HYPERTENSION IN PREGNANCY

DEFINITION
Hypertension in pregnancy is defined as BPs >140 or BP_D ≥ 90 measured with patient sitting at rest and confirmed at least once at least six hours later. Hypertensive disorders complicate at least 7% of pregnancies and are expected to increase as obesity increases and older women conceive. Hypertensive disorders are more common in nulliparous women and in multifetal pregnancies. Hypertension has serious adverse impacts on pregnancy outcomes, including increased risks for IUGR, placental abruption, stillbirth, preterm delivery and early onset pre-eclampsia. Maternal morbidity and mortality rates are also increased. These adverse outcomes increase with the severity of hypertension and end organ damage. Hypertension may be chronic (i.e., exist prior to pregnancy) or may develop during pregnancy (i.e., transient hypertension, pre-eclampsia, and HELLP syndrome), and will resolve within 12 weeks after delivery. Chronic hypertension is considered mild if BPs 140-159 or BP_D 90-110 mm Hg. Severe hypertension is diagnosed when blood pressure is at higher levels. Pre-eclampsia, eclampsia, and HELLP syndrome are covered in a separate protocol.

SUBJECTIVE
Must exclude: New onset subjective symptoms of pre-eclampsia (see protocol Pre-Eclampsia (Mild & Severe), HELLP Syndrome, Eclampsia protocol). If present, refer to ER.

Must include:
1. History of hypertension before pregnancy or BPs > 140 or BPD ≥ 90 mm Hg before 20 weeks GA on at least 2 occasions at least 6 hours apart.
2. LMP and PMP.
4. List of any medications and other treatments.

May include history of:
1. Cardiac or renal disease.
2. Other cardiovascular risk factors (e.g., diabetes, smoking, obesity, lipid abnormalities).
3. Sleep apnea.

OBJECTIVE
Must include:
1. BP ≥ 140/90 measured with appropriate cuff size (1 ½ times upper arm circumference) after 10 minutes rest.
   a. Optimal time to diagnose is first trimester.
   b. BP may not appear elevated in second trimester.
2. FHTs, if GA appropriate.
3. Measure fundal height and compare to GA determined by dates. Rule out IUGR.

LABORATORY
1. Urine dipstick for protein or 24 hour collection for protein.
2. CBC, creatinine, BUN.

ASSESSMENT
Prenatal patient with chronic hypertension.

PLAN
1. If BP currently ≥ 150/105 mm Hg., ≥2+ proteinuria or signs or symptoms of pre-eclampsia, refer to ER or consult MD immediately.
2. If known hypertensive patient with good BP control, no comorbidities and no signs of fetal IUGR:
   a. May continue with NP/CNM care through second trimester, if MD concurs.
   c. Order EKG and ophthalmologic exam.
   d. Order dating ultrasound in first trimester and ultrasound for anatomical survey at 18-20 weeks gestation. Consider third trimester ultrasound scan to monitor continued fetal growth and amniotic fluid index.
   e. Advise patient to continue diet and exercise.
   f. Consult with MD regarding medication continuation. See Table 1 for medication to use in
**PLAN (Continued)**

- Pregnancy and possible side effects of each of those antihypertensive agents.
  
- If using teratogenic medication (see Table 2), refer to genetics and transfer care to MD to readjust medication.
  
- If known hypertensive patient with BP >150/100 mm Hg., and those with multiple medications or with other medical problems:
  
  a. Refer to high risk obstetrical service.
  
  
  c. Order baseline ultrasound studies.
  
- Monitor proteinuria throughout pregnancy.
  
- Advise low salt diet.
  
- Transfer to MD care in third trimester.
  
3. If known hypertensive patient with BP >150/100 mm Hg., and those with multiple medications or with other medical problems:

   a. Refer to high risk obstetrical service.
   
   
   c. Order baseline ultrasound studies.

4. If hypertension diagnosed for first time at initial visit, patient will need thorough workup for causes of secondary hypertension. Refer to high risk obstetrical service.

5. If hypertension develops or worsens during pregnancy, consult MD and refer to ER or high risk obstetrical service, to rule out superimposed pre-eclampsia.

**PATIENT EDUCATION**


2. Urge prompt follow-up in high risk obstetrical service, if required. Provide patient with:

   a. Date of appointment.
   
   b. Copy of records, if needed.

3. Describe time commitments needed for patient throughout pregnancy, including need for serial ultrasound studies and antepartum testing.

4. Instruct patient about signs and symptoms of superimposed pre-eclampsia. Advise her to go to ER if:

   a. Visual changes, such as scotoma.
   
   b. Severe abdominal pain.
   
   c. Nausea and vomiting, especially epigastric pain.
   
   d. Severe headaches.
   
   e. Decreased urinary output.
   
   f. Syncope or vertigo.
   
   g. Shortness of breath.
   
   h. Rapid development of facial or hand edema.
   
   i. Decreased fetal movement.

**REFER to MD/ER**

1. Patients with pre-eclampsia, uncontrolled hypertension, newly diagnosed hypertension.

2. Patients using teratogenic antihypertensive medication.

**Gestational Hypertension or Transient Hypertension of Pregnancy or Pregnancy Induced Hypertension (PIH)**

**SUBJECTIVE**

Must exclude:

1. History of chronic hypertension.

2. Symptoms consistent with pre-eclampsia or eclampsia (see Pre-Eclampsia (Mild & Severe), HELLP Syndrome, and Eclampsia protocol). If present, refer to ER.

May include:

1. History of gestational hypertension, pre-eclampsia or eclampsia in prior pregnancies.

2. Risk factors, such as diabetes, obesity, Dyslipidemia, SSRI use, tobacco addiction.

**OBJECTIVE**

Must exclude:

1. Proteinuria.

2. Other signs of pre-eclampsia, HELLP, or worsening hypertension (see Pre-Eclampsia (Mild & Severe), HELLP Syndrome, and Eclampsia protocol).
<table>
<thead>
<tr>
<th><strong>OBJECTIVE</strong> (Continued)</th>
<th><strong>Gestational Hypertension or Transient Hypertension of Pregnancy or Pregnancy Induced Hypertension (PIH)</strong></th>
</tr>
</thead>
</table>
| **Must include:**        | 1. $BP_S \geq 140$ or $BP_D \geq 90$ measured with appropriate size cuff after 20 weeks GA on at least 2 occasions at least 6 hours apart.  
2. Return to normal BP post partum. |

| **LABORATORY**            | Urine dipstick negative for protein. |

| **ASSESSMENT**            | Prenatal patient with gestational hypertension, transient hypertension of pregnancy or pregnancy induced hypertension (PIH). |

| **PLAN**                  | 1. Document presence or absence of FHTs. If fetal distress suspected, call receiving hospital for transport instructions.  
2. Plan depends upon severity of problem (repeat BP to confirm diagnosis).  
   a. If BP severely elevated ($BP_S \geq 160$ or $BP_D \geq 110$), call receiving ER for transport and medication instructions. Keep patient calm and in left lateral recumbent position pending transport. Monitor patient and fetus frequently. Implement seizure precautions.  
   b. If BP less severely elevated ($BP_S 140-159; BP_D 90-109$), call MD immediately for instructions. Generally, patients will need close follow-up, but may not need medications unless they have comorbidities.  
   c. If BP levels significantly elevated above first trimester BP but absolute BP <140/90 and no proteinuria:  
      1) Advise frequent left sided bed rest.  
      2) Have patient return to clinic within 2-4 days to repeat BP and check for proteinuria.  
      3) Consult MD. |

| **PATIENT EDUCATION**     | 1. Instruct patient about signs and symptoms of superimposed pre-eclampsia. About 15-45% of women with gestational hypertension develop pre-eclampsia. Advise her to go to ER if she develops:  
   a. Visual changes, such as scotoma.  
   b. Severe abdominal pain.  
   c. Nausea and vomiting, especially epigastric pain.  
   d. Severe headaches.  
   e. Decreased urinary output  
   f. Syncope or vertigo.  
   g. Shortness of breath.  
   h. Rapid development of facial of hand edema.  
   i. Decreased fetal movement.  
2. Advise patient of her risks later in life for diabetes, especially women with obesity and hypertension.  
3. Counsel her that she will have to be monitored for IUGR and oligohydramnios. |

| **REFER to MD/ER**        | 1. Hypertension in women with comorbidities.  
2. Hypertension not well controlled by exercise or diet.  
3. New onset hypertension.  
4. Pre-eclampsia.  
5. Pregnancies complicated by IUGR or oligohydramnios and women who had IUGR in prior pregnancies. |

| **REFERENCES**            | 1. ACOG: Practice Bulletin No. 125 February 2012: Chronic Hypertension in Pregnancy.  

### Table 1: Treatment of Chronic Hypertension in Pregnancy: Oral antihypertensives commonly used in pregnancy

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dosage</th>
<th>Maternal Adverse Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labetalol</td>
<td>200-2,400 mg per day in 2-3 divided doses</td>
<td>Headache</td>
</tr>
<tr>
<td>Nifedipine</td>
<td>30-120 mg per day of a slow-release preparation</td>
<td>Headache</td>
</tr>
<tr>
<td>Methyldopa</td>
<td>0.5-3.0 g per day in 2-3 divided doses</td>
<td>Maternal sedation, elevated LFTs, depression</td>
</tr>
</tbody>
</table>

**Adjunctive agents:**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dosage</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydralazine</td>
<td>50-300 mg per day in 2-4 divided doses</td>
<td>Use with methyldopa or labetalol to prevent reflex tachycardia; risk of neonatal thrombocytopenia</td>
</tr>
<tr>
<td>Hydrochlorothiazide</td>
<td>12.5-50 mg per day</td>
<td>Can cause volume depletion and electrolyte disorders</td>
</tr>
</tbody>
</table>

### Table 2: Hypertension Drugs to Avoid in Pregnancy

<table>
<thead>
<tr>
<th>Drug</th>
<th>Problem caused</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atenolol (pure beta antagonist)</td>
<td>IUGR</td>
</tr>
<tr>
<td>Angiotensin-converting enzyme (ACE) inhibitors</td>
<td>Cardiovascular malformations, underdeveloped calvicular bone, renal dysgenesis, pulmonary hypoplasia, IUGR, fetal renal failure, olighydramnios</td>
</tr>
<tr>
<td>Captolpril, Enalapril, Fosinopril, Imidapril, Lisinopril, Moexipril, Peridopril, Quinapril, Ramipril</td>
<td></td>
</tr>
<tr>
<td>Angiotensin receptor blocker</td>
<td>Teratogenic: renal abnormalities, dysmorphia, stillbirth</td>
</tr>
<tr>
<td>Candesartan, Eposartan, Irbesartan, Losartan, Olmisartan, Telmisartan, Valsartan</td>
<td></td>
</tr>
</tbody>
</table>