Screening for Gestational Diabetes Mellitus: A Systematic Review for the U.S. Preventive Services Task Force

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Background: In 2003, the U.S. Preventive Services Task Force concluded that evidence was insufficient to advise for or against routinely screening all pregnant women for gestational diabetes mellitus.

Purpose: To review evidence about the benefits and harms of screening for gestational diabetes.

Data Sources: Databases (MEDLINE, Database of Abstracts of Reviews of Effects, Health Technology Assessment Database, National Institute for Health and Clinical Effectiveness, and Cochrane Library) were searched for reports published from January 2000 to 15 November 2007 (and from 1966 to 1999 for additional studies on screening at less than 24 weeks' gestation), citations in the 2003 evidence report, and studies identified through consultation of experts and searches of bibliographies.

Study Selection: English-language studies that used standard 1- or 2-step testing for gestational diabetes and that evaluated at least 1 of the following outcomes: neonatal mortality; brachial plexus injury; clavicular fracture; admission to a neonatal intensive care unit for hypoglycemia, hyperbilirubinemia, or the respiratory distress syndrome; maternal mortality; and preeclampsia or pregnancy-induced hypertension.

Data Extraction: 2 reviewers evaluated 1607 abstracts, critically appraised 288 articles, and qualitatively synthesized 13 studies.

Data Synthesis: No randomized, controlled trials that directly evaluated the risks and benefits of gestational diabetes screening were found. One good-quality randomized, controlled trial of treatment of mild gestational diabetes in a screening-detected population supported a reduction in serious neonatal complications and showed that gestational diabetes treatment also reduced the risk for gestational hypertension. Very limited evidence was found to evaluate early screening for gestational diabetes (before 24 weeks' gestation). Limited evidence suggests that serious maternal hypoglycemia is rare with treatment and that overall quality of life is not worse among women receiving gestational diabetes treatment compared with women not receiving treatment.

Limitation: The literature is limited by lack of a consistent standard for screening or diagnosis of gestational diabetes.

Conclusion: Limited evidence suggests that gestational diabetes treatment after 24 weeks improves some maternal and neonatal outcomes. Evidence is even more sparse for screening before 24 weeks' gestation.

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Gestational diabetes is currently defined as any degree of glucose intolerance with onset or first recognition during pregnancy (1–4). Its prevalence in the United States is 1% to 14%, depending on population characteristics (1, 5). As obesity and diabetes mellitus have become more prevalent in U.S. women of child-bearing age (6), so has gestational diabetes (7, 8).

Although the American Diabetes Association, the American College of Obstetricians and Gynecologists, and the World Health Organization (1, 2, 4, 9) recommend screening most pregnant women for gestational diabetes between 24 and 28 weeks' gestation and screening high-risk pregnant women (for example, those with a personal history of gestational diabetes or marked obesity) at the first antenatal visit (1, 2, 4, 10), the U.S. Preventive Services Task Force (USPSTF) concluded in 2003 that there was insufficient evidence to advise for or against routinely screening all pregnant women (11). At that time, fair to good evidence showed that screening combined with therapy for gestational diabetes could reduce fetal macrosomia, but insufficient evidence supported other health benefits for mothers or infants (11).

The USPSTF considers the potential benefits and harms of screening, and weighs the net benefit when evaluating the evidence for screening. A potential harm of gestational diabetes screening is unnecessary glucose testing and treatment of many women who would not ultimately develop problems related to gestational diabetes. Potential benefits include reduction in maternal preeclampsia, stillbirth, brachial plexus injuries, and clavicular fractures due to macrosomia (4). A major challenge in evaluating the evidence for the benefits and harms of gestational diabetes screening is the range of adverse maternal and neonatal outcomes associated with untreated gestational diabetes. With the USPSTF, we developed an analytic framework

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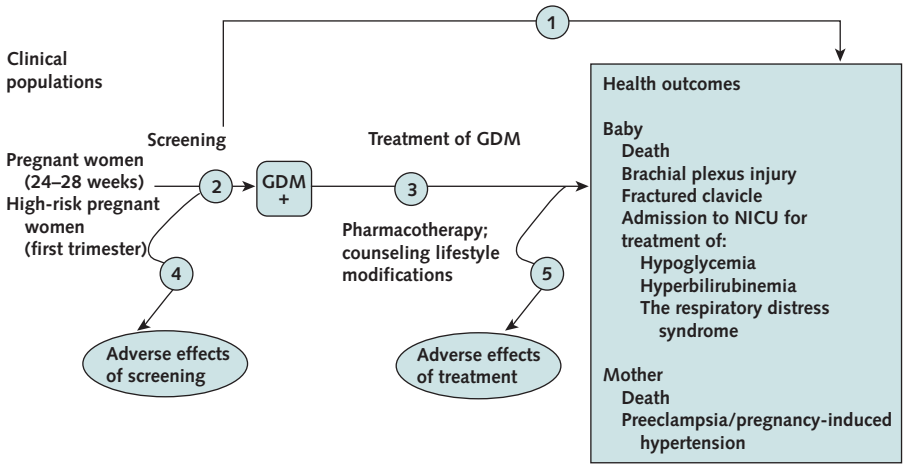
Figure 1. **Analytic framework.**



Key questions: 1) Does screening for gestational diabetes lead to a reduction in perinatal morbidity and mortality for mother or infant? A) After 24 weeks' gestation? B) During the first trimester and up to 24 weeks' gestation? 2) What are the sensitivities, specificities, reliabilities, and yields of current screening tests for gestational diabetes? A) After 24 weeks' gestation? B) During the first trimester and up to 24 weeks' gestation? 3) Does treatment of gestational diabetes lead to reduction in perinatal morbidity and mortality for mother or infant? A) After 24 weeks' gestation? B) During the first trimester and up to 24 weeks' gestation? 4) What are the adverse effects associated with screening for gestational diabetes? 5) What are the adverse effects associated with treatment of gestational diabetes? GDM = gestational diabetes mellitus; NICU = neonatal intensive care unit.

(**Figure 1**) that incorporated 5 key questions to guide the current systematic review:

1. Does screening for gestational diabetes lead to a reduction in perinatal morbidity and mortality for mother or infant? A) After 24 weeks' gestation? B) During the first trimester and up to 24 weeks' gestation?

2. What are the sensitivities, specificities, reliabilities, and yields of current screening tests for gestational diabetes? A) After 24 weeks' gestation? B) During the first trimester and up to 24 weeks' gestation?

3. Does treatment of gestational diabetes lead to reduction in perinatal morbidity and mortality for mother or infant? A) After 24 weeks' gestation? B) During the first trimester and up to 24 weeks' gestation?

4. What are the adverse effects associated with screening for gestational diabetes?

5. What are the adverse effects associated with treatment of gestational diabetes?

Methods

We followed the USPSTF's standard methods for systematic reviews and rating the quality of evidence (12).

Data Sources and Searches

For each key question, we searched the following databases for literature published from January 2000 to 15 November 2007: MEDLINE, Cochrane Central Registry of Controlled Trials, Cochrane Database of Systematic Reviews, Database of Abstracts of Reviews of Effects, Health Technology Assessment Database, and National Institute for Health and Clinical Excellence. These searches were supplemented by a search for literature on screening before 24 weeks' gestation published from 1966 to 1999 (**Appendix Table 1**, available at www.annals.org). Articles were also obtained from outside experts and through reviewing bibliographies of other relevant articles and systematic reviews. Two authors also reviewed all articles cited in the 2003 USPSTF evidence synthesis (11).

Study Selection

We included studies that examined 1 or more of the selected outcomes and used the 1- or 2-step screening method and the diagnostic criteria of the American Diabetes Association, American College of Obstetricians and Gynecologists, or World Health Organization (1, 2, 9, 13, 14). The 1-step method (an oral glucose tolerance test), in which a 75-g or 100-g oral glucose load is administered in a fasting state without previous plasma or serum screening (1), is most commonly used outside the United States. The 2-step method is common in the United States and involves an initial test after administration of 50 g of glucose (1, 2, 14), followed by an oral glucose tolerance test to confirm the diagnosis for patients with an abnormal initial result (glucose level, ≥7.2 mmol/L [≥130 mg/dL] or ≥7.8 mmol/L [≥140 mg/dL]).

Using inclusion criteria developed for each key question (described in **Appendix Table 2**, available at www.annals.org), we first sought randomized trials to assess the potential benefit of gestational diabetes screening and treatment in improving final health outcomes, and then prospective cohort studies if trials were not available. Any study design was considered in the evaluation of potential

harms. Inclusion criteria were also less stringent for study harms.

Data Extraction and Quality Assessment

Literature searches were focused for each key question but were reviewed with all key questions in mind. Neonatal outcomes evaluated were mortality (stillbirth or neonatal death); brachial plexus injury; clavicular fracture; and neonatal intensive care for hypoglycemia, hyperbilirubinemia, or the respiratory distress syndrome. Maternal outcomes were mortality and preeclampsia or pregnancy-induced hypertension.

For all included studies, 1 primary reviewer abstracted relevant information into standardized evidence tables (full evidence review available at www.ahrq.gov/clinic/uspstfix.htm). A second reviewer checked the abstracted data for accuracy. Two investigators critically appraised and rated the quality of all included articles by using USPSTF quality criteria (12). If the investigators disagreed on study content or quality, a third investigator reviewed the study and disagreements were resolved by consensus.

Data Synthesis

Studies were synthesized qualitatively rather than quantitatively because of heterogeneity and were categorized according to whether diagnosis and treatment occurred before or after 24 weeks' gestation and whether the comparison was against no treatment or a comparison treatment. Because this was a qualitative synthesis, we reported the statistics as published in the original studies; when reported, we used the 95% CI. If the 95% CI was not available, we reported a *P* value. Studies evaluating the harms of screening were evaluated individually because of the variety of instruments used to measure the psychological effect of screening.

Role of the Funding Source

The Agency for Healthcare Research and Quality funded this work, provided project oversight, and assisted with internal and external review of the draft evidence synthesis. The authors worked with 4 USPSTF members to develop the analytic framework and resolve issues involving the scope of the review.

Results

We reviewed 1607 English-language abstracts and 288 full-text articles. **Figure 2** summarizes the search and selection process, which resulted in the inclusion of the following articles: 7 randomized, controlled trials reported in 8 publications that tested interventions that alter glycemic control and reported specified health outcomes in women receiving a diagnosis at 24 weeks' gestation or later (key question 3A) (15–22); 1 prospective study addressing treatment of women in whom gestational diabetes was diagnosed before 24 weeks' gestation (key question 3B) (23); and 3 studies reporting harms of screening for gestational diabetes (key question 4) (24–26). One additional article, along with 6 of the 8 articles related to key question 3, reported adverse effects of treatment (key question 5) (15–19, 21, 27). The details of each included study are available in the full evidence tables (available at www.ahrq.gov/clinic/uspstfix.htm). **Appendix Table 3** (available at www.annals.org) summarizes the excluded studies. The **Table** displays study-level summaries of the data.

Key Question 1

Does screening for gestational diabetes lead to a reduction in perinatal morbidity and mortality for mother or infant? A) After 24 weeks' gestation? B) During the first trimester and up to 24 weeks' gestation?

We identified no randomized, controlled trials of screening and subsequent treatment.

Key Question 2

What are the sensitivities, specificities, reliabilities, and yields of current screening tests for gestational diabetes? A) After 24 weeks' gestation? B) During the first trimester and up to 24 weeks' gestation?

No articles met our inclusion criteria for this key question. Although 2 studies reported the sensitivity or specificity of gestational diabetes screening for at least 1 of the specified health outcomes (28, 29), both were limited by using a mixture of treated and untreated women to evaluate sensitivity and specificity and by lack of blinding of treating providers to screening results. The pending Hyperglycemia and Adverse Pregnancy Outcome prospective cohort study of 25 000 pregnant women will probably address these limitations (30). In sum, there was little available evidence on sensitivity and specificity for our primary health outcomes; evidence was available only for macrosomia, which was not an outcome of primary interest to us.

Key Question 3

Does treatment of gestational diabetes lead to reduction in perinatal morbidity and mortality for mother or infant? A) After 24 weeks' gestation? B) During the first trimester and up to 24 weeks' gestation?

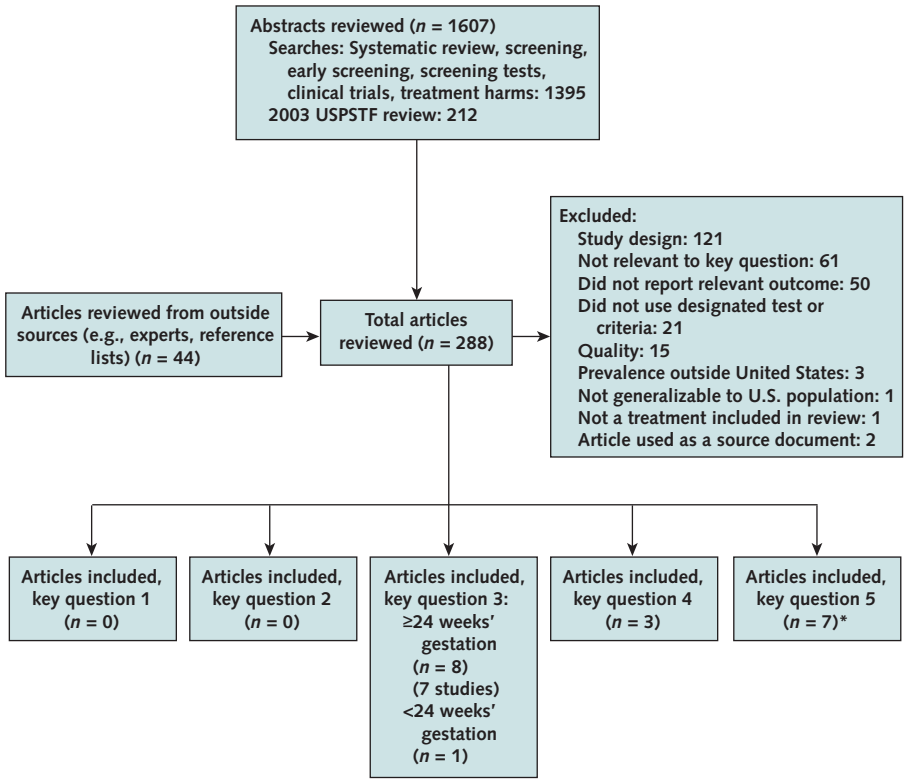
Seven randomized, controlled trials of gestational diabetes treatment after 24 weeks' gestation (15–22) and 1 prospective cohort study (23) compared outcomes of women given a diagnosis at the first prenatal visit with outcomes of women given a diagnosis after 24 weeks' gestation. **Appendix Tables 4** and **5** (available at www.annals.org) summarize these studies, and details are available in the full evidence review (www.ahrq.gov/clinic/uspstfix.htm).

Diagnosis and Treatment at More Than 24 Weeks' Gestation

Treatment versus No Treatment of Gestational Diabetes. We found 2 eligible randomized, controlled trials that tested treatment versus no treatment of gestational diabetes detected in universal screening programs. We judged 1 to be good quality (16) and the other to be fair quality (22).

The good-quality ACHOIS (Australian Carbohydrate Intolerance Study in Pregnant Women) study was a multicenter, blinded, randomized, controlled trial that in-

Figure 2. **Search results by key question.**



USPSTF = U.S. Preventive Services Task Force. *Six of these articles are also included in the results from key question 3.

cluded 1000 women and was conducted at 14 sites in Australia and 4 sites in the United Kingdom (16). It was designed to determine whether the treatment of mild gestational diabetes would reduce perinatal complications and to assess the effects of treatment on maternal outcomes, mood, and quality of life. Inclusion criteria were a singleton or twin pregnancy at 16 to 30 weeks' gestation and positive result on 2-step screening for mild gestational diabetes by current World Health Organization criteria with a 75-g oral glucose tolerance test (2-hour glucose level, 7.8 to 11.0 mmol/L [140 to 200 mg/dL] and fasting plasma glucose level <7.8 mmol/L [<140 mg/dL]). At the time of the study, these glucose criteria were defined by the World Health Organization as glucose intolerance of pregnancy (that is, intermediate between normal and gestational diabetes), and thus it was considered ethical to randomly assign and evaluate treatment compared with a blinded untreated group. The intervention group received both individualized dietary advice and instructions to self-monitor glucose levels 4 times daily until glucose values were at the normoglycemic goal (fasting glucose level of 3.5 to 5.0 mmol/L [63 to 99 mg/dL]) for 2 weeks. Insulin treatment was initiated and the dosage titrated as needed to achieve glycemic goals (20% of women in the intervention group required insulin). The treated group gained statistically significantly less weight during pregnancy than the untreated group (8.1 vs. 9.8 kg; adjusted mean difference, −1.4 kg [95% CI, −2.3 to −0.4 kg]), but the study did not collect data on glucose values (Crowther CA. Personal communication. 25 July 2006.) and therefore does not allow estimation of the relative effect of glycemic control compared with weight control on outcomes.

The rate of serious perinatal complications (stillbirth or neonatal death, shoulder dystocia, bone fracture, or nerve palsy) was lower in the treated group than in the untreated group after adjustment for maternal age, race, and parity (relative risk, 0.33 [CI, 0.14 to 0.75]). The relative risk for these individual perinatal outcomes was not calculated between groups because no patients in the treatment group died or developed bone fracture or nerve palsy. Overall, 7 infants in the treatment group had serious perinatal complications (all shoulder dystocia) compared with 23 infants in the untreated group (5 who died, 1 with a fractured humerus, 3 with nerve palsy, and 16 with shoulder dystocia). Shoulder dystocia was not a specified health outcome for this evidence review, and critics of ACHOIS believe that the composite outcome was misleading because shoulder dystocia accounted for most adverse outcomes (31). The ACHOIS investigators did not specifically report the rate of admission to the neonatal intensive care unit

Table. **Summary of Evidence***

Studies, *n* (Reference)	Design	Limitation	Consistency	Applicability	Overall Quality
KQ1: Does screening for gestational diabetes lead to a reduction in perinatal morbidity and mortality for mother or infant?					
A. After 24 weeks' gestation?					
No evidence	–	–	–	–	–
B. During the first trimester and up to 24 weeks' gestation?					
No evidence	–	–	–	–	–
KQ2: What are the sensitivities, specificities, reliabilities, and yields of current screening tests for gestational diabetes?					
A. After 24 weeks' gestation?					
No evidence	–	–	–	–	–
B. During the first trimester and up to 24 weeks' gestation?					
No evidence					
KQ3: Does treatment of gestational diabetes lead to a reduction in perinatal morbidity and/or mortality for mother or infant?					
A. After 24 weeks' gestation?					
Treated vs. untreated					
2 (16, 22)	RCT	No serious limitations. 1 of 2 RCTs occurred 40 y ago, when ability to achieve tight glucose control was limited.	No inconsistencies	Studies conducted in inner-city Boston (race/ethnicity not reported) and Australia (75% white).	Good
Trials of treatment comparisons					
6 (15, 17–21)	RCT	3 of the 6 studies evaluated <75 women.	Studies varied in treatment tested, but none had serious inconsistencies with other trials regarding outcomes.	4 of 6 trials included predominantly Hispanic women and limited numbers of other ethnic groups.	Fair
B. During the first trimester and up to 24 weeks' gestation?					
1 (23)	Prospective cohort	Hypertension categories were not defined.	Not applicable	Conducted in Spain.	Fair
KQ4: What are the adverse effects associated with screening for gestational diabetes?					
3 (24–26)	2 prospective cohort; 1 cross-sectional	No serious limitations. Studies did not attempt to isolate the psychological effect of antenatal surveillance, such as the modified biophysical profile. Antenatal surveillance is presumed to be more common among women with gestational diabetes and thus represented by the diagnosis itself.	No serious inconsistencies	2 Australian studies and 1 U.S. study; all included primarily white women.	Fair
KQ5: What are the adverse effects associated with treatment of gestational diabetes?					
7 (15–19, 21, 27)	RCT, 1 prospective cohort	Limited data available; only 2 of the studies included >100 women with gestational diabetes.	No serious inconsistencies	1 RCT is Australian, but reasonably representative of U.S. primary care practice; the RCT included 75% white women; the remaining studies included primarily Hispanic women.	Fair

* FPG = fasting plasma glucose; GCT = glucose challenge test; KQ = key question; OGTT = oral glucose tolerance test; RCT = randomized, controlled trial; RR = relative risk.

Table—**Continued**

Summary of Findings	Comment
–	–
–	–
Maternal: Reported in only 1 study; gestational hypertension reduced with treatment compared with no treatment (adjusted RR, 0.70 [95% CI, 0.51–0.95]). *Neonatal:* Composite outcome (stillbirth, neonatal death, shoulder dystocia, bone fracture, and nerve palsy) reduced with treatment of mild gestational diabetes compared with no treatment (adjusted RR, 0.33 [CI, 0.14–0.75]); 0 vs. 5 stillbirths/neonatal deaths with treatment vs. no treatment. Older study did not find a significant difference in perinatal mortality (only macrosomia improved with treatment).	Both used 50-g GCT; recent study used 75-g diagnostic OGTT and included only women with mild gestational diabetes (FPG level < 7.8 mmol/L [<140 mg/dL] and 2-h OGTT level 7.8–11.0 mmol/L [140–198 mg/dL]).
Maternal: None reported maternal death or found significant differences in gestational hypertension with treatment. *Neonatal:* Outcomes did not differ with treatment or improved if treatment improved glycemic control (e.g., neonatal hyperbilirubinemia and hypoglycemia).	No evidence available for metformin. The Metformin in Gestational Diabetes trial is in progress.
Maternal: Women with early-onset gestational diabetes (first antenatal visit) were significantly more likely to have preexisting chronic hypertension, hypertension, combined preeclampsia (preeclampsia and superimposed preeclampsia) than those diagnosed before 24 weeks. *Neonatal:* Neonates of women with early-onset gestational diabetes were more likely to have perinatal death and hypoglycemia.	–
Maternal: Limited data are mixed on whether anxiety/quality of life is worsened in the first several weeks after screening. The RCT found no differences between women who screened positive vs. those who screened negative in measures of anxiety, depression, or concern for baby's health immediately after screening or later in pregnancy. The prospective cohort study found that health perceptions (in a minority of self-reported health domains) were worse at 30 weeks' gestation among screening-positive women but did not differ at 36 weeks' gestation or 6 weeks' postpartum. The cross-sectional study found no differences in anxiety or depression at 35 weeks. *Neonatal:* No adverse effects identified in the literature.	–
Maternal: No maternal deaths were reported. Clinically significant maternal hypoglycemia was rarely reported, regardless of type of treatment. No evidence supported psychological harm with treatment. On the contrary, 1 RCT found a statistically significant reduction in postpartum depression (based on the Edinburgh Postnatal Depression Scale questionnaire) among women treated for gestational diabetes compared with those not treated (adjusted RR, 0.46 [CI, 0.29–0.73]). *Neonatal:* Limited data in small studies found no harm to the fetus; we found no good-quality data on other potential harms to the offspring associated with maternal treatment of gestational diabetes.	No data are available for metformin.

but identified no statistically significant differences by treatment group in infants who required intravenous therapy for hypoglycemia, phototherapy for jaundice, or supplemental oxygen more than 4 hours after birth (**Appendix Table 5**, available at www.annals.org). Women in the treatment group had a 30% lower risk for preeclampsia or gestational hypertension compared with untreated patients (12% vs. 18%; adjusted relative risk, 0.70 [CI, 0.51 to 0.95]).

A fair-quality randomized, controlled trial reported in 1966 (22) found that treatment in a screened population of women at high risk for gestational diabetes reduced macrosomia but not perinatal death. Initial treatment was a small daily dose of insulin (10 units per day). Of note, this trial occurred when home glucose monitoring was unavailable; thus, the ability to achieve tight glycemic control was limited.

Treatment Comparisons for Gestational Diabetes. Five randomized, controlled trials (reported in 6 publications) compared different treatment strategies for gestational diabetes. One was good quality and the other fair quality, and none blinded participants to treatment. Heterogeneity of treatment precluded quantitative synthesis.

The best comparative evidence came from a trial of 404 predominantly Latina women with gestational diabetes in whom diet therapy had failed and were randomly assigned to receive glyburide or insulin (glyburide is not currently Food and Drug Administration–approved for gestational diabetes). The investigators found excellent and similar control in both groups (mean glycosylated hemoglobin level, 5.7% in the glyburide group and 5.6% in the insulin group) and no differences in maternal weight gain or neonatal outcomes (20).

A fair-quality trial ($n = 68$) compared women who had mild gestational diabetes treated with diet and home glucose monitoring to women treated with diet and no monitoring (15). Compared with the unmonitored group, the glucose-monitored group achieved statistically significantly lower glycosylated hemoglobin levels at 32 weeks, with no significant difference in hypoglycemia frequency and no neonatal deaths in either group.

Another trial compared insulin given 4 versus 2 times per day and found mean hemoglobin A_{1c} values of 5.5% and 5.8%, respectively (mean difference, −0.3% [CI, −0.4% to −0.2%]) (21). The only perinatal death occurred with a mother in the twice-daily insulin (less intensive) treatment group. The relative risks for neonatal hypoglycemia (0.12 [CI, 0.02 to 0.97]) and hyperbilirubinemia (0.51 [CI, 0.29 to 0.91]) were also lower with more frequent dosing.

Diagnosis and Treatment before 24 Weeks' Gestation: Early versus Late Screening

We identified no randomized, controlled trials of screening and treatment before 24 weeks' gestation in high-risk women. However, in a fair-quality prospective cohort study (23), women with early-onset gestational diabetes were more likely to have hypertension (18.5% vs. 5.9%; $P = 0.006$), mostly because of a higher rate of preexisting chronic hypertension (10.8% vs. 2.4%; $P = 0.010$); were more likely to have preeclampsia (6.2% vs. 0.6%; $P = 0.020$); and had higher mean fasting, 2-hour postprandial, and predinner glucose levels. In addition, 33.9% of women with an early diagnosis of gestational diabetes required insulin, compared with 7.1% of those given a late diagnosis ($P < 0.001$). The neonates of women with an early diagnosis were more likely to have perinatal death (6% vs. 0%; $P = 0.020$) and hypoglycemia (8% vs. 0%; $P = 0.005$) but not respiratory distress (5-minute Apgar score <7) or admission to an intensive care unit.

Key Question 4

What are the adverse effects associated with screening for gestational diabetes?

Three fair-quality studies (2 prospective cohort and 1 cross-sectional) addressed the psychological effect and burden of screening, which we considered to be the primary harms associated with screening (24–26).

The first cohort study assessed 209 Australian women by using the Spielberger State-Trait Anxiety Inventory, the Edinburgh Postnatal Depression Scale, and the Short-Form 36 (SF-36) before gestational diabetes screening at 24 to 28 weeks and again at about 36 weeks (24). The investigators found no statistically significant associations of anxiety, depression, or concern for the baby's health with glucose challenge test results. Of note, women in the late third trimester who had negative results reported less vitality and greater social functioning than those who had positive results, but the researchers found no differences in any other SF-36 domain. Women with negative glucose challenge results were more likely than those with positive results to rate their screening experience as positive (77% vs. 57%; $P < 0.010$), but they did not differ in likelihood of requesting screening during subsequent pregnancies.

The other cohort study involved 50 women with gestational diabetes and 50 with normal glucose tolerance. The gestational diabetes group had higher mean scores on the Mental Health Inventory 5 (13.9 [SD, 4.8] vs. 11.4 [SD, 3.8]; $P = 0.004$) and higher mean anxiety scores on the Spielberger State-Trait Anxiety Inventory (40.6 [SD, 13.3] vs. 34.2 [SD, 9.9]; $P = 0.007$) than women with normal glucose tolerance at 30 weeks' gestation (26). There were no statistically significant differences, however, at 36 weeks' gestation or 6 weeks' postpartum. The gestational diabetes and control groups also did not differ in attitudes about gestational diabetes testing during any assessment period.

The cross-sectional study assessed psychological status around 35 weeks' gestation in 68 women with gestational diabetes and 50 nondiabetic pregnant controls (25). The

researchers found no differences between groups in mood according to the Profile of Mood States Bipolar Form.

Key Question 5

What are the adverse effects associated with treatment of gestational diabetes?

Potential adverse effects of gestational diabetes treatment included physical (maternal hypoglycemia, maternal side effects of oral hypoglycemic agents or insulin, teratogenicity in the neonate) and psychological effects. Two good-quality (16, 19) and 5 fair-quality (15, 17, 18, 21, 27) studies addressed this question.

Treatment versus No Treatment of Gestational Diabetes

An analysis of ACHOIS compared measures of quality of life, depression, and anxiety between subsets of 332 (of 490) treated and 350 (of 510) untreated women (16). Six weeks after diagnosis, the treated and untreated groups differed significantly on 6 quality-of-life components on the SF-36, with all differences favoring treatment (32, 33). At 3 months' postpartum, 3 SF-36 components (physical functioning, general health, and overall physical component) were better with treatment. Five of the 6-week differences, however, were no longer statistically significant (16). The relative risk for postpartum depression was 0.46 (CI, 0.29 to 0.73) with gestational diabetes treatment compared with no treatment. Scores on the Spielberger State-Trait Anxiety Inventory did not differ between treated and untreated women 6 weeks after diagnosis or 3 months' postpartum. These analyses did not report hypoglycemia rates.

Studies Comparing Gestational Diabetes Treatments

A good-quality randomized, controlled trial evaluated potential harms of glyburide versus insulin (19). Only 4 women in the glyburide group, compared with 41 in the insulin group, experienced hypoglycemia (glucose level <2.2 mmol/L [<40 mg/dL]; $P = 0.030$), and none of the women reported severe hypoglycemia.

A fair-quality randomized, controlled trial of primarily Latina women randomly assigned to neutral protamine Hagedorn insulin (NPH) plus insulin lispro (an insulin analogue) versus NPH plus regular insulin assessed the safety of lispro (18). Maternal hypoglycemia (glucose level <3.1 mmol/L [<55 mg/dL]) was rare in both groups before all meals. However, the only statistically significant difference in number of hypoglycemic episodes was for fasting prebreakfast measurements (a mean of 0.93% [SD, 1.04%] of measures in the regular insulin group were in the hypoglycemic range vs. 0.65% [SD, 0.13%] of those in the lispro group; $P = 0.025$).

Of the remaining fair-quality studies, only 1 reported on maternal hypoglycemia (21). Of 274 Israeli women with gestational diabetes who were randomly assigned to insulin treatment 4 times daily (compared with 2 times daily), excellent glycemic control further improved with 4-times-daily insulin (mean hemoglobin A_{1c} value, 5.5% vs. 5.8%; mean difference, −0.3% [CI, −0.4% to −0.2%]) but did not increase hypoglycemic episodes necessitating help from another person (21). Another trial comparing preprandial versus postprandial glucose monitoring to guide insulin treatment in gestational diabetes did not report specific rates of maternal hypoglycemia (17). However, there were no significant differences between the treatment groups in hospitalization to optimize glycemic control during pregnancy (relative risk, 0.7 [CI, 0.2 to 3.1] for preprandial vs. postprandial monitoring) (17). One fair-quality prospective cohort study used the Profile of Mood States Bipolar Form to evaluate emotional adjustment to diagnosis and treatment of gestational diabetes in 206 women with newly diagnosed gestational diabetes who required diet or insulin therapy and 95 pregnant controls (27). The overall mean values on each of the 6 mood scales did not statistically significantly differ between the diet- or insulin-treated groups. In analyses that stratified good versus poor glycemic control, women with better control had significantly better mood scores.

Discussion

We identified no randomized, controlled trials of gestational diabetes screening at 24 weeks' gestation or later. We believe it is unlikely that such a study will ever be conducted in the United States given the relatively common clinical practice of gestational diabetes screening and institutionalized ethical constraints for research in human subjects. We also found no high-quality evidence on sensitivity or specificity of gestational diabetes screening for primary neonatal outcomes (stillbirth; neonatal death; brachial plexus injury; clavicular fracture; and neonatal intensive care for hypoglycemia, hyperbilirubinemia, or the respiratory distress syndrome) or for primary maternal outcomes (death and preeclampsia or pregnancy-induced hypertension). However, we did find new good-quality evidence that treatment of a screening-detected population with mild gestational diabetes reduced serious neonatal (as a composite outcome) and maternal (preeclampsia or gestational hypertension) outcomes in a population similar to the United States in ethnicity and obesity (16). This new evidence adds to evidence from a 1966 study that found a reduction in macrosomia with gestational diabetes treatment compared with no treatment (22). Several of the trials comparing gestational diabetes treatments also suggest that improved glycemic control with intensified management (whether postprandial monitoring or insulin given 4 times daily) reduces perinatal complications.

Regarding potential harms associated with gestational diabetes screening at 24 weeks' gestation or later and treatment, evidence suggests that during the first few weeks after screening, women with positive results on screening for gestational diabetes may report higher anxiety, more psychological distress, and poorer perceptions of their gen-

eral health than women with negative results. However, these differences do not persist into the late third trimester or postpartum period. There also appears to be no long-term differences between women with positive and those with negative screening results in the experience of screening or likelihood of requesting screening for gestational diabetes during future pregnancies. Limited evidence suggests that quality of life is not worse in women receiving gestational diabetes treatment than in women not receiving treatment.

Our review found limited evidence on screening and treating gestational diabetes diagnosed before 24 weeks' gestation. One fair-quality prospective cohort study suggests that an early diagnosis of gestational diabetes may represent pregestational diabetes, because women given an early diagnosis were more likely to require insulin and had a higher proportion of perinatal deaths and neonatal hypoglycemia than those with a late diagnosis. The number of U.S. women who are obese and thus are at risk for both type 2 diabetes and gestational diabetes is increasing; thus, data on the risks and benefits of early gestational diabetes screening would be useful.

This review had several limitations. First, there is no consistent standard for gestational diabetes screening or diagnosis. The USPSTF limited this review to current national and international standard criteria for gestational diabetes diagnosis to maintain consistency in interpreting potential benefits and harms. This consistent definition resulted in eliminating some studies considered in other reviews. Second, we only assessed potential benefits of gestational diabetes screening during the perinatal and immediate postpartum period. It is well recognized that women who develop gestational diabetes during pregnancy have an increased risk for future type 2 diabetes after pregnancy (34), and long-term benefits to a mother or her future child might arise from gestational diabetes screening during pregnancy. Third, we reviewed a select group of outcomes. We did not systematically review intermediate outcomes (such as macrosomia, cesarean section/operative delivery, induction of labor, perineal lacerations, shoulder dystocia), but we did abstract and describe these outcomes when they were reported in the studies that addressed our primary outcomes (available in the full review at www.ahrq.gov/clinic/uspstfix.htm). Of note, ACHOIS found that, in women receiving gestational diabetes treatment, there was improvement in a composite outcome that included intermediate outcomes plus the primary outcomes that were the focus of this review. Fourth, the USPSTF also explicitly excluded antepartum surveillance (for example, ultrasound and non–stress test evaluations of the pregnancy to determine whether delivery should be induced) from the scope of this review. Finally, the economics of gestational diabetes screening was beyond the scope of this update.

Ongoing studies will address important gaps in the literature. The Hyperglycemia and Adverse Pregnancy Outcome study, a prospective cohort study of 25 000 pregnant women screened at 24 to 32 weeks' gestation in 10 countries, is nearing completion. This study will provide information on how glycemic level may relate to outcomes (cesarean section rates, fetal size, neonatal hypoglycemia, and fetal hyperinsulinemia) and will help to identify an ideal diagnostic threshold (35). A multicenter randomized, controlled trial in the Maternal-Fetal Medicine Units Network is studying outcomes with treatment versus no treatment of mild gestational diabetes detected by a 2-step approach. For the 1-hour 50-g glucose challenge test, values were 7.5 mmol/L (135 mg/dL) to 11.1 mmol/L (200 mg/dL); for the 3-hour 100-g oral glucose challenge test, a normal fasting level was less than 5.3 mmol/L (<95 mg/dL), and 2 of the 3 remaining postchallenge measurements were abnormal (36–38). Other trials are evaluating the efficacy and safety of metformin in pregnancy (39, 40).

Unfortunately, no high-quality evidence is available on screening and treatment of gestational diabetes among high-risk women in the first trimester. Screening can identify previously unrecognized type 2 diabetes and the transient abnormality of glucose tolerance during pregnancy—both currently defined as gestational diabetes. It is important to evaluate the effect of these gestational diabetes conditions on maternal and fetal outcomes separately in future studies.

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Appendix Table 1. Search Strategies

Systematic review

Databases: MEDLINE, Database of Abstracts of Reviews of Effects, Health Technology Assessment Database, Cochrane Database of Systematic Reviews
2000–15 November 2007

1. "Diabetes, Gestational"[MeSH:NoExp]
2. "Fetal Macrosomia"[MeSH]
3. "gestational diabetes"[ti]
4. gdm[ti]
5. macrosomia[ti]
6. antepartum[tiab] AND surveillance[tiab]
7. 1 OR 2 OR 3 OR 4 OR 5 OR 6
8. "gestational diabetes"[tiab]
9. "gestational diabetic*"[tiab]
10. gdm[tiab]
11. macrosomia[tiab]
12. 8 OR 9 OR 10 OR 11
13. 12 AND (in process[sb] OR publisher[sb])
14. 7 OR 13
15. 14 AND systematic[sb]
16. 14 AND systematic[sb] Field: All Fields, Limits: Publication Date from 2000 to 2006, English

Screening

Database: MEDLINE
2000–15 November 2007

1. Diabetes, Gestational/
2. gestational diabet$.ti,ab.
3. 1 or 2
4. Mass Screening/
5. screen$.ti,ab.
6. 4 or 5
7. 3 and 6
8. Diabetes, Gestational/di [Diagnosis]
9. 7 or 8
10. limit 9 to english language
11. limit 10 to humans
12. limit 10 to animals
13. 12 not 11
14. 10 not 13
15. limit 14 to yr="2000 - 2006"

Early screening

Database: MEDLINE
1966–1999

1. Diabetes, Gestational/
2. gestational diabet$.ti,ab.
3. Pregnancy in Diabetics/
4. 1 or 2 or 3
5. Mass Screening/
6. screen$.ti,ab.
7. 5 or 6
8. 4 and 7
9. Diabetes, Gestational/di [Diagnosis]
10. Pregnancy in Diabetics/di [Diagnosis]
11. 8 or 9 or 10
12. Pregnancy Trimester, First/
13. first trimester.ti,ab.
14. first pregnancy trimester.ti,ab.
15. Pregnancy Trimester, Second/
16. second trimester.ti,ab.
17. second pregnancy trimester.ti,ab.
18. early.ti,ab.
19. earlier.ti,ab.
20. 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19
21. 11 and 20
22. limit 21 to english language
23. limit 22 to humans
24. limit 22 to animals
25. 24 not 23
26. 22 not 25
27. limit 26 to yr="1966 - 1999"

Continued on following page

Appendix Table 1—Continued

Screening tests

Database: MEDLINE

2000–15 November 2007

1. Glucose Tolerance Test/
2. oral glucose tolerance.ti,ab.
3. ogtt.ti,ab.
4. glucose challenge test$.ti,ab.
5. Glucose Intolerance/
6. Blood Glucose/
7. Diabetes, Gestational/
8. gestational diabet$.ti,ab.
9. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8
10. Pregnancy/
11. pregnan$.ti,ab,hw.
12. 10 or 11
13. 9 and 12
14. "Sensitivity and Specificity"/
15. "Predictive Value of Tests"/
16. ROC Curve/
17. specificit$.ti,ab.
18. sensitiv$.ti,ab.
19. predictive value.ti,ab.
20. accurac$.ti,ab.
21. False Negative Reactions/
22. False Positive Reactions/
23. Diagnostic Errors/
24. exp "Reproducibility of Results"/
25. Reference Values/
26. Reference Standards/
27. 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26
28. 13 and 27
29. 1 or 2 or 3 or 4
30. 12 and 29
31. limit 30 to (clinical trial or controlled clinical trial or randomized controlled trial)
32. clinical trials/ or controlled clinical trials/ or randomized controlled trials/
33. double-blind method/ or random allocation/ or single-blind method/
34. random$.ti,ab.
35. 32 or 33 or 34
36. 30 and 35
37. Glucose Tolerance Test/st [Standards]
38. 28 or 31 or 36 or 37
39. limit 38 to english language
40. limit 39 to humans
41. limit 39 to animals
42. 41 not 40
43. 39 not 42
44. limit 43 to yr="2000 - 2006"

Clinical trials

Databases: MEDLINE, Cochrane Central Registry of Controlled Trials

2000–15 November 2007

1. Diabetes, Gestational/
2. gestational diabet$.ti,ab.
3. 1 or 2
4. limit 3 to (clinical trial or controlled clinical trial or randomized controlled trial)
5. clinical trials/ or controlled clinical trials/ or randomized controlled trials/
6. double-blind method/ or random allocation/ or single-blind method/
7. random$.ti,ab.
8. 5 or 6 or 7
9. 3 and 8
10. 4 or 9
11. limit 10 to english language
12. limit 11 to humans
13. limit 11 to animals
14. 13 not 12
15. 11 not 14
16. limit 15 to yr="2000 - 2006"

Treatment harms

Database: MEDLINE

Appendix Table 1—Continued

2000–15 November 2007

1. Diabetes, Gestational/dh, dt, pc, th [Diet Therapy, Drug Therapy, Prevention & Control, Therapy]
2. Insulin/
3. Glyburide/
4. Metformin/
5. Sulfonylurea Compounds/
6. Hypoglycemic Agents/
7. (administration dosage or "therapeutic use").fs.
8. treat$.ti,ab,hw.
9. therapy.ti,ab,hw.
10. 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9
11. Diabetes, Gestational/
12. gestational diabet$.ti,ab.
13. 11 or 12
14. 10 and 13
15. 1 or 14
16. (adverse effects or mortality or poisoning or toxicity).fs.
17. adverse effect$.ti,ab.
18. harm$.ti,ab.
19. Prenatal Exposure Delayed Effects/
20. Abnormalities, Drug-Induced/
21. anxiety.ti,ab,hw.
22. depression.ti,ab,hw.
23. Depressive Disorder/
24. labeling.ti,ab.
25. labelling.ti,ab.
26. labeled.ti,ab.
27. labelled.ti,ab.
28. Hypoglycemia/
29. Hypoglycemi$.ti,ab.
30. Hypoglycaemi$.ti,ab.
31. Acidosis/
32. Acidosis, Lactic/
33. acidosis.ti,ab.
34. Teratogens/
35. teratogen$.ti,ab.
36. pain.ti,ab,hw.
37. unnecessary.ti,ab,hw.
38. Pre-Eclampsia/
39. Pre-Eclamp$.ti,ab.
40. preeclamp$.ti,ab.
41. Hypertension, Pregnancy-Induced/
42. pregnancy induced hypertension.ti,ab.
43. gestational hypertension.ti,ab.
44. Hypertension/ and Pregnancy Complications, Cardiovascular/
45. Infant Mortality/
46. infant mortality.ti,ab.
47. neonatal mortality.ti,ab.
48. perinatal mortality.ti,ab.
49. hyperbilirubinemia, neonatal/ or jaundice, neonatal/
50. hyperbilirubin$.ti,ab.
51. Phototherapy/
52. phototherapy.ti,ab.
53. Polycythemia/
54. Polycythemi$.ti,ab.
55. Polycythaemi$.ti,ab.
56. Respiratory Distress Syndrome, Newborn/
57. Respiratory Distress.ti,ab.
58. Intensive Care, Neonatal/
59. neonatal intensive care.ti,ab.
60. nicu.ti,ab.
61. Infant, Small for Gestational Age/
62. Small for Gestational Age.ti,ab.
63. Fetal Growth Retardation/
64. Intrauterine Growth Retardation.ti,ab.
65. Intrauterine Growth Restriction.ti,ab.
66. IUGR.ti,ab.
67. Fetal Growth Retardation.ti,ab.
68. Fetal Growth Restriction.ti,ab.

Continued on following page

Appendix Table 1—**Continued**

69. 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 or 60 or 61 or 62 or 63 or 64 or 65 or 66 or 67 or 68
70. 15 and 69
71. limit 70 to english language
72. limit 71 to humans
73. limit 71 to animals
74. 73 not 72
75. 71 not 74
76. limit 75 to yr="2000–2006"

Appendix Table 2. Inclusion Criteria*

Key Question 1

1. Study evaluates screening for gestational diabetes <24 wk or ≥24 wk in a population relevant to primary care
2. Acceptable screening methods: 1-step (75 g or 100 g); 2-step (50 g/100 g; 50 g/75 g); fasting glucose for <24 wk
3. Positive result on screening includes
   a. 50 g: glucose value ≥130 mg/dL or ≥140 mg/dL
   b. 75 g: Carpenter and Coustan, ADA, or WHO criteria
   c. 100 g: Carpenter and Coustan or NDDG criteria
4. Primary outcomes systematically identified
   a. Maternal: mortality; preeclampsia/pregnancy-induced hypertension
   b. Perinatal outcomes: mortality; brachial plexus injury; fractured clavicle; admission to NICU for treatment of hypoglycemia, hyperbilirubinemia, or the respiratory distress syndrome
   c. Secondary or intermediate outcomes (not systematically included): macrosomia; cesarean section; induction of labor; preterm birth; maternal third- or fourth-degree perineal lacerations
5. Study design: RCT, CCT, or prospective cohort if no RCT available

Key Question 2

1. Study evaluates screening test sensitivity, specificity, reliability, and yield
2. Acceptable screening methods: 1-step (75 g or 100 g); 2-step (50 g/100 g; 50 g/75 g); fasting glucose for <24 wk
3. Positive result on screening includes
   a. 50 g: glucose value ≥130 mg/dL or ≥140 mg/dL
   b. 75 g: Carpenter and Coustan, ADA, or WHO criteria
   c. 100 g: Carpenter and Coustan or NDDG criteria
4. Outcomes: sensitivity, specificity, reliability, and yield
5. Study design: RCT, CCT, observational
6. Uses sensitivity and specificity criteria to assess primary health outcomes specified in the analytic framework

Key Question 3

1. Study evaluates treatment of gestational diabetes, including glyburide, any sulfonylurea, metformin, insulin, diet, and/or exercise therapy
2. Acceptable screening methods: 1-step (75 g or 100 g); 2-step (50 g/100 g; 50 g/75 g); fasting glucose for <24 wk
3. Positive result on screening includes
   a. 50 g: glucose value ≥130 mg/dL or ≥140 mg/dL
   b. 75 g: Carpenter and Coustan, ADA, or WHO criteria
   c. 100 g: Carpenter and Coustan or NDDG criteria
4. Primary outcomes systematically identified
   a. Maternal: mortality; preeclampsia/pregnancy-induced hypertension
   b. Perinatal outcomes: mortality; brachial plexus injury; fractured clavicle; admission to NICU for treatment of hypoglycemia, hyperbilirubinemia, or the respiratory distress syndrome
   c. Secondary or intermediate outcomes (not systematically identified): macrosomia; cesarean section; preterm birth; maternal third- or fourth-degree perineal lacerations
5. Study design: RCT, CCT, or prospective cohort if no RCT available

Key Question 4

1. Study presents harms of screening tests accepted in key questions 1 or 3
2. Acceptable screening methods: 1-step (75 g or 100 g); 2-step (50 g/100 g; 50 g/75 g); fasting glucose for <24 wk
3. Positive result on screening includes:
   a. 50 g: glucose value ≥130 mg/dL or ≥140 mg/dL
   b. 75 g: Carpenter and Coustan, ADA, or WHO criteria
   c. 100 g: Carpenter and Coustan or NDDG criteria
   d. Exception allowed if used an accepted screening method and nonstandard cutoff criteria
4. Study design: all considered

Key Question 5

1. Study presents harms of treatment accepted in key question 3
2. Acceptable screening methods: 1-step (75 g or 100 g); 2-step (50 g/100 g; 50 g/75 g); fasting glucose for <24 wk
3. Positive result on screening includes
   a. 50 g: glucose value ≥130 mg/dL or ≥140 mg/dL
   b. 75 g: Carpenter and Coustan, ADA, or WHO criteria
   c. 100 g: Carpenter and Coustan or NDDG criteria
   d. Exception allowed if used an accepted screening method and nonstandard cutoff criteria
4. Study design: all considered

Exclusion Criteria

1. Not an acceptable study design, including method of accepted study types or mixing gestational diabetes/impaired glucose tolerance/normal groups
2. Not generalizable to U.S. population
3. Did not address specified conditions and/or mortality
4. Not 1 of established screening criteria used (hemoglobin A_{1c}), or 50-g OGTT used as a diagnostic test (nonstandard) or 75-/100-g or 100-g OGTT diagnostic tests using different diagnostic criteria than the current standards as outlined in our workplan (e.g., cutoffs plus SD to a different population mean)
5. No information on yield (prevalence), sensitivity, specificity, or reliability
6. Not 1 of established screening criteria used (e.g., hemoglobin A_{1c})

Continued on following page

Appendix Table 2—Continued

7. Not 1 of the included treatments for gestational diabetes (e.g., thiazolidinediones)
8. Editorials, comments, and letters
9. Nonsystematic reviews
10. Did not address 1 of the key questions
11. Systematic review, but search strategy too old to be relevant for our interval update of the USPSTF 2003 gestational diabetes review
12. SER used as source document
13. Prevalence outside United States
14. Prevalence-only articles
15. Natural history–only articles
16. Did not report sensitivity and specificity criteria to assess specified health outcomes in the analytic framework
17. Poor quality

* To convert glucose values in mg/dL to mmol/L, multiply by 0.05551. ADA = American Diabetes Association; CCT = clinical controlled trial; NDDG = National Diabetes Data Group; NICU = neonatal intensive care unit; OGTT = oral glucose tolerance test; RCT = randomized, controlled trial; SER = systematic evidence review; USPSTF = U.S. Preventive Services Task Force; WHO = World Health Organization.

Appendix Table 3. **Excluded Studies**

Reference	Reason for Exclusion
Aberg A, Rydhstroem H, Frid A. Impaired glucose tolerance associated with adverse pregnancy outcome: a population-based study in southern Sweden. Am J Obstet Gynecol. 2001;184:77-83. [PMID: 11174484]	–
Aberg A, Westbom L. Association between maternal pre-existing or gestational diabetes and health problems in children. Acta Paediatr. 2001;90:746-50. [PMID: 11519976]	Did not address 1 of the key questions
Adams KM, Li H, Nelson RL, Ogburn PL Jr, Danilenko-Dixon DR. Sequelae of unrecognized gestational diabetes. Am J Obstet Gynecol. 1998;178:1321-32. [PMID: 9662318]	Study design
Agardh CD, Aberg A, Nordén NE. Glucose levels and insulin secretion during a 75 g glucose challenge test in normal pregnancy. J Intern Med. 1996;240:303-9. [PMID: 8946813]	No information on yield (prevalence), sensitivity/specificity, or reliability
Agarwal MM, Dhatt GS, Punnose J, Zayed R. Gestational diabetes: fasting and postprandial glucose as first prenatal screening tests in a high-risk population. J Reprod Med. 2007;52:299-305. [PMID: 17506370]	Did not report sensitivity and specificity criteria to assess specified health outcomes
Agarwal MM, Dhatt GS, Punnose J, Koster G. Gestational diabetes in a high-risk population: using the fasting plasma glucose to simplify the diagnostic algorithm. Eur J Obstet Gynecol Reprod Biol. 2005;120:39-44. [PMID: 15866084]	Did not address morbidity and/or mortality
Agarwal MM, Dhatt GS, Punnose J, Koster G. Gestational diabetes: a reappraisal of HBA1c as a screening test. Acta Obstet Gynecol Scand. 2005;84:1159-63. [PMID: 16305701]	Did not use designated diagnostic test or diagnostic criteria
Agarwal MM, Dhatt GS, Punnose J, Koster G. Gestational diabetes: dilemma caused by multiple international diagnostic criteria. Diabet Med. 2005;22:1731-6. [PMID: 16401320]	Prevalence outside United States
Agarwal MM, Hughes PF, Ezimokhai M. Screening for gestational diabetes in a high-risk population using fasting plasma glucose. Int J Gynaecol Obstet. 2000;68:147-8. [PMID: 10717820]	Study design
Agarwal MM, Hughes PF, Punnose J, Ezimokhai M. Fasting plasma glucose as a screening test for gestational diabetes in a multi-ethnic, high-risk population. Diabet Med. 2000;17:720-6. [PMID: 11110505]	Did not address morbidity and/or mortality
Agarwal MM, Punnose J, Dhatt GS. Gestational diabetes: implications of variation in post-partum follow-up criteria. Eur J Obstet Gynecol Reprod Biol. 2004;113:149-53. [PMID: 15063951]	Did not address 1 of the key questions
Agrawal RK, Lui K, Gupta JM. Neonatal hypoglycaemia in infants of diabetic mothers. J Paediatr Child Health. 2000;36:354-6. [PMID: 10940170]	Study design
Al Mahroos S, Nagalla DS, Yousif W, Sanad H. A population-based screening for gestational diabetes mellitus in non-diabetic women in Bahrain. Ann Saudi Med. 2005;25:129-33. [PMID: 15977691]	Did not use designated diagnostic test or diagnostic criteria
Alberico S, Strazzanti C, De Santo D, De Seta F, Lenardon P, Bernardon M, et al. Gestational diabetes: universal or selective screening? J Matern Fetal Neonatal Med. 2004;16:331-7. [PMID: 15621551]	Natural history only
Baliutaviciene D, Petrenko V, Zalinkevicius R. Selective or universal diagnostic testing for gestational diabetes mellitus. Int J Gynaecol Obstet. 2002;78:207-11. [PMID: 12384265]	Study design
Barahona MJ, Sucunza N, García-Patterson A, Hernández M, Adelantado JM, Ginovart G, et al. Period of gestational diabetes mellitus diagnosis and maternal and fetal morbidity. Acta Obstet Gynecol Scand. 2005;84:622-7. [PMID: 15954869]	Study design
Barden A, Singh R, Walters BN, Ritchie J, Roberman B, Beilin LJ. Factors predisposing to pre-eclampsia in women with gestational diabetes. J Hypertens. 2004;22:2371-8. [PMID: 15614032]	Study design
Bartha JL, Martinez-Del-Fresno P, Comino-Delgado R. Early diagnosis of gestational diabetes mellitus and prevention of diabetes-related complications. Eur J Obstet Gynecol Reprod Biol. 2003;109:41-4. [PMID: 12818441]	Study design
Beischer NA, Wein P, Sheedy MT, Steffen B. Identification and treatment of women with hyperglycaemia diagnosed during pregnancy can significantly reduce perinatal mortality rates. Aust N Z J Obstet Gynaecol. 1996;36:239-47. [PMID: 8883743]	Did not use designated diagnostic test or diagnostic criteria
Benjamin F, Wilson SJ, Deutsch S, Seltzer VL, Droesch K, Droesch J. Effect of advancing pregnancy on the glucose tolerance test and on the 50-g oral glucose load screening test for gestational diabetes. Obstet Gynecol. 1986;68:362-5. [PMID: 3737059]	Prevalence-only data
Berger H, Crane J, Farine D, Armson A, De La RS, Keenan-Lindsay L et al. Maternal-Fetal Medicine Committee. Screening for gestational diabetes mellitus. J Obstet Gynaecol Can. 2002;24:894-912. [PMID: 12417905]	Non–systematic review
Berkowitz GS, Roman SH, Lapinski RH, Alvarez M. Maternal characteristics, neonatal outcome, and the time of diagnosis of gestational diabetes. Am J Obstet Gynecol. 1992;167:976-82. [PMID: 1415436]	Study design
Berkus MD, Langer O, Piper JM, Luther MF. Efficiency of lower threshold criteria for the diagnosis of gestational diabetes. Obstet Gynecol. 1995;86:892-6. [PMID: 7501334]	Did not address 1 of the key questions
Berkus MD, Langer O. Glucose tolerance test: degree of glucose abnormality correlates with neonatal outcome. Obstet Gynecol. 1993;81:344-8. [PMID: 8437783]	Did not address 1 of the key questions
Bertini AM, Silva JC, Taborda W, Becker F, Lemos Bebber FR, Zucco Viesi JM, et al. Perinatal outcomes and the use of oral hypoglycemic agents. J Perinat Med. 2005;33:519-23. [PMID: 16318615]	Quality
Bhattacharya SM. Fasting or two-hour postprandial plasma glucose levels in early months of pregnancy as screening tools for gestational diabetes mellitus developing in later months of pregnancy. J Obstet Gynaecol Res. 2004;30:333-6. [PMID: 15238113]	Study design
Bhattacharya SM. Glucose screening test results in first and early third trimester of pregnancy: is there any correlation? J Obstet Gynaecol Res. 2002;28:304-7. [PMID: 12512927]	Study design; did not address morbidity and/or mortality
Bitó T, Nyári T, Kovács L, Pál A. Oral glucose tolerance testing at gestational weeks < or =16 could predict or exclude subsequent gestational diabetes mellitus during the current pregnancy in high risk group. Eur J Obstet Gynecol Reprod Biol. 2005;121:51-5. [PMID: 15989984]	Not generalizable to U.S. population
Bo S, Menato G, Signorile A, Bardelli C, Lezo A, Gallo ML, et al. Obesity or diabetes: what is worse for the mother and for the baby? Diabetes Metab. 2003;29:175-8. [PMID: 12746640]	Study design
Boriboonhirunsarn D, Sunsaneevithayakul P, Nuchangrid M. Incidence of gestational diabetes mellitus diagnosed before 20 weeks of gestation. J Med Assoc Thai. 2004;87:1017-21. [PMID: 15516000]	Did not address morbidity and/or mortality
Buchanan TA, Xiang AH, Kjos SL, Trigo E, Lee WP, Peters RK. Antepartum predictors of the development of type 2 diabetes in Latino women 11-26 months after pregnancies complicated by gestational diabetes. Diabetes. 1999;48:2430-6. [PMID: 10580433]	Did not address 1 of the key questions
Buchbinder A, Miodovnik M, Khoury J, Sibai BM. Is the use of insulin lispro safe in pregnancy? J Matern Fetal Neonatal Med. 2002;11:232-7. [PMID: 12375676]	Non–systematic review
Calle-Pascual AL, Bagazgoitia J, Calle JR, Charro A, Marañes JP. Use of insulin lispro in pregnancy. Diabetes Nutr Metab. 2000;13:173-7. [PMID: 10963394]	Non–systematic review
Carpenter MW, Coustan DR. Criteria for screening tests for gestational diabetes. Am J Obstet Gynecol. 1982;144:768-73. [PMID: 7148898]	No information on yield (prevalence), sensitivity/specificity, or reliability
Carr CA. Evidence-based diabetes screening during pregnancy. J Midwifery Womens Health. 2001;46:152-8. [PMID: 11480747]	Non–systematic review
Catalano PM, Thomas A, Huston-Presley L, Amini SB. Increased fetal adiposity: a very sensitive marker of abnormal in utero development. Am J Obstet Gynecol. 2003;189:1698-704. [PMID: 14710101]	Did not address 1 of the key questions
Chan BC, Lao TT. Gestational diabetes mellitus in women in the fourth decade—is treatment worthwhile? Gynecol Obstet Invest. 2005;60:112-6. [PMID: 15886486]	Study design
Chen X, Scholl TO, Stein TP. Association of elevated serum ferritin levels and the risk of gestational diabetes mellitus in pregnant women: The Camden study. Diabetes Care. 2006;29:1077-82. [PMID: 16644640]	Did not address 1 of the key questions
Cheng YW, Esakoff TF, Block-Kurbisch I, Ustinov A, Shafer S, Caughey AB. Screening or diagnostic: markedly elevated glucose loading test and perinatal outcomes. J Matern Fetal Neonatal Med. 2006;19:729-34. [PMID: 17127496]	Quality
Cheung NW, Byth K. Population health significance of gestational diabetes. Diabetes Care. 2003;26:2005-9. [PMID: 12832303]	Did not address 1 of the key questions
Contreras-Soto J, Forsbach G, Vazquez-Rosales J, Alvarez-Garcia C, Garcia G. Noninsulin dependent diabetes mellitus and pregnancy in Mexico. Int J Gynaecol Obstet. 1991;34:205-10. [PMID: 1673935]	Did not use established screening criteria; prevalence outside United States
Conway DL, Gonzales O, Skiver D. Use of glyburide for the treatment of gestational diabetes: the San Antonio experience. J Matern Fetal Neonatal Med. 2004;15:51-5. [PMID: 15101612]	Study design
Coomarasamy A, Connock M, Thornton J, Khan KS. Accuracy of ultrasound biometry in the prediction of macrosomia: a systematic quantitative review. BJOG. 2005;112:1461-6. [PMID: 16225563]	Did not address 1 of the key questions

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Appendix Table 3—**Continued**

Reference	Reason for Exclusion
Coustan DR, Imarah J. Prophylactic insulin treatment of gestational diabetes reduces the incidence of macrosomia, operative delivery, and birth trauma. Am J Obstet Gynecol. 1984;150:836-42. [PMID: 6391174]	Study design
Coustan DR. Management of gestational diabetes mellitus: a self-fulfilling prophecy? [Editorial]. JAMA. 1996;275:1199-200. [PMID: 8609690]	Editorials, comments, and letters
Culligan PJ, Myers JA, Goldberg RP, Blackwell L, Gohmann SF, Abell TD. Elective cesarean section to prevent anal incontinence and brachial plexus injuries associated with macrosomia—a decision analysis. Int Urogynecol J Pelvic Floor Dysfunct. 2005;16:19-28; discussion 28. [PMID: 15647962]	Did not address 1 of the key questions
Cundy T, Gamble G, Townend K, Henley PG, MacPherson P, Roberts AB. Perinatal mortality in Type 2 diabetes mellitus. Diabet Med. 2000;17:33-9. [PMID: 10691157]	Study design
Dablea D, Snell-Bergeon JK, Hartsfield CL, Bischoff KJ, Hamman RF, McDuffie RS. Kaiser Permanente of Colorado GDM Screening Program. Increasing prevalence of gestational diabetes mellitus (GDM) over time and by birth cohort: Kaiser Permanente of Colorado GDM Screening Program. Diabetes Care. 2005;28:579-84. [PMID: 15735191]	Prevalence-only data
Dang K, Homko C, Reece EA. Factors associated with fetal macrosomia in offspring of gestational diabetic women. J Matern Fetal Med. 2000;9:114-7. [PMID: 10902825]	Did not address 1 of the key questions
Davey RX, Hamblin PS. Selective versus universal screening for gestational diabetes mellitus: an evaluation of predictive risk factors. Med J Aust. 2001;174:118-21. [PMID: 11247613]	Study design
De Muylder X. Perinatal complications of gestational diabetes: the influence of the timing of the diagnosis. Eur J Obstet Gynecol Reprod Biol. 1984;18:35-42. [PMID: 6500149].	Study design
de Sereday MS, Damiano MM, González CD, Bennett PH. Diagnostic criteria for gestational diabetes in relation to pregnancy outcome. J Diabetes Complications. 2003;17:115-9. [PMID: 12738394]	Did not report sensitivity and specificity criteria to assess specified health outcomes
Deerochanawong C, Putiyanun C, Wongsuryrat M, Serirat S, Jinayon P. Comparison of National Diabetes Data Group and World Health Organization criteria for detecting gestational diabetes mellitus. Diabetologia. 1996;39:1070-3. [PMID: 8877291]	Did not report sensitivity and specificity criteria to assess specified health outcomes
Di Cianni G, Volpe L, Lencioni C, Miccoli R, Cuccuru I, Ghio A, et al. Prevalence and risk factors for gestational diabetes assessed by universal screening. Diabetes Res Clin Pract. 2003;62:131-7. [PMID: 14581150]	Did not address 1 of the key questions
Di Cianni G, Benzi L, Bottone P, Volpe L, Orsini P, Murru S, et al. Neonatal outcome and obstetric complications in women with gestational diabetes: effects of maternal body mass index. Int J Obes Relat Metab Disord. 1996;20:445-9. [PMID: 8696423]	Study design
Di Cianni G, Miccoli R, Volpe L, Lencioni C, Ghio A, Giovannitti MG, et al. Maternal triglyceride levels and newborn weight in pregnant women with normal glucose tolerance. Diabet Med. 2005;22:21-5. [PMID: 15606686]	Did not address 1 of the key questions
Di Cianni G, Volpe L, Lencioni C, Miccoli R, Cuccuru I, Ghio A, et al. Prevalence and risk factors for gestational diabetes assessed by universal screening. Diabetes Res Clin Pract. 2003;62:131-7. [PMID: 14581150]	Study design; prevalence outside United States
Dodd JM, Crowther CA, Antoniou G, Baghurst P, Robinson JS. Screening for gestational diabetes: the effect of varying blood glucose definitions in the prediction of adverse maternal and infant health outcomes. Aust N Z J Obstet Gynaecol. 2007;47:307-12. [PMID: 17627686]	Quality
Dong ZG, Beischer NA, Wein P, Sheedy MT. Value of early glucose tolerance testing in women who had gestational diabetes in their previous pregnancy. Aust N Z J Obstet Gynaecol. 1993;33:350-7. [PMID: 8179539]	Study design
Dornan T, Hollis S. Critical appraisal of published research evidence: treatment of gestational diabetes. Diabet Med. 2001;Suppl 3:1-5. [PMID: 11534305]	Editorials, comments, and letters
Dornhorst A, Frost G. The principles of dietary management of gestational diabetes: reflection on current evidence. J Hum Nutr Diet. 2002;15:145-56; quiz 157-9. [PMID: 11972744]	Non–systematic review
Dornhorst A. A comparison of glyburide and insulin in women with gestational diabetes mellitus. Diabet Med. 2001;Suppl 3:12-4. [PMID: 11534307]	Editorials, comments, and letters
Drexel H, Bichler A, Sailer S, Breier C, Lisch HJ, Braunsteiner H, et al. Prevention of perinatal morbidity by tight metabolic control in gestational diabetes mellitus. Diabetes Care. 1988;11:761-8. [PMID: 3073066]	Study design
El-Sayed YY, Lyell DJ. New therapies for the pregnant patient with diabetes. Diabetes Technol Ther. 2001;3:635-40. [PMID: 11911177]	Non–systematic review
Erem C, Cihanyurdu N, Deger O, Karahan C, Can G, Telatar M. Screening for gestational diabetes mellitus in northeastern Turkey (Trabzon City). Eur J Epidemiol. 2003;18:39-43. [PMID: 12705622]	Study design
Ertunc D, Tok E, Dilek U, Pata O, Dilek S. The effect of carbohydrate intolerance on neonatal birth weight in pregnant women without gestational diabetes mellitus. Ann Saudi Med. 2004;24:280-3. [PMID: 15387495]	Did not address 1 of the key questions
Esakoff TF, Cheng YW, Caughey AB. Screening for gestational diabetes: different cut-offs for different ethnicities? Am J Obstet Gynecol. 2005;193:1040-4. [PMID: 16157108]	Did not report sensitivity and specificity criteria to assess specified health outcomes
Fedele D, Lapolla A. A protocol of screening of gestational diabetes mellitus. Ann Ist Super Sanita. 1997;33:383-7. [PMID: 9542267]	Prevelence-only data
Feig DS, Briggs GG, Koren G. Oral antidiabetic agents in pregnancy and lactation: a paradigm shift? Ann Pharmacother. 2007;41:1174-80. [PMID: 17535842]	Study design
Feig DS, Chen E, Naylor CD. Self-perceived health status of women three to five years after the diagnosis of gestational diabetes: a survey of cases and matched controls. Am J Obstet Gynecol. 1998;178:386-93. [PMID: 9500504]	Quality
Feig DS, Razzaq A, Sykora K, Hux JE, Anderson GM. Trends in deliveries, prenatal care, and obstetrical complications in women with pregestational diabetes: a population-based study in Ontario, Canada, 1996-2001. Diabetes Care. 2006;29:232-5. [PMID: 16443865]	Did not address 1 of the key questions
Ferrara A, Hedderson MM, Quesenberry CP, Selby JV. Prevalence of gestational diabetes mellitus detected by the national diabetes data group or the carpenter and coustan plasma glucose thresholds. Diabetes Care. 2002;25:1625-30. [PMID: 12196438]	Prevelence-only data
Ferrara A, Kahn HS, Quesenberry CP, Riley C, Hedderson MM. An increase in the incidence of gestational diabetes mellitus: Northern California, 1991-2000. Obstet Gynecol. 2004;103:526-33. [PMID: 14990417]	Prevelence-only data
Fink K, Clark B. Screening for gestational diabetes mellitus. Am Fam Physician. 2004;69:1187-8. [PMID: 15023021]	Did not address 1 of the key questions
Fotinos C, Dodson S, French L. Clinical inquiries. Does tight control of blood glucose in pregnant women with diabetes improve neonatal outcomes? J Fam Pract. 2004;53:838-41. [PMID: 15469784]	Non–systematic review
Gabbe SG, Mestman JG, Freeman RK, Anderson GV, Lowensohn RI. Management and outcome of class A diabetes mellitus. Am J Obstet Gynecol. 1977;127:465-9. [PMID: 836643]	Study design
García-Patterson A, Erdozain L, Ginovart G, Adelantado JM, Cubero JM, Gallo G, et al. In human gestational diabetes mellitus congenital malformations are related to pre-pregnancy body mass index and to severity of diabetes. Diabetologia. 2004;47:509-14. [PMID: 14770278]	Study design
García-Patterson A, Martín E, Ubeda J, María MA, de Leiva A, Corcoy R. Evaluation of light exercise in the treatment of gestational diabetes [Letter]. Diabetes Care. 2001;24:2006-7. [PMID: 11679479]	Study design
Garner P, Okun N, Keely E, Wells G, Perkins S, Sylvain J, et al. A randomized controlled trial of strict glycemic control and tertiary level obstetric care versus routine obstetric care in the management of gestational diabetes: a pilot study. Am J Obstet Gynecol. 1997;177:190-5. [PMID: 9240606]	Did not use established screening criteria
Gezer A, Esen F, Mutlu H, Oztˇurk E, Ocak V. Prognosis of patients with positive screening but negative diagnostic test for gestational diabetes. Arch Gynecol Obstet. 2002;266:201-4. [PMID: 12192479]	Study design
Gillman MW, Rifas-Shiman S, Berkey CS, Field AE, Colditz GA. Maternal gestational diabetes, birth weight, and adolescent obesity. Pediatrics. 2003;111:e221-6. [PMID: 12612275]	Study design
Giuffrida FM, Castro AA, Atallah AN, Dib SA. Diet plus insulin compared to diet alone in the treatment of gestational diabetes mellitus: a systematic review. Braz J Med Biol Res. 2003;36:1297-300. [PMID: 14502360]	Quality
Glueck CJ, Bornovali S, Pranikoff J, Goldenberg N, Dharashivkar S, Wang P. Metformin, pre-eclampsia, and pregnancy outcomes in women with polycystic ovary syndrome. Diabet Med. 2004;21:829-36. [PMID: 15270785]	Did not address 1 of the key questions
Glueck CJ, Goldenberg N, Pranikoff J, Loftspring M, Sieve L, Wang P. Height, weight, and motor-social development during the first 18 months of life in 126 infants born to 109 mothers with polycystic ovary syndrome who conceived on and continued metformin through pregnancy. Hum Reprod. 2004;19:1323-30. [PMID: 15117896]	Did not address 1 of the key questions

Appendix Table 3—**Continued**

Reference	Reason for Exclusion
Glueck CJ, Wang P, Goldenberg N, Sieve-Smith L. Pregnancy outcomes among women with polycystic ovary syndrome treated with metformin. Hum Reprod. 2002;17:2858-64. [PMID: 12407039]	Did not address 1 of the key questions
Gokcel A, Bagis T, Killicadag EB, Tarim E, Guvener N. Comparison of the criteria forgestational diabetes mellitus by NDDG and Carpenter and Coustan, and the outcomes of pregnancy. J Endocrinol Invest. 2002;25:357-61. [PMID: 12030608]	Study design
González C, Santoro S, Salzberg S, Di Girolamo G, Alvariñas J. Insulin analogue therapy in pregnancies complicated by diabetes mellitus. Expert Opin Pharmacother. 2005;6:735-42. [PMID: 15934900]	Non–systematic review
Gray-Donald K, Robinson E, Collier A, David K, Renaud L, Rodrigues S. Intervening to reduce weight gain in pregnancy and gestational diabetes mellitus in Cree communities: an evaluation. CMAJ. 2000;163:1247-51. [PMID: 11107459]	Study design
Greene MF. Oral hypoglycemic drugs for gestational diabetes [Editorial]. N Engl J Med. 2000;343:1178-9. [PMID: 11036125]	Editorials, comments, and letters
Griffin ME, Coffey M, Johnson H, Scanlon P, Foley M, Stronge J, et al. Universal vs. risk factor-based screening for gestational diabetes mellitus: detection rates, gestation at diagnosis and outcome. Diabet Med. 2000;17:26-32. [PMID: 10691156]	Quality
Gruendhammer M, Brezinka C, Lechleitner M. The number of abnormal plasma glucose values in the oral glucose tolerance test and the feto-maternal outcome of pregnancy. Eur J Obstet Gynecol Reprod Biol. 2003;108:131-6. [PMID: 12781399]	Study design
Hadden D. Evidence-based screening for gestational diabetes? Diabet Med. 2000;17:402-4. [PMID: 10872544]	Editorials, comments, and letters
Hague WM, Davoren PM, Oliver J, Rowan J. Contraindications to use of metformin. Metformin may be useful in gestational diabetes [Letter]. BMJ. 2003;326:762; author reply 762. [PMID: 12680386]	Editorials, comments, and letters
HAPO Study Cooperative Research Group. The Hyperglycemia and Adverse Pregnancy Outcome (HAPO) Study. Int J Gynaecol Obstet. 2002;78:69-77. [PMID: 12113977]	Study design
Harlass FE, Brady K, Read JA. Reproducibility of the oral glucose tolerance test in pregnancy. Am J Obstet Gynecol. 1991;164:564-8. [PMID: 1992702]	Quality
Hassan A. Screening of pregnant women for gestational diabetes mellitus. J Ayub Med Coll Abbottabad. 2005;17:54-8. [PMID: 16092653]	Did not address morbidity and/or mortality
Hedderson MM, Ferrara A, Sacks DA. Gestational diabetes mellitus and lesser degrees of pregnancy hyperglycemia: association with increased risk of spontaneous preterm birth. Obstet Gynecol. 2003;102:850-6. [PMID: 14551018]	Study design
Hellmuth E, Damm P, Mølsted-Pedersen L. Oral hypoglycaemic agents in 118 diabetic pregnancies. Diabet Med. 2000;17:507-11. [PMID: 10972579]	Did not address morbidity and/or mortality
Hill JC, Krishnaveni GV, Annamma I, Leary SD, Fall CH. Glucose tolerance in pregnancy in South India: relationships to neonatal anthropometry. Acta Obstet Gynecol Scand. 2005;84:159-65. [PMID: 15683377]	Did not address morbidity and/or mortality
Hiramatsu Y, Masuyama H, Mizutani Y, Kudo T, Oguni N, Oguni Y. Heavy-for-date infants: their backgrounds and relationship with gestational diabetes. J Obstet Gynaecol Res. 2000;26:193-8. [PMID: 10932981]	Study design
Homko CJ, Reece EA. To screen or not to screen for gestational diabetes mellitus. The clinical quagmire. Clin Perinatol. 2001;28:407-17. [PMID: 11499061]	Non–systematic review
Homko CJ, Sivan E, Reece AE. Is there a role for oral antihyperglycemics in gestational diabetes and type 2 diabetes during pregnancy? Treat Endocrinol. 2004;3:133-9. [PMID: 16026109]	Non–systematic review
Homko CJ, Sivan E, Reece EA. The impact of self-monitoring of blood glucose on self-efficacy and pregnancy outcomes in women with diet-controlled gestational diabetes. Diabetes Educ. 2002;28:435-43. [PMID: 12073958]	Not 1 of the included treatments
Hong PL, Benjamin F, Deutsch S. First prenatal visit glucose screening. Am J Perinatol. 1989;6:433-6. [PMID: 2789541]	Did not use designated diagnostic test or diagnostic criteria
Hughes PF, Agarwal M, Newman P, Morrison J. Screening for gestational diabetes in a multi-ethnic population. Diabetes Res Clin Pract. 1995;28:73-8. [PMID: 7587916]	Natural history only
Hunger-Dathe W, Volk K, Braun A, S¨amann A, M¨uller UA, Peiker G, et al. Perinatal morbidity in women with undiagnosed gestational diabetes in northern thuringia in Germany. Exp Clin Endocrinol Diabetes. 2005;113:160-6. [PMID: 15789275]	Study design
Jacobson GF, Ramos GA, Ching JY, Kirby RS, Ferrara A, Field DR. Comparison of glyburide and insulin for the management of gestational diabetes in a large managed care organization. Am J Obstet Gynecol. 2005;193:118-24. [PMID: 16021069]	Study design
Jensen DM, Damm P, Sørensen B, Mølsted-Pedersen L, Westergaard JG, Klebe J, et al. Clinical impact of mild carbohydrate intolerance in pregnancy: a study of 2904 nondiabetic Danish women with risk factors for gestational diabetes mellitus. Am J Obstet Gynecol. 2001;185:413-9. [PMID: 11518901]	Study design
Jensen DM, Damm P, Sørensen B, Mølsted-Pedersen L, Westergaard JG, Korsholm L, et al. Proposed diagnostic thresholds for gestational diabetes mellitus according to a 75-g oral glucose tolerance test. Maternal and perinatal outcomes in 3260 Danish women. Diabet Med. 2003;20:51-7. [PMID: 12519320]	Study design
Jensen DM, Damm P, Sørensen B, Mølsted-Pedersen L, Westergaard JG, Ovesen P, et al. Pregnancy outcome and prepregnancy body mass index in 2459 glucose-tolerant Danish women. Am J Obstet Gynecol. 2003;189:239-44. [PMID: 12861169]	Study design
Jensen DM, Mølsted-Pedersen L, Beck-Nielsen H, Westergaard JG, Ovesen P, Damm P. Screening for gestational diabetes mellitus by a model based on risk indicators: a prospective study. Am J Obstet Gynecol. 2003;189:1383-8. [PMID: 14634573]	Did not address 1 of the key questions
Jensen DM, Sørensen B, Feilberg-Jørgensen N, Westergaard JG, Beck-Nielsen H. Maternal and perinatal outcomes in 143 Danish women with gestational diabetes mellitus and 143 controls with a similar risk profile. Diabet Med. 2000;17:281-6. [PMID: 10821294]	Study design
Jiménez-Moleón JJ, Bueno-Cavanillas A, Luna-del-Castillo JD, Lardelli-Claret P, García-Martàn M, Gálvez-Vargas R. Predictive value of a screen for gestational diabetes mellitus: influence of associated risk factors. Acta Obstet Gynecol Scand. 2000;79:991-8. [PMID: 11081686]	Did not address 1 of the key questions
Jiménez-Moleón JJ, Bueno-Cavanillas A, Luna-del-Castillo Jde D, García-Martín M, Lardelli-Claret P, Gálvez-Vargas R. Impact of different levels of carbohydrate intolerance on neonatal outcomes classically associated with gestational diabetes mellitus. Eur J Obstet Gynecol Reprod Biol. 2002;102:36-41. [PMID: 12039087]	Study design
Jiménez-Moleón JJ, Bueno-Cavanillas A, Luna-Del-Castillo JD, García-Martín M, Lardelli-Claret P, Gálvez-Vargas R. Prevalence of gestational diabetes mellitus: variations related to screening strategy used. Eur J Endocrinol. 2002;146:831-7. [PMID: 12039704]	Prevalence outside United States
Jiménez-Moleón JJ, Bueno-Cavanillas A, Luna-del-Castillo JD, Lardelli-Claret P, García-Martín M, Gálvez-Vargas R. Predictive value of a screen for gestational diabetes mellitus: influence of associated risk factors. Acta Obstet Gynecol Scand. 2000;79:991-8. [PMID: 11081686]	Study design
Joffe GM, Esterlitz JR, Levine RJ, Clemens JD, Ewell MG, Sibai BM, et al. The relationship between abnormal glucose tolerance and hypertensive disorders of pregnancy in healthy nulliparous women. Calcium for Preeclampsia Prevention (CPEP) Study Group. Am J Obstet Gynecol. 1998;179:1032-7. [PMID: 9790393]	Did not address 1 of the key questions
Jørgensen LG, Schytte T, Brandslund I, Stahl M, Petersen PH, Andersen B. Fasting and post-glucose load—reference limits for peripheral venous plasma glucose concentration in pregnant women. Clin Chem Lab Med. 2003;41:187-99. [PMID: 12667006]	Did not use designated diagnostic test or diagnostic criteria
Jovanovic L, Knopp RH, Brown Z, Conley MR, Park E, Mills JL et al. National Institute of Child Health and Human Development Diabetes in Early Pregnancy Study Group. Declining insulin requirement in the late first trimester of diabetic pregnancy. Diabetes Care. 2001;24:1130-6. [PMID: 11423491]	Did not address 1 of the key questions
Jovanovic L, Knopp RH, Kim H, Cefalu WT, Zhu XD, Lee YJ, et al. Elevated pregnancy losses at high and low extremes of maternal glucose in early normal and diabetic pregnancy: evidence for a protective adaptation in diabetes. Diabetes Care. 2005;28:1113-7. [PMID: 15855575]	Did not address 1 of the key questions
Juntarat W, Rueangchainikhom W, Promas S. 50-grams glucose challenge test for screening of gestational diabetes mellitus in high risk pregnancy. J Med Assoc Thai. 2007;90:617-23. [PMID: 17487113]	Did not report sensitivity and specificity criteria to assess specified health outcomes
Kalter H. The non-teratogenicity of gestational diabetes. Paediatr Perinat Epidemiol. 1998;12:456-8. [PMID: 9805717]	Study design
Kerbel D, Glazier R, Holzapfel S, Yeung M, Lofsky S. Adverse effects of screening for gestational diabetes: a prospective cohort study in Toronto, Canada. J Med Screen. 1997;4:128-32. [PMID: 9368868]	Quality
Keshavarz M, Cheung NW, Babaee GR, Moghadam HK, Ajami ME, Shariati M. Gestational diabetes in Iran: incidence, risk factors and pregnancy outcomes. Diabetes Res Clin Pract. 2005;69:279-86. [PMID: 16098925]	Natural history only

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Appendix Table 3—**Continued**

Reference	Reason for Exclusion
Kestilä KK, Ekblad UU, Rönnemaa T. Continuous glucose monitoring versus self-monitoring of blood glucose in the treatment of gestational diabetes mellitus. Diabetes Res Clin Pract. 2007;77:174-9. [PMID: 17234297]	Did not address 1 of the key questions
Kitzmiller JL, Elixhauser A, Carr S, Major CA, de Veciana M, Dang-Kilduff L, et al. Assessment of costs and benefits of management of gestational diabetes mellitus. Diabetes Care. 1998;21 Suppl 2:B123-30. [PMID: 9704239]	Did not address 1 of the key questions
Kjos SL, Buchanan TA. Gestational diabetes mellitus. N Engl J Med. 1999;341:1749-56. [PMID: 10580075]	Non–systematic review
Kjos SL, Schaefer-Graf U, Sardesi S, Peters RK, Buley A, Xiang AH, et al. A randomized controlled trial using glycemic plus fetal ultrasound parameters versus glycemic parameters to determine insulin therapy in gestational diabetes with fasting hyperglycemia. Diabetes Care. 2001;24:1904-10. [PMID: 11679455]	Did not address 1 of the key questions
Knopp RH, Magee MS, Raisys V, Benedetti T, Bonet B. Hypocaloric diets and ketogenesis in the management of obese gestational diabetic women. J Am Coll Nutr. 1991;10:649-67. [PMID: 1770194]	Study design
Ko GT, Chan JC, Tsang LW, Yeung VT, Chow CC, Cockram CS. Outcomes of screening for diabetes in high-risk Hong Kong Chinese subjects. Diabetes Care. 2000;23:1290-4. [PMID: 10977020]	Did not address 1 of the key questions
Kremer CJ, Duff P. Glyburide for the treatment of gestational diabetes. Am J Obstet Gynecol. 2004;190:1438-9. [PMID: 15167862]	Study design
Kumar KM. Current diagnostic criteria and their impact on outcome and management. J Indian Med Assoc. 2002;100:149-52. [PMID: 12408272]	Editorials, comments, and letters
Kvetny J, Poulsen HF. Incidence of gestational hypertension in gestational diabetes mellitus. Arch Gynecol Obstet. 2003;267:153-7. [PMID: 12552326]	Natural history only
Kyle CV, Cundy TF. Screening for gestational diabetes mellitus: can we be more efficient? Aust N Z J Obstet Gynaecol. 2001;41:285-90. [PMID: 11592542]	Study design; no information on yield (prevalence), sensitivity/specificity, or reliability
Landon MB, Thom E, Spong CY, Carpenter M, Mele L, Johnson F, Tillinghast J, Anderson G. Maternal-Fetal Medicine Units Network, The National Institute of Child Health and Human Development. The National Institute of Child Health and Human Development Maternal-Fetal Medicine Unit Network randomized clinical trial in progress: standard therapy versus no therapy for mild gestational diabetes. Diabetes Care. 2007;30 Suppl 2:S194-9. [PMID: 17596471]	Did not address 1 of the key questions
Landon MB, Thom E, Spong CY, Gabbe SG, Leindecker S, Johnson F, et al. A planned randomized clinical trial of treatment for mild gestational diabetes mellitus. J Matern Fetal Neonatal Med. 2002;11:226-31. [PMID: 12375675]	Did not address 1 of the key questions
Langer O, Anyaegbunam A, Brustman L, Divon M. Management of women with one abnormal oral glucose tolerance test value reduces adverse outcome in pregnancy. Am J Obstet Gynecol. 1989;161:593-9. [PMID: 2675597]	Did not address 1 of the key questions
Langer O, Brustman L, Anyaegbunam A, Mazze R. The significance of one abnormal glucose tolerance test value on adverse outcome in pregnancy. Am J Obstet Gynecol. 1987;157:758-63. [PMID: 3631178]	Did not address 1 of the key questions
Langer O, Rodriguez DA, Xenakis EM, McFarland MB, Berkus MD, Arrendondo F. Intensified versus conventional management of gestational diabetes. Am J Obstet Gynecol. 1994;170:1036-46; discussion 1046-7. [PMID: 8166187]	Study design
Langer O, Yogev Y, Most O, Xenakis EM. Gestational diabetes: the consequences of not treating. Am J Obstet Gynecol. 2005;192:989-97. [PMID: 15846171]	Study design
Langer O, Yogev Y, Xenakis EM, Brustman L. Overweight and obese in gestational diabetes: the impact on pregnancy outcome. Am J Obstet Gynecol. 2005;192:1768-76. [PMID: 15970805]	Study design
Lanni S, Barrett D. The predictive value of the 1-h 50-g glucose screen for diagnosing gestational diabetes mellitus in a high-risk population. J Matern Fetal Neonatal Med. 2004;15:375-9. [PMID: 15280108]	Study design
Lao TT, Tam KF. Gestational diabetes diagnosed in third trimester pregnancy and pregnancy outcome. Acta Obstet Gynecol Scand. 2001;80:1003-8. [PMID: 11703196]	Did not use designated diagnostic test or diagnostic criteria
Lao TT, Wong KY. Perinatal outcome in large-for-gestational-age infants. Is it influenced by gestational impaired glucose tolerance? J Reprod Med. 2002;47:497-502. [PMID: 12092021]	Study design
Lauenborg J, Hansen T, Jensen DM, Vestergaard H, Mølsted-Pedersen L, Hornnes P, et al. Increasing incidence of diabetes after gestational diabetes: a long-term follow-up in a Danish population. Diabetes Care. 2004;27:1194-9. [PMID: 15111544]	Did not address 1 of the key questions
Lauszus FF, Rasmussen OW, Henriksen JE, Klebe JG, Jensen L, Lauszus KS, et al. Effect of a high monounsaturated fatty acid diet on blood pressure and glucose metabolism in women with gestational diabetes mellitus. Eur J Clin Nutr. 2001;55:436-43. [PMID: 11423920]	Did not use designated diagnostic test or diagnostic criteria
Lavin JP, Barden TP, Miodovnik M. Clinical experience with a screening program for gestational diabetes. Am J Obstet Gynecol. 1981;141:491-4. [PMID: 7294074]	Did not address 1 of the key questions
Leipold H, Worda C, Gruber CJ, Kautzky-Willer A, Husslein PW, Bancher-Todesca D. Large-for-gestational-age newborns in women with insulin-treated gestational diabetes under strict metabolic control. Wien Klin Wochenschr. 2005;117:521-5. [PMID: 16160802]	Did not use designated diagnostic test or diagnostic criteria
Lemen PM, Wigton TR, Miller-McCarthey AJ, Cruikshank DP. Screening for gestational diabetes mellitus in adolescent pregnancies. Am J Obstet Gynecol. 1998;178:1251-6. [PMID: 9662309]	Did not address 1 of the key questions
Li DF, Wong VC, O'Hoy KM, Yeung CY, Ma HK. Is treatment needed for mild impairment of glucose tolerance in pregnancy? A randomized controlled trial. Br J Obstet Gynaecol. 1987;94:851-4. [PMID: 3311138]	Quality
Livingston RC, Bachman-Carter K, Frank C, Mason WB. Diabetes mellitus in Tohon O'odham pregnancies. Diabetes Care. 1993;16:318-21. [PMID: 8422800]	Study design
Lu GC, Rouse DJ, DuBard M, Cliver S, Kimberlin D, Hauth JC. The effect of the increasing prevalence of maternal obesity on perinatal morbidity. Am J Obstet Gynecol. 2001;185:845-9. [PMID: 11641663]	Study design
Lucas MJ, Lowe TW, Bowe L, McIntire DD. Class A1 gestational diabetes: a meaningful diagnosis? Obstet Gynecol. 1993;82:260-5. [PMID: 8336875]	Study design
MacNeill S, Dodds L, Hamilton DC, Armson BA, VandenHof M. Rates and risk factors for recurrence of gestational diabetes. Diabetes Care. 2001;24:659-62. [PMID: 11315827]	Did not address 1 of the key questions
Magee MS, Walden CE, Benedetti TJ, Knopp RH. Influence of diagnostic criteria on the incidence of gestational diabetes and perinatal morbidity. JAMA. 1993;269:609-15. [PMID: 8421365]	Study design
Manassakorn J, Wankrue P, Tantisirin P, Cheunwatana P, Intramax L. Oral glucose tolerance test at each trimester of pregnancy. J Med Assoc Thai. 1988;71:25-8. [PMID: 3361252]	Did not address morbidity and/or mortality, did not address 1 of the key questions
Mannucci E, Bardini G, Rotella CM. Effect of lower diagnostic thresholds on estimates of prevalence of impaired fasting glucose (IFG) [Letter]. Diabet Med. 2005;22:353-4. [PMID: 15717889]	Editorials, comments, and letters
Marquette GP, Klein VR, Niebyl JR. Efficacy of screening for gestational diabetes. Am J Perinatol. 1985;2:7-9. [PMID: 3921038]	Did not address morbidity and/or mortality
Massion C, O'Connor PJ, Gorab R, Crabtree BF, Nakamura RM, Coulehan JL. Screening for gestational diabetes in a high-risk population. J Fam Pract. 1987;25:569-75. [PMID: 3681218]	No information on yield (prevalence), sensitivity/specificity, or reliability
Mazze RS, Langer O. Primary, secondary, and tertiary prevention. Program for diabetes in pregnancy. Diabetes Care. 1988;11:263-8. [PMID: 3416681]	Natural history only
McDonald GW, Fisher GF, Burnham C. Reproducibility of the oral glucose tolerance test. Diabetes. 1965;14:473-80. [PMID: 14334838]	Did not address 1 of the key questions
McIntyre HD, Begg LM, Parry AF, Oats J. Audit of maternal and fetal outcomes in women treated for glucose intolerance during pregnancy. Aust N Z J Obstet Gynaecol. 2002;42:23-8. [PMID: 11926637]	Study design
McIntyre HD, Cheung NW, Oats JJ, Simmons D. Gestational diabetes mellitus: from consensus to action on screening and treatment [Editorial]. Med J Aust. 2005;183:288-9. [PMID: 16167866]	Editorials, comments, and letters
Mecacci F, Carignani L, Cioni R, Bartoli E, Parretti E, La Torre P, et al. Maternal metabolic control and perinatal outcome in women with gestational diabetes treated with regular or lispro insulin: comparison with non-diabetic pregnant women. Eur J Obstet Gynecol Reprod Biol. 2003;111:19-24. [PMID: 14557006]	Quality
Mello G, Elena P, Ognibene A, Cioni R, Tondi F, Pezzati P, et al. Lack of concordance between the 75-g and 100-g glucose load tests for the diagnosis of gestational diabetes mellitus. Clin Chem. 2006;52:1679-84. [PMID: 16873295]	Did not report sensitivity and specificity criteria to assess specified health outcomes

Appendix Table 3—**Continued**

Reference	Reason for Exclusion
Mello G, Parretti E, Mecacci F, Lucchetti R, Cianciulli D, Lagazio C, et al. Anthropometric characteristics of full-term infants: effects of varying degrees of "normal" glucose metabolism. J Perinat Med. 1997;25:197-204. [PMID: 9189841]	Did not address 1 of the key questions
Mello G, Parretti E, Mecacci F, Lucchetti R, Lagazio C, Pratesi M, et al. Risk factors for fetal macrosomia: the importance of a positive oral glucose challenge test. Eur J Endocrinol. 1997;137:27-33. [PMID: 9242198]	Natural history only
Meyer WJ, Carbone J, Gauthier DW, Gottmann DA. Early gestational glucose screening and gestational diabetes. J Reprod Med. 1996;41:675-9. [PMID: 8887193]	No information on yield (prevalence), sensitivity/specificity, or reliability
Miyakoshi K, Tanaka M, Matsumoto T, Hattori Y, Ueno K, Teranishi T, et al. Hypertensive disorders in Japanese women with gestational glucose intolerance. Diabetes Res Clin Pract. 2004;64:201-5. [PMID: 15126008]	Study design
Miyakoshi K, Tanaka M, Ueno K, Uehara K, Ishimoto H, Yoshimura Y. Cutoff value of 1 h, 50 g glucose challenge test for screening of gestational diabetes mellitus in a Japanese population. Diabetes Res Clin Pract. 2003;60:63-7. [PMID: 12639767]	Study design; no information on yield (prevalence), sensitivity/specificity, or reliability
Montoro MN, Kjos SL, Chandler M, Peters RK, Xiang AH, Buchanan TA. Insulin resistance and preeclampsia in gestational diabetes mellitus. Diabetes Care. 2005;28:1995-2000. [PMID: 16043744]	Did not address 1 of the key questions
Moses RG, Griffiths RD. Can a diagnosis of gestational diabetes be an advantage to the outcome of pregnancy? J Soc Gynecol Investig. 1995;2:523-5. [PMID: 9420853]	Study design
Moses RG, Mackay MT. Gestational diabetes: is there a relationship between leg length and glucose tolerance? Diabetes Care. 2004;27:1033-5. [PMID: 15111516]	Did not address 1 of the key questions
Moses RG, Moses J, Davis WS. Gestational diabetes: do lean young caucasian women need to be tested? Diabetes Care. 1998;21:1803-6. [PMID: 9802724]	Did not address 1 of the key questions
Nahum GG, Huffaker BJ. Correlation between first- and early third-trimester glucose screening test results. Obstet Gynecol. 1990;76:709-13. [PMID: 2216208]	Quality
Nahum GG, Wilson SB, Stanislaw H. Early-pregnancy glucose screening for gestational diabetes mellitus. J Reprod Med. 2002;47:656-62. [PMID: 12216433]	Did not use designated diagnostic test or diagnostic criteria
Naylor CD, Sermer M, Chen E, Farine D. Selective screening for gestational diabetes mellitus. Toronto Trihospital Gestational Diabetes Project Investigators. N Engl J Med. 1997;337:1591-6. [PMID: 9371855]	Study design
Naylor JL, Schraer CD, Mayer AM, Lanier AP, Treat CA, Murphy NJ. Diabetes among Alaska Natives: a review. Int J Circumpolar Health. 2003;62:363-87. [PMID: 14964764]	Non–systematic review
Nielsen IK, Vinther S, Birch K, Lange AP. Random blood glucose sampling as an early antenatal screening test for diabetes mellitus. Diabetes Res. 1988;8:31-3. [PMID: 3066564]	No information on yield (prevalence), sensitivity/specificity, or reliability
Nordin NM, Wei JW, Naing NN, Symonds EM. Comparison of maternal-fetal outcomes in gestational diabetes and lesser degrees of glucose intolerance. J Obstet Gynaecol Res. 2006;32:107-14. [PMID: 16445535]	Study design
Olefsky JM, Reaven GM. Insulin and glucose responses to identical oral glucose tolerance tests performed forty-eight hours apart. Diabetes. 1974;23:449-53. [PMID: 4830180]	Study design
Omori Y, Minei S, Uchigata Y, Shimizu M, Sanaka M, Honda M, et al. Comparison of diagnostic criteria of Intervention groupT, borderline, and GDM. Blood glucose curve and IRI response. Diabetes. 1991;40 Suppl 2:30-4. [PMID: 1748262]	No information on yield (prevalence), sensitivity/specificity, or reliability
Oppermann W, Camerini-Davalos RA. Early diabetes during pregnancy. Diabetes Care. 1980;3:465-7. [PMID: 6993161]	Study design
Ostlund I, Hanson U, Björklund A, Hjertberg R, Eva N, Nordlander E, et al. Maternal and fetal outcomes if gestational impaired glucose tolerance is not treated. Diabetes Care. 2003;26:2107-11. [PMID: 12832321]	Study design
Ostlund I, Hanson U. Repeated random blood glucose measurements as universal screening test for gestational diabetes mellitus. Acta Obstet Gynecol Scand. 2004;83:46-51. [PMID: 14678085]	Did not use designated diagnostic test or diagnostic criteria
O'Sullivan JB. Establishing criteria for gestational diabetes. Diabetes Care. 1980;3:437-9. [PMID: 7389559]	Quality
O'Sullivan JB. Gestational diabetes. Unsuspected, asymptomatic diabetes in pregnancy. N Engl J Med. 1961;264:1082-5. [PMID: 13730123]	Prevalence-only data
O'Sullivan JB, Charles D, Mahan CM, Dandrow RV. Gestational diabetes and perinatal mortality rate. Am J Obstet Gynecol. 1973;116:901-4. [PMID: 4718217]	Natural history only
O'Sullivan JB, Mahan CM. Criteria for the oral glucose tolerance test in pregnancy. Diabetes. 1964;13:278-85. [PMID: 14166677]	Did not address 1 of the key questions
Peled Y, Perri T, Chen R, Pardo J, Bar J, Hod M. Gestational diabetes mellitus—implications of different treatment protocols. J Pediatr Endocrinol Metab. 2004;17:847-52. [PMID: 15270402]	Study design
Pennison EH, Egerman RS. Perinatal outcomes in gestational diabetes: a comparison of criteria for diagnosis. Am J Obstet Gynecol. 2001;184:1118-21. [PMID: 11349174]	Study design; no information on yield (prevalence), sensitivity/specificity, or reliability
Pettitt DJ, Ospina P, Howard C, Zisser H, Jovanovic L. Efficacy, safety and lack of immunogenicity of insulin aspart compared with regular human insulin for women with gestational diabetes mellitus. Diabet Med. 2007;24:1129-35. [PMID: 17888133]	Did not address 1 of the key questions
Pettitt DJ, Bennett PH, Hanson RL, Narayan KM, Knowler WC. Comparison of World Health Organization and National Diabetes Data Group procedures to detect abnormalities of glucose tolerance during pregnancy. Diabetes Care. 1994;17:1264-8. [PMID: 7821165]	Quality; nonstandard screening test
Pettitt DJ, Bennett PH, Saad MF, Charles MA, Nelson RG, Knowler WC. Abnormal glucose tolerance during pregnancy in Pima Indian women. Long-term effects on offspring. Diabetes. 1991;40 Suppl 2:126-30. [PMID: 1748241]	Did not address 1 of the key questions
Pettitt DJ, Knowler WC, Baird HR, Bennett PH. Gestational diabetes: infant and maternal complications of pregnancy in relation to third-trimester glucose tolerance in the Pima Indians. Diabetes Care. 1980;3:458-64. [PMID: 7389563]	Natural history only
Phung H, Bauman A, Tran M, Young L, McDonald J, Michell L, et al. Factors that influence special care nursery admissions to a district hospital in South-western Sydney. J Paediatr Child Health. 2005;41:119-24. [PMID: 15790322]	Study design
Pöyhönen-Alho M, Teramo K, Kaaja R. Treatment of gestational diabetes with short- or long-acting insulin and neonatal outcome: a pilot study. Acta Obstet Gynecol Scand. 2002;81:258-9. [PMID: 11966484]	Did not use designated diagnostic test or diagnostic criteria
Ramadhani TA, Canfield MA, Waller DK, Case AP. Medical records vs. interview responses: a comparative analysis of selected variables for linked birth defect cases. Birth Defects Res A Clin Mol Teratol. 2004;70:592-6. [PMID: 15368558]	Study design
Ramírez-Torres MA, Rodríuez-Pezino J, Zambrana-Castañeda M, Lira-Plascencia J, Parra A. Gestational diabetes mellitus and glucose intolerance among Mexican pregnant adolescents. J Pediatr Endocrinol Metab. 2003;16:401-5. [PMID: 12705365]	Did not address morbidity and/or mortality; no information on yield (prevalence), sensitivity/specificity, or reliability
Ratzon N, Greenbaum C, Dulitzky M, Ornoy A. Comparison of the motor development of school-age children born to mothers with and without diabetes mellitus. Phys Occup Ther Pediatr. 2000;20:43-57. [PMID: 11293914]	Did not address 1 of the key questions
Ray JG. Screening and active management reduced perinatal complications more than routine care in gestational diabetes. ACP J Club. 2005;143:65. [PMID: 16262222]	Editorials, comments, and letters
Reece EA. Synopsis of the North American Diabetes in Pregnancy Study Group Conference in Little Rock, Arkansas, May 2003 [Editorial]. J Matern Fetal Neonatal Med. 2004;15:1-5. [PMID: 15101605]	Editorials, comments and letters
Ricart W, Bach C, Fernández-Real JM, Sabrià J. Major fetal complications in optimised progestational diabetes mellitus [Letter]. Diabetologia. 2000;43:1077-8. [PMID: 10990089]	Editorials, comments, and letters
Ricart W, Lopez J, Mozas J, Pericot A, Sancho MA, Gonzalez N, et al. Spanish Group for the Study of the Impact of Carpenter and Coustan GDM Thresholds. Body mass index has a greater impact on pregnancy outcomes than gestational hyperglycaemia. Diabetologia. 2005;48:1736-42. [PMID: 16052327]	Natural history only
Ricart W, Lopez J, Mozas J, Pericot A, Sancho MA, Gonzalez N, et al. Spanish Group for the Study of the Impact of Carpenter and Coustan GDM thresholds. Potential impact of American Diabetes Association (2000) criteria for diagnosis of gestational diabetes mellitus in Spain. Diabetologia. 2005;48:1135-41. [PMID: 15889233]	Natural history only
Rizzo TA, Dooley SL, Metzger BE, Cho NH, Ogata ES, Silverman BL. Prenatal and perinatal influences on long-term psychomotor development in offspring of diabetic mothers. Am J Obstet Gynecol. 1995;173:1753-8. [PMID: 8610757]	Study design
Roberts RN, Moohan JM, Foo RL, Harley JM, Traub AI, Hadden DR. Fetal outcome in mothers with impaired glucose tolerance in pregnancy. Diabet Med. 1993;10:438-43. [PMID: 8334823]	Study design

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Appendix Table 3—**Continued**

Reference	Reason for Exclusion
Rouse DJ, Owen J, Goldenberg RL, Cliver SP. The effectiveness and costs of elective cesarean delivery for fetal macrosomia diagnosed by ultrasound. JAMA. 1996;276:1480-6. [PMID: 8903259]	Did not address 1 of the key questions
Rouse DJ, Owen J. Prophylactic cesarean delivery for fetal macrosomia diagnosed by means of ultrasonography—a Faustian bargain? Am J Obstet Gynecol. 1999;181:332-8. [PMID: 10454678]	Did not address 1 of the key questions
Rudge MV, Calderon IM, Ramos MD, Abbade JF, Rugolo LM. Perinatal outcome of pregnancies complicated by diabetes and by maternal daily hyperglycemia not related to diabetes. A retrospective 10-year analysis. Gynecol Obstet Invest. 2000;50:108-12. [PMID: 10965194]	Study design
Rust OA, Bofill JA, Andrew ME, Kincaid TA, Stubbs TM, Miller EH, et al. Lowering the threshold for the diagnosis of gestational diabetes. Am J Obstet Gynecol. 1996;175:961-5. [PMID: 8885755]	Study design
Sacks DA, Abu-Fadil S, Greenspoon JS, Fotheringham N. Do the current standards for glucose tolerance testing in pregnancy represent a valid conversion of O'Sullivan's original criteria? Am J Obstet Gynecol. 1989;161:638-41. [PMID: 2782345]	Did not address 1 of the key questions
Sacks DA, Abu-Fadil S, Greenspoon JS, Fotheringham N. How reliable is the fifty-gram, one-hour glucose screening test? Am J Obstet Gynecol. 1989;161:642-5. [PMID: 2782346]	Quality
Sacks DA, Abu-Fadil S, Karten GJ, Forsythe AB, Hackett JR. Screening for gestational diabetes with the one-hour 50-g glucose test. Obstet Gynecol. 1987;70:89-93. [PMID: 3601272]	No information on yield (prevalence), sensitivity/specificity, or reliability
Sacks DA, Chen W, Wolde-Tsadik G, Buchanan TA. Fasting plasma glucose test at the first prenatal visit as a screen for gestational diabetes. Obstet Gynecol. 2003;101:1197-203. [PMID: 12798525]	Did not use established screening criteria
Sacks DA, Greenspoon JS, Abu-Fadil S, Henry HM, Wolde-Tsadik G, Yao JF. Toward universal criteria for gestational diabetes: the 75-gram glucose tolerance test in pregnancy. Am J Obstet Gynecol. 1995;172:607-14. [PMID: 7856693]	Did not address 1 of the key questions
Sacks DA, Liu AI, Wolde-Tsadik G, Amini SB, Huston-Presley L, Catalano PM. What proportion of birth weight is attributable to maternal glucose among infants of diabetic women? Am J Obstet Gynecol. 2006;194:501-7. [PMID: 16458653]	Study design
Saldana TM, Siega-Riz AM, Adair LS, Savitz DA, Thorp JM Jr. The association between impaired glucose tolerance and birth weight among black and white women in central North Carolina. Diabetes Care. 2003;26:656-61. [PMID: 12610017]	Natural history only
Sameshima H, Kamitomo M, Kajiya S, Kai M, Furukawa S, Ikenoue S. Early glycemic control reduces large-for-gestational-age infants in 250 Japanese gestational diabetes pregnancies. Am J Perinatol. 2000;17:371-6. [PMID: 12141524]	Study design
Santini DL, Ales KL. The impact of universal screening for gestational glucose intolerance on outcome of pregnancy. Surg Gynecol Obstet. 1990;170:427-36. [PMID: 2326724]	Study design
Sarkar S, Watman J, Seigel WM, Schaeffer HA. A prospective controlled study of neonatal morbidities in infants born at 36 weeks or more gestation to Women with diet-controlled gestational diabetes (GDM-class A!). J Perinatol. 2003;23:223-8. [PMID: 12732860]	Did not address 1 of the key questions
Schäfer-Graf UM, Dupak J, Vogel M, Dudenhausen JW, Kjos SL, Buchanan TA, et al. Hyperinsulinism, neonatal obesity and placental immaturity in infants born to women with one abnormal glucose tolerance test value. J Perinat Med. 1998;26:27-36. [PMID: 9595364]	Did not address 1 of the key questions
Schmidt MI, Duncan BB, Reichelt AJ, Branchtein L, Matos MC, Costa e Forti, et al. Brazilian Gestational Diabetes Study Group. Gestational diabetes mellitus diagnosed with a 2-h 75-g oral glucose tolerance test and adverse pregnancy outcomes. Diabetes Care. 2001;24:1151-5. [PMID: 11423494]	Natural history only
Schwartz ML, Ray WN, Lubarsky SL. The diagnosis and classification of gestational diabetes mellitus: is it time to change our tune? Am J Obstet Gynecol. 1999;180:1560-71. [PMID: 10368504]	Did not report sensitivity and specificity criteria to assess specified health outcomes
Schytte T, Jørgensen LG, Brandslund I, Petersen PH, Andersen B. The clinical impact of screening for gestational diabetes. Clin Chem Lab Med. 2004;42:1036-42. [PMID: 15497470]	Did not use designated diagnostic test or diagnostic criteria
Scott DA, Loveman E, McIntyre L, Waugh N. Screening for gestational diabetes: a systematic review and economic evaluation. Health Technol Assess. 2002;6:1-161. [PMID: 12433317]	Systematic evidence review used as source document
Sermer M, Naylor CD, Farine D, Kenshole AB, Ritchie JW, Gare DJ, et al. The Toronto Tri-Hospital Gestational Diabetes Project. A preliminary review. Diabetes Care. 1998;21 Suppl 2:B33-42. [PMID: 9704225]	Did not use designated diagnostic test or diagnostic criteria
Sermer M, Naylor CD, Gare DJ, Kenshole AB, Ritchie JW, Farine D, et al. Impact of increasing carbohydrate intolerance on maternal-fetal outcomes in 3637 women without gestational diabetes. The Toronto Tri-Hospital Gestational Diabetes Project. Am J Obstet Gynecol. 1995;173:146-56. [PMID: 7631672]	Did not use designated diagnostic test or diagnostic criteria
Sermer M, Naylor CD, Gare DJ, Kenshole AB, Ritchie JW, Farine D, et al. Impact of time since last meal on the gestational glucose challenge test. The Toronto Tri-Hospital Gestational Diabetes Project. Am J Obstet Gynecol. 1994;171:607-16. [PMID: 8092205]	No information on yield (prevalence), sensitivity/specificity, or reliability
Seshiah V, Balaji V, Balaji MS, Paneerselvam A, Arthi T, Thamizharasi M, et al. Gestational diabetes mellitus manifests in all trimesters of pregnancy. Diabetes Res Clin Pract. 2007;77:482-4. [PMID: 17292506]	Prevalence-only data
Shamsuddin K, Mahdy ZA, Siti Rafiaah I, Jamil MA, Rahimah MD. Risk factor screening for abnormal glucose tolerance in pregnancy. Int J Gynaecol Obstet. 2001;75:27-32. [PMID: 11597616]	Did not address 1 of the key questions
Sheffield JS, Butler-Koster EL, Casey BM, McIntire DD, Leveno KJ. Maternal diabetes mellitus and infant malformations. Obstet Gynecol. 2002;100:925-30. [PMID: 12423854]	Study design
Silverman BL, Rizzo T, Green OC, Cho NH, Winter RJ, Ogata ES, et al. Long-term prospective evaluation of offspring of diabetic mothers. Diabetes. 1991;40 Suppl 2:121-5. [PMID: 1748240]	Did not address 1 of the key questions
Simmons D, Thompson CF, Conroy C, Scott DJ. Use of insulin pumps in pregnancies complicated by type 2 diabetes and gestational diabetes in a multiethnic community. Diabetes Care. 2001;24:2078-82. [PMID: 11723086]	Did not use designated diagnostic test or diagnostic criteria
Simmons D, Thompson CF, Conroy C. Incidence and risk factors for neonatal hypoglycaemia among women with gestational diabetes mellitus in South Auckland. Diabet Med. 2000;17:830-4. [PMID: 11168324]	Study design
Simpson RW, Kast SJ. Management of gestational diabetes with a conservative insulin protocol. Med J Aust. 2000;172:537-40. [PMID: 10920751]	Did not use designated diagnostic test or diagnostic criteria
Siribaddana SH, Deshabandu R, Rajapakse D, Silva K, Fernando DJ. The prevalence of gestational diabetes in a Sri Lankan antenatal clinic. Ceylon Med J. 1998;43:88-91. [PMID: 9704548]	Prevalence outside United States
Sjögren B, Robeus N, Hansson U. Gestational diabetes: a case-control study of women's experience of pregnancy, health and the child. J Psychosom Res. 1994;38:815-22. [PMID: 7722961]	Quality
Skitek M. Screening for gestational diabetes mellitus [Letter]. Clin Chem Lab Med. 2005;43:664-6. [PMID: 16006265]	Editorials, comments, and letters
Soonthornpun S, Soonthornpun K, Aksonteing J, Thamprasit A. A comparison between a 75-g and 100-g oral glucose tolerance test in pregnant women. Int J Gynaecol Obstet. 2003;81:169-73. [PMID: 12706274]	No information on yield (prevalence), sensitivity/specificity, or reliability
Southwick RD, Wigton TR. Screening for gestational diabetes mellitus in adolescent Hispanic Americans. J Reprod Med. 2000;45:31-4. [PMID: 10664944]	Study design
Stamilio DM, Olsen T, Ratcliffe S, Sehdev HM, Macones GA. False-positive 1-hour glucose challenge test and adverse perinatal outcomes. Obstet Gynecol. 2004;103:148-56. [PMID: 14704259]	Study design
Suhonen L, Teramo K. Hypertension and pre-eclampsia in women with gestational glucose intolerance. Acta Obstet Gynecol Scand. 1993;72:269-72. [PMID: 8389513]	Study design
Sunsaneevithayakul P, Boriboohirunsarn D, Sutanthavibul A, Ruangvutilert P, Kanokpongsakdi S, Singkiratana D, et al. Risk factor-based selective screening program for gestational diabetes mellitus in Siriraj Hospital: result from clinical practice guideline. J Med Assoc Thai. 2003;86:708-14. [PMID: 12948268]	Study design
Super DM, Edelberg SC, Philipson EH, Hertz RH, Kalhan SC. Diagnosis of gestational diabetes in early pregnancy. Diabetes Care. 1991;14:288-94. [PMID: 2060431]	Did not use designated diagnostic test or diagnostic criteria
Sutton L, Sayer GP, Bajuk B, Richardson V, Berry G, Henderson-Smart DJ. Do very sick neonates born at term have antenatal risks? 2. Infants ventilated primarily for lung disease. Acta Obstet Gynecol Scand. 2001;80:917-25. [PMID: 11580736]	Study design
Svare JA, Hansen BB, Mølsted-Pedersen L. Perinatal complications in women with gestational diabetes mellitus. Acta Obstet Gynecol Scand. 2001;80:899-904. [PMID: 11580734]	Study design

Appendix Table 3—**Continued**

Reference	Reason for Exclusion
Tanir HM, Sener T, Gürer H, Kaya M. A ten-year gestational diabetes mellitus cohort at a university clinic of the mid-Anatolian region of Turkey. Clin Exp Obstet Gynecol. 2005;32:241-4. [PMID: 16440823]	Study design
Taylor JS, Kacmar JE, Nothnagle M, Lawrence RA. A systematic review of the literature associating breastfeeding with type 2 diabetes and gestational diabetes. J Am Coll Nutr. 2005;24:320-6. [PMID: 16192255]	Did not address 1 of the key questions
Tuffnell DJ, West J, Walkinshaw SA. Treatments for gestational diabetes and impaired glucose tolerance in pregnancy. Cochrane Database Syst Rev. 2003:CD003395. [PMID: 12917965]	Systematic evidence review used as source document
Turok DK, Ratcliffe SD, Baxley EG. Management of gestational diabetes mellitus. Am Fam Physician. 2003;68:1767-72. [PMID: 14620596]	Non–systematic review
Vaidyanathan B, Menon PS. Insulin analogues and management of diabetes mellitus. Indian J Pediatr. 2000;67:435-41. [PMID: 10932964]	Study design
van Hoorn J, Dekker G, Jeffries B. Gestational diabetes versus obesity as risk factors for pregnancy-induced hypertensive disorders and fetal macrosomia. Aust N Z J Obstet Gynaecol. 2002;42:29-34. [PMID: 11926638]	Study design
Vanky E, Salvesen KA, Heimstad R, Fougner KJ, Romundstad P, Carlsen SM. Metformin reduces pregnancy complications without affecting androgen levels in pregnant polycystic ovary syndrome women: results of a randomized study. Hum Reprod. 2004;19:1734-40. [PMID: 15178665]	Did not address 1 of the key questions
Vidaeff AC, Yeomans ER, Ramin SM. Gestational diabetes: a field of controversy. Obstet Gynecol Surv. 2003;58:759-69. [PMID: 14581827]	Non–systematic review
Vogel N, Burnand B, Vial Y, Ruiz J, Paccaud F, Hohlfeld P. Screening for gestational diabetes: variation in guidelines. Eur J Obstet Gynecol Reprod Biol. 2000;91:29-36. [PMID: 10817875]	Did not address 1 of the key questions
Walkinshaw SA. WITHDRAWN: Dietary regulation for 'gestational diabetes'. Cochrane Database Syst Rev. 2006:CD000070. [PMID: 17636583]	Did not address 1 of the key questions
Walkinshaw SA. WITHDRAWN: Very tight versus tight control for diabetes in pregnancy. Cochrane Database Syst Rev. 2006:CD000226. [PMID: 17636623]	Did not address 1 of the key questions
Watson WJ. Serial changes in the 50-g oral glucose test in pregnancy: implications for screening. Obstet Gynecol. 1989;74:40-3. [PMID: 2733939]	No information on yield (prevalence), sensitivity/specificity, or reliability
Weijers RN, Bekedam DJ, Smulders YM. Determinants of mild gestational hyperglycemia and gestational diabetes mellitus in a large dutch multiethnic cohort. Diabetes Care. 2002;25:72-7. [PMID: 11772904]	Non–systematic review
Wein P, Dong ZG, Beischer NA, Sheedy MT. Factors predictive of recurrent gestational diabetes diagnosed before 24 weeks' gestation. Am J Perinatol. 1995;12:352-6. [PMID: 8540942]	Study design
Weiner CP, Fraser MM, Burns JM, Schnoor D, Herrig J, Whitaker LA. Cost efficacy of routine screening for diabetes in pregnancy: 1-h versus 2-h specimen. Diabetes Care. 1986;9:255-9. [PMID: 3089747]	Did not address 1 of the key questions
Weiss JL, Malone FD, Emig D, Ball RH, Nyberg DA, Comstock CH, et al. FASTER Research Consortium. Obesity, obstetric complications and cesarean delivery rate—a population-based screening study. Am J Obstet Gynecol. 2004;190:1091-7. [PMID: 15118648]	Did not address 1 of the key questions
Weissman A, Solt I, Zloczower M, Jakobi P. Hypoglycemia during the 100-g oral glucose tolerance test: incidence and perinatal significance. Obstet Gynecol. 2005;105:1424-8. [PMID: 15932839]	Study design
Wen SW, Liu S, Kramer MS, Joseph KS, Levitt C, Marcoux S, et al. Impact of prenatal glucose screening on the diagnosis of gestational diabetes and on pregnancy outcomes. Am J Epidemiol. 2000;152:1009-14; discussion 1015-6. [PMID: 11117609]	Study design
Wong L, Tan AS. The glucose challenge test for screening gestational diabetes in pregnant women with no risk factors. Singapore Med J. 2001;42:517-21. [PMID: 11876377]	Did not address morbidity and/or mortality
Wood SL, Jick H, Sauve R. The risk of stillbirth in pregnancies before and after the onset of diabetes. Diabet Med. 2003;20:703-7. [PMID: 12925047]	Study design
Wyatt PR, Owolabi T, Meier C, Huang T. Age-specific risk of fetal loss observed in a second trimester serum screening population. Am J Obstet Gynecol. 2005;192:240-6. [PMID: 15672031]	Did not address 1 of the key questions
Yang X, Hsu-Hage B, Zhang H, Zhang C, Zhang Y, Zhang C. Women with impaired glucose tolerance during pregnancy have significantly poor pregnancy outcomes. Diabetes Care. 2002;25:1619-24. [PMID: 12196437]	Natural history only
Yogev Y, Langer O, Brustman L, Rosenn B. Pre-eclampsia and gestational diabetes mellitus: does a correlation exist early in pregnancy? J Matern Fetal Neonatal Med. 2004;15:39-43. [PMID: 15101610]	Study design
Yogev Y, Langer O, Xenakis EM, Rosenn B. Glucose screening in Mexican-American women. Obstet Gynecol. 2004;103:1241-5. [PMID: 15172859]	Prevalence-only data
Young C, Kuehl TJ, Sulak PJ, Allen SR. Gestational diabetes screening in subsequent pregnancies of previously healthy patients. Am J Obstet Gynecol. 2000;182:1024-6. [PMID: 10819816]	Study design

Appendix Table 4. **Summary Characteristics of Treatment Trials after 24 Weeks' Gestation (Key Question 3)***

Study, Year (Reference)	Patients, *n*	Treatment	Setting	Population, %	BMI, *kg/m²*	Gestational Age at Screening, *wk*	Screening Test Used	Quality Rating
Treated vs. untreated								
Crowther et al., 2005 (16)	1000	Treatment of mild gestational diabetes vs. no treatment	Australia, United Kingdom	White: 75 Asian: 16 Other: 8	Intervention group: 26.8 (23.3–31.2)† Control group: 26.0 (22.9–30.9)†	Intervention group: 29.1 (28.2–30.0)† Control group: 29.2 (28.2–30.0)†	Step 1: Risk factors or 50-g GCT (≥7.8 mmol/L) 1-h cutoff (93% were positive on 50-g test) Step 2: 75-g OGTT: 1) fasting glucose value <7.8 mmol/L and 2) 2-h glucose value, 7.8–11.0 mmol/L	Good
O'Sullivan et al., 1966 (22)	943	Treatment of screening-positive patients vs. no treatment of screening-positive patients vs. no treatment of screening-negative participants	Boston	NR	≥20% over ideal body weight Intervention group: 27.7 Control group: 30.5	NR	Step 1: 50-g GCT; whole-blood glucose value >130 mg/dL Step 2: 100-g OGTT with ≥2 abnormal glucose values	Fair
Treatment comparisons								
Langer et al., 2000, 2005 (19, 20)	404	Glyburide vs. insulin treatment	San Antonio, Texas	Hispanic: 83 White:12 Black: 5	≥27.3 before pregnancy: Insulin group, *n (%)*: 141 (70) Glyburide group, *n (%)*: 132 (65)	Mean: Insulin group: 24 (SD, 7) Glyburide group: 25 (SD, 7)	Step 1: 50-g GCT result >130 mg/dL Step 2: 100-g OGTT with ≥2 abnormal glucose values by Carpenter and Coustan criteria	Good
Bancroft et al., 2000 (15)	68	Diet plus intensive glucose monitoring vs. diet plus standard clinic glucose monitoring	United Kingdom	Asian: 31 White: 69	Mean: Diet plus intensive monitoring group: 32.2 (SD, 6.7) Diet plus standard monitoring group: 27.5 (SD, 6.1)	Median (range): Diet plus intensive monitoring group: 31 (24–38) Diet plus standard monitoring group: 32 (15–37)	75-g OGTT with fasting glucose value <7.0 mmol/L and 2-h glucose value of 7.8–11.0 mmol/L GTT done at the discretion of individual clinicians	Fair
Jovanovic et al., 1999 (18)	42	NPH plus lispro insulin vs. NPH plus regular insulin	California	Hispanic: Lispro group: 89 Regular insulin group: 100)	Mean (±SE): Lispro group: 31.5 ± 1.1 Regular insulin group: 33.3 ± 1.2 (*P* = NS)	Mean (±SE) at enrollment: Lispro group: 27.3 ± 1.4 Regular insulin group: 25.6 ± 1.3 (*P* > 0.05)	NDDG criteria (2-step 50-g GCT, then 100-g OGTT)	Fair
Nachum et al., 1999 (21)	274	4-times-daily insulin vs. 2-times-daily insulin	Israel	Jewish: 4-times-daily group: 57 2-times-daily group: 55	4-times-daily group: 27.9 (SD, 2.6) 2-times-daily group: 27.8 (SD, 2.7)	At diagnosis: 4-times-daily group: 25.9 (SD, 2.6) 2-times-daily group: 26.3 (SD, 7.2) Initiated treatment: 4-times-daily group: 27.4 (SD, 6.8) 2-times-daily group: 28.0 (SD, 6.9)	100-g OGTT with ≥2 serum glucose values ≥5.9, 10.6, 9.2, 8.1 mmol/L at 0, 1, 2, and 3 h, respectively	Fair
de Veciana et al., 1995 (17)	66	Preprandial vs. postprandial monitoring of glucose to inform treatment decisions	California	Hispanic: 85 White: 11 Black/Asian: 5	Preprandial group: 29.0 (SD, 3.2) Postprandial group: 28.4 (SD, 3.8) (*P* = NS)	At diagnosis: Preprandial group: 22.9 (SD, 7.5) Postprandial group: 21.8 (SD, 6.5) (*P* = NS) Initiated treatment: Preprandial group: 24.3 (SD, 5.2) Postprandial group: 25.1 (SD, 5.1) (*P* = NS)	Step 1: 1-hour 50-g GCT value >140 mg/dL but <190 mg/dL; patients with glucose value >190 mg/dL started insulin immediately Step 2: 3-h 100-g OGTT with ≥2 abnormal glucose values (fasting >105 mg/dL, 1-h >190 mg/dL, 2-h >165 mg/dL, 3-h >145 mg/dL)	Fair

* To convert glucose values in mg/dL to mmol/L, multiply by 0.05551; to convert glucose values in mmol/L to mg/dL, divide by 0.05551. BMI = body mass index; GCT = glucose challenge test; NDDG = National Diabetes Data Group; NPH = neutral protamine Hagedorn; NR = not reported; NS = not significant; OGTT = oral glucose tolerance test.
† Median (interquartile range).

Appendix Table 5. **Health Outcomes of Treatment Trials after 24 Weeks' Gestation (Key Question 3)***

Study, Year (Reference)	Mortality, *n* (%)	Fracture, *n* (%)	Brachial Plexus Injury, *n* (%)	NICU Admissions, *n* (%)	Hypoglycemia, *n* (%)	Hyperbilirubinemia, *n* (%)	Respiratory Distress, *n* (%)	Death	Pregnancy-Induced Hypertension or Preeclampsia, *n* (%)
Treated vs. untreated									
Crowther et al., 2005 (16)	Intervention group: 0 Control group: 5 (1)†	Intervention group: 0 Control group: 1 (<1)†	Intervention group: 0 (0) Control group: 3 (1)†	NICU: NR Neonatal nursery: Intervention group: 357 (71) Control group: 321 (61) Adjusted RR, 1.13 (95% CI, 1.03–1.23)	Intervention group: 35 (7) Control group: 27 (5) Adjusted RR, 1.42 (CI, 0.87–2.32)	Intervention group: 44 (9) Control group: 48 (9) Adjusted RR, 0.93 (CI, 0.63–1.37)	Intervention group: 27 (5) Control group: 19 (4) Adjusted RR, 1.52 (CI, 0.86–2.71)	NR	Intervention group: 58 (12) Control group: 93 (18) Adjusted RR, 0.70 (CI, 0.51–0.95)
O'Sullivan et al., 1966 (22)	Intervention group: 13 (4.3) Control group: 15 (4.9) ($P > 0.05$)	NR	NR	NR	NR	NR	NR	NR	NR
Treatment comparisons									
Langer et al., 2000 (19)	Glyburide group: 2 (1.0) Insulin group: 2 (1.0) ($P = 0.99$)	NR	NR	Glyburide group: 12 (6) Insulin group: 14 (7) ($P = 0.68$)	Glyburide group: 18 (9) Insulin group: 12 (6) ($P = 0.25$)	Glyburide group: 12 (6) Insulin group: 8 (4) ($P = 0.36$)	Glyburide group: 4 (2) Insulin group: 6 (3) ($P = 0.52$)	NR	Glyburide group: 6% Insulin group: 6% (P = NS)
Bancroft et al., 2000 (15)	None	NR	Diet plus intensive monitoring group: 0 Diet plus standard monitoring group: 1 (P = NS)	Diet plus intensive monitoring group: 2 (6) Diet plus standard monitoring group: 6 (17) (P = NS)	Diet plus intensive monitoring group: 2 (6) Diet plus standard monitoring group: 6 (17) (P = NS)	NR	NR	None	NR
Jovanovic et al., 1999 (18)	NR	NR	NR	NR	None	NR	NR	NR	NR
Nachum et al., 1999 (21)	Insulin 4-times-daily group: 0 Insulin 2-times-daily group: 1 (0.7) (P = NS)	NR	NR	NR	Insulin 4-times-daily group: 1 (0.7) Insulin 2-times-daily group: 8 (5.9) RR, 0.12 (CI, 0.02–0.97)	Insulin 4-times-daily group: 15 (11) Insulin 2-times-daily group: 29 (21) RR, 0.51 (CI, 0.29–0.91)	NR	NR	Insulin 4-times-daily group: 11 (8) Insulin 2-times-daily group: 12 (9) Difference: −1 (CI, −11 to 9)‡
de Veciana et al., 1995 (17)	Preprandial glucose monitoring group: 1 (3) Postprandial glucose monitoring group: 0 (P = NS)	NR	NR	NR	Preprandial glucose monitoring group: 7 (21) Postprandial glucose monitoring group: 1 (3) RR, 7.0 (CI, 0.9–53.8)	Preprandial glucose monitoring group: 4 (12) Postprandial glucose monitoring group: 3 (9) (P = NS)	Transient tachypnea: Preprandial glucose monitoring group: 2 (6) Postprandial glucose monitoring group: 2 (6) ($P = 0.10$)	NR	Preprandial glucose monitoring group: 2 (6) Postprandial glucose monitoring group: 2 (6) ($P > 0.05$)

* NICU = neonatal intensive care unit; NR = not reported; NS = not significant; RR = relative risk.
† RR not calculated as zero in intervention group. A composite outcome (stillbirth, neonatal death, shoulder dystocia, bone fracture, and nerve palsy) was reported with an adjusted RR of 0.33 (CI, 0.14–0.75) with intervention group compared with control group. Seven shoulder dystocia events occurred in the intervention group and 16 in the control group.
‡ Original report was unclear on units for CI.