

Maine Medical

PARTNERS

Women's Health

A department of Maine Medical Center

Hypertensive Disorders in Pregnancy

Treatment of Severe Persistent Hypertension in Pregnancy

Hydralazine Hydrochloride:

A direct arterial smooth muscle relaxant

- Indicated for severe (systolic \geq 160 mmHg **or** diastolic \geq 110 mmHg), persistent (lasting 15 minutes or more) blood pressure
- Side effects include maternal hypotension, tachycardia, flushing, and headache
- Contraindicated in patients with coronary artery disease, mitral valvular rheumatic heart disease and known hypersensitivity
- Dosage with initial first-line management with hydralazine:
 1. Administer hydralazine 5 or 10 mg IV over 2 minutes
 2. Repeat BP in 20 minutes
 3. If BP is above either threshold, administer hydralazine 10 mg IV over 2 minutes
 4. Repeat BP in 20 minutes
 5. If BP is above either threshold, administer labetalol 20 mg IV over 2 minutes
 6. Repeat BP in 10 minutes
 7. If BP is above either threshold, administer labetalol 40 mg IV over 2 minutes and obtain MFM consult.
 8. Repeat BP in 10 minutes

References:

1. ACOG Practice Bulletin No. 203. Chronic hypertension in pregnancy. *Obstet Gynecol* 2019;133:e26-e50.
2. Chobanian AV, Bakris GL, Black HR, et al. Seventh report of the Joint National committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *Joint National committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure, National Heart, Lung, and Blood Institute, national High blood Pressure education Program Coordinating Committee. Hypertension* 2003;42:1206-52.

Labetalol:

A combined alpha- and beta-adrenoreceptor antagonist decreases systemic vascular resistance.

- Indicated for severe (systolic \geq 160 mmHg **or** diastolic \geq 110 mmHg), persistent (lasting 15 minutes or more) blood pressure
- Side effects include posture-related dizziness, scalp tingling, tiredness, headache, skin rash, fever and upper GI disturbances

- Contraindicated in patients with bronchial asthma, overt cardiac failure, greater than first degree heart block, cardiogenic shock, severe bradycardia and known hypersensitivity.
- May cause neonatal bradycardia.
- Dosage with initial first-line management with labetalol:
 1. Administer labetalol 20 mg IV over 2 minutes
 2. Repeat BP in 10 minutes
 3. If BP is above either threshold, administer labetalol 40 mg IV over 2 minutes
 4. Repeat BP in 10 minutes
 5. If BP is above either threshold, administer labetalol 80 mg IV over 2 minutes
 6. Repeat BP in 10 minutes
 7. If BP is above either threshold, administer hydralazine 10 mg IV over 2 minutes and obtain MFM consult.
 8. Repeat BP in 20 minutes

References:

1. ACOG Practice Bulletin No. 203. Chronic hypertension in pregnancy. Obstet Gynecol 2019;133:e26-e50.
2. Chobanian AV, Bakris GL, Black HR, et al. Seventh report of the Joint National committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. Joint National committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure, National Heart, Lung, and Blood Institute, national High blood Pressure education Program Coordinating Committee. Hypertension 2003;42:1206-52.

Nifedipine:

A calcium channel blocker that relaxes arterial smooth muscle

- Indicated for severe (systolic \geq 160 mmHg **or** diastolic \geq 110 mmHg), persistent (lasting 15 minutes or more) blood pressure
- Side effects include headache, flushing, tachycardia, and overshoot hypotension.
- Contraindicated in patients with known hypersensitivity
- Caution should be used in patients being treated concomitantly with MgSO₄. An exaggerated hypotensive response, smooth muscle blockage and respiratory depression have been reported.
- Oral nifedipine may be given with special attention to heart rate and BP in normal range. Only PO (**not IV or SL**)
- Dosages
 1. Administer nifedipine 10 mg PO
 2. Repeat BP in 20 minutes
 3. If BP is above either threshold, administer nifedipine 20 mg PO
 4. Repeat BP in 20 minutes
 5. If BP is above either threshold, administer nifedipine 20 mg PO
 6. Repeat BP in 20 minutes
 7. If BP is above either threshold, administer labetalol 40 mg IV over 2 minutes and obtain MFM consult.
 8. Repeat BP in 10 minutes

References:

1. Chobanian AV, Bakris GL, Black HR, et al. Seventh report of the Joint National committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. Joint National committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure, National Heart, Lung, and Blood Institute, national High blood Pressure education Program Coordinating Committee. Hypertension 2003;42:1206-52.
2. Vermillion ST, Scardo JA, Newman RB, Chauhan SP. A randomized, double-blind trial of oral nifedipine and intravenous labetalol in hypertensive emergencies of pregnancy. Am J Obstet Gynecol 1999;181:858-61.
3. Raheem IA, Saaid R, Omar SZ, Tan PC. Oral nifedipine versus intravenous labetalol for acute blood pressure control in hypertensive emergencies of pregnancy: a randomized trial. BJOG 2012;119:78-85.
4. Shekhar S, Sharma C, Thakur S, Verma S. Oral nifedipine or intravenous labetalol for hypertensive emergency in pregnancy: a randomized controlled trial. Obstet Gynecol 2013;122:1057-63.
5. Duley L, Meher S, Jones L. Drugs for treatment of very high blood pressure during pregnancy. Cochrane Database of Systematic Reviews 2013, Issue 7. Available at: <https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD001449.pub3/full>
6. ACOG Practice Bulletin No. 203. Chronic hypertension in pregnancy. Obstet Gynecol 2019;133:e26-e50.

I. Hypertension in Pregnancy

Definition

Hypertension in pregnancy can be classified into four categories:

1. **Preeclampsia**
 - a. Disorder of pregnancy associated with new onset hypertension which most often occurs after 20 weeks gestation
 - i. **And** proteinuria
 - ii. **Or** in the absence proteinuria, any severe feature of preeclampsia (See Box 3, page 4)
 - b. HELLP syndrome is a subset of preeclampsia with severe features that includes hemolysis, elevated liver enzymes and low platelets.
 - c. Eclampsia is the convulsive manifestation of hypertensive disorders of pregnancy
2. **Chronic hypertension in pregnancy:**
 - d. Hypertension that is diagnosed or present before pregnancy
 - e. **Or** hypertension that is diagnosed or present before ~20 weeks gestation
 - f. **Or** hypertension that is diagnosed for the first time in pregnancy that does not resolve postpartum
 - g. See Table 1 (page 5) for ACOG definitions hypertensive disorders
 - h. See discussion below regarding degree and timing of hypertension required to confirm diagnosis as well as goal blood pressure.

3. **Chronic hypertension with superimposed preeclampsia:**
 - i. Preeclampsia complicating pre-existing chronic hypertension
 - j. **Or** preeclampsia in a patient with a history of hypertension before pregnancy
 - k. **Or** preeclampsia in a patient with a history of hypertension before ~20 weeks gestation
 - l. This may be further classified as chronic hypertension with superimposed preeclampsia with severe features or chronic hypertension with superimposed preeclampsia without severe features.
4. **Gestational hypertension:**
 - m. Systolic blood pressure of ≥ 140 mmHg or diastolic blood pressure of ≥ 90 mmHg, or both, on 2 occasions at least 4 hours apart after 20 weeks gestation, in a patient with previously normal blood pressure.
 - n. **And** absence of any severe features of preeclampsia (See Box 3, page 4)

Hypertension in pregnancy is a multisystem, dynamic process that requires timely recognition, accurate diagnosis and close surveillance. It is one the leading causes of maternal morbidity perinatal mortality worldwide.

Box 3. Historical Features Favoring Hypertension Cause

Primary Hypertension

- Gradual increase in BP, with slow rate of rise in BP
- Lifestyle factors that favor higher BP (eg, weight gain, high-sodium diet, decreased physical activity, job change entailing increased travel, excessive consumption of alcohol)
- Family history of hypertension

Secondary Hypertension

- BP lability, episodic pallor, and dizziness (pheochromocytoma)
- Snoring or hypersomnolence (obstructive sleep apnea)
- Muscle cramps or weakness (hypokalemia from primary aldosteronism or secondary aldosteronism due to renovascular disease)
- Weight loss, palpitations, heat intolerance (hyperthyroidism)
- Edema, fatigue, frequent urination (kidney disease or failure)
- History of coarctation repair (residual hypertension associated with coarctation)
- Central obesity, facial rounding, easy bruisability (Cushing syndrome)
- Medication or substance use (eg, alcohol, NSAIDs, cocaine, amphetamines)
- Absence of family history of hypertension

Abbreviations: BP, blood pressure; NSAIDs, nonsteroidal antiinflammatory drugs.

Reprinted from: Whelton PK, Carey RM, Aronow WS, Casey DE Jr, Collins KJ, Dennison Himmelfarb C, et al. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA guideline for the prevention, detection, evaluation, and management of high blood pressure in adults: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines [published erratum appears in J Am Coll Cardiol 2018;71:2275-9]. J Am Coll Cardiol 2018;71:e127-248.

Table 1 . American College of Obstetricians and Gynecologists Definitions of Hypertensive Disorders

Disorder	Definition
Hypertension in pregnancy	Systolic blood pressure \geq 140 mm Hg or diastolic BP \geq 90 mm Hg, or both, measured on two occasions at least 4 hours apart
Severe-range hypertension	Systolic blood pressure \geq 160 mm Hg or diastolic BP \geq 110 mm Hg, or both, measured on two occasions at least 4 hours apart
Chronic hypertension	Hypertension diagnosed or present before pregnancy or before 20 weeks of gestation; or hypertension that is diagnosed for the first time during pregnancy and that does not resolve in the postpartum period
Chronic hypertension with superimposed preeclampsia	Preeclampsia in a woman with a history of hypertension before pregnancy or before 20 weeks of gestation

1. Preeclampsia

Definition

Blood pressure:

- Systolic blood pressure \geq 140 mmHg or diastolic \geq 90 mmHg, or both, on 2 occasions at least 4 hours apart after 20 weeks' gestation in a patient with a previously normal blood pressure
- Systolic blood pressure \geq 160 mmHg or diastolic \geq 110 mmHg, or both, 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 time collection)
- **Or** protein/creatinine ratio greater than or equal to 0.3 (each measured mg/dL)
- **Or** dipstick reading of 1+ (used only if other quantitative methods are 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 concentration 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 disturbances unresponsive to medication and not accounted for by alternative diagnosis

1a. Preeclampsia with severe features

Definition

Any single finding below is diagnostic of preeclampsia with severe features (See Box 3, page 4)

- Systolic blood pressure 160 mmHg or higher, or diastolic blood pressure of 110 mmHg or higher, or both, on two occasions at least 4 hours apart (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 enzyme (to twice laboratory normal concentration), severe persistent right upper quadrant or epigastric pain unresponsive to medication and not accounted for by alternative diagnosis
- Renal insufficiency (serum creatinine greater than 1.1 mg/dL or doubling of serum creatinine concentration in the absence of other renal disease)
- Pulmonary edema
- New-onset cerebral or visual disturbances unresponsive to medication and not accounted for by alternate diagnosis

1b. Preeclampsia without severe features

Definition

Blood pressure:

- Greater than or equal to 140 mmHg systolic or greater than or equal to 90 mmHg diastolic, or both, on 2 occasions at least 4 hours apart after 20 weeks' gestation in a patient with a previously normal blood pressure

AND

Proteinuria:

- Greater than or equal to 300 mg per 24 hour urine collection (or this amount extrapolated from a time collection)
- **Or** protein/creatinine ratio greater than or equal to 0.3 (each measured mg/dL)
- **Or** dipstick reading of 1+ (used only if other quantitative methods are not available)

AND WITHOUT AFOREMENTIONED SEVERE FEATURES (SEE BOX 3, page 4)

1c. HELLP Syndrome

Definition:

A subset of preeclampsia that includes hemolysis, elevated liver enzymes and low platelets.

Criteria suggesting the diagnosis may include:

- Lactate dehydrogenase (LDH) > 600 IU/L
- AST and ALT greater than twice the upper limits of normal
- Platelet count of less than 100,000/microliter

The clinical course with HELLP syndrome is typically characterized by progressive and often sudden deterioration in the maternal and fetal status.

1d. Eclampsia

Definition:

The convulsive manifestation of hypertensive disorders in pregnancy.

New onset tonic-clonic, focal or multifocal seizures in the absence of other causative conditions. A significant proportion of pregnant patients do not demonstrate classic signs of preeclampsia before seizure episode.

2. Chronic Hypertension

Definition:

Hypertension that is diagnosed or present before pregnancy or present before ~20 weeks' gestation or diagnosed for the first time in pregnancy that does not resolve postpartum.

The American College of Cardiology (ACC) and the American Heart Association (AHA) revised criteria for diagnosing hypertension adults was published in 2018. These recommendations include for categories of

- Normal—systolic blood pressure less than 120 mmHg and diastolic blood pressure less than 80 mmHg
- Elevated—systolic blood pressure of 120-129 mmHg and diastolic blood pressure of less than 80 mmHg
- Stage I hypertension—systolic blood pressure of 130 to 139 mmHg or diastolic blood pressure of 80-89 mmHg
- Stage II hypertension—systolic blood pressure of 140 mmHg or more or diastolic blood pressure of 90 mmHg or more

Patients diagnosed with chronic hypertension (stage 1 or greater) outside of pregnancy should be managed as a chronic hypertensive for the purposes of pregnancy.

The management of patients without a prior diagnosis of chronic hypertension that have blood pressure in the stage I hypertension range before 20 weeks gestation is unclear. However, "a conservative approach of a higher degree of observation may be warranted" as these patients do have a higher risk of preeclampsia, gestational diabetes and indicated preterm birth.² Logistically, managing these patients as having suspected chronic hypertension for the purposes of pregnancy is a reasonable approach. Postpartum confirmation of this diagnosis is recommended. Admittedly, this approach may mislabel some patients with "borderline and possibly inconsequential cases of blood pressure elevation" as abnormal. Alternatively, it may avoid unindicated preterm delivery while allowing for earlier diagnosis of progressive disease.

The assumption that the 20-week mark can discriminate chronic hypertension from pregnancy related hypertension is not well substantiated in the medical literature. As

such, "the 20-week convention should not be used dogmatically but rather for orientation while maintaining clinical judgment."

"The uncertainty of the new approach to hypertension from the ACC/AHA as applied to the care of pregnant patients should be an active area of investigation."

ACOG has also defined hypertensive disorders. (See Table 1, page 5)

Initiation or titration of antihypertensive medication is recommended to a goal blood pressure of less than 140/90 mmHg. Active treatment including initiation of antihypertensives and/or appropriate titration to goal blood pressure appears to reduce the risk of adverse pregnancy outcome without evidence of adverse fetal effects.

References:

1. ACOG Practice Bulletin No. 203. Chronic hypertension in pregnancy. *Obstet Gynecol* 2019;133:e26-e50.
2. Sutton EF, Hauspurg A, Caritis SN, Powers RW, Catov JM. Maternal outcomes associated with lower range stage 1 hypertension. *Obstet Gynecol* 2018;132:843-849.
3. Tita AT, et al. Treatment for Mild Chronic Hypertension during Pregnancy. Chronic Hypertension and Pregnancy (CHAP) Trial Consortium. *N Engl J Med*. 2022;386(19):1781

3. Chronic Hypertension with Superimposed Preeclampsia

Definition:

Superimposed preeclampsia refers to patients with chronic hypertension who develop preeclampsia. Distinguishing superimposed preeclampsia from benign gestational increases in blood pressure and proteinuria can be quite challenging.

Given the higher risk of adverse pregnancy outcome in patients with superimposed preeclampsia, vigilance in diagnosis is recommended to avoid catastrophic maternal and fetal outcomes.

Thus "in cases of diagnostic uncertainty and discriminating transient blood pressure increases and chronic hypertension from superimposed preeclampsia, particularly with severe range blood pressures, initial surveillance in a hospital setting is recommended."

Clinicians should be aware that there is considerable ambiguity in the diagnosis of superimposed preeclampsia.

For the purposes of classification there are two subsets of superimposed preeclampsia. These include a superimposed preeclampsia with severe features and superimposed preeclampsia without severe features. This is similar to the classification system for preeclampsia (i.e., preeclampsia with severe features or preeclampsia without severe features).

3a. Chronic Hypertension with Superimposed Preeclampsia with Severe Features

Definition:

Superimposed preeclampsia with severe features is a subset of superimposed preeclampsia.

Superimposed preeclampsia with severe features is likely when any of the systemic findings exist:

- Severe range blood pressure despite escalation of antihypertensive medication
- Thrombocytopenia (platelet count less than 100,000/ microliter)
- Elevated liver transaminases (greater than or equal to 2 times the upper normal limits for the reference laboratory)
- New onset or worsening renal insufficiency
- Pulmonary edema
- Persistent cerebral or visual disturbances

3b. Chronic Hypertension with Superimposed Preeclampsia without Severe Features

Definition:

Superimposed preeclampsia without severe features is a subset of superimposed preeclampsia.

Chronic hypertension with superimposed preeclampsia is likely when any of the following exist:

- A sudden increase in blood pressure that was previously well controlled or escalation of antihypertensive medication to control blood pressure
- New-onset proteinuria or sudden increase in proteinuria in a pregnant patient with known proteinuria before or early in pregnancy

AND WITHOUT AFOREMENTIONED SYSTEMIC FINDINGS

4. Gestational Hypertension

Definition:

Gestational hypertension is defined as new onset of blood pressure elevation after 20 weeks' gestation in the absence of accompanying proteinuria or aforementioned systemic findings.

An important distinction exists for patients with severe, persistent range elevations in blood pressures (≥ 160 mmHg systolic or ≥ 110 mmHg diastolic) with absent proteinuria. Patients with severe, persistent range elevated blood pressures with absent proteinuria carry the diagnosis of preeclampsia with severe features and **not** gestational hypertension.

II. Management of Preeclampsia/Gestational Hypertension/Chronic Hypertension with Superimposed Preeclampsia

Delivery is the only cure for the disease. The decision for immediate delivery versus expectant management is dependent upon:

1. Rate and severity of disease progression
2. Gestational age
3. Maternal and fetal condition

Maternal assessment:

Frequent ongoing maternal assessments are required to assess for severity and progression of disease.

1. Laboratory assessment:
 - CBC
 - Creatinine
 - AST, ALT
 - 24-hour urine protein and creatinine clearance
 - Consider protein/creatinine ratio, urinalysis, uric acid, lactate dehydrogenase, total bilirubin, peripheral blood smear and coagulation profile to clarify diagnosis
2. Symptom assessment:
 - New-onset cerebral or visual disturbances
 - Shortness of breath
 - Right upper quadrant pain
3. Physical exam assessment:
 - Right upper quadrant tenderness
 - Pulmonary exam
 - Edema
4. Maternal assessments should be repeated frequently as clinically indicated.
5. Outpatient expectant management, if deemed appropriate in cases of preeclampsia without severe features should include twice-weekly maternal assessments.
6. Close maternal-fetal monitoring by a physician/nurse are advised during treatment of acute-onset severe hypertension.
7. No cardiac monitoring required.
8. Expectant management of preeclampsia is reasonable in certain circumstances. However, delivery after maternal stabilization is recommended in the presence of uncontrolled severe hypertension, eclampsia, pulmonary edema, disseminated intravascular coagulation, new or increasing renal insufficiency, placental abruption or abnormal fetal testing.

Accurate blood pressure to optimally manage hypertension or pregnancy is necessary.

- Standardized BP monitoring should be in place regardless arm size/shape
Gold standard: manual sphygmomanometer, however, validated calibrated equivalent automated equipment may be used.
- Patient has rested preferably for 10 minutes or more
Patient is seated with legs uncrossed and back supported

Patient has not used caffeine for tobacco for at least 30 minutes before measurement

- Patient's arm is supported at the level of the right atrium
Appropriate size cuff (length 1.5 times upper arm circumference or a cuff with a bladder that encircles at least 80% of the arm and a width of at least 40% of the arm circumference)
 - ▶ For an arm circumference of 22 to 26 cm, the cuff should be small adult size; 12 x 22 cm
 - ▶ For an arm circumference of 27 to 34 cm, the cuff should be an adult size: 16 x 30 cm
 - ▶ For an arm circumference of 35 to 44 cm, the cuff should be large adult size: 16 x 36 cm
 - ▶ For an arm circumference of 45 to 52 cm, the cuff should be adult thigh size: 16 x 42 cm
- Do not put patient on side or in reclined supine position to obtain lower readings.

Fetal assessment:

Frequent ongoing fetal assessments are required to assess for severity and progression of disease.

- **Inpatient expectant management** based upon gestational age at diagnosis is recommended for patients with preeclampsia with severe features, chronic hypertension with superimposed preeclampsia with severe features barring above contraindications. This should be accomplished at a tertiary care facility. Testing determined by severity 1-2x daily.
- **Outpatient expectant management** based upon gestational age at diagnosis can be considered for patients with preeclampsia without severe features, chronic hypertension with superimposed preeclampsia without severe features and gestational hypertension. At least 2x/week or as clinically indicated
- Assessment of fetal growth at the time of diagnosis and repeated as clinically indicated, approximately every 2 weeks.
- Fetal assessments should be repeated as clinically indicated.

Magnesium Sulfate

Intravenous magnesium sulfate to prevent eclampsia is recommended for all patients with preeclampsia with severe features, HELLP syndrome and chronic hypertension with superimposed preeclampsia with severe features.

Intravenous magnesium sulfate to prevent eclampsia may be considered for patients with preeclampsia without severe features, chronic hypertension with superimposed preeclampsia without severe features and gestational hypertension.

A loading dose of 4-6 over 20 minutes followed by maintenance therapy of 2 grams/hour is recommended.

Treatment is suggested for 24 hours post-delivery.

Frequent monitoring of respiratory rate, deep tendon reflexes, and state of consciousness must be carried out.

Intake and output should be strictly monitored. A Foley catheter with urometer may be required.

An ampule of calcium gluconate should be readily available.

Aspirin

Table 1. Clinical Risk Factors and Aspirin Use*

Level of Risk	Risk Factors	Recommendation
High [†]	<ul style="list-style-type: none"> • History of preeclampsia, especially when accompanied by an adverse outcome • Multifetal gestation • Chronic hypertension • Type 1 or 2 diabetes • Renal disease • Autoimmune disease (ie, systemic lupus erythematosus, the antiphospholipid syndrome) 	Recommend low-dose aspirin if the patient has one or more of these high-risk factors
Moderate [‡]	<ul style="list-style-type: none"> • Nulliparity • Obesity (body mass index greater than 30) • Family history of preeclampsia (mother or sister) • Sociodemographic characteristics (African American race, low socioeconomic status) • Age 35 years or older • Personal history factors (eg, low birth weight or small for gestational age, previous adverse pregnancy outcome, more than 10-year pregnancy interval) 	Consider low-dose aspirin if the patient has more than one of these moderate-risk factors [§]
Low	<ul style="list-style-type: none"> • Previous uncomplicated full-term delivery 	Do not recommend low-dose aspirin

*Includes only risk factors that can be obtained from the patient's medical history. Clinical measures, such as uterine artery Doppler ultrasonography, are not included.

[†]Single risk factors that are consistently associated with the greatest risk of preeclampsia. The preeclampsia incidence rate would be approximately 8% or more in a pregnant woman with one or more of these risk factors.

[‡]A combination of multiple moderate-risk factors may be used by clinicians to identify women at high risk of preeclampsia. These risk factors are independently associated with moderate risk of preeclampsia, some more consistently than others.

[§]Moderate-risk factors vary in their association with increased risk of preeclampsia.

Goal for Timing of Delivery

Conditions Precluding Expectant Management*

Maternal

- Uncontrolled severe-range blood pressures (persistent systolic blood pressure 160 mm Hg or more or diastolic blood pressure 110 mm Hg or more not responsive to antihypertensive medication)
- Persistent headaches, refractory to treatment

- Epigastric pain or right upper pain unresponsive to repeat analgesics
- Visual disturbances, motor deficit or altered sensorium
- Stroke
- Myocardial infarction
- HELLP syndrome
- New or worsening renal dysfunction (serum creatinine greater than 1.1 mg/dL or twice baseline)
- Pulmonary edema
- Eclampsia
- Suspected acute placental abruption or vaginal bleeding in the absence of placenta previa

Fetal

- Abnormal fetal testing
- Fetal death
- Fetus without expectation for survival at the time of maternal diagnosis (eg, lethal anomaly, extreme prematurity)
- Persistent reversed end-diastolic flow in the umbilical artery

Abbreviation: HELLP, hemolysis, elevated liver enzymes, and low platelet count

*In some cases, a course of antenatal steroids can be considered depending on gestational age and maternal severity of illness.

Data from Balogun OA, Sibai BM. Counseling, management, and outcome in women with severe preeclampsia at 23 to 28 weeks' gestation. Clin Obstet Gynecol 2017;60:183–9.

In the absence of contraindications, general guidelines for timing of delivery are presented below:

Preeclampsia without severe features:

- At diagnosis goal of 37 0/7 weeks

Preeclampsia with severe features:

- At diagnosis goal of 34 0/7 weeks

HELLP syndrome

- At diagnosis goal of 34 0/7 weeks
- At diagnosis prior to gestational age of fetal viability
- At diagnosis in the presence of disseminated intravascular coagulation, liver infarction or hemorrhage, renal failure, placental abruption or nonreassuring fetal status.
- Consider delay of delivery for 24-48 hours if maternal and fetal conditions remain stable to complete a course of corticosteroids for fetal benefits from the gestational age of fetal viability to 33 6/7 weeks. Delivery after completion of corticosteroids

Chronic hypertension on no medication

- 38 0/7-39 6/7 weeks of gestation

Chronic hypertension on medication

- 37 0/7-39 and 6/7 weeks of gestation

Chronic hypertension with superimposed preeclampsia with severe features

- At diagnosis after 34 0/7 weeks

Chronic hypertension with superimposed preeclampsia without severe features

- At diagnosis after 37 0/7 weeks

Gestational hypertension:

- At diagnosis after 37 0/7 weeks

Postpartum

Postpartum education prior to discharge should include information on signs and symptoms of severe hypertension with direction on when and where to access care.

Patients with severe hypertension should be assessed within 7 to 14 days of discharge or earlier as clinically indicated. Verification of follow-up should occur within the practice that provided prenatal care.

References:

1. ACOG Committee Opinion No. 764. Medically indicated late-preterm and early-term deliveries. *Obstet Gynecol* 2019;133:e151-e155.
2. ACOG Practice Bulletin No. 202. Gestational hypertension and preeclampsia. *Obstet Gynecol* 2019;133:e1-e25.
3. ACOG Practice Bulletin No. 203. Chronic hypertension in pregnancy. *Obstet Gynecol* 2019;133:e26-e50.
4. Sutton EF, Hauspurg A, Caritis SN, Powers RW, Catov JM. Maternal outcomes associated with lower range State 1 hypertension. *Obstet Gynecol* 2018;132:843-849.

MFM Treatment of Severe Hypertension Algorithm

**Systolic BP \geq 160 mmHg and/or
Diastolic BP \geq 110 mmHg
2 times 15 minutes apart (notify provider after 1st)**

- Inform OB Team
- IV Access
- Monitor FHR
- Send Labs

Hypertensive Medication

**PO NIFEDIPINE
10 mg PO**

Repeat BP in **20 min**
if severe administer
Nifedipine 20 mg PO

Repeat BP in **20 min**
if severe administer
Nifedipine 20 mg PO

Repeat BP in **20 min**
if severe administer
**Labetalol 40 mg IV
and consult MFM**

**IV LABETALOL
20 mg over 2 min**

Repeat BP in **10 min**
if severe administer
Labetalol 40 mg

Repeat BP in **10 min**
if severe administer
Labetalol 80 mg

Repeat BP in **10 min**
if severe administer
Hydralazine 10 mg

Repeat BP in **20 min**
if remains severe
obtain MFM consult
and repeat BP in **20 min**

*Hold IV Labetalol for maternal
pulse under **60***

**IV HYDRALAZINE
5-10 mg over 2
minutes**

Repeat BP in **20 min**
if severe administer
Hydralazine 10 mg

Repeat BP in **20 min**
if severe administer
Labetalol 20 mg

Repeat BP in **10 min**
if severe administer
**Labetalol 40mg AND
obtain MFM consult**

Seizure Prophylaxis

**Mag Sulfate bolus
dose 4-6 g over 15
min, remain with pt**

**Mag Sulfate
maintenance dose
1-2 g/hr**

**Complete mag
assessment per
protocol and check
serum mag levels if
indicated**

**Once BP thresholds are
achieved, repeat BP:**

- Every 10 min x 1 hour
- Then q15 min x 1 hour
- Then q30 min x 1 hour
- Then q1 hr for 4 hours

MANAGEMENT OF ECLAMPSIA

Call for help + Inform OB provider + call anesthesia

Monitor maternal Vital Signs Immediately
Bring Code cart to room

AIRWAY BREATHING

100% O2 via nonrebreather
have suction available
O2 sat probe on

OPEN AIRWAY

Jaw thrust/head tilt chin-

Secure pt in bed rails up

Insert oral airway if airway
is obstructed

If O2 sats fall below 94%
and not able to insert oral
airway insert nasal airway

If apneic ventilate with an
ambu bag

CIRCULATION

Place patient in left
lateral position

Check O2, pulse and BP

Maintain IV access with
1-2 large bore catheters

CONTRAINDICATIONS TO MAG:

Pulmonary edema, renal
failure, myasthenia gravis

May use :

Lorazepam – 2-4 mg IV X 1

Phenytoin – 15-20 mg/kg IV
X1

SEIZURE CONTROL

**Initial mag 6 g bolus IV
over 20 minutes**
if no IV access Mag 10
grams of 50% solution IM
5 grams in each buttock

**If mag running already
2 g IV over 3-5 minutes**

**Maintain mag
maintenance
dose of 1-2 g/hour**

**If seizure not resolved
administer Lorazepam 2-4
mg IV may repeat x 1 after
10-15 minutes**

MONITOR FHR

Make sure the FHR is
being monitored

With a goal of avoiding
immediate delivery if
possible anesthesia team
and OB team to discuss
delivery if required.
Time should be allowed
for FHR to return to
baseline. Delivery should
only be pursued if
bradycardia after
termination of seizure