/she writes on it. But he/she would have to do most things with his/her left hand." Otherwise, this individual is of normal intelligence and function (25).

We assumed life expectancy to be 78 years for the healthy mothers and all surviving offspring. With regard to the offspring, we assumed that brachial plexus injury and preterm birth after surviving the

neonatal period would not reduce life expectancy. Life expectancy was shortened by 8 years in treated symptomatic diabetic patients and 9 years in untreated diabetic patients (20,22,26).

Cost data were derived from published literature or internal data and are listed in Table 2. There were no screening costs in strategy 1. In strategy 2, screening costs included a 1-h GCT and a 3-h GTT in the proportion of women that failed the GCT. In strategy 3, screening costs include a fasting blood glucose and if normal, a 2-h GTT. In strategies 2 and 3, GDM women received additional prenatal care including home glucose monitoring, insulin as indicated, and additional fetal monitoring, such as ultrasounds. We assumed that prenatal care costs for overt diabetes patients were higher than GDM patients because diabetes patients are more likely to require insulin. The costs of pregnancy complications (preterm labor admissions, preeclampsia, shoulder dystocia, brachial plexus injury, and intensive care admissions) were included in the model.

All costs are presented in 2011 U.S. dollars and are adjusted based on the use of the medical care component of the Consumer Price Index. Costs and utilities are discounted at a baseline rate of 3% based on average inflation, although the range was varied from 1–5% in the sensitivity analysis. All analyses were from a health care perspective.

For a cohort of 100,000 women, we calculated the cost of care for each strategy. The primary outcome of the study was cost-effectiveness measured as the incremental cost-effectiveness ratio (ICER). ICER is the amount we are willing to pay for each unit of improved quality of life. Although some debate exists in the literature, for this study an ICER of $100,000 was considered cost-effective (27). We performed univariate analyses by varying the values of the variables in the model to their plausible extremes. We also performed a Monte Carlo simulation (a computational algorithm that relies on repeated random sampling) with 10,000 trials to assess the robustness of the model. Other outcomes calculated included total cost of each strategy; total QALYs per strategy; and incidence of GDM, shoulder dystocia, and preeclampsia with each strategy.

RESULTS—The results for the base-case model are reported in Table 3. Our model predicts that the screening strategy advocated by the IADPSG (strategy 3) would greatly expand the number of

Table 2—*Cost estimates*

	Base case (2011 $)	Range (2011 $)	Reference
Serum glucose measurement	11	1–110	(28)
1-h GTT	22	11–220	(28)
2-h GTT	35	16–340	(28)
3-h GTT	45	22–450	(28)
Prenatal care			
With euglycemia	307	150–3,010	(29)
With iGDM	1,459	307–2,918	Internal data* (29,30)
With cGDM	1,459	614–2,918	Internal data* (30)
With diabetes	2,020	614–2,918	(30)
Preterm birth	3,060	0–10,000	(23)
Preeclampsia	1,996	998–19,960	(35)
Delivery			
Vaginal delivery	5,765	4,255–6,479	(25)
Cesarean section	8,288	6,871–9,481	(25)
Maternal costs due to shoulder dystocia	0	0–10,000	(31,36)
Neonatal intensive care	2,370	1,185–24,878	(37)
Newborn nursery care	1,221	808–6,048	(38)
Care for permanent brachial plexus injury	18,912	900–200,000	(36)
Intensive intervention to prevent diabetes†	8,636	7,883–9,511	(22)

*Data derived by Yale Medical Group Data using Medicaid reimbursement. †Included one-to-one counseling for 16 weeks followed by monthly sessions with a case manager. The curriculum included diet, exercise, and behavior modification.

women diagnosed with GDM in the U.S. from 5,020 to 17,800 per 100,000 women screened when compared with the current standard (strategy 2). Assuming implementation of the IADPSG screening protocol and therefore classification and intervention provided to more subjects, we would expect to prevent 85 cases of shoulder dystocia and 262 cases of preeclampsia for every 100,000 pregnancies screened. In addition to the perinatal health benefits, we would prevent 688 cases of future diabetes per 100,000 women screened if the IADPSG protocol was adopted over the standard screening. Assuming long-term health intervention with diet and exercise, for every 100,000 pregnancies, we expect the IADPSG proposal to increase costs by $125,633,826 and to increase QALYs by 6,178 when compared with current screening techniques. The ICER would be $20,336, a cost-effective proposition. When compared with a no-screening strategy, both strategy 2 and 3 are cost-effective with ICERs of $16,689 per QALY and $19,339 per QALY gained, respectively.

To further explore the proposed screening strategy, we limited the base case to perinatal outcomes and excluded potential long-term maternal benefits. In these cases, neither the current screening strategy nor the proposed strategy was cost-effective. Both strategies modestly improved perinatal health but at a high cost. For every 100,000 pregnancies screened by the current standard (strategy 2), we would expect to prevent 218 cases of preeclampsia, 56 cases of shoulder dystocia, and 4 cases of permanent brachial plexus injury resulting in 17 QALYs gained at an additional cost of $9,233,018 when compared with no screening. The ICER would be $543,119, making screening not cost-effective. Similarly, when we limited our analysis to perinatal outcomes, the IADPSG proposal is not cost-effective when compared with the current standard of care. For every 100,000 pregnancies, 27 QALYs are gained compared with the current standard of care at an additional cost of $15,265,992. The ICER is $565,407 per QALY gained.

To further evaluate the impact of changing each probability and cost variable, we performed univariate sensitivity analysis. The model was robust over a wide range of inputs. The model was most sensitive to the probability that long-term behavioral intervention in iGDM patients would reduce progression to diabetes.

In the Monte Carlo simulation, all variables were simultaneously allowed to fluctuate across the extreme ranges listed in Tables 1 and 2. With 10,000 simulations, the IADPSG screening strategy was cost-effective in 96.4% of cases. However, this strategy was never found to be cost-saving (save health care costs and generate health benefits simultaneously).

CONCLUSIONS—This study demonstrates that the IADPSG approach to GDM screening and diagnosis is cost-effective compared with the current screening strategy and a no-screening strategy only if a GDM diagnosis provides an opportunity for early and intensive intervention and prevention of future overt diabetes. Although there are potential perinatal benefits associated with the IADPSG guidelines, these benefits alone do not justify the additional cost associated with tripling the number of GDM diagnoses in the U.S.

Interestingly, when we limited the analysis to pregnancy alone, current GDM screening practices were not cost-effective, costing over half a million dollars per QALY gained. We chose to include a no-screening strategy specifically so that we could determine under what circumstance screening at all is cost-ineffective. This finding highlights the need for long-term intervention to curb progression to diabetes if any GDM screening program is to be cost-effective. Prior analyses have found lifestyle modification to be cost-effective in at-risk adults (11,23). The IADPSG guidelines would greatly expand this population. Although this increase will come at some cost because thousands of women will be falsely identified as at-risk, it also provides a unique opportunity to advocate behavior modification to mitigate the effects of the obesity/diabetes epidemic. Furthermore, if fetuses grown in hyperglycemic environments are found to be prone to obesity and cardiovascular disease as is speculated by some, the IADPSG may prevent long-term morbidity in the next generation.

A MEDLINE search using the terms diabetes, gestational, screening, and cost-effective revealed other cost-effectiveness studies, but to our knowledge, our analysis is the first comprehensive decision analysis comparing the newly proposed IADPSG strategy with the current system. Meltzer et al. (28) compared the cost of the 2-h GTT to the 1-h GCT and 3-h GTT but did not include any other expenses associated with a GDM diagnosis or any utilities. To our knowledge, we are also

Table 3—Summary of results (per 100,000 women)

	Strategy 1	Strategy 2	Strategy 3	Difference between strategies 2 and 3
Cases of GDM diagnosed	0	5,020	17,800	12,780
Future diabetes cases prevented with intervention	0	446	1,134	688
Shoulder dystocia	1,051	995	910	85
Cases of preeclampsia	5,292	5,074	4,812	262
Total QALY	5,563,323	5,565,646	5,571,824	6,178
Total cost (2011 $)	831,622,028	870,390,167	996,023,993	125,633,826
Marginal cost/QALY gained*	—	16,689	20,336	—
If diagnosis provides no long-term maternal health benefit				
Total QALY	5,563,323	5,563,340	5,563,367	27
Total cost (2011 $)	831,622,028	840,855,046	856,121,038	15,265,992
Marginal cost/QALY gained*	—	543,119	565,407	—

Strategy 1 is no screening, strategy 2 is current practice, and strategy 3 is IADPSG recommendations. *Strategy 2 is compared with strategy 1, and strategy 3 is compared with strategy 2.

the first to assess the costs and effects associated with GDM over the course of a lifetime. Several other studies have examined the cost-effectiveness of GDM treatment (29,30), but only in pregnancy.

We acknowledge that our model is limited by a lack of randomized controlled trials. No study exists that simultaneously examines both fetal and long-term maternal outcomes, and no study exists that directly compares outcomes using the current screening guidelines to outcomes with the IADPSG guidelines. As there is no primary study evaluating the long-term risk of diabetes in patients identified as having GDM by the IADPSG recommendations or the effect of lifestyle modification on this risk, we extrapolated the lifetime risk of diabetes to iGDM patients from the limited data on the likelihood of developing diabetes in cGDM patients.

As with any model-based analysis, there are significant limitations to this study. We attempted to account for all direct costs associated with the new screening strategy, but we did not account for indirect costs. It is conceivable that some indirect costs would favor no screening. Meltzer et al. (28) demonstrated that the indirect costs to patients screened for GDM with the 1-h GCT were approximately $5 less than patients screened with the 2-h GTT. The study by Meltzer et al. limited indirect costs to the time lost because of the screening test itself, but not time lost as the result of additional prenatal care and pregnancy complications.

Furthermore, we did not account for any disutility associated with the stress of a GDM diagnosis. Although it is conceivable that patients diagnosed with GDM will spend a significant amount of time researching their condition, Crowther et al. (8) found that quality of life was not negatively impacted by a GDM diagnosis.

Despite the aforementioned limitations, we believe this study provides a comprehensive analysis of the intended and unintended direct costs of using fasting blood glucose followed by 2 h GTT to screen for GDM and diabetes in pregnancy. Our study results underscore the limited short-term benefits of screening and treatment, illustrating that neither the current screening practices nor those recommended by the IADPSG are cost-effective intervention strategies unless long-term maternal benefits are achieved. Thus, before adopting aggressive new criteria such as those recommended by the IADPSG, there is a pressing need not only to confirm their effectiveness in improving perinatal outcomes, but also to develop and test postpartum strategies that will ameliorate the longer-term risks and enhance the overall health status of women who show mild and more severe forms of GDM.

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