The American College of Obstetricians and Gynecologists
WOMEN'S HEALTH CARE PHYSICIANS

Hypertension in Pregnancy

Report of the American College of Obstetricians and Gynecologists' Task Force on Hypertension in Pregnancy

Executive Summary

The American College of Obstetricians and Gynecologists (the College) convened a task force of experts in the management of hypertension in pregnancy to review available data and publish evidence-based recommendations for clinical practice. The Task Force on Hypertension in Pregnancy comprised 17 clinician–scientists from the fields of obstetrics, maternal–fetal medicine, hypertension, internal medicine, nephrology, anesthesiology, physiology, and patient advocacy. This executive summary includes a synopsis of the content and task force recommendations of each chapter in the report and is intended to complement, not substitute, the report.

Hypertensive disorders of pregnancy remain a major health issue for women and their infants in the United States. Preeclampsia, either alone or superimposed on preexisting (chronic) hypertension, presents the major risk. Although appropriate prenatal care, with observation of women for signs of preeclampsia and then delivery to terminate the disorder, has reduced the number and extent of poor outcomes, serious maternal–fetal morbidity and mortality still occur. Some of these adverse outcomes are avoidable, whereas others can be ameliorated. Also, although some of the problems that face neonates are related directly to preeclampsia, a large proportion are secondary to prematurity that results from the appropriate induced delivery of the fetuses of women who are ill. Optimal management requires close observation for signs and premonitory findings and, after establishing the diagnosis, delivery at the optimal time for both maternal and fetal well-being. More recent clinical evidence to guide this timing is now available. Chronic hypertension is associated with fetal morbidity in the form of growth restriction and maternal morbidity manifested as severely increased blood pressure (BP). However, maternal and fetal morbidity increase dramatically with the superimposition of preeclampsia. One of the major challenges in the care of women with chronic hypertension is deciphering whether chronic hypertension has worsened or whether preeclampsia has developed. In this report, the task force provides suggestions for the recognition and management of this challenging condition.

In the past 10 years, there have been substantial advances in the understanding of preeclampsia as well as increased efforts to obtain evidence to guide therapy. Nonetheless, there remain areas on which evidence is scant. The evidence is now clear that preeclampsia is associated with later-life cardiovascular (CV) disease; however, further research is needed to determine how best to use this information to help patients. The task force also has identified issues in the management of preeclampsia that warrant special attention. First, is the failure by health care providers to appreciate the multisystemic nature of preeclampsia. This is in part due to attempts at rigid diagnosis, which is addressed in the report. Second, preeclampsia is a dynamic process, and a diagnosis such as "mild preeclampsia" (which is discouraged) applies only at the moment the diagnosis is established because preeclampsia by nature is progressive, although at different rates. Appropriate management mandates frequent reevaluation for severe features that indicate the actions outlined in the recommendations (which are listed after the chapter summaries). It has been known

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for many years that preeclampsia can worsen or present for the first time after delivery, which can be a major scenario for adverse maternal events. In this report, the task force provides guidelines to attempt to reduce maternal morbidity and mortality in the postpartum period.

The Approach

The task force used the evidence assessment and recommendation strategy developed by the Grading of Recommendations Assessment, Development and Evaluation (GRADE) Working Group (available at www.gradeworkinggroup.org/index.htm). Because of its utility, this strategy has been adapted worldwide by a large number of organizations. With the GRADE Working Group approach, the function of expert task forces and working groups is to evaluate the available evidence regarding a clinical decision that, because of limited time and resources, would be difficult for the average health care provider to accomplish. The expert group then makes recommendations based on the evidence that are consistent with typical patient values and preferences. The task force evaluated the evidence for each recommendation, the implications, and the confidence in estimates of effect. With this combination, the available information was evaluated and recommendations were made. In this report, the confidence in estimates of effect (quality) of the available evidence is judged as very low, low, moderate, or high.

Recommendations are practices agreed to by the task force as the most appropriate course of action; they are graded as strong or qualified. A strong recommendation is one that is so well supported that it would be the approach appropriate for virtually all patients. It could be the basis for health care policy. A qualified recommendation is also one that would be judged as appropriate for most patients, but it might not be the optimal recommendation for some patients (whose values and preferences differ, or who have different attitudes toward uncertainty in estimates of effect). When the task force has made a qualified recommendation, the health care provider and patient are encouraged to work together to arrive at a decision based on the values and judgment and underlying health condition of a particular patient in a particular situation.

Classification of Hypertensive Disorders of Pregnancy

The task force chose to continue using the classification schema first introduced in 1972 by the College and modified in the 1990 and 2000 reports of the Working Group of the National High Blood Pressure Education Program. Similar classifications can be found in the American Society of Hypertension guidelines, as well as College Practice Bulletins. Although the task force has modified some of the components of the classification, this basic, precise, and practical classification was used, which considers hypertension during pregnancy in only four categories: 1) preeclampsia–eclampsia, 2) chronic hypertension (of any cause), 3) chronic hypertension with superimposed preeclampsia, and 4) gestational hypertension. Importantly, the following components were modified. In recognition of the syndromic nature of preeclampsia, the task force has eliminated the dependence of the diagnosis on proteinuria. In the absence of proteinuria, preeclampsia is diagnosed as hypertension in association with thrombocytopenia (platelet count less than 100,000/microliter), impaired liver function (elevated blood levels of liver transaminases to twice the normal concentration), the new development of renal insufficiency (elevated serum creatinine greater than 1.1 mg/dL or a doubling of serum creatinine in the absence of other renal disease), pulmonary edema, or new-onset cerebral or visual disturbances (see Box E-1). *Gestational hypertension* is BP elevation after 20 weeks of gestation in the absence of proteinuria or the aforementioned systemic findings; *chronic hypertension* is hypertension that predates pregnancy; and *superimposed preeclampsia* is chronic hypertension in association with preeclampsia.

Establishing the Diagnosis of Preeclampsia or Eclampsia

The BP criteria are maintained from prior recommendations. *Proteinuria* is defined as the excretion of 300 mg or more of protein in a 24-hour urine collection. Alternatively, a timed excretion that is extrapolated to this 24-hour urine value or a protein/creatinine ratio of at least 0.3 (each measured as mg/dL) is used. Because of the variability of qualitative determinations (dipstick test), this method is discouraged for diagnostic use unless other approaches are not readily available. If this approach must be used, a determination of 1+ is considered as the cutoff for the diagnosis of proteinuria. In view of recent studies that indicate a minimal relationship between the quantity of urinary protein and pregnancy outcome in preeclampsia, massive proteinuria (greater than 5 g) has been eliminated from the consideration of preeclampsia as severe. Also, because fetal growth restriction is managed similarly in pregnant women with and without preeclampsia, it has been removed as a finding indicative of severe preeclampsia (Table E-1).

Prediction of Preeclampsia

A great deal of effort has been directed at the identification of demographic factors, biochemical analytes, or biophysical findings, alone or in combination, to predict early in pregnancy the later development of preeclampsia. Although

BOX E-1. Severe Features of Preeclampsia (Any of these findings)

- Systolic blood pressure of 160 mm Hg or higher, or diastolic blood pressure of 110 mm Hg or higher on two occasions at least 4 hours apart while the patient is on bed rest (unless antihypertensive therapy is initiated before this time)
- Thrombocytopenia (platelet count less than 100,000/microliter)
- Impaired liver function as indicated by abnormally elevated blood concentrations of liver enzymes (to twice normal concentration), severe persistent right upper quadrant or epigastric pain unresponsive to medication and not accounted for by alternative diagnoses, or both
- Progressive renal insufficiency (serum creatinine concentration greater than 1.1 mg/dL or a doubling of the serum creatinine concentration in the absence of other renal disease)
- Pulmonary edema
- New-onset cerebral or visual disturbances

there are some encouraging findings, these tests are not yet ready for clinical use.

TASK FORCE RECOMMENDATION

- Screening to predict preeclampsia beyond obtaining an appropriate medical history to evaluate for risk factors is not recommended.

  Quality of evidence: Moderate
  Strength of recommendation: Strong

Prevention of Preeclampsia

It is clear that the antioxidants vitamin C and vitamin E are not effective interventions to prevent preeclampsia or adverse outcomes from preeclampsia in unselected women at high risk or low risk of preeclampsia. Calcium may be useful to reduce the severity of preeclampsia in populations with low calcium intake, but this finding is not relevant to a population with adequate calcium intake, such as in the United States. The administration of low-dose aspirin (60–80 mg) to prevent preeclampsia has been examined in meta-analyses of more than 30,000 women, and it appears that there is a slight effect to reduce preeclampsia and adverse perinatal outcomes. These findings are not clinically relevant to low-risk women but may be relevant to populations at very high risk in whom the number to treat to achieve the desired outcome will be substantially less. There is no evidence that bed rest or salt restriction reduces preeclampsia risk.

TASK FORCE RECOMMENDATIONS

- For women with a medical history of early-onset preeclampsia and preterm delivery at less than 34 0/7 weeks of gestation or preeclampsia in more than one prior pregnancy, initiating the administration of daily low-dose (60–80 mg) aspirin beginning in the late first trimester is suggested.*

  Quality of evidence: Moderate
  Strength of recommendation: Qualified

  *Meta-analysis of more than 30,000 women in randomized trials of aspirin to prevent preeclampsia indicates a small reduction in the incidence and morbidity of preeclampsia and reveals no evidence of acute risk, although long-term fetal effects cannot be excluded. The number of women to treat to have a therapeutic effect is determined by prevalence. In view of maternal safety, a discussion of the use of aspirin in light of individual risk is justified.

- The administration of vitamin C or vitamin E to prevent preeclampsia is not recommended.

  Quality of evidence: High
  Strength of recommendation: Strong

- It is suggested that dietary salt not be restricted during pregnancy for the prevention of preeclampsia.

  Quality of evidence: Low
  Strength of recommendation: Qualified

- It is suggested that bed rest or the restriction of other physical activity not be used for the primary prevention of preeclampsia and its complications.

  Quality of evidence: Low
  Strength of recommendation: Qualified

Management of Preeclampsia and HELLP Syndrome

Clinical trials have provided an evidence base to guide management of several aspects of preeclampsia. Nonetheless,

TABLE E-1. Diagnostic Criteria for Preeclampsia

Blood pressure	• Greater than or equal to 140 mm Hg systolic or greater than or equal to 90 mm Hg diastolic on two occasions at least 4 hours apart after 20 weeks of gestation in a woman with a previously normal blood pressure • Greater than or equal to 160 mm Hg systolic or greater than or equal to 110 mm Hg diastolic, hypertension can be confirmed within a short interval (minutes) to facilitate timely antihypertensive therapy
and	
Proteinuria	• Greater than or equal to 300 mg per 24-hour urine collection (or this amount extrapolated from a timed collection) or • Protein/creatinine ratio greater than or equal to 0.3* • Dipstick reading of 1+ (used only if other quantitative methods not available)
Or in the absence of proteinuria, new-onset hypertension with the new onset of any of the following:	
Thrombocytopenia	• Platelet count less than 100,000/microliter
Renal insufficiency	• Serum creatinine concentrations greater than 1.1 mg/dL or a doubling of the serum creatinine concentration in the absence of other renal disease
Impaired liver function	• Elevated blood concentrations of liver transaminases to twice normal concentration
Pulmonary edema	
Cerebral or visual symptoms	

*Each measured as mg/dL.

several important questions remain unanswered. Reviews of maternal mortality data reveal that deaths could be avoided if health care providers remain alert to the likelihood that preeclampsia will progress. The same reviews indicate that intervention in acutely ill women with multiple organ dysfunction is sometimes delayed because of the absence of proteinuria. Furthermore, accumulating information indicates that the amount of proteinuria does not predict maternal or fetal outcome. It is for these reasons that the task force has recommended that alternative systemic findings with new-onset hypertension can fulfill the diagnosis of preeclampsia even in the absence of proteinuria.

Perhaps the biggest changes in preeclampsia management relate to the timing of delivery in women with preeclampsia without severe features, which based on evidence is suggested at 37 0/7 weeks of gestation, and an increasing awareness of the importance of preeclampsia in the postpartum period. Health care providers are reminded of the contribution of nonsteroidal antiinflammatory agents to increased BP. It is suggested that these commonly used postpartum pain relief agents be replaced by other analgesics in women with hypertension that persists for more than 1 day postpartum.

TASK FORCE RECOMMENDATIONS

- The close monitoring of women with gestational hypertension or preeclampsia without severe features, with serial assessment of maternal symptoms and fetal movement (daily by the woman), serial measurements of BP (twice weekly), and assessment of platelet counts and liver enzymes (weekly) is suggested.

  Quality of evidence: Moderate
  Strength of recommendation: Qualified

- For women with gestational hypertension, monitoring BP at least once weekly with proteinuria assessment in the office and with an additional weekly measurement of BP at home or in the office is suggested.

  Quality of evidence: Moderate
  Strength of recommendation: Qualified

- For women with mild gestational hypertension or preeclampsia with a persistent BP of less than 160 mm Hg systolic or 110 mm Hg diastolic, it is suggested that antihypertensive medications not be administered.

  Quality of evidence: Moderate
  Strength of recommendation: Qualified

- For women with gestational hypertension or preeclampsia without severe features, it is suggested that strict bed rest not be prescribed.*†

  Quality of evidence: Low
  Strength of recommendation: Qualified

  *The task force acknowledged that there may be situations in which different levels of rest, either at home or in the hospital, may be indicated for individual women. The previous recommendations do not cover advice regarding overall physical activity and manual or office work.

  †Women may need to be hospitalized for reasons other than bed rest, such as for maternal and fetal surveillance. The task force agreed that hospitalization for maternal and fetal surveillance is resource intensive and should be considered as a priority for research and future recommendations.

- For women with preeclampsia without severe features, use of ultrasonography to assess fetal growth and antenatal testing to assess fetal status is suggested.

  Quality of evidence: Moderate
  Strength of recommendation: Qualified

- If evidence of fetal growth restriction is found in women with preeclampsia, fetoplacental assessment that includes umbilical artery Doppler velocimetry as an adjunct antenatal test is recommended.

  Quality of evidence: Moderate
  Strength of recommendation: Strong

- For women with mild gestational hypertension or preeclampsia without severe features and no indication for delivery at less than 37 0/7 weeks of gestation, expectant management with maternal and fetal monitoring is suggested.

  Quality of evidence: Low
  Strength of recommendation: Qualified

- For women with mild gestational hypertension or preeclampsia without severe features at or beyond 37 0/7 weeks of gestation, delivery rather than continued observation is suggested.

  Quality of evidence: Moderate
  Strength of recommendation: Qualified

- For women with preeclampsia with systolic BP of less than 160 mm Hg and a diastolic BP less than 110 mm Hg and no maternal symptoms, it is suggested that magnesium sulfate not be administered universally for the prevention of eclampsia.

  Quality of evidence: Low
  Strength of recommendation: Qualified

- For women with severe preeclampsia at or beyond 34 0/7 weeks of gestation, and in those with unstable maternal or fetal conditions irrespective of gestational age, delivery soon after maternal stabilization is recommended.

  Quality of evidence: Moderate
  Strength of recommendation: Strong

- For women with severe preeclampsia at less than 34 0/7 weeks of gestation with stable maternal and fetal conditions, it is recommended that continued pregnancy be undertaken only at facilities with adequate maternal and neonatal intensive care resources.

  Quality of evidence: Moderate
  Strength of recommendation: Strong

- For women with severe preeclampsia receiving expectant management at 34 0/7 weeks or less of gestation, the administration of corticosteroids for fetal lung maturity benefit is recommended.

  Quality of evidence: High
  Strength of recommendation: Strong

- For women with preeclampsia with severe hypertension during pregnancy (sustained systolic BP of at least 160 mm Hg or diastolic BP of at least 110 mm Hg), the use of antihypertensive therapy is recommended.

  Quality of evidence: Moderate
  Strength of recommendation: Strong

- For women with preeclampsia, it is suggested that a delivery decision should not be based on the amount of proteinuria or change in the amount of proteinuria.

  Quality of evidence: Moderate
  Strength of recommendation: Strong

- For women with severe preeclampsia and before fetal viability, delivery after maternal stabilization is recommended. Expectant management is not recommended.

  Quality of evidence: Moderate
  Strength of recommendation: Strong

- It is suggested that corticosteroids be administered and delivery deferred for 48 hours if maternal and fetal conditions remain stable for women with severe preeclampsia and a viable fetus at 33 6/7 weeks or less of gestation with any of the following:
  - preterm premature rupture of membranes
  - labor
  - low platelet count (less than 100,000/microliter)
  - persistently abnormal hepatic enzyme concentrations (twice or more the upper normal values)
  - fetal growth restriction (less than the fifth percentile)
  - severe oligohydramnios (amniotic fluid index less than 5 cm)

– reversed end-diastolic flow on umbilical artery Doppler studies
– new-onset renal dysfunction or increasing renal dysfunction

Quality of evidence: Moderate
Strength of recommendation: Qualified

- It is recommended that corticosteroids be given if the fetus is viable and at 33 6/7 weeks or less of gestation, but that delivery not be delayed after initial maternal stabilization regardless of gestational age for women with severe preeclampsia that is complicated further with any of the following:
  – uncontrollable severe hypertension
  – eclampsia
  – pulmonary edema
  – abruptio placentae
  – disseminated intravascular coagulation
  – evidence of nonreassuring fetal status
  – intrapartum fetal demise

  Quality of evidence: Moderate
  Strength of recommendation: Strong

- For women with preeclampsia, it is suggested that the mode of delivery need not be cesarean delivery. The mode of delivery should be determined by fetal gestational age, fetal presentation, cervical status, and maternal and fetal conditions.

  Quality of evidence: Moderate
  Strength of recommendation: Qualified

- For women with eclampsia, the administration of parenteral magnesium sulfate is recommended.

  Quality of evidence: High
  Strength of recommendation: Strong

- For women with severe preeclampsia, the administration of intrapartum–postpartum magnesium sulfate to prevent eclampsia is recommended.

  Quality of evidence: High
  Strength of recommendation: Strong

- For women with preeclampsia undergoing cesarean delivery, the continued intraoperative administration of parenteral magnesium sulfate to prevent eclampsia is recommended.

  Quality of evidence: Moderate
  Strength of recommendation: Strong

- For women with HELLP syndrome and before the gestational age of fetal viability, it is recommended that delivery be undertaken shortly after initial maternal stabilization.

  Quality of evidence: High
  Strength of recommendation: Strong

- For women with HELLP syndrome at 34 0/7 weeks or more of gestation, it is recommended that delivery be undertaken soon after initial maternal stabilization.

  Quality of evidence: Moderate
  Strength of recommendation: Strong

- For women with HELLP syndrome from the gestational age of fetal viability to 33 6/7 weeks of gestation, it is suggested that delivery be delayed for 24–48 hours if maternal and fetal condition remains stable to complete a course of corticosteroids for fetal benefit.*

  Quality of evidence: Low
  Strength of recommendation: Qualified

*Corticosteroids have been used in randomized controlled trials to attempt to improve maternal and fetal condition. In these studies, there was no evidence of benefit to improve overall maternal and fetal outcome (although this has been suggested in observational studies). There is evidence in the randomized trials of improvement of platelet counts with corticosteroid treatment. In clinical settings in which an improvement in platelet count is considered useful, corticosteroids may be justified.

- For women with preeclampsia who require analgesia for labor or anesthesia for cesarean delivery and with a clinical situation that permits sufficient time for establishment of anesthesia, the administration of neuraxial anesthesia (either spinal or epidural anesthesia) is recommended.

  Quality of evidence: Moderate
  Strength of recommendation: Strong

- For women with severe preeclampsia, it is suggested that invasive hemodynamic monitoring not be used routinely.

  Quality of evidence: Low
  Strength of recommendation: Qualified

- For women in whom gestational hypertension, preeclampsia, or superimposed preeclampsia is diagnosed, it is suggested that BP be monitored in the hospital or that equivalent outpatient surveillance be performed for at least 72 hours postpartum and again 7–10 days after delivery or earlier in women with symptoms.

  Quality of evidence: Moderate
  Strength of recommendation: Qualified

- For all women in the postpartum period (not just women with preeclampsia), it is suggested that discharge instructions include information about the signs and symptoms of preeclampsia as well as the importance of prompt reporting of this information to their health care providers.

Quality of evidence: Low
Strength of recommendation: Qualified

- For women in the postpartum period who present with new-onset hypertension associated with headaches or blurred vision or preeclampsia with severe hypertension, the parenteral administration of magnesium sulfate is suggested.

  Quality of evidence: Low
  Strength of recommendation: Qualified

- For women with persistent postpartum hypertension, BP of 150 mm Hg systolic or 100 mm Hg diastolic or higher, on at least two occasions that are at least 4–6 hours apart, antihypertensive therapy is suggested. Persistent BP of 160 mm Hg systolic or 110 mm Hg diastolic or higher should be treated within 1 hour.

  Quality of evidence: Low
  Strength of recommendation: Qualified

Management of Women With Prior Preeclampsia

Women who have had preeclampsia in a prior pregnancy should receive counseling and assessments before their next pregnancy. This can be initiated at the postpartum visit but is ideally accomplished at a preconception visit before the next planned pregnancy. During the preconception visit, the previous pregnancy history should be reviewed and the prognosis for the upcoming pregnancy should be discussed. Potentially modifiable lifestyle activities, such as weight loss and increased physical activity, should be encouraged. The current status of medical problems should be assessed, including laboratory evaluation if appropriate. Medical problems such as hypertension and diabetes should be brought into the best control possible. The effect of medical problems on the pregnancy should be discussed. Medications should be reviewed and their administration modified for upcoming pregnancy. Folic acid supplementation should be recommended. If a woman has given birth to a preterm infant during a preeclamptic pregnancy or has had preeclampsia in more than one pregnancy, the use of low-dose aspirin in the upcoming pregnancy should be suggested. Women with a medical history of preeclampsia should be instructed to return for care early in pregnancy. During the next pregnancy, early ultrasonography should be performed to determine gestational age, and assessment and visits should be tailored to the prior pregnancy outcome, with frequent visits beginning earlier in women with prior preterm preeclampsia. The woman should be educated about the signs and symptoms of preeclampsia and instructed when and how to contact her health care provider.

TASK FORCE RECOMMENDATION

- For women with preeclampsia in a prior pregnancy, preconception counseling and assessment is suggested.

  Quality of evidence: Low
  Strength of recommendation: Qualified

Chronic Hypertension and Superimposed Preeclampsia

Chronic hypertension (hypertension predating pregnancy), presents special challenges to health care providers. Health care providers must first confirm that the BP elevation is not preeclampsia. Once this is established, if the BP elevation has not been previously evaluated, a workup should be performed to document that BP is truly elevated (ie, not white coat hypertension) and to check for secondary hypertension and end-organ damage. The choice of which women to treat and how to treat them requires special considerations during pregnancy, especially in light of emerging data that suggest lowering BP excessively might have adverse fetal effects.

Perhaps the greatest challenge is the recognition of preeclampsia superimposed on chronic hypertension, a condition that is commonly associated with adverse maternal and fetal outcomes. Recommendations are provided to guide health care providers in distinguishing women who may have superimposed preeclampsia without severe features (only hypertension and proteinuria) and require only observation from women who may have superimposed preeclampsia with severe features (evidence of systemic involvement beyond hypertension and proteinuria) and require intervention.

TASK FORCE RECOMMENDATIONS

- For women with features suggestive of secondary hypertension, referral to a physician with expertise in treating hypertension to direct the workup is suggested.

  Quality of evidence: Low
  Strength of recommendation: Qualified

- For pregnant women with chronic hypertension and poorly controlled BP, the use of home BP monitoring is suggested.

  Quality of evidence: Moderate
  Strength of recommendation: Qualified

- For women with suspected white coat hypertension, the use of ambulatory BP monitoring to confirm the diagnosis before the initiation of antihypertensive therapy is suggested.

  Quality of evidence: Low
  Strength of recommendation: Qualified

- It is suggested that weight loss and extremely low-sodium diets (less than 100 mEq/d) not be used for managing chronic hypertension in pregnancy.

  Quality of evidence: Low
  Strength of recommendation: Qualified

- For women with chronic hypertension who are accustomed to exercising, and in whom BP is well controlled, it is recommended that moderate exercise be continued during pregnancy.

  Quality of evidence: Low
  Strength of recommendation: Qualified

- For pregnant women with persistent chronic hypertension with systolic BP of 160 mm Hg or higher or diastolic BP of 105 mm Hg or higher, antihypertensive therapy is recommended.

  Quality of evidence: Moderate
  Strength of recommendation: Strong

- For pregnant women with chronic hypertension and BP less than 160 mm Hg systolic or 105 mm Hg diastolic and no evidence of end-organ damage, it is suggested that they not be treated with pharmacologic antihypertensive therapy.

  Quality of evidence: Low
  Strength of recommendation: Qualified

- For pregnant women with chronic hypertension treated with antihypertensive medication, it is suggested that BP levels be maintained between 120 mm Hg systolic and 80 mm Hg diastolic and 160 mm Hg systolic and 105 mm Hg diastolic.

  Quality of evidence: Low
  Strength of recommendation: Qualified

- For the initial treatment of pregnant women with chronic hypertension who require pharmacologic therapy, labetalol, nifedipine, or methyldopa are recommended above all other antihypertensive drugs.

  Quality of evidence: Moderate
  Strength of recommendation: Strong

- For women with uncomplicated chronic hypertension in pregnancy, the use of angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, renin inhibitors, and mineralocorticoid receptor antagonists is not recommended.

  Quality of evidence: Moderate
  Strength of recommendation: Strong

- For women of reproductive age with chronic hypertension, the use of angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, renin inhibitors, and mineralocorticoid receptor antagonists is not recommended unless there is a compelling reason, such as the presence of proteinuric renal disease.

  Quality of evidence: Low
  Strength of recommendation: Qualified

- For women with chronic hypertension who are at a greatly increased risk of adverse pregnancy outcomes (history of early-onset preeclampsia and preterm delivery at less than 34 0/7 weeks of gestation or preeclampsia in more than one prior pregnancy), initiating the administration of daily low-dose aspirin (60–80 mg) beginning in the late first trimester is suggested.*

  Quality of evidence: Moderate
  Strength of recommendation: Qualified

  *Meta-analysis of more than 30,000 women in randomized trials of aspirin to prevent preeclampsia indicates a small reduction in the incidence and morbidity of preeclampsia and reveals no evidence of acute risk, although long-term fetal effects cannot be excluded. The number of women to treat to have a therapeutic effect is determined by prevalence. In view of maternal safety, a discussion of the use of aspirin in light of individual risk is justified.

- For women with chronic hypertension, the use of ultrasonography to screen for fetal growth restriction is suggested.

  Quality of evidence: Low
  Strength of recommendation: Qualified

- If evidence of fetal growth restriction is found in women with chronic hypertension, fetoplacental assessment to include umbilical artery Doppler velocimetry as an adjunct antenatal test is recommended.

  Quality of evidence: Moderate
  Strength of recommendation: Strong

- For women with chronic hypertension complicated by issues such as the need for medication, other underlying medical conditions that affect fetal outcome, or any evidence of fetal growth restriction, and superimposed preeclampsia, antenatal fetal testing is suggested.

  Quality of evidence: Low
  Strength of recommendation: Qualified

- For women with chronic hypertension and no additional maternal or fetal complications, delivery before 38 0/7 weeks of gestation is not recommended.

  Quality of evidence: Moderate
  Strength of recommendation: Strong

- For women with superimposed preeclampsia who receive expectant management at less than 34 0/7 weeks of

gestation, the administration of corticosteroids for fetal lung maturity benefit is recommended.

Quality of evidence: High
Strength of recommendation: Strong

- For women with chronic hypertension and superimposed preeclampsia with severe features, the administration of intrapartum–postpartum parenteral magnesium sulfate to prevent eclampsia is recommended.

  Quality of evidence: Moderate
  Strength of recommendation: Strong

- For women with superimposed preeclampsia without severe features and stable maternal and fetal conditions, expectant management until 37 0/7 weeks of gestation is suggested.

  Quality of evidence: Low
  Strength of recommendation: Qualified

- Delivery soon after maternal stabilization is recommended irrespective of gestational age or full corticosteroid benefit for women with superimposed preeclampsia that is complicated further by any of the following:
  - uncontrollable severe hypertension
  - eclampsia
  - pulmonary edema
  - abruptio placentae
  - disseminated intravascular coagulation
  - nonreassuring fetal status

  Quality of evidence: Moderate
  Strength of the recommendation: Strong

- For women with superimposed preeclampsia with severe features at less than 34 0/7 weeks of gestation with stable maternal and fetal conditions, it is recommended that continued pregnancy should be undertaken only at facilities with adequate maternal and neonatal intensive care resources.

  Quality of evidence: Moderate
  Strength of evidence: Strong

- For women with superimposed preeclampsia with severe features, expectant management beyond 34 0/7 weeks of gestation is not recommended.

  Quality of evidence: Moderate
  Strength of the recommendation: Strong

Later-Life Cardiovascular Disease in Women With Prior Preeclampsia

Over the past 10 years, information has accumulated indicating that a woman who has had a preeclamptic pregnancy is at an increased risk of later-life CV disease. This increase ranges from a doubling of risk in all cases to an eightfold to ninefold increase in women with preeclampsia who gave birth before 34 0/7 weeks of gestation. This has been recognized by the American Heart Association, which now recommends that a pregnancy history be part of the evaluation of CV risk in women. It is the general belief that preeclampsia does not cause CV disease, but rather preeclampsia and CV disease share common risk factors. Awareness that a woman has had a preeclamptic pregnancy might allow for the identification of women not previously recognized as at-risk for earlier assessment and potential intervention. However, it is unknown if this will be a valuable adjunct to previous information. If this is the case, would the current recommendation of assessing risk factors for women by medical history, lifestyle evaluation, testing for metabolic abnormalities, and possibly inflammatory activation at age 40 years provide all of the information that would be gained by knowing a woman had a past preeclamptic pregnancy? Would it be valuable to perform this assessment at a younger age in women who had a past preeclamptic pregnancy? If the risk was identified earlier, what intervention (other than lifestyle modification) would potentially be useful and would it make a difference? Are there risk factors that could be unmasked by pregnancy other than conventional risk factors? Further research is needed to determine how to take advantage of this information relating preeclampsia to later-life CV disease. At this time, the task force cautiously recommends lifestyle modification (maintenance of a healthy weight, increased physical activity, and not smoking) and suggests early evaluation for the most high-risk women.

TASK FORCE RECOMMENDATION

- For women with a medical history of preeclampsia who gave birth preterm (less than 37 0/7 weeks of gestation) or who have a medical history of recurrent preeclampsia, yearly assessment of BP, lipids, fasting blood glucose, and body mass index is suggested.*

  Quality of evidence: Low
  Strength of recommendation: Qualified

*Although there is clear evidence of an association between preeclampsia and later-life CV disease, the value and appropriate timing of assessment is not yet established. Health care providers and patients should make this decision based on their judgment of the relative value of extra information versus expense and inconvenience.

Patient Education

Patient and health care provider education is key to the successful recognition and management of preeclampsia.

Health care providers need to inform women during the prenatal and postpartum periods of the signs and symptoms of preeclampsia and stress the importance of contacting health care providers if these are evident. The recognition of the importance of patient education must be complemented by the recognition and use of strategies that facilitate the successful transfer of this information to women with varying degrees of health literacy. Recommended strategies to facilitate this process include using plain nonmedical language, taking time to speak slowly, reinforcing key issues in print using pictorially based information, and requesting feedback to indicate that the patient understands, and, where applicable, her partner.

TASK FORCE RECOMMENDATION

- It is suggested that health care providers convey information about preeclampsia in the context of prenatal care and postpartum care using proven health communication practices.

  Quality of evidence: Low
  Strength of recommendation: Qualified

The State of the Science and Research Recommendations

In the past 10 years, striking increases in the understanding of the pathophysiology of preeclampsia have occurred. Clinical research advances also have emerged that have provided evidence to guide therapy. It is now understood that preeclampsia is a multisystemic disease that affects all organ systems and is far more than high BP and renal dysfunction. The placenta is evident as the root cause of preeclampsia. It is with the delivery of the placenta that preeclampsia begins to resolve. The insult to the placenta is proposed as an immunologically initiated alteration in trophoblast function, and the reduction in trophoblast invasion leads to failed vascular remodeling of the maternal spiral arteries that perfuse the placenta. The resulting reduced perfusion and increased velocity of blood perfusing the intervillous space alter placental function. The altered placental function leads to maternal disease through putative primary mediators, including oxidative and endoplasmic reticulum stress and inflammation, and secondary mediators that include modifiers of endothelial function and angiogenesis. This understanding of preeclampsia pathophysiology has not translated into predictors or preventers of preeclampsia or to improved clinical care. This has led to a reassessment of this conceptual framework, with attention to the possibility that preeclampsia is not one disease but that the syndrome may include subsets of pathophysiology.

Clinical research advances have shown approaches to therapy that work (eg, delivery for women with gestational hypertension and preeclampsia without severe features at 37 0/7 weeks of gestation) or do not work (vitamin C and vitamin E to prevent preeclampsia). However, there are few clinical recommendations that can be classified as "strong" because there are huge gaps in the evidence base that guides therapy. These knowledge gaps form the basis for research recommendations to guide future therapy.

Conclusion

The task force provides evidence-based recommendations for the management of patients with hypertension during and after pregnancy. Recommendations are graded as strong or qualified based on evidence of effectiveness weighed against evidence of potential harm. In all instances, the final decision is made by the health care provider and patient after consideration of the strength of the recommendations in relation to the values and judgments of the individual patient.

Executive summary: hypertension in pregnancy. American College of Obstetricians and Gynecologists. Obstet Gynecol 2013;122:1122–31.