Maternal Safety Bundle for Severe Hypertension in Pregnancy
January 14, 2014
Severe Hypertension in Pregnancy: Key Elements

- Diagnostic Criteria
- When to Treat
- Agents to Use
- Monitoring
- Complications and Escalation Process
- Further Evaluation
- Change of Status
- Postpartum Surveillance
Diagnostic Criteria: Severe Hypertension

• Severe hypertension that is accurately measured using standard techniques and is persistent for > 15 minutes is considered a hypertensive emergency.

Severe hypertension is defined as:

\[
\text{systolic blood pressure} \geq 160 \text{ mm Hg } \quad \text{or} \quad \text{diastolic blood pressure} \geq 110 \text{ mm Hg}
\]

• Severe hypertension can occur during the antepartum, intrapartum, or postpartum period.
All pregnant or postpartum patients with 

systolic blood pressure $\geq 160$ mm Hg 

or 

diastolic blood pressure $\geq 110$ mm Hg 

that persists $> 15$ minutes require treatment.
Agents to Use: First Line

First line medications for the management of severe hypertension in pregnant and postpartum women are:

• Intravenous labetalol
• Intravenous hydralazine

Note: magnesium sulfate

• Is not recommended as an antihypertensive agent
• Remains the drug of choice for seizure prophylaxis and for controlling seizures in eclampsia
• Unless contraindicated, should be given when managing a hypertensive crisis
  – IV bolus of 4-6 grams in 100 ml over 15 minutes followed by IV infusion of 1-2 grams per hour
  – continue for 24 hours postpartum
Algorithm: **First Line Management with Labetalol***

SBP ≥ 160 or DBP ≥ 110

Notify a provider and institute fetal surveillance if viable

Labetalol 20 mg IV over 2 minutes

Repeat BP in 10 minutes

If SBP ≥ 160 or DBP ≥ 110, administer labetalol 40 mg IV over 2 minutes; if BP is below threshold, continue to monitor BP closely

If SBP ≥ 160 or DBP ≥ 110, administer labetalol 80 mg IV over 2 minutes; if BP is below threshold, continue to monitor BP closely

Repeat BP in 10 minutes

If SBP ≥ 160 or DBP ≥ 110, administer hydralazine 10 mg IV over 2 minutes; if below threshold, continue to monitor BP closely

Repeat BP in 10 minutes and again in 20 minutes

If SBP ≥ 160 or DBP ≥ 110 at 20 minutes, obtain emergency consultation from specialist in MFM, internal medicine, anesthesiology, or critical care

Give additional antihypertensive medication per specific order as recommended by specialist

Once BP thresholds are achieved, repeat BP
- every 10 minutes for 1 hour
- then every 15 minutes for 1 hour
- then every 30 minutes for 1 hour
- then every hour for 4 hours

Institute additional BP monitoring per specific order

*Hold IV labetalol for maternal pulse under 60
Algorithm: First Line Management with Hydralazine

- Notify a provider and institute fetal surveillance if viable
- Administer hydralazine 5 mg or 10 mg IV over 2 minutes
- Repeat BP in 10 minutes and again in 20 minutes
- If SBP ≥ 160 or DBP ≥ 110 at 20 minutes, administer hydralazine 10 mg IV over 2 minutes; if below threshold, continue to monitor BP closely
- Repeat BP in 10 minutes
- If SBP ≥ 160 or DBP ≥ 110 at 20 minutes, administer labetalol 20 mg IV over 2 minutes; if below threshold, continue to monitor BP closely
- Repeat BP in 10 minutes
- If SBP ≥ 160 or DBP ≥ 110, administer labetalol 40 mg IV over 2 minutes and obtain emergency consultation from specialist in MFM, internal medicine, anesthesiology, or critical care
- Give additional antihypertensive medication per specific order as recommended by specialist
- Once BP thresholds are achieved, repeat BP:
  - every 10 minutes for 1 hour
  - then every 15 minutes for 1 hour
  - then every 30 minutes for 1 hour
  - then every hour for 4 hours
- Institute additional BP monitoring per specific order
Agents to Use: **No IV Access**

If intravenous access is not yet obtained in a pregnant or postpartum woman with severe hypertension, administer:

- 200 mg of labetalol orally or
  10 mg of nifedipine orally (*not for sublingual use*)

- Repeat in 30 minutes if systolic blood pressure remains $\geq 160$ or diastolic blood pressure $\geq 110$ and intravenous access still unavailable
Agents to Use: Second Line

If the patient fails to respond to first line agents, recommend emergency consultation with a specialist in one of the following areas for second line management decisions:

- Maternal Fetal Medicine
- Internal Medicine
- Anesthesiology
- Critical Care
Monitoring: Blood Pressure Management

Maternal

• Measure blood pressure every 10 minutes during administration of antihypertensive medications

• Once blood pressure is controlled (<160/110), measure blood pressure:
  – every 10 minutes for 1 hour
  – every 15 minutes for next hour
  – every 30 minutes for next hour
  – every hour for four hours

• Obtain baseline labs:
  – CBC, platelets, LDH, liver function tests, electrolytes, BUN creatinine, urine protein

Fetal

• Fetal monitoring surveillance as appropriate for gestational age
Severe Hypertension in Pregnancy Checklist

*Trigger for initiating this checklist is a SBP ≥160 or DBP ≥110*
Severe Hypertension in Pregnancy Checklist

Trigger for initiating this checklist is a SBP ≥160 or DBP ≥110

• Initiate magnesium sulfate for seizure prophylaxis (if not already initiated). See eclampsia checklist for magnesium sulfate use.

• Antihypertensive medications (refer to antihypertensive medication algorithms)
  – Labetalol - (20, 40, 80 mg IV over 2 minutes, escalating doses, repeat every 10 minutes or 200 mg orally if no IV access); avoid in asthma or heart failure, can cause neonatal bradycardia
  – Hydralazine - (5-10 mg IV over 2 minutes, repeat in 20 minutes until target blood pressure is reached)
  – Repeat blood pressure every 10 minutes during administration

• If first line agents are unsuccessful, recommend emergent consultation with specialist (e.g., MFM, internal medicine, OB anesthesiology, critical care) for second line management decisions

• Anticonvulsant medications (for recurrent seizures or when magnesium is contraindicated):
  – Lorazepam (2-4 mg IV x 1, may repeat x 1 after 10-15 minutes)
  – Diazepam (5-10 mg IV every 5-10 minutes to maximum dose 30 mg)
  – Phenytoin (15-20 mg/kg IV x 1, may repeat 10 mg/kg IV after 20 minutes if no response); avoid with hypotension, may cause cardiac arrhythmias
  – Keppra (500 mg IV or orally, may repeat in 12 hours); dose adjustment needed if renal impairment
Severe Hypertension in Pregnancy Checklist

*Trigger for initiating this checklist is a SBP ≥160 or DBP ≥110*

- Antenatal corticosteroids if < 34 weeks of gestation
- Re-address VTE prophylaxis requirement
- Postpartum:
  - Antihypertensive therapy is suggested for women with persistent postpartum hypertension, SBP of 150 mm Hg or DBP of 100 mm or higher on at least two occasions that are at least 4 hours apart. Persistent SBP of 160 mm Hg or DBP of 110 mm Hg or higher should be treated within 1 hour.
  - Consider early follow-up of blood pressure after discharge (either early office visit or home nurse visit)
- Brain imaging studies if:
  - unremitting headache
  - focal signs and symptoms
  - uncontrolled high blood pressure
  - lethargy
  - confusion
  - seizures
  - abnormal neurologic examination
  - coagulopathy
Eclampsia Checklist
Eclampsia Checklist

[ ] Call for assistance *(Hospital should identify Rapid Response Team)* to location of the event

[ ] Check in:
  ✓ OB Attendings/ Fellows/Residents
  ✓ Three RNs
  ✓ Anesthesia
  ✓ Neonatology (if indicated)

[ ] Appoint a leader
[ ] Appoint a recorder
[ ] Appoint an “above the waist RN”
[ ] Appoint a “below the waist RN”
[ ] Protect airway
[ ] Secure patient in bed, rails up on bed, padding
[ ] Lateral decubitus position
[ ] Maternal pulse oximetry
[ ] IV access/PEC labs
[ ] Supplement oxygen (100% non-rebreather)
[ ] Bag-mask ventilation on the unit
[ ] Suction available
[ ] Continuous fetal monitoring (if appropriate)
Eclampsia Checklist

Initial Medications
[ ] Magnesium sulfate load 4-6 gm IV over 20 minutes
[ ] Magnesium sulfate on infusion pump
[ ] Magnesium sulfate and pump labeled
[ ] Magnesium sulfate 10 gm IM (5 mg/each buttock) if no IV access
[ ] Magnesium sulfate maintenance 2 gm/hour
Contraindications: pulmonary edema, renal failure, myasthenia gravis

Recurrent or Contraindications Medication Options
[ ] Diazepam (5-10 mg IV every 5-10 minutes to maximum dose 30 mg)
[ ] Lorazepam (2-4 mg IV x1, may repeat once after 10-15 minutes)
[ ] Phenytoin (15-20 mg/kg IV x1, may repeat 10 mg/kg IV after 20 minutes if no response, avoid with hypotension)
Eclampsia Checklist

Persistent Seizure
[ ] Paralyze and intubate
[ ] Obtain radiographic imaging
[ ] ICU admission

Hypertensive medications $SBP \geq 160$ or $DBP \geq 110$
(see severe hypertension in pregnancy checklist)

Recurrent or Contraindications Medication Options
[ ] Diazepam (5-10 mg IV every 5-10 minutes max 30 mg)
[ ] Lorazepam (2-4 mg IV x1, may repeat once after 10-15 minutes)
[ ] Phenytoin (15-20 mg/kg IV x1, may repeat 10 mg/kg IV after 20 minutes, avoid with hypotension)
Eclampsia Checklist

After Seizure
[ ] Access neurologic status every 15 minutes
[ ] PEC labs: CBC, Chem 7, LFT, Uric Acid, LDH, T&$S$, PT/PTT, Fibrinogen, Magnesium
[ ] Foley catheter (Hourly I&O. Report output < 30 cc/hour)
  *Strict I&O (no less than every 2 hours). Report urine output to the clinician if < 30 cc/hr. (Foley catheter should be placed if urine output is borderline or strict I&O cannot be maintained. Urometer should be utilized if the urine output is borderline or <30 cc/hr.*

Delivery plan

**Magnesium Toxicity**
[ ] Stop Magnesium maintenance
[ ] Calcium gluconate 1 gm (10 ml of 10% solution) IV over 1-2 minutes

[ ] Oral hypertensive medication postpartum if > 150/100
[ ] Follow up blood pressure weekly postpartum

[ ] Debrief
[ ] Document after debrief with the whole team
Complications & Escalation Process

Maternal (pregnant or postpartum)
- CNS (seizure, unremitting headache, visual disturbance)
- Pulmonary edema or cyanosis
- Epigastric or right upper quadrant pain
- Impaired liver function
- Thrombocytopenia
- Hemolysis
- Coagulopathy
- Oliguria*

Fetal
- Abnormal fetal tracing
- IUGR

Prompt Evaluation and Communication
(if undelivered, plan for delivery)

* Oliguria is defined as <30 ml/hr for 2 consecutive hours
Further Evaluation
4 Types of Hypertension Defined

1. **Chronic hypertension (of any cause)**
   - SBP ≥ 140 or DBP ≥ 90
   - Prepregnancy or < 20 weeks

2. **Gestational hypertension**
   - SBP ≥ 140 or DBP ≥ 90
   - > 20 weeks
   - Absence of proteinuria or systemic signs or symptoms

3. **Chronic hypertension with superimposed preeclampsia**
Further Evaluation

4 Types of Hypertension Defined

4. Preeclampsia-eclampsia
   - SBP ≥ 140 or DBP ≥ 90
   - Proteinuria with or without signs/symptoms
   - No proteinuria but, with signs, symptoms or lab abnormalities
   - Proteinuria is not required for diagnosis

   eclampsia
   - seizure in setting of preeclampsia

Severe features of preeclampsia
   - SBP ≥ 160 or DBP ≥ 110 on 2 occasions, 4 hours apart
   - Persistent oliguria < 500 ml/24-hour
   - Progressive renal insufficiency
   - Unremitting headache/visual disturbances
   - Pulmonary edema
   - Epigastric/RUQ pain
   - LFTs > 2x normal
   - Platelets < 100K
   - HELLP syndrome

(5 grams of proteinuria is no longer a criteria for severe preeclampsia)
Monitoring: Change of Status

Once the pregnant patient with severe hypertension is stabilized, consider:

- Magnesium sulfate for seizure prophylaxis if not already initiated

- Timing and route for delivery
  - In cases of eclampsia, recommend delivery after stabilization
  - Vaginal delivery is preferred if thought to be attainable in reasonable amount of time in most cases of HELLP syndrome, severe preeclampsia, and chronic hypertension with superimposed preeclampsia
  - If ≥ 34 weeks, deliver

- Use of antenatal corticosteroids and subsequent pharmacotherapy if preterm (<34 weeks) and expectant management planned
  - Delivery should not be delayed for antenatal steroids in cases complicated by eclampsia, HELLP syndrome, or severe hypertension refractory to treatment, or with maternal symptoms, biochemical/hematological impairment, or fetal compromise
Guidelines for Documentation

On admission, document complete history and complete physical examination including any symptoms associated with preeclampsia

✓ Include symptoms of unremitting headaches, visual changes, epigastric pain, fetal activity, vaginal bleeding

✓ Baseline BPs over the course of the pregnancy

✓ Any medications/drugs taken during the pregnancy (including illicit and OTC)

✓ Current vital signs, including oxygen saturation

✓ Current and past fetal assessment (including FHR monitoring results, estimated fetal weight, and BPP, as appropriate)
Guidelines for Documentation

In documentation of assessment and plan, include:

✓ Whether a diagnosis of preeclampsia has been made and, if not, what steps are being taken to exclude the diagnosis
✓ Whether antihypertensive medications are required to control BP and, if so, medication, dose, route, and frequency
✓ Current fetal status
✓ Whether magnesium sulfate is being initiated for seizure prophylaxis and if so, dosing, route, and duration of therapy
✓ Whether delivery is indicated and if so, timing, method, and route. If delivery is not indicated, document under what circumstances it would be indicated
✓ Antenatal corticosteroids if < 34 weeks of gestation

Ongoing assessment and documentation should be every 30 minutes until the patient is stabilized with blood pressures below the trigger SBP of 160 or DBP of 110
Postpartum Surveillance: Inpatient

Once a hypertensive emergency is treated and the patient is delivered, additional monitoring, follow-up, and education is necessary to prevent additional morbidity.

- Preeclampsia and eclampsia can develop postpartum

- Blood pressure should be measured every 4 hours after delivery

- Patient should not be discharged until blood pressure is well controlled for at least 24 hours

- Blood pressure peaks 2-6 days after delivery so discharge planning should include repeat blood pressure measurements as outpatient and a review of the signs and symptoms that should prompt the patient to seek medical care
Discharge Information & Planning: Postpartum Patients without Preeclampsia

- All patients get a patient information sheet describing in lay terms the signs and symptoms of preeclampsia.

- All new nursing and physician staff receive an information sheet regarding hypertension in pregnancy and post partum.
Discharge Information & Planning:
Postpartum Patients with a Diagnosis of Preeclampsia

• Patients get a patient information sheet describing in lay terms the signs and symptoms of preeclampsia

• Visiting nurse, if possible, or provider visit within 2-4 days of discharge

• Follow-up visit to a provider within 2 weeks
Post-Discharge Evaluation: Elevated BP at home, in office, in triage

Postpartum triggers:
- SBP ≥ 160 or DBP ≥ 110 or
- SBP ≥ 140-159 or DBP ≥ 90-109 with any of the following:
  - unremitting headaches
  - visual disturbances
  - epigastric/RUQ pain

To Emergency Department; physicians to begin treatment (antihypertensives for SBP ≥ 160 or DBP ≥ 110, magnesium for seizure prophylaxis), and evaluation (e.g. lab work, head imaging studies)

- Good response to antihypertensive treatment and asymptomatic
  - To Labor & Delivery or ICU setting
  - Patient stable
  - High Risk OB Unit

- Signs and symptoms of eclampsia, abnormal neurological evaluation, congestive heart failure, renal failure, coagulopathy, poor response to antihypertensive treatment
  - MICU consult
  - To Medical Unit

- Special concerns (e.g. telemetry)

OB consult

MICU consult

To Medical Unit
Conclusion

• Risk reduction and successful, safe clinical outcomes for women with preeclampsia, eclampsia, or chronic hypertension with superimposed preeclampsia require avoidance and management of severe systolic and severe diastolic hypertension

• Increasing evidence indicates that standardization of care improves patient outcomes

• Systolic BP ≥ 160 mm Hg or diastolic BP ≥ 110 mm Hg warrant prompt evaluation at the bedside and treatment to decrease maternal morbidity and mortality
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<tbody>
<tr>
<td>Dhruv Agneshwar, MD</td>
<td>Kimberly Ferree, RN</td>
<td>Mark Rosing, MD</td>
</tr>
<tr>
<td>Peter Bernstein, MD, MPH</td>
<td>Wendy Fried, MD</td>
<td>Genevieve Sicuranza, MD</td>
</tr>
<tr>
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<tr>
<td>Judith Chervenak, MD</td>
<td>Kimberly Hyde, RN</td>
<td>Joanne Stone, MD</td>
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<tr>
<td>Kirsten Cleary, MD</td>
<td>Steven Inglis, MD</td>
<td>Cheryl Tibbitts, RN</td>
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<tr>
<td>Jean Cramer, MS, RNC-LRN</td>
<td>Nicholas Kulbida, MD</td>
<td>Jeanne Woods-Ludwig, RN</td>
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<td>Jeannette DeSantis, RN</td>
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