

Screening for Gestational Diabetes Mellitus: U.S. Preventive Services Task Force Recommendation Statement

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Description: Update of the 2008 U.S. Preventive Services Task Force (USPSTF) recommendation on screening for gestational diabetes mellitus (GDM).

Methods: The USPSTF reviewed the evidence on the accuracy of screening tests for GDM, the benefits and harms of screening before and after 24 weeks of gestation, and the benefits and harms of treatment in the mother and infant.

Population: This recommendation applies to pregnant women who have not been previously diagnosed with type 1 or 2 diabetes mellitus.

Recommendation: The USPSTF recommends screening for GDM in asymptomatic pregnant women after 24 weeks of gestation. (B recommendation)

The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of screening for GDM in asymptomatic pregnant women before 24 weeks of gestation. (I statement)

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The U.S. Preventive Services Task Force (USPSTF) makes recommendations about the effectiveness of specific preventive care services for patients without related signs or symptoms.

It bases its recommendations on the evidence of both the benefits and harms of the service and an assessment of the balance. The USPSTF does not consider the costs of providing a service in this assessment.

The USPSTF recognizes that clinical decisions involve more considerations than evidence alone. Clinicians should understand the evidence but individualize decision making to the specific patient or situation. Similarly, the USPSTF notes that policy and coverage decisions involve considerations in addition to the evidence of clinical benefits and harms.

SUMMARY OF RECOMMENDATIONS AND EVIDENCE

The USPSTF recommends screening for gestational diabetes mellitus (GDM) in asymptomatic pregnant women after 24 weeks of gestation. (B recommendation)

The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of screening for GDM in asymptomatic pregnant women before 24 weeks of gestation. (I statement)

See the **Figure** for a summary of the recommendation and suggestions for clinical practice. **Appendix Table 1** (available at www.annals.org) describes the USPSTF grades, and **Appendix Table 2** (available at www.annals.org) describes the USPSTF classification of levels of certainty about net benefit.

RATIONALE

Importance

Gestational diabetes mellitus is glucose intolerance discovered during pregnancy. The prevalence of GDM in the United States is 1% to 25%, depending on patient demographics and diagnostic thresholds (1). Pregnant women with gestational diabetes are at increased risk for maternal and fetal complications, including preeclampsia, fetal macrosomia (which can cause shoulder dystocia and birth injury), and neonatal hypoglycemia. Women with GDM are also at increased risk for developing type 2 diabetes mellitus; approximately 15% to 60% of women develop type 2 diabetes within 5 to 15 years of delivery (2). Screening for GDM generally occurs after the 24th week of pregnancy. Screening before 24 weeks may identify women with glucose intolerance earlier in pregnancy.

Detection

The USPSTF found adequate evidence that primary care providers can accurately detect GDM in asymptomatic pregnant women after 24 weeks of gestation. The most

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Figure. Screening for gestational diabetes mellitus: clinical summary of U.S. Preventive Services Task Force recommendation.

Annals of Internal Medicine



SCREENING FOR GESTATIONAL DIABETES MELLITUS
CLINICAL SUMMARY OF U.S. PREVENTIVE SERVICES TASK FORCE RECOMMENDATION

Population	Asymptomatic pregnant women after 24 wk of gestation		Asymptomatic pregnant women before 24 wk of gestation
Recommendation	Screen for GDM. Grade: B		No recommendation. Grade: I statement
Risk Assessment	Risk factors that increase a woman's risk for developing GDM include obesity, increased maternal age, history of GDM, family history of diabetes, and belonging to an ethnic group with increased risk for type 2 diabetes mellitus (Hispanic, Native American, South or East Asian, African American, or Pacific Islands descent).		
Screening Tests	The most commonly used screening test in the United States is the 50-g oral glucose challenge test, administered between 24 and 28 wk of gestation in a nonfasting state. If the screening threshold is met or exceeded (7.22 mmol/L [130 mg/dL], 7.50 mmol/L [135 mg/dL], or 7.77 mmol/L [140 mg/dL]), patients receive the oral glucose tolerance test. A diagnosis of GDM is made when 1 or more glucose levels meet or exceed the specified glucose thresholds. Other methods of screening include fasting plasma glucose screening and screening based on risk factors. However, there is limited evidence about these alternative screening approaches.		
Treatment	Initial treatment includes moderate physical activity, dietary changes, support from diabetes educators and nutritionists, and glucose monitoring. If the patient's glucose levels are not controlled after these initial interventions, she may be prescribed medication (either insulin or oral hypoglycemic agents), have increased surveillance in prenatal care, and have changes in delivery management.		
Balance of Benefits and Harms	There is a moderate net benefit to screening for GDM after 24 wk of gestation to reduce maternal and fetal complications.		The evidence for screening for GDM before 24 wk of gestation is insufficient, and the balance of benefits and harms of screening cannot be determined.
Other Relevant USPSTF Recommendations	The USPSTF has made recommendations on screening for type 2 diabetes mellitus. These recommendations are available at www.uspreventiveservicestaskforce.org .		

For a summary of the evidence systematically reviewed in making this recommendation, the full recommendation statement, and supporting documents, please go to www.uspreventiveservicestaskforce.org.

commonly used screening test in the United States is the 50-g oral glucose challenge test (OGCT).

Other methods of screening include the fasting plasma glucose test and screening based on risk factors. However, there is limited evidence on these alternative screening approaches. The USPSTF found inadequate evidence to compare the effectiveness of different screening tests or thresholds for a positive screen result.

Benefits of Detection and Early Treatment

The USPSTF found adequate evidence that treatment of screen-detected GDM with dietary modifications, glucose monitoring, and insulin (if needed) can significantly reduce the risk for preeclampsia, fetal macrosomia, and shoulder dystocia. When these outcomes are considered collectively, there is a moderate net benefit for the mother and infant. The benefit of treatment on long-term metabolic outcomes in women who are treated for GDM compared with those who are not treated is uncertain.

The USPSTF found inadequate evidence to determine whether there are benefits to screening for GDM in women before 24 weeks of gestation.

Harms of Detection and Early Treatment

Overall, the USPSTF found adequate evidence that the magnitude of the harms of screening and treatment is small to none. Randomized, controlled trials (RCTs) demonstrated an increase in the number of prenatal visits in screen-detected women who were treated for GDM compared with screen-detected women who were not treated. There was conflicting evidence on the risk for an increase in the induction of labor associated with treatment. No significant differences were reported for cesarean delivery or neonatal intensive care unit admissions between women who were treated and women who were not treated for GDM in the overall pooled meta-analysis. Trials also demonstrated no significant differences in the incidence of small-for-gestational-age infants or episodes of neonatal hypoglycemia, but the trials were not adequately powered to detect meaningful differences in these outcomes.

USPSTF Assessment

The USPSTF concludes with moderate certainty that there is a moderate net benefit to screening for gestational diabetes after 24 weeks of gestation to reduce maternal and

fetal complications (the collective outcomes of preeclampsia, macrosomia, and shoulder dystocia).

The USPSTF concludes that the evidence on screening for gestational diabetes before 24 weeks of gestation is insufficient, and the balance of benefits and harms of screening cannot be determined.

CLINICAL CONSIDERATIONS

Patient Population Under Consideration

These recommendations apply to pregnant women who have not been previously diagnosed with type 1 or 2 diabetes mellitus.

Assessment of Risk

Several factors increase a woman's risk for developing GDM, including obesity, increased maternal age, history of GDM, family history of diabetes, and belonging to an ethnic group that has increased risk of developing type 2 diabetes mellitus (Hispanic, Native American, South or East Asian, African American, or Pacific Island descent).

Factors associated with a lower risk for developing GDM include age younger than 25 to 30 years, white race, a body mass index (BMI) of 25 kg/m² or less, no family history (that is, in a first-degree relative) of diabetes, and no history of glucose intolerance or adverse pregnancy outcomes related to GDM.

Screening

A 2-step approach is commonly used in the United States. The 50-g OGCT is performed between 24 and 28 weeks of gestation in a nonfasting state. If the screening threshold is met or exceeded (130 mg/dL, 135 mg/dL, or 140 mg/dL [7.21, 7.49, or 7.77 mmol/L]), patients receive the oral glucose tolerance test (OGTT). During the OGTT, a fasting glucose level is obtained, followed by administration of a 100-g glucose load, and glucose levels are evaluated after 1, 2, and 3 hours. Alternatively, a 75-g glucose load is administered after fasting glucose and plasma glucose levels are evaluated after 1 and 2 hours (1-step approach). A diagnosis of GDM is made when 2 or more glucose values fall at or above the specified glucose thresholds.

Timing of Screening

Screening is recommended after 24 weeks of gestation. Screening for GDM may occur earlier than 24 weeks of gestation in high-risk women, but there is little evidence about the benefits and harms of screening before 24 weeks of gestation.

Treatment

Initial treatment includes moderate physical activity, dietary changes, support from diabetes educators and nutritionists, and glucose monitoring. If the patient's glucose is not controlled after these initial interventions, she may be prescribed medication (either insulin or oral hypoglycemic agents) or have increased surveillance in prenatal care or changes in delivery management.

Suggestions for Practice Regarding the I Statement

In deciding whether to screen for GDM before 24 weeks of gestation, primary care providers should consider the following.

Potential Preventable Burden

Gestational diabetes affects about 240,000 (7%) of the 4 million annual births in the United States (3). Pregnant women who are diagnosed with GDM before 24 weeks may be at even greater risk for maternal and fetal complications and development of type 2 diabetes and may benefit from early identification and treatment. Women with GDM are at increased risk for developing type 2 diabetes mellitus.

Potential Harms

Potential harms of screening for gestational diabetes include psychological harms and intensive medical interventions (induction of labor, cesarean delivery, or admission to the neonatal intensive care unit). Possible adverse effects of treatment include neonatal or maternal hypoglycemia and maternal stress.

Current Practice

A cross-sectional study reported that universal screening is the most common practice in the United States, with 96% of obstetricians routinely screening for GDM (4). Some women are screened earlier than 24 weeks of gestation because they have risk factors for type 2 diabetes, such as obesity, family history of type 2 diabetes, or fetal macrosomia during a previous pregnancy.

If a pregnant woman presents in the first trimester or in early pregnancy with risk factors for type 2 diabetes, clinicians should use their clinical judgment to determine what is appropriate screening for that individual patient given her health needs and the insufficient evidence.

Other Approaches to Prevention

Most pregnant women should be encouraged to attain moderate gestational weight gain, based on their prepregnancy BMI, and to participate in physical activity based on their clinician's recommendations. The Institute of Medicine has made recommendations for weight gain during pregnancy based on prepregnancy BMI (5).

OTHER CONSIDERATIONS

Research Needs and Gaps

More research is needed to directly evaluate screening for GDM and maternal and infant health outcomes. Research is also needed to help determine the most beneficial glucose thresholds for a positive screen and treatment targets. Continued research is needed to examine alternative screening methods, such as glycosylated hemoglobin (HbA1c) measurement and risk factor-based assessment. Additional studies are needed to evaluate the effect of dif-

ferent treatments for GDM on longer-term metabolic maternal and infant outcomes, such as persistent maternal glucose intolerance after delivery and type 2 diabetes mellitus and obesity in the mother and infant. The use of a consistent strategy for screening for and diagnosing GDM in studies would allow for better comparisons of treatment outcomes across clinical trials.

The increasing prevalence of type 2 diabetes mellitus in women of reproductive age merits consideration of preconception screening for overt diabetes in women who are at risk for type 2 diabetes. Additional studies are needed to determine whether identifying and treating glucose intolerance before 24 weeks of gestation reduces maternal and fetal complications at delivery or leads to improved long-term health outcomes. For example, a follow-up to the Mild GDM Trial is examining whether different types of interventions in pregnant women with mild GDM decreases the risk for obesity in their children (6).

DISCUSSION

Burden of Disease

The prevalence of GDM in the United States is about 6% to 7%, affecting approximately 240,000 of 4 million annual births (3). However, the prevalence of GDM depends on the diagnostic criteria used and the population screened and ranges in studies from 1.1% to 25.5% (1). Gestational diabetes generally resolves postpartum; however, women who have GDM are at increased risk for developing overt type 2 diabetes mellitus. In fact, 15% to 60% of women with GDM develop type 2 diabetes mellitus within 5 to 15 years postpartum (2). Screening for gestational diabetes may have important implications in the prevention of overt type 2 diabetes.

Scope of Review

In 2008, the USPSTF concluded that there was insufficient evidence to assess the balance of benefits and harms of screening for GDM before or after 24 weeks of gestation (7). To update the 2008 recommendation, the USPSTF commissioned a systematic review of the evidence on the accuracy of screening tests, the benefits and harms of screening before and after 24 weeks of gestation, and the benefits and harms of treatment for the mother and infant. Pregestational diabetes (undiagnosed type 2 diabetes mellitus) is not the focus of this recommendation.

ACCURACY OF SCREENING

Fifty-one studies of fair to good quality assessed the accuracy and yield of various screening tests, including the 50-g OGCT, fasting plasma glucose test, HbA1c test, and screening based on risk factors, after 24 weeks of gestation. The reference standard varied and included criteria from Carpenter and Coustan, the American Diabetes Association (2000–2010), the National Diabetes Data Group, and the World Health Organization (WHO) (5). The

studies were from a range of populations and settings, and the prevalence of GDM varied from 1.4% to 50%. The lack of an established gold standard for the diagnosis of GDM limits the USPSTF's ability to compare results of studies that used different diagnostic criteria. Data on screening and diagnostic tests for GDM before 24 weeks of gestation were limited (1).

Nine studies provided data to estimate sensitivity and specificity of OGCT using a cut-point of 140 mg/dL (7.77 mmol/L) or greater. Gestational diabetes was confirmed by a 100-g 3-hour OGTT using Carpenter and Coustan criteria. The joint estimates of sensitivity and specificity were 85% and 86%, respectively. Six studies reported results for a 50-g OGCT using a cut-point of 130 mg/dL (7.21 mmol/L) or greater. Gestational diabetes was confirmed using Carpenter and Coustan criteria. The joint estimates of sensitivity and specificity were 99% and 77%, respectively. A 50-g OGCT with a cut-point of 130 mg/dL (7.21 mmol/L) had higher sensitivity compared with a cut-point of 140 mg/dL (7.77 mmol/L); however, specificity was lower (1, 8).

Seven studies assessed the fasting plasma glucose test; GDM was confirmed using Carpenter and Coustan criteria. Four fasting plasma glucose thresholds were compared; sensitivity was 87% and specificity was 52% for 85 mg/dL (4.72 mmol/L) or greater, 77% and 76% for 90 mg/dL (5.00 mmol/L) or greater, 76% and 92% for 92 mg/dL (5.11 mmol/L) or greater, and 54% and 93% for 95 mg/dL (5.27 mmol/L) or greater. Although both the OGCT and the fasting plasma glucose (85 mg/dL [4.72 mmol/L]) test can rule out women who do not have GDM by 24 weeks of gestation, the OGCT is better at identifying women who have an abnormal response to larger glucose loads (1).

Limited evidence demonstrated that the HbA1c test has poorer test characteristics than the OGCT. A study in the United Arab Emirates using an A1c value of 5.5% or greater had a specificity of 21% and a sensitivity of 82% (using Carpenter and Coustan criteria). A Turkish study reported that an A1c cut-point of 7.2% or greater had 64% sensitivity and specificity (using Carpenter and Coustan criteria). However, a highly elevated A1c level supports a possible diagnosis of overt diabetes in pregnancy (1, 8).

Data on screening based on risk factors were limited. Studies that examined risk factors for screening used different diagnostic criteria and could not be pooled due to heterogeneity; sensitivity and specificity varied widely (1, 8).

Effectiveness of Early Detection and Treatment

No RCTs addressed the direct benefits or harms of screening for GDM. Five fair- to good-quality RCTs and 6 retrospective cohort studies evaluated the benefits and harms of treatment compared with usual care of mild, screen-detected GDM identified at or after 24 weeks of gestation. The studies used a variety of glucose inclusion

criteria and assessed short- and long-term outcomes in the mother and infant. All studies compared usual care with diet modification, glucose monitoring, and insulin as needed. The 2 largest RCTs, the Mild GDM Trial and the Australian Carbohydrate Intolerance in Pregnancy Study (ACHOIS), used different diagnostic glucose thresholds (Carpenter and Coustan [fasting glucose cut-point of <95 mg/dL (5.27 mmol/L)] and WHO criteria, respectively), but patients' mean fasting glucose levels at study entry were similar (1, 9, 10).

Evidence from 11 studies demonstrated fewer cases of preeclampsia (3 RCTs; $n = 2014$), shoulder dystocia (3 RCTs and 4 cohort studies; $n = 3054$), and macrosomia (5 RCTs; $n = 2643$) in women who were treated for GDM compared with those who were not treated. Outcomes that had inconsistent evidence or did not demonstrate significant differences between groups included maternal weight gain, birth injury, brachial plexus injury and clavicular fracture, hyperbilirubinemia, perinatal death, and respiratory distress syndrome (1).

The overall evidence was strongly influenced by the 2 largest RCTs, the Mild GDM Trial and ACHOIS. The fair-quality Mild GDM Trial included 958 women at 24 to 31 weeks of gestation with mild GDM (based on abnormal results on the OGTT and a fasting plasma glucose level of <95 mg/dL [5.27 mmol/L]) who were randomly assigned to an intervention group that received dietary intervention, glucose self-monitoring, and insulin (if needed) or to a control group of usual care. The good-quality ACHOIS included 1000 women at 24 to 34 weeks of gestation with mild GDM (based on WHO criteria) who were randomly assigned to dietary intervention, glucose self-monitoring, and insulin (if needed) or to a control group of usual care (1, 9, 10).

Maternal Outcomes

Three fair- and good-quality RCTs and 1 good-quality cohort study provided evidence on preeclampsia (9–12). The pooled estimate from the RCTs ($n = 2014$) showed a significant difference favoring the treatment group (risk ratio [RR], 0.62 [95% CI, 0.43 to 0.89]), with little statistical heterogeneity across the trials. The cohort study ($n = 258$) showed no significant difference in preeclampsia (12).

In ACHOIS, anxiety and depression were measured at 6 weeks and 3 months postpartum in a subgroup ($n = 568$) of participants. There was no significant difference between groups in anxiety, but there were significantly lower rates of depression in the treatment group at 3 months postpartum (RR, 0.50 [CI, 0.31 to 0.79]) (1, 10).

No studies provided evidence on long-term maternal outcomes, such as type 2 diabetes mellitus, obesity, and hypertension (1).

Infant Outcomes

The pooled estimate from 3 fair- and good-quality RCTs ($n = 2044$) showed a significant decrease in shoulder dystocia in the treatment group (RR, 0.42 [CI, 0.23 to 0.77]). Four good-quality cohort studies ($n = 3054$) also showed a significant difference favoring the treatment group (RR, 0.38 [CI, 0.19 to 0.78]). There was no statistical heterogeneity across the studies (1). A pooled estimate from 5 fair- and good-quality RCTs showed significantly lower incidence of macrosomia (>4000 g) in infants in the treatment groups (RR, 0.50 [CI, 0.35 to 0.71]; $n = 2643$), with moderate heterogeneity across the studies. Pooled estimates were not assessed for 6 cohort studies ($n = 3426$) because of significant heterogeneity ($I^2 = 86\%$) (1, 13).

One small RCT ($n = 89$) followed a subset of children for 7 to 11 years and found no differences for impaired glucose tolerance, type 2 diabetes mellitus, or BMI greater than the 95th percentile between the offspring of the treatment and control groups. Another RCT ($n = 199$) assessed BMI greater than the 85th percentile in children followed for 4 to 5 years and also did not show a difference between offspring of the treatment and control groups. Pooled results from 2 RCTs ($n = 284$) showed no difference in BMI greater than the 85th percentile (1, 13).

Harms of Screening and Treatment

Maternal Outcomes

One RCT (ACHOIS) assessed anxiety and depression in a subgroup of study participants after study enrollment. As previously discussed, rates of depression at 3 months postpartum were significantly lower in women who were treated for GDM than in those who were not treated for GDM. These results should be interpreted with caution because the assessment of depression and anxiety was conducted in a subgroup of the larger RCT (1, 10).

Two RCTs reported an increase in the number of prenatal visits in screen-detected women who were treated for GDM compared with those who were not treated. The Mild GDM Trial reported 7 prenatal visits in the treatment group versus 5 in the control group ($P < 0.001$). ACHOIS reported more clinic visits (with a physician, dietitian, or diabetes educator) but fewer antenatal visits in the treatment group compared with the control group (1, 9, 10).

Evidence on the risk for an increased rate of induction of labor was conflicting. Two RCTs showed no overall difference (RR, 1.16 [CI, 0.91 to 1.49]; $n = 1931$), while 1 cohort study reported significantly fewer inductions in the treatment group compared with the nontreatment group (RR, 0.63 [CI, 0.55 to 0.72]; $n = 1665$). The cohort study results may be due to confounding by the different delivery protocols between treated and untreated groups (1, 13).

Pooled estimates from trials (RR, 0.90 [CI, 0.79 to 1.01]; $n = 2613$) and from cohort studies (RR, 1.09 [CI, 0.90 to 1.31]; $n = 3110$) showed no significant differences

between treated and untreated groups for cesarean delivery. One RCT and 1 cohort study found no differences between groups in emergency cesarean delivery (RCT RR, 0.81 [CI, 0.62 to 1.05]; $n = 1000$; cohort RR, 0.83 [CI, 0.33 to 2.06]; $n = 126$) (1, 13).

Infant Outcomes

Three RCTs (RR, 0.96 [CI, 0.67 to 1.37]; $n = 2262$) and 1 cohort study (RR, 0.66 [CI, 0.19 to 2.35]; $n = 126$) reported no significant differences in admissions to a neonatal intensive care unit. Four trials also demonstrated no significant differences between groups in incidence of small-for-gestational-age infants (RR, 1.10 [CI, 0.81 to 1.48]; $n = 1168$). Pooled results of 4 RCTs showed no significant differences between groups in episodes of neonatal hypoglycemia (RR, 1.18 [CI, 0.92 to 1.52]; $n = 2367$). Two cohort studies reported conflicting results on neonatal hypoglycemia, possibly because of differing definitions of hypoglycemia or screening practices (overall RR, 0.55 [CI, 0.10 to 2.97]; $n = 2054$) (1, 13).

The Hyperglycemia and Adverse Pregnancy Outcomes Study has shown a continuous relationship between fetal outcomes (increased birth weight, cord blood serum C-peptide levels, neonatal hypoglycemia, and primary cesarean delivery) and varying levels of maternal glycemia below the diagnostic threshold for diabetes. This study was an international observational study ($n = 25,505$) of women receiving the 75-g OGTT. However, there was no clear glucose threshold at which risk was increased for fetal overgrowth or other maternal and neonatal outcomes (14).

Estimate of Magnitude of Net Benefit

The USPSTF determined that screening for and treatment of GDM in women after 24 weeks of gestation are associated with moderate health improvements in the mother and infant through the collective reduction in preeclampsia, macrosomia, and shoulder dystocia. The harms of screening or treatment are considered no greater than small. Therefore, the USPSTF concludes with moderate certainty that the overall net benefit is moderate.

The USPSTF was not able to estimate the magnitude of net benefit for screening for or treatment of GDM before 24 weeks of gestation because of limited evidence.

How Does Evidence Fit With Biological Understanding?

Screening for GDM occurs between the 24th and 28th week of pregnancy. Women with GDM are at increased risk for maternal and infant complications. Screening for and detecting GDM provides a potential opportunity to prevent adverse outcomes. Once detected, GDM may return in subsequent pregnancies and is associated with an increased future risk for developing overt diabetes.

The evidence shows a benefit of screening and treatment on the collective outcomes of preeclampsia, macrosomia, and shoulder dystocia. In addition to being at increased risk for eclampsia, women who are diagnosed with preeclampsia are at risk for a cascade of interventions, in-

cluding further monitoring, additional medications, and earlier delivery. Macrosomia can be diagnosed before delivery, possibly allowing for the prevention of negative downstream effects. Infants with macrosomia are at risk for shoulder dystocia, which results in an increased risk for clavicular fracture and, more seriously, brachial plexus palsy.

Response to Public Comments

A draft version of this recommendation statement was posted for public comment on the USPSTF Web site from 28 May to 24 June 2013. In response to these comments, the USPSTF added language to the Rationale section about the link between GDM and type 2 diabetes mellitus. The USPSTF also added language to emphasize the scope of the recommendation statement, and additional language describing gaps in the evidence was added to the Research Needs and Gaps section.

UPDATE OF PREVIOUS RECOMMENDATION

In 2008, the USPSTF concluded that the evidence was insufficient to assess the balance of benefits and harms of screening for GDM before or after 24 weeks of gestation (7). To update this recommendation, the USPSTF reviewed the indirect chain of evidence and found adequate evidence that screening for and treatment of GDM can significantly reduce the risk for preeclampsia, fetal macrosomia, and shoulder dystocia. When assessing these outcomes collectively, the USPSTF concluded that there is a moderate net benefit for the mother and infant. As a result of the evidence, the USPSTF changed its recommendation for screening after 24 weeks of gestation (B recommendation). However, the evidence on the benefits and harms of screening for gestational diabetes before 24 weeks of gestation remains insufficient.

RECOMMENDATIONS OF OTHERS

In 2013, the American Congress of Obstetricians and Gynecologists recommended screening all pregnant women with a patient history or the 50-g OGCT (15). The American Diabetes Association endorses glucose testing for GDM in all pregnant women who do not have a prepregnancy diagnosis of diabetes between 24 and 28 weeks of gestation using a 75-g 2-hour OGTT with thresholds proposed by the International Association of Diabetes and Pregnancy Study Groups (16). In 2013, an independent panel supported by the National Institutes of Health Consensus Development Program considered whether using the 75-g OGTT (1-step approach), as proposed by the International Association of Diabetes and Pregnancy Study Groups and supported by the American Diabetes Association, should be adopted instead of the 2-step approach. The panel released a draft statement that there is not enough evidence to adopt a 1-step approach (17, 18). The American Academy of Family Physicians recommends

screening for GDM in asymptomatic pregnant women after 24 weeks of gestation. It also concludes that the evidence is insufficient to assess the balance of benefits and harms of screening for GDM in asymptomatic pregnant women before 24 weeks of gestation (19). The Endocrine Society recommends universal screening for GDM using the OGTT at 24 to 28 weeks of gestation (20).

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APPENDIX: U.S. PREVENTIVE SERVICES TASK FORCE MEMBERS

Members of the U.S. Preventive Services Task Force at the time this recommendation was finalized† are Virginia A. Moyer, MD, MPH, *Chair* (American Board of Pediatrics, Chapel Hill, North Carolina); Michael L. LeFevre, MD, MSPH, *Co-Vice Chair* (University of Missouri School of Medicine, Columbia, Missouri); Albert L. Siu, MD, MSPH, *Co-Vice Chair* (Mount Sinai School of Medicine, New York, and James J. Peters Veterans Affairs Medical Center, Bronx, New York); Linda Ciofu Baumann, PhD, RN (University of Wisconsin, Madison, Wisconsin); Kirsten Bibbins-Domingo, PhD, MD (University of California, San Francisco, San Francisco, California); Susan J. Curry, PhD (University of Iowa College of Public Health, Iowa City, Iowa); Mark Ebell, MD, MS (University of Georgia, Athens, Georgia); Glenn Flores, MD (University of Texas Southwestern, Dallas, Texas); Francisco A.R. García, MD, MPH

(Pima County Department of Health, Tucson, Arizona); Adelita Gonzales Cantu, RN, PhD (University of Texas Health Science Center, San Antonio, Texas); David C. Grossman, MD, MPH (Group Health Cooperative, Seattle, Washington); Jessica Herzstein, MD, MPH (Air Products, Allentown, Pennsylvania); Wanda K. Nicholson, MD, MPH, MBA (University of North Carolina School of Medicine, Chapel Hill, North Carolina); Douglas K. Owens, MD, MS (Veterans Affairs Palo Alto Health Care System, Palo Alto, and Stanford University, Stanford, California); William R. Phillips, MD, MPH (University of Washington, Seattle, Washington); and Michael P. Pignone, MD, MPH (University of North Carolina, Chapel Hill, North Carolina). Joy Melnikow, MD, MPH, a former USPSTF member, also contributed to the development of the recommendation.

† For a list of current Task Force members, go to www.uspreventiveservicestaskforce.org/members.htm.

Appendix Table 1. What the USPSTF Grades Mean and Suggestions for Practice

Grade	Definition	Suggestions for Practice
A	The USPSTF recommends the service. There is high certainty that the net benefit is substantial.	Offer/provide this service.
B	The USPSTF recommends the service. There is high certainty that the net benefit is moderate or there is moderate certainty that the net benefit is moderate to substantial.	Offer/provide this service.
C	The USPSTF recommends selectively offering or providing this service to individual patients based on professional judgment and patient preferences. There is at least moderate certainty that the net benefit is small.	Offer/provide this service for selected patients depending on individual circumstances.
D	The USPSTF recommends against the service. There is moderate or high certainty that the service has no net benefit or that the harms outweigh the benefits.	Discourage the use of this service.
I statement	The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of the service. Evidence is lacking, of poor quality, or conflicting, and the balance of benefits and harms cannot be determined.	Read the Clinical Considerations section of the USPSTF Recommendation Statement. If the service is offered, patients should understand the uncertainty about the balance of benefits and harms.

Appendix Table 2. USPSTF Levels of Certainty Regarding Net Benefit

Level of Certainty*	Description
High	The available evidence usually includes consistent results from well-designed, well-conducted studies in representative primary care populations. These studies assess the effects of the preventive service on health outcomes. This conclusion is therefore unlikely to be strongly affected by the results of future studies.
Moderate	The available evidence is sufficient to determine the effects of the preventive service on health outcomes, but confidence in the estimate is constrained by such factors as: the number, size, or quality of individual studies; inconsistency of findings across individual studies; limited generalizability of findings to routine primary care practice; and lack of coherence in the chain of evidence. As more information becomes available, the magnitude or direction of the observed effect could change, and this change may be large enough to alter the conclusion.
Low	The available evidence is insufficient to assess effects on health outcomes. Evidence is insufficient because of: the limited number or size of studies; important flaws in study design or methods; inconsistency of findings across individual studies; gaps in the chain of evidence; findings that are not generalizable to routine primary care practice; and a lack of information on important health outcomes. More information may allow an estimation of effects on health outcomes.

* The USPSTF defines *certainty* as “likelihood that the USPSTF assessment of the net benefit of a preventive service is correct.” The net benefit is defined as benefit minus harm of the preventive service as implemented in a general primary care population. The USPSTF assigns a certainty level on the basis of the nature of the overall evidence available to assess the net benefit of a preventive service.