Illinois Maternal Hypertension Initiative Comprehensive Slide Set

Presented by:
Acknowledgments

This slide set was adapted from materials created by the following groups:

• FPQC Hypertension in Pregnancy Initiative
  • http://health.usf.edu/publichealth/chiles/fpqc/hip

• CMQCC Preeclampsia Collaborative
  • https://www.cmqcc.org/projects/past-projects/cmqcc-preeclampsia-collaborative

• ACOG DII (New York) Safe Motherhood Initiative
  • https://www.acog.org/About-ACOG/ACOG-Districts/District-II/Safe-Motherhood-Initiative

• AIM Severe Hypertension in Pregnancy Bundle
  • http://www.safehealthcareforeverywoman.org/secure/hypertension-bundle.php
Overview

• Background – HTN and QI
• AIM HTN Bundle: Readiness
• AIM HTN Bundle: Recognition & Prevention
• AIM HTN Bundle: Response
• AIM HTN Bundle: Reporting & Systems Learning
• ILPQC Maternal Hypertension Initiative
Background

• Worldwide and in the United States, hypertension is one leading cause of pregnancy-related deaths (PRDs) before, during, or after delivery.

• Reports from North Carolina and California state that maternal deaths due to hypertension had significant prevention opportunities. (Berg, C. et al., 2005 & California Department of Public Health, 2011)
Maternal Morbidity and Mortality: Preeclampsia

About 8 Preeclampsia Related Mortalities/2007 in CA

Source: 2007 All-California Rapid Cycle Maternal/Infant Database for CA Births: CMQCC
Maternal Mortality

**Odd one out**

Maternal-mortality rate, per 100,000 live births

- **Developed countries**
- Germany
- Japan
- **United States**
- Britain

Source: Kassebaum et al, *Lancet*
## Cause of U.S. Maternal Mortality

- CDC Review of 14 years of coded data: 1979-1992
- 4024 maternal deaths
- 790 (19.6%) from preeclampsia

### Table 2. Specific Causes of Death Among Women Who Died of Preeclampsia or Eclampsia

<table>
<thead>
<tr>
<th>Cause of death</th>
<th>Percent of deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Preeclampsia</td>
</tr>
<tr>
<td>Cerebrovascular events</td>
<td>17.3</td>
</tr>
<tr>
<td>Cerebrovascular hemorrhage</td>
<td>15.8</td>
</tr>
<tr>
<td>Cerebral edema</td>
<td>1.1</td>
</tr>
<tr>
<td>Cerebral embolus</td>
<td>0.4</td>
</tr>
<tr>
<td>Renal or hepatic failure</td>
<td>7.2</td>
</tr>
<tr>
<td>HELLP syndrome</td>
<td>4.8</td>
</tr>
<tr>
<td>Other complications of hypertension</td>
<td>13.9</td>
</tr>
<tr>
<td>Not specified hypertension</td>
<td></td>
</tr>
<tr>
<td>Preeclampsia and eclamps</td>
<td>50.8</td>
</tr>
</tbody>
</table>

HELLP = hemolysis, elevated liver enzymes, and low platelet count syndrome.

90% of CVA were from hemorrhage

Prevalence – ACOG 2013

- Incidence of preeclampsia has increased by 25% in the past 20 years
- Preeclampsia causes an estimated 60,000 maternal deaths yearly worldwide
- There are 50 –100 near misses for every maternal death
- Preeclampsia is a risk for future cardiovascular disease
# Distribution of Pregnancy-Related Causes of Deaths in Illinois

<table>
<thead>
<tr>
<th>Cause of Death</th>
<th>Examples</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vascular</td>
<td>AFE, PE, cerebrovascular events, chronic HT</td>
<td>72</td>
<td>29.4%</td>
</tr>
<tr>
<td>Cardiac</td>
<td>Cardiomyopathy, heart disease, dysrhythmias</td>
<td>45</td>
<td>18.4%</td>
</tr>
<tr>
<td>Hemorrhage</td>
<td>Uterine rupture, atony, lacerations</td>
<td>35</td>
<td>14.3%</td>
</tr>
<tr>
<td>Pre-eclampsia/Eclampsia</td>
<td>Pre-eclampsia/Eclampsia</td>
<td>18</td>
<td>7.3%</td>
</tr>
<tr>
<td>Infection</td>
<td>Puerperal, due to spontaneous AB</td>
<td>14</td>
<td>5.7%</td>
</tr>
<tr>
<td>Cancer</td>
<td>Breast, leukemia, lymphoma, melanoma</td>
<td>13</td>
<td>5.3%</td>
</tr>
<tr>
<td>Pulmonary</td>
<td>Pneumonia, asthma</td>
<td>13</td>
<td>5.3%</td>
</tr>
<tr>
<td>Other</td>
<td>Psychiatric, anesthesia, hematologic, hepatic</td>
<td>35</td>
<td>14.3%</td>
</tr>
</tbody>
</table>
Maternal Morbidity


Rate per 10,000 delivery hospitalizations

Maternal Morbidity: Disparities in Illinois

In Illinois in 2011-2013, 7,239 women were affected by severe maternal morbidities — a rate of 161 cases for every 10,000 delivery hospitalizations. This is higher than the published national rate of 129 per 10,000.
ILPQC Maternal Hypertension Initiative

**Aim:** Reduce the rate of severe morbidities in women with severe preeclampsia, eclampsia, or preeclampsia superimposed on pre-existing hypertension by 20% by December 2017

**Approach:**
- OB Advisory Workgroup and HTN Clinical Leadership Team developed process/outcome measures, toolkit/education, data form and reports
- Input from IDPH SQC / PNAs / AIM Initiative / CA, NY, and NC
- Launched Wave 1 in January 2016 with 24 teams
- Launched Wave 2 on May 2, 2016 with 108 teams with over 200 participants on webinar!
Initiative Goals

• Early recognition of hypertension / preeclampsia triggers during pregnancy and postpartum period

• **Reduce time to treatment of severe range blood pressure, >160/110(105)**

• Provide patient education and appropriate discharge follow up

• Implementation of evidence based protocols
  • Management of severe HTN, preeclampsia triggers, magnesium, expectant management vs delivery, postpartum management, eclampsia
## ILPQC HTN Initiative

### Goal & Measures

**Goal:** Reduce preeclampsia maternal morbidity

<table>
<thead>
<tr>
<th>IL Measure</th>
<th>Type</th>
<th>Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Severe Maternal Morbidity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of women with severe maternal morbidities (e.g. Acute renal failure, ARDS, Pulmonary Edema, Puerperal CNS Disorder such as Seizure, DIC, Ventilation, Abruption) / No. pregnant &amp; postpartum women with new onset severe range HTN</td>
<td>Outcome</td>
<td>20% reduction</td>
</tr>
<tr>
<td><strong>Appropriate Medical Management in under 60 minutes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of women treated at different time points (30,60,90, &gt;90 min) after elevated BP is confirmed / No. of women with new onset severe range HTN</td>
<td>Process</td>
<td>100%</td>
</tr>
<tr>
<td><em><em>Debriefs on all new onset severe range HTN</em> cases</em>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Process</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Discharge education and follow-up</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>within 7-10 days for all women with severe range HTN, 72 hours with all women with severe range HTN on medications</td>
<td>Process</td>
<td>100%</td>
</tr>
</tbody>
</table>

Severe range HTN: ≥160 systolic / ≥110(105) diastolic per hospital standard

*New onset severe range HTN: first episode of persistent severe range HTN (lasting >15 minutes) in a hospitalization (ER, L&D, or other inpatient setting), can be chronic HTN, gestational HTN, preeclampsia and/or postpartum diagnosis.
Opportunities for Quality Improvement

• Early recognition of hypertension and response to clinical triggers of preeclampsia (pregnant and pp)
• Importance of accurate blood pressure measurement
• Initiating antihypertensive medications early and aggressively for BP ≥160/110(105)
• Coordination of care (L&D, PP, ED, ICU) and timely evaluations and consultations
• Postpartum follow-up and patient education
Where to start?

- Staff education and standardized BP measurement
- Rapid access to medications
- IV treatment of BP’s ≥ 160 mmHg systolic or ≥ 110 (105) mmHg diastolic within 30-60 min
- Uniform policy for magnesium sulfate
- Early postpartum follow-up
- Standardized postpartum patient educational materials.
Implementation of AIM Hypertension Bundle

- ILPQC Maternal Hypertension Initiative roll out will focus on implementation of the AIM Hypertension Patient Safety Bundle
- Drive quality improvement through the 4 domains/key drivers
  - Readiness (every Provider and unit)
  - Recognition & Prevention (every case of HIP)
  - Response (every patient)
  - Reporting & Systems Learning (every multidisciplinary team)
- Implementation of resources linked to bundle
  - Visual aids, checklists, algorithm’s, protocols, etc.
  - Education for physicians and nurses
  - Key education topics and use of resources
- ILPQC Maternal HTN Quality Improvement Initiative has been approved to meet ABOG Part IV Improvement in Medical Practice MOC requirements for 2016 and 2017 for participating OB/GYN physicians
AIM Hypertension Safety Patient Bundle

- Readiness (every Provider and Unit)
- Recognition & Prevention (every patient)
- Response (every case of HIP)
- Reporting/Systems Learning (every multidisciplinary team)
Hypertension Safety Patient Bundle

Readiness (every Provider and Unit)

Standards for diagnostic criteria, early warning signs, monitoring and management/treatment of preeclampsia w/ and w/o features (include policies, procedures, order sets and algorithms)
Readiness at Your Hospital

- Standardize preeclampsia diagnostic criteria
- Process flow
- Look at antepartum/postpartum, ED, and Triage
- Protocols reflect current standards / evidence
  - Samples available
- Implementation Checklist
- Order sets
- AIM baseline survey
Updated Terminology and New Standards for Diagnostic Criteria
1. The term “mild” preeclampsia is discouraged for clinical classification. The recommended terminology is:
   a. “preeclampsia without severe features” (mild)
   b. “preeclampsia with severe features” (severe)
2. Proteinuria **is not** a requirement to diagnose preeclampsia with new onset hypertension.
3. The **total** amount of proteinuria > 5g in 24 hours has been eliminated from the diagnosis of severe preeclampsia.
4. Early treatment of severe hypertension is mandatory at the threshold levels of **160 mm Hg** systolic or **110 mm Hg** diastolic.
5. Magnesium sulfate for seizure prophylaxis is indicated for severe preeclampsia and should not be administered universally for preeclampsia without severe features (mild).
6. Preeclampsia with onset prior to 34 weeks is most often severe and should be managed at a facility with appropriate resources for management of serious maternal and neonatal complications.

7. Induction of labor at 37 weeks is indicated for preeclampsia and gestational hypertension.

8. The postpartum period is potentially dangerous. Patient education for early detection during and after pregnancy is important.

9. Long-term health effects should be discussed.
Terminology

Previous
- Pregnancy Induced Hypertension (PIH)
- Mild and Severe Preeclampsia

Present
- Hypertension in Pregnancy (HIP)
- Preeclampsia with or without severe features

Preeclampsia with onset prior to 34 weeks is most often severe and should be managed at a facility with appropriate resources for management of serious maternal and neonatal complications.
Proteinuria

- 300 mg in a 24 hour period or
- Protein/creatinine ratio 0.3 (mg/dL/mg/dL)
- 1+ or more proteinuria by dipstick if above are not available
- The old 5 grams of protein has gone away. The amount of proteinuria does not correlate with outcome, or guide therapy
Delivery Management

- Induction of labor at 37 weeks is indicated for preeclampsia and gestational hypertension.
Postpartum Attention

- The postpartum period is potentially dangerous. Patient education for early detection of signs and symptoms of preeclampsia during and after pregnancy is important.
- Long-term health effects of preeclampsia should be discussed.
## Updated Classification of Hypertension in Pregnancy

### Chronic (Preexisting) Hypertension

<table>
<thead>
<tr>
<th>Abnormal blood pressure predating pregnancy or before 20 weeks gestation</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Hypertension that predated the pregnancy</td>
</tr>
<tr>
<td>• Hypertension that develops before 20 weeks gestation and first trimester blood pressures are not known</td>
</tr>
</tbody>
</table>

### Gestational Hypertension

<table>
<thead>
<tr>
<th>Abnormal blood pressure first developing in pregnancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Hypertension that develops after 20 weeks gestation in a woman with previously normal blood pressure</td>
</tr>
<tr>
<td>• At least two measurements taken 4 or more hours apart</td>
</tr>
<tr>
<td>• If hypertension occurs before 20 weeks gestation and first trimester blood pressure measurements are normal, then consider early onset gestational hypertension</td>
</tr>
<tr>
<td>• Rule out preeclampsia</td>
</tr>
</tbody>
</table>
Updated Classification of Hypertension in Pregnancy

<table>
<thead>
<tr>
<th>Preeclampsia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Abnormal blood pressure as described in gestational hypertension plus proteinuria</strong></td>
</tr>
<tr>
<td>• Greater than 300 mg total protein in a 24 hour collection</td>
</tr>
<tr>
<td>• Random urine protein (mg/dL) to creatinine (mg/dL) ratio of 0.3</td>
</tr>
<tr>
<td>• 1+ protein on urine dipstick if above quantifiable measures not available</td>
</tr>
<tr>
<td><strong>Severe features for gestational hypertension and preeclampsia</strong></td>
</tr>
<tr>
<td>• Systolic blood pressure greater than 160 mm Hg or diastolic blood pressure greater than 110 mm Hg (check blood pressure within 15 minutes to confirm since persistent elevation greater than 160 mm Hg or 110 mm Hg is a hypertensive emergency)</td>
</tr>
<tr>
<td>• CNS symptoms (generalized tonic clonic seizure, headache or visual disturbances)</td>
</tr>
<tr>
<td>• Pulmonary edema</td>
</tr>
<tr>
<td>• Platelet count less than 100,000/microliter</td>
</tr>
<tr>
<td>• Elevation serum transaminases more than 2 times over baseline or ALT greater than 70</td>
</tr>
<tr>
<td>• Serum creatinine level greater than 1.1 mg/dL or doubling of serum creatinine</td>
</tr>
<tr>
<td>• HELLP syndrome</td>
</tr>
</tbody>
</table>
## Updated Classification of Hypertension in Pregnancy

### Superimposed preeclampsia

<table>
<thead>
<tr>
<th>Chronic hypertension with the development of preeclampsia</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Sudden increase in blood pressure that was previously controlled requiring escalation of blood pressure medication</td>
<td></td>
</tr>
<tr>
<td>- New onset proteinuria or sudden increase in proteinuria</td>
<td></td>
</tr>
<tr>
<td>- Development of any of the criteria listed under “severe features”</td>
<td></td>
</tr>
</tbody>
</table>

### Postpartum Hypertension

<table>
<thead>
<tr>
<th>New onset condition OR Secondary to persistent hypertension</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>- BP increases again 3-6 days postpartum</td>
<td></td>
</tr>
<tr>
<td>- Symptoms of preeclampsia or eclampsia, including stroke</td>
<td></td>
</tr>
<tr>
<td>- Can develop up to 4-6 weeks postpartum</td>
<td></td>
</tr>
</tbody>
</table>
Hospital Protocols, Algorithms, Order sets

Facility-wide standard protocols with checklists and escalation policies for management and treatment of:

- severe hypertension
- eclampsia, seizure prophylaxis, and mag over-dosage
- postpartum presentation of severe hypertension/preeclampsia
Hypertensive Emergency Checklist

Hypertensive Emergency:
- Two severe BP values (≥160/110) taken 15-60 minutes apart. Values do not need to be consecutive.
- May treat within 15 minutes if clinically indicated

☐ Call for Assistance
☐ Designate:
  ☐ Team leader
  ☐ Checklist reader/recorder
  ☐ Primary RN
☐ Ensure side rails are up
☐ Administer seizure prophylaxis (magnesium sulfate first line agent, unless contraindicated)
☐ Antihypertensive therapy within 1 hour for persistent severe range BP
☐ Place IV; Draw preeclampsia labs
☐ Antenatal corticosteroids (if <34 weeks of gestation)
☐ Re-address VTE prophylaxis requirement
☐ Place indwelling urinary catheter
☐ Brain imaging if unremitting headache or neurological symptoms
☐ Debrief patient, family, and obstetric team

Magnesium Sulfate
Contraindications: pulmonary edema, renal failure, myasthenia gravis

☐ Load 4-6 grams 10% magnesium sulfate in 100 mL solution over 20 min
☐ Label magnesium sulfate; Connect to labeled infusion pump
☐ Magnesium sulfate maintenance 1-2 grams/hour

No IV access:
☐ 10 grams of 50% solution IM (5 g in each buttock)

Antihypertensive Medications
For SBP ≥ 160 or DBP ≥ 110

☐ Labetalol (20 mg, 40, 80 IV* over 2 min, escalating doses, repeat q 10 min); Avoid in asthma or heart failure
☐ Hydralazine (5-10 mg IV* over 2 min, repeat q 20 min until target BP reached)
☐ Oral Nifedipine (10, 20, 40 mg capsules; repeat BP q 20 min until target BP reached); Capsules should be administered orally, not punctured or otherwise administered sublingually

* Maximum cumulative IV-administered doses should not exceed 220 mg labetalol or 25 mg hydralazine in 24 hours

Note: If first line agents unsuccessful, emergency consult with specialist (MFM, Internal medicine, OB anesthesiology, critical care) is recommended

Anticonvulsant Medications
For recurrent seizures or when magnesium sulfate contraindicated

☐ Lorazepam (Ativan): 2-4 mg IV x 1, may repeat once after 10-15 min
☐ Diazepam (Vallum): 5-10 mg IV q 5-10 min to maximum dose 30 mg

Administer seizure prophylaxis
Antihypertensive therapy within 1 hr for persistent severe range BP
Place IV; Draw PEC labs
Antenatal corticosteroids is <34 wks gestation
Re-address VTE prophylaxis requirement
Place indwelling urinary catheter
Brain imaging if unremitting headache or neurological symptoms
Debrief patient, family, OB team
Eclampsia Checklist

☐ Call for Assistance

☐ Designate
  ☐ Team leader
  ☐ Checklist reader/recorder
  ☐ Primary RN

☐ Ensure side rails up

☐ Protect airway and improve oxygenation:
  ☐ Maternal pulse oximetry
  ☐ Supplemental oxygen (100% non-rebreather)
    ☐ Lateral decubitus position
    ☐ Bag-mask ventilation available
    ☐ Suction available

☐ Continuous fetal monitoring

☐ Place IV; Draw preeclampsia labs

☐ Administer magnesium sulfate

☐ Administer antihypertensive therapy if appropriate

☐ Develop delivery plan, if appropriate

☐ Debrief patient, family, and obstetric team

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**MAGNESIUM SULFATE**

Contraindications: pulmonary edema, renal failure, myasthenia gravis

**IV access:**

☐ Load 4-6 grams 10% magnesium sulfate in 100 mL solution over 20 min

☐ Label magnesium sulfate; Connect to labeled infusion pump

☐ Magnesium sulfate maintenance 1-2 grams/hour

**No IV access:**

☐ 10 grams of 50% solution IM (5 g in each buttock)

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**ANTIHYPERTENSIVE MEDICATIONS**

For SBP ≥ 160 or DBP ≥ 110

☐ Labetalol (20 mg, 40, 80 IV* over 2 min, escalating doses, repeat q 10 min); Avoid in asthma or heart failure, can cause neonatal bradycardia

☐ Hydralazine (5-10 mg IV* over 2 min, repeat q 20 min until target BP reached)

* Maximum cumulative IV-administered doses should not exceed 220 mg labetalol or 25 mg hydralazine in 24 hours

**Note:** If persistent seizures, consider anticonvulsant medications and additional workup

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**ANTICONVULSANT MEDICATIONS**

For recurrent seizures or when magnesium sulfate contraindicated

☐ Lorazepam (Ativan): 2-4 mg IV x 1, may repeat once after 10-15 min

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**FOR PERSISTENT SEIZURES**

☐ Neuromuscular block and intubate

☐ Obtain radiographic imaging

☐ ICU admission

☐ Consider anticonvulsant medications

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☑ Call for assistance

☑ Designate team leader, checklist reader, primary RN

☑ Ensure side rails are up

☑ Protect airway + improve oxygenation

☑ Continuous fetal monitoring

☑ Place IV; Draw PEC labs

☑ Administer antihypertensive therapy if appropriate

☑ Develop delivery plan

☑ Debrief patient, family, OB team
Postpartum Preeclampsia Checklist

IF PATIENT < 6 WEEKS POSTPARTUM WITH:

- BP ≥ 160/110 or
- BP ≥ 140/90 with unrelenting headache, visual disturbances, epigastric pain

☐ Call for assistance

☐ Designate:
  - Team leader
  - Checklist reader/record
  - Primary RN

☐ Ensure side rails up

☐ Call obstetric consult; Document call

☐ Place IV; Draw preeclampsia labs
  - CBC
  - Chemistry Panel
  - PT
  - Uric Acid
  - PTT
  - Hepatic Function
  - Fibrinogen
  - Type and Screen

☐ Administer seizure prophylaxis

☐ Administer antihypertensive therapy
  - Contact MFM or Critical Care for refractory blood pressure

☐ Consider indwelling urinary catheter
  - Maintain strict I&O - patient at risk for pulmonary edema

☐ Brain imaging if unrelenting headache or neurological symptoms

MAGNESIUM SULFATE

Contraindications: pulmonary edema, renal failure, myasthenia gravis

IV access:
- Load 4-6 grams 10% magnesium sulfate in 100 mL solution over 20 min
- Label magnesium sulfate; Connect to labeled infusion pump
- Magnesium sulfate maintenance 1-2 grams/hour

No IV access:
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For SBP ≥ 160 or DBP ≥ 110

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ANTICONVULSANT MEDICATIONS

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Call for assistance

Designate team leader, checklist reader, primary RN

Ensure side rails up

Call OB consult; Document call

Place IV; Draw PEC labs

Administer seizure prophylaxis

Administer antihypertensive therapy

Consider indwelling urinary catheter. Maintain strict I&O

Brain imaging if unrelenting headache or neurological symptoms
The best way to diagnose preeclampsia is to listen to your patients.
~ Dr. Baha Sibai

Standard protocol for measurement and assessment of BP, labs and urine protein for all pregnant and postpartum women
Standard and timely response to maternal early warning (danger) signs including listening to and investigating patient’s symptoms, fetal condition and assessment of labs
Importance of Obtaining Accurate Blood Pressure

- Preeclampsia and preeclampsia with severe features are characterized by elevated blood pressure.
- Failing to accurately measure blood pressure in a consistent manner can lead to misdiagnosis, delays in treatment, worsening disease, increased morbidity and even death.
- Accurate blood pressure measurement is essential for clinical decision making
  - Correct positioning of the woman
  - Proper equipment (cuff sizes and shapes; calibrated readings)
Challenge #1: Proper positioning of the woman

- **Position:**
  - If in bed: Semi-fowlers with the **head of the bed elevated** 30-40 degrees; arm supported; legs uncrossed
  - If sitting in chair: feet resting on the floor (not dangling)
  - At least 5 minutes of rest before assessment

- **Arm:**
  - Right arm preferred but either arm may be used and should be supported
  - Cuff at heart level

**No talking**: Systolic and diastolic BPs of hypertensive and normotensive patients increase with talking

***NOT lying down in bed***
Challenge #2: Choose the Right Cuff Size

- The cuff bladder width should cover between 40-50% of the circumference of the arm.
- The lower cuff edge should be about 1 inch above the antecubital space.
- Center the bladder over the brachial artery.

- If the cuff is too small the blood pressure will be falsely higher.
- If the cuff is too large the reading will be artificially lowered.
Challenge #3: Choose the Right Cuff Shape

- Not every woman has an upper arm shape that works with a rectangular cuff.
- Some women have an upper arm shape that is conical rather than cylindrical.
Challenge #4: The Obese Patient

- Upper arm circumference > 50 cm
  - Can use a thigh cuff if upper arm is long enough

- Measure forearm
  - Choose cuff that covers 40% of circumference
  - Inflate cuff and feel for radial pulse

This method is not considered as accurate and should be used in circumstances when a proper cuff can’t be obtained.
Clinical Pearls

- Take time to use correct equipment and measure her arm
- Position the woman correctly
- Initial blood pressure should be assessed after the woman has been resting with minimal distraction for 5 minutes.
- BP ≥160/110(105) lasting for 15 minutes must be should in under 30-60 minutes

Initial BP is ≥ 140 systolic OR ≥ 90 diastolic
- Repeat blood pressure in 15 minutes
- Take in the same arm
- Do not reposition to side-lying

Evaluate for preeclampsia

Initial BP is ≥ 160 systolic or ≥ 110(105) diastolic
- Notify provider after first elevated BP
- Reassess after 15 minutes
- Activate treatment algorithms if remains ≥160/110(105)

Activate Severe HTN Treatment Algorithm
Appropriate Preeclampsia Evaluation
Patients presenting with vague symptoms of:

- headache
- abdominal pain
- shortness of breath
- generalized swelling
- complaints of “I just don’t feel right”

should be evaluated for atypical presentations of preeclampsia or “severe features”

Laboratory Evaluation of Preeclampsia

• Initial lab studies should include:
  • CBC with platelet count
  • AST, ALT, LDH
  • Creatinine, Bilirubin, Uric acid, Glucose

• For women with acute abdominal pain, add:
  • Serum amylase, lipase and ammonia
## Diagnosis 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. |
| 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). |
| Proteinuria | or |
| Proteinuria | Protein/creatinine ratio greater than or equal to 0.3* |
| Proteinuria | 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.
Diagnosis of Preeclampsia with Severe Features

- 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

# Preeclampsia Early Recognition Tool

<table>
<thead>
<tr>
<th>ASSESS</th>
<th>NORMAL (GREEN)</th>
<th>WORRISOME (YELLOW)</th>
<th>SEVERE (RED)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Awareness</strong></td>
<td>Alert/oriented</td>
<td>• Agitated/confused</td>
<td>• Unresponsive</td>
</tr>
<tr>
<td><strong>Headache</strong></td>
<td>None</td>
<td>• Mild headache</td>
<td>• Unrelieved headache</td>
</tr>
<tr>
<td><strong>Vision</strong></td>
<td>None</td>
<td>• Blurred or impaired</td>
<td>• Temporary blindness</td>
</tr>
<tr>
<td><strong>Systolic BP (mm Hg)</strong></td>
<td>100-139</td>
<td>140-159</td>
<td>≥160</td>
</tr>
<tr>
<td><strong>Diastolic BP (mm Hg)</strong></td>
<td>50-89</td>
<td>90-105</td>
<td>≥105</td>
</tr>
<tr>
<td><strong>HR</strong></td>
<td>61-110</td>
<td>111-129</td>
<td>≥130</td>
</tr>
<tr>
<td><strong>Respiration</strong></td>
<td>11-24</td>
<td>25-30</td>
<td>&lt;10 or &gt;30</td>
</tr>
<tr>
<td><strong>SOB</strong></td>
<td>Absent</td>
<td>Present</td>
<td>Present</td>
</tr>
<tr>
<td><strong>O2 Sat (%)</strong></td>
<td>≥95</td>
<td>91-94</td>
<td>≤90</td>
</tr>
<tr>
<td><strong>Pain: Abdomen or Chest</strong></td>
<td>None</td>
<td>• Nausea, vomiting</td>
<td>• Nausea, vomiting</td>
</tr>
<tr>
<td><strong>Fetal Signs</strong></td>
<td>• Category I</td>
<td>• Chest pain</td>
<td>• Chest pain</td>
</tr>
<tr>
<td><strong>Urine Output (mL/hr)</strong></td>
<td>≥50</td>
<td>30-49</td>
<td>≤30 (in 2 hrs)</td>
</tr>
<tr>
<td><strong>Proteinuria</strong></td>
<td>Trace</td>
<td>• ≥ +1**</td>
<td></td>
</tr>
<tr>
<td><strong>Platelets</strong></td>
<td>&gt;100</td>
<td>50-100</td>
<td>&lt;50</td>
</tr>
<tr>
<td><strong>AST/ALT</strong></td>
<td>&lt;70</td>
<td>&gt;70</td>
<td>&gt;70</td>
</tr>
<tr>
<td><strong>Creatinine</strong></td>
<td>&lt;0.8</td>
<td>0.9-1.1</td>
<td>&gt;1.2</td>
</tr>
<tr>
<td><strong>Magnesium</strong></td>
<td>• DTR +1</td>
<td>• Depression of patellar reflexes</td>
<td>• Respiration &lt;12</td>
</tr>
<tr>
<td><strong>Sulfate Toxicity</strong></td>
<td>Respiration 16-20</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Clinical Signs to Watch for:

**GREEN = NORMAL**
Proceed with protocol

**YELLOW = WORRISOME**
Increase assessment frequency

<table>
<thead>
<tr>
<th>Triggers</th>
<th>TO DO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Notify provider</td>
</tr>
<tr>
<td>≥2</td>
<td>Notify charge RN</td>
</tr>
<tr>
<td></td>
<td>In-person evaluation</td>
</tr>
<tr>
<td></td>
<td>Order labs/tests</td>
</tr>
<tr>
<td></td>
<td>Anesthesia consult</td>
</tr>
<tr>
<td></td>
<td>Consider magnesium sulfate</td>
</tr>
<tr>
<td></td>
<td>Supplemental oxygen</td>
</tr>
</tbody>
</table>

**RED = SEVERE**

Trigger: 1 of any type listed below

<table>
<thead>
<tr>
<th>TO DO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immediate evaluation</td>
</tr>
<tr>
<td>Transfer to higher acuity level</td>
</tr>
<tr>
<td>1:1 staff ratio</td>
</tr>
</tbody>
</table>

- **Awareness**
  - Consider Neurology consult
  - CT Scan
  - R/O SAH/intracranial hemorrhage

- **Headache**
  - Labetalol/hydralazine in 30 min
  - In-person evaluation
  - Magnesium sulfate loading or maintenance infusion

- **Visual**
  - Consider CT angiogram

- **BP**
  - O2 at 10 L per rebreather mask
  - R/O pulmonary edema
  - Chest x-ray

**WARNING**
Level of proteinuria is not an accurate predictor of pregnancy outcome.

**Note:**
Physician should be made aware of worsening or new-onset proteinuria.
Timing of Delivery
Hypertension in Pregnancy

Not To Early....Not Too Late
Preeclamptic Balancing Act

- Stroke
- Hemorrhage
- Renal Failure
- Hepatic Failure
- Subcapsular Hepatic Hematoma
- Pulmonary Edema
- Retinal detachment
- Placental Abruption
- Fetal and Maternal Death
- Etc...

Prematurity
- ROP
- Sepsis
- NEC
- IVH
- CP
- RDS
- Etc...

CMOP
When to Deliver

- **Chronic Hypertension**
  - With no additional maternal or fetal complications, delivery before 38 0/7 weeks not recommended
  - With superimposed preeclampsia, follow preeclampsia recommendations

- **Preeclampsia/Gestational Hypertension**
  - Without severe features:
    - May expectantly manage until severe features present or 37 0/7 weeks
  - With Severe Features
    - Prior to viability - deliver
    - May expectantly manage in appropriate setting until 34 weeks gestation, if maternal and fetal status stable

In patients with **preterm** preeclampsia with severe features, the disease can rapidly progress to significant maternal morbidity and/or mortality.

*Transfer to appropriate level of care if possible*
Expectant Management of Pregnancies < 34 Weeks Gestation
(From CMQCC Preeclampsia Toolkit, 2013)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Definition/Significance</th>
<th>Attempt to Delay Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal headache</td>
<td>Suggest central nervous system dysfunction</td>
<td>No</td>
</tr>
<tr>
<td>Blurred vision or Scotomata*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mental status changes**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Persistent epigastric pain or right upper quadrant pain</td>
<td>Suggest liver capsule distension or rupture</td>
<td>No</td>
</tr>
<tr>
<td>Eclampsia</td>
<td>Generalized tonic clonic seizure</td>
<td>No</td>
</tr>
<tr>
<td>Pulmonary edema or Hypoxia (O2 saturation &lt; 95%)</td>
<td>Excessive fluid accumulation in the lungs</td>
<td>No</td>
</tr>
<tr>
<td>Oliguria/Renal failure</td>
<td>Urine output of &lt;500/24 hours or Creatinine &gt;1.2</td>
<td>No</td>
</tr>
<tr>
<td>Hepatocellular Injury</td>
<td>Serum transaminases &gt;2x normal</td>
<td>No</td>
</tr>
<tr>
<td>Blood Pressure</td>
<td>&gt; 160/110 mm Hg BP criteria for <strong>Severe</strong> Preeclampsia</td>
<td>Yes, if responds to treatment</td>
</tr>
</tbody>
</table>

See notes for *,**, explanation.
Management of Preeclampsia with Severe Features at Less Than 34 Weeks Gestation After Viability

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

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

Expectant Management of Preeclampsia with Severe Features at Less Than 34 Weeks Gestation

- Facilities with adequate maternal and neonatal intensive care resources
- Fetal viability—33 6/7 weeks of gestation
- Inpatient only and stop magnesium sulfate
- Daily maternal–fetal tests
- Vital signs, symptoms, and blood tests
- Oral antihypertensive drugs

- Achievement of 34 0/7 weeks of gestation
- New-onset contraindications to expectant management
- Abnormal maternal–fetal test results
- Labor or premature rupture of membranes

Management of Suspected Severe Preeclampsia < 34 Weeks Gestation

**No** contraindications to expectant management – Short Term

**Initial 24-48 hours observation**
- Initiate antenatal corticosteroids if not previously administered
- Initiate 24 hour urine monitoring as appropriate
- Ongoing assessment of maternal symptoms, BP, urine output
- Daily lab evaluation (minimum) for HELLP and renal function
- May observe on an antepartum ward after initial evaluation

**Proceed to delivery for:**
- Recurrent severe hypertension despite therapy
- Other contraindications to expectant management

**Antenatal corticosteroid treatment completed:**
- Expectant management not contraindicated
- Consider ongoing in-patient expectant management

Expectant Management in Pregnancies with Severe Preeclampsia < 34 Weeks Gestation

**Expectant management recommendations:**

With stable maternal/fetal conditions, continued pregnancy should be undertaken only at facilities with adequate maternal and neonatal intensive care resources.

Administer corticosteroids for fetal lung maturity benefit

Consider ongoing, inpatient expectant management until 34 weeks or indication for delivery:

- Monitor vital signs frequently (at least each shift)
- At least daily maternal assessment for subjective symptoms of severe preeclampsia
- At least daily assessment of fetal well-being
- Serial evaluation for HELLP syndrome and of renal function
- Serial estimation of fetal growth and amniotic fluid volume

Indications for Delivery

- 34 weeks gestation OR
- Any of the following:
  - Uncontrolled hypertension despite therapy
  - Recurrent symptoms such as headache, visual changes, RUQ pain
  - Pulmonary edema
  - Significant renal or hepatic dysfunction
  - HELLP Syndrome or Disseminated Intravascular Coagulation
  - Eclampsia
  - Abruptio placenta
  - Non reassuring fetal status: growth restriction, oligohydramnios, or abnormal fetal testing
Management of Gestational Hypertension or Preeclampsia without Severe Features

Maternal and Fetal Findings

- 37 0/7 weeks or more of gestation or
- 34 0/7 weeks or more of gestation with:
  - Labor or rupture of membranes
  - Abnormal maternal-fetal test results
  - Ultrasonographic estimate of fetal weight less than fifth percentile
  - Suspected abruptio placentae

**Yes**
- Delivery
- Prostaglandins if needed for induction

**No**
- Less than 37 0/7 weeks of gestation
- Inpatient or outpatient management
  - Maternal evaluation: twice weekly
  - Fetal evaluation
    - With preeclampsia: twice weekly nonstress test
    - With gestational hypertension: weekly nonstress test

- 37 0/7 weeks or more of gestation
- Worsening maternal or fetal condition*
- Labor or premature rupture of membranes

**Yes**

Preeclampsia: Outpatient Management

Maternal stability

- BP in the non-severe range
- Gestational age < 37 weeks (At 37 weeks delivery should be considered)
- No indicators of severe features of preeclampsia
- None of the following maternal symptoms: Headache, visual disturbances, abdominal pain, gastrointestinal symptoms
- No evidence of hemolysis
- In essence a near normal laboratory assessment
Preeclampsia: Outpatient Management

**Fetal stability**
- Appropriate fetal growth
- Reassuring antenatal fetal testing
- Normal amniotic fluid volume

**Ability to be followed as an outpatient**
- Communicative and reliable patient
  - Patient can check BP at home
- Twice weekly assessment in office:
  - Maternal blood pressure
  - Laboratory assessment for indicators of worsening disease (creatinine, liver function, platelets)
  - Fetal testing including amniotic fluid assessment
  - Periodic ultrasound assessment of fetal growth
Process for timely triage and evaluation of pregnant and postpartum women with hypertension including emergency department and outpatient readiness (every provider and unit), recognition & prevention (every patient), and response (every case of HIP).
Key Clinical Pearl

Controlling blood pressure is the optimal intervention to prevent deaths due to stroke in women with preeclampsia.

Over the last decade, the UK has focused QI efforts on aggressive timely treatment of both systolic and diastolic blood pressure and has demonstrated a significant reduction in deaths.
• The critical initial step in decreasing maternal morbidity and mortality is to administer anti-hypertensive medications within 60 minutes of documentation of persistent (retested within 15 minutes) BP ≥160 systolic, and/or ≥105-110 diastolic.

• Ideally, antihypertensive medications should be administered as soon as possible, and availability of a “preeclampsia box” will facilitate rapid treatment.

• In Martin et al., stroke occurred in:
  • 23/24 (95.8%) women with systolic BP ≥ 160mm Hg
  • 24/24 (100%) had a BP ≥ 155 mm Hg
  • 3/24 (12.5%) women with diastolic BP ≥ 110mm Hg
  • 5/28 (20.8%) women with diastolic BP ≥ 105mm Hg

BP $\geq 160/110(105)$

Need To Treat*

*BP persistent 15 minutes, activate treatment algorithm with IV therapy ASAP, < 30-60 minutes
Hypertensive Medication Administration Oral versus IV

• First line therapy recommendations for acute treatment of critically elevated BP in pregnant women [≥160/110(105)] are with either IV labetalol or hydralazine.

• In the event that acute treatment is needed in a patient without IV access oral nifedipine may be used (10 mg) and may be repeated in 30 minutes.

• PO (oral) nifedipine appears equally as efficacious as IV labetalol in correcting severe BP elevations.

• Oral labetalol would be expected to be less effective in acutely lowering the BP due to its slower onset to peak and thus should be used only if nifedipine is not available in a patient without IV access.

## Antihypertensive Therapy

### First line agents

<table>
<thead>
<tr>
<th>IV Labetalol (Normadyne)</th>
<th>IV Apresoline (Hydralazine)</th>
<th>PO Nifedipine* (Procardia)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Beta blocker (some alpha)</td>
<td>• Vasodilator</td>
<td>• Calcium channel blocker</td>
</tr>
<tr>
<td>• Caution with heart rate &lt; 60, congenital heart failure, AV heart block or asthma</td>
<td>• Watch for rebound tachycardia or hypotension</td>
<td>• Caution with heart rate &gt; 100, severe aortic stenosis, recent MI, cardiogenic shock.</td>
</tr>
<tr>
<td>• Can repeat after 10 minutes</td>
<td>• Caution with Heart rate &gt; 100, recent stroke, severe mitral valve disease</td>
<td>• Can repeat after 30 minutes</td>
</tr>
</tbody>
</table>

*If IV access unavailable*
ACOG protocol
Standing Order (Labetalol)

**Labetalol 20 mg** IV over 2 minutes
- Recheck in 10 min

If still elevated, **labetalol 40 mg** IV over 2 min
- Recheck in 10 min

If still elevated, **labetalol 80 mg** IV over 2 min
- Recheck in 10 min
- Seek consultation MFM, Critical Care, Anesthesia, Internal medicine

If still elevated, **Repeat labetalol 80mg** over 10 minutes to achieve total dosage of 220mg (includes all previous administrations)

Switch to hydralazine 10 mg IV over 2 min
- Recheck in 20 min

**Target B/P**
140 to <160 or 90-100
1. Notify physician if systolic BP measurement is greater than or equal to 160 mm Hg or if diastolic BP measurement is greater than or equal to 110 (105) mm Hg.
2. Institute fetal surveillance if undelivered and fetus is viable.
3. Administer labetalol (20 mg IV over 2 minutes).
4. Repeat BP measurement in 10 minutes and record results.
5. If either BP threshold is still exceeded, administer labetalol (40 mg IV over 2 minutes). If BP is below threshold, continue to monitor BP closely.
6. Repeat BP measurement in 10 minutes and record results.
7. If either BP threshold is still exceeded, administer labetalol (80 mg IV over 2 minutes). If BP is below threshold, continue to monitor BP closely.
8. Repeat BP measurement in 10 minutes and record results.
9. If either BP threshold is still exceeded, administer hydralazine (10 mg IV over 2 minutes). If BP is below threshold, continue to monitor BP closely.
10. Repeat BP measurement in 20 minutes and record results.
11. If either BP threshold is still exceeded, obtain emergency consultation from maternal–fetal medicine, internal medicine, anesthesia, or critical care specialists.
12. Give additional antihypertensive medication per specific order.
ACOG protocol
Standing Order (Hydralazine)

Hydralazine 5 or 10 mg IV over 2 minutes
• Recheck in 20 min

If still elevated, hydralazine 10 mg IV over 2 min
• Recheck 20 min

If still elevated, labetalol 20 mg IV over 2 min
• Recheck in 10 min

If still elevated, labetalol 40 mg IV over 2 min
• Emergency consults: MFM and anesthesia

Target B/P
140 to <160 or 90-100
ACOG Protocol (Hydralazine)

1. Notify physician if systolic BP is greater than or equal to 160 mm Hg or if diastolic BP is greater than or equal to 110 (105) mm Hg.
2. Institute fetal surveillance if undelivered and fetus is viable.
3. Administer hydralazine (5 mg or 10 mg IV over 2 minutes).
4. Repeat BP measurement in 20 minutes and record results.
5. If either BP threshold is still exceeded, administer hydralazine (10 mg IV over 2 minutes). If BP is below threshold, continue to monitor BP closely.
6. Repeat BP measurement in 20 minutes and record results.
7. If either BP threshold is still exceeded, administer labetalol (20 mg IV over 2 minutes). If BP is below threshold, continue to monitor BP closely.
8. Repeat BP measurement in 10 minutes and record results.
9. If either BP threshold is still exceeded, administer labetalol (40 mg IV over 2 minutes) and obtain emergency consultation from maternal–fetal medicine, internal medicine, anesthesia, or critical care specialists.
10. Give additional antihypertensive medication per specific order.
ACOG protocol
Standing Order (Oral Nifedipine)

Nifedipine 10 mg PO (never crush or give SL)
• Recheck in 20 min

If still elevated, nifedipine 20 mg PO
• Recheck 20 min

If still elevated, nifedipine 40 mg PO
• Recheck in 20 min
• Emergency consults: MFM and anesthesia, critical care or internal medicine

If still elevated, switch to labetalol or hydralazine protocol
1. Notify physician if systolic BP is greater than or equal to 160 mm Hg or if diastolic BP is greater than or equal to 110 (105) mm Hg.
2. Institute fetal surveillance if undelivered and fetus is viable.
3. Administer nifedipine 10 mg PO
4. Repeat BP measurement in 20 minutes and record results.
5. If either BP threshold is still exceeded, administer nifedipine 20 mg PO. If BP is below threshold, continue to monitor BP closely.
6. Repeat BP measurement in 20 minutes and record results.
7. If either BP threshold is still exceeded, administer nifedipine 20 mg PO. If BP is below threshold, continue to monitor BP closely.
8. Repeat BP measurement in 20 minutes and record results.
9. If either BP threshold is still exceeded, administer labetalol (40 mg IV over 2 minutes) and obtain emergency consultation from maternal–fetal medicine, internal medicine, anesthesia, or critical care specialists.
10. Give additional antihypertensive medication per specific order.
# Anti-Hypertensive Medications for Chronic Hypertension

<table>
<thead>
<tr>
<th>Agent</th>
<th>Initial dosing</th>
<th>Frequency</th>
<th>Total maximal daily dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labetalol*</td>
<td>200 mg bid</td>
<td>Q 12 hours to Q 8 hours</td>
<td>2400 mg</td>
</tr>
<tr>
<td>Nifedipine long acting</td>
<td>30 mg daily</td>
<td>Daily</td>
<td>120 mg</td>
</tr>
<tr>
<td>Methyldopa**</td>
<td>250 mg bid</td>
<td>Q 12 hours to Q 6 hours</td>
<td>3000 mg</td>
</tr>
</tbody>
</table>
FIRST LINE THERAPIES

- Intravenous labetalol
- Intravenous hydralazine
- Oral nifedipine

**Magnesium sulfate not recommended as antihypertensive agent**
- Should be used for: seizure prophylaxis and controlling seizures in eclampsia
- IV bolus of 4-6 grams in 100 ml over 20 minutes, followed by IV infusion of 1-2 grams per hour. **Continue for 24 hours postpartum**
- If no IV access, 10 grams of 50% solution IM (5 g in each buttock)
- Contraindications: pulmonary edema, renal failure, myasthenia gravis

**Anticonvulsants (for recurrent seizures or when magnesium is C/I):**
- **Lorazepam:** 2-4 mg IV x 1, may repeat x 1 after 10-15 min
- **Diazepam:** 5-10 mg IV every 5-10 min to max dose 30 mg
- **Phenytoin:** 15-20 mg/kg IV x 1, may repeat 10 mg/kg IV after 20 min 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.

*There may be adverse effects and additional contraindications. Clinical judgement should prevail*
ADDITIONAL THERAPY RECOMMENDATIONS

IF NO IV ACCESS AVAILABLE:

- Initiate algorithm for oral nifedipine, or
- Oral labetalol, 200 mg *Repeat in 30 min if SBP remains ≥ 160 or DBP ≥ 110 and IV access still unavailable

SECOND LINE THERAPIES (if patient fails to respond to first line tx):

Recommend emergency consult with:

- Maternal Fetal Medicine
- Internal Medicine
- Anesthesiology
- Critical Care
- Emergency Medicine

*May also consider:*

- Labetalol or nicardipine via infusion pump
- Sodium nitroprusside for extreme emergencies *Use for shortest amount of time due to cyanide/thiocyanate toxicity*
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 *<30 ml/hr for 2 consecutive hours

FETAL

- Abnormal fetal tracing
- IUGR

Prompt evaluation and communication: If undelivered, plan for delivery
MONITORING BLOOD PRESSURE

MATERNAL

- Once BP is controlled (<160/110), measure
  - Every 10 minutes for 1 hour
  - Every 15 minutes for next hour
  - Every 30 minutes for next hour
  - Every hour for 4 hours

- Obtain baseline labs:
  - CBC
  - Platelets
  - LDH
  - Liver Function Tests
  - Electrolytes
  - BUN creatinine
  - Urine protein

FETAL

- Fetal monitoring surveillance as appropriate for gestational age
Magnesium Therapy: Key Clinical pearl

- Magnesium sulfate therapy for seizure prophylaxis should be administered to any patients with:
  - Preeclampsia with “severe features” i.e., subjective neurological symptoms (headache or blurry vision), abdominal pain, epigastric pain, OR BP > 160/110
  - Eclampsia
  - Should be considered in patients with preeclampsia without severe features
Recommendations for Women Who Should Be Treated With Magnesium

<table>
<thead>
<tr>
<th></th>
<th>Preeclampsia with Severe Features</th>
<th>Preeclampsia without severe features</th>
<th>Eclampsia</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACOG</td>
<td>X</td>
<td>**</td>
<td>X</td>
</tr>
<tr>
<td>NICE</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>SOGC</td>
<td>X*</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>CMQCC</td>
<td>X*</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>WHO</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

**ACOG Executive Summary, 2013: for preeclampsia without severe features, it is suggested that magnesium sulfate not be administered universally for the prevention of eclampsia.

* Should be considered: Numbers needed to treat \((\text{NNT})\) = 109 for “mild”, 63 for “severe”
Late Postpartum Eclampsia

- >48 hours following delivery, up to 4 weeks PP
- Accounts for approximately 15% of cases of eclampsia
- 63% had no antepartum hypertensive diagnosis
- The magnitude of blood pressure elevation does not appear to be predictive of eclampsia
- The most common presenting symptom was headache, which occurred in about 70% of patients; other prodromal symptoms included shortness of breath, blurry vision, nausea or vomiting, edema, neurological deficit, and epigastric pain

**POSTPARTUM SURVEILLANCE**

Necessary to prevent additional morbidity as preeclampsia/ eclampsia can develop postpartum.

<table>
<thead>
<tr>
<th>INPATIENT</th>
<th>OUTPATIENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure BP every 4 hours after delivery until stable</td>
<td>For pts with preeclampsia, visiting nurse evaluation recommended:</td>
</tr>
<tr>
<td>Do not use NSAIDs for women with elevated BP</td>
<td>✓ Within 3-5 days</td>
</tr>
<tr>
<td>Do not discharge patient until BP is well controlled for at least 24 hours</td>
<td>✓ Again in 7-10 days after delivery (earlier if persistent symptoms)</td>
</tr>
</tbody>
</table>

**ANTIHYPTERTENSIVE THERAPY**

- Recommended for persistent postpartum HTN: SBP ≥ 150 or DBP ≥ 100 on at least two occasions at least 4 hours apart
- Persistent SBP ≥ 160 or DBP ≥ 110 should be treated within 1 hour
DISCHARGE PLANNING

All patients receive information on preeclampsia:

✓ Signs and symptoms
✓ Importance of reporting information to health care provider as soon as possible
✓ Culturally-competent, patient-friendly language

All new nursing and physician staff receive information on hypertension in pregnancy and postpartum

FOR PATIENTS WITH PREECLAMPSIA

✓ BP monitoring recommended 72 hours after delivery
✓ Outpatient surveillance (visiting nurse evaluation) recommended:
  o Within 3-5 days
  o Again in 7-10 days after delivery (earlier if persistent symptoms)
Patient Education

- Postpartum/discharge protocols should include:
  - Management and verification of postpartum follow-up & BP check within 7 to 10 days post-discharge
  - Standardize discharge patient education for women with preeclampsia and/or severe range HTN
  - Discharge instructions to include warning signs of preeclampsia for ALL postpartum patients
  - Support/communication plan for patients, families, and staff for ICU admissions and serious complications of severe hypertension
Materials for Prenatal & Postpartum Patient Education

“7 Symptoms Every Pregnant Woman Should Know” video available in English and Spanish on YouTube™

**POST-DISCHARGE EVALUATION**

**ELEVATED BP AT HOME, OFFICE, TRIAGE**

**Postpartum triggers:**
- SBP ≥ 160 or DBP ≥ 110 or
- SBP ≥ 140-159 or DBP ≥ 90-109 with unremitting headaches, visual disturbances, or epigastric/RUQ pain

- Emergency Department treatment (OB/MICU consult as needed)
- AntiHTN therapy suggested if persistent SBP ≥ 150 or DBP ≥ 100 on at least two occasions at least 4 hours apart
- Persistent SBP ≥ 160 or DBP ≥ 110 should be treated within 1 hour

**Good response to antiHTN treatment and asymptomatic**

**Admit for further observation and management (L&D, ICU, unit with telemetry)**

**Signs and symptoms of eclampsia, abnormal neurological evaluation, congestive heart failure, renal failure, coagulopathy, poor response to antihypertensive treatment**

**Recommend emergency consultation for further evaluation (MFM, internal medicine, OB anesthesiology, critical care)**
# Postpartum Preeclampsia Checklist

**If Patient < 6 Weeks Postpartum with:**

- BP ≥ 160/110 or
- BP ≥ 140/90 with unremitting headache, visual disturbances, epigastric pain

- **Call for Assistance**
  - ☐

- **Designate:**
  - ☐ Team leader
  - ☐ Checklist reader/recorder
  - ☐ Primary RN

- **Ensure side rails up**
  - ☐

- **Call obstetric consult; Document call**
  - ☐

- **Place IV; Draw preeclampsia labs**
  - ☐ CBC
  - ☐ Chemistry Panel
  - ☐ PT
  - ☐ Uric Acid
  - ☐ PTT
  - ☐ Hepatic Function
  - ☐ Fibrinogen
  - ☐ Type and Screen

- **Administer seizure prophylaxis**
  - ☐

- **Administer antihypertensive therapy**
  - ☐ Contact MFM or Critical Care for refractory blood pressure
  - ☐ Consider indwelling urinary catheter
    - ☐ Maintain strict I&O - patient at risk for pulmonary edema
  - ☐ Brain imaging if unremitting headache or neurological symptoms

## Magnesium Sulfate

- **Contraindications:** pulmonary edema, renal failure, myasthenia gravis
- **IV access:**
  - ☐ Load 4-6 grams 10% magnesium sulfate in 100 mL solution over 20 min
  - ☐ Label magnesium sulfate; Connect to labeled infusion pump
  - ☐ Magnesium sulfate maintenance 1-2 grams/hour
- **No IV access:**
  - ☐ 10 grams of 50% solution IM (5 g in each buttock)

## Antihypertensive Medications

- **For SBP ≥ 160 or DBP ≥ 110**
  - ☐ Labetalol (20 mg, 40, 80 IV* over 2 min, escalating doses, repeat q 10 min; Avoid in asthma or heart failure)
  - ☐ Hydralazine (5-10 mg IV* over 2 min, repeat q 20 min until target BP reached)
  - ☐ Oral Nifedipine (10, 20, 40 mg capsules; repeat BP q 20 min until target BP reached); Capsules should be administered orally, not punctured or otherwise administered sublingually

  *Maximum cumulative IV-administered doses should not exceed 220 mg labetalol or 25 mg hydralazine in 24 hours*

- **Note:** If first line agents unsuccessful, emergency consult with specialist (MFM, internal medicine, OB anesthesiology, critical care) is recommended

## Anticonvulsant Medications

- **For recurrent seizures or when magnesium sulfate contraindicated**
  - ☐ Lorazepam (Ativan): 2-4 mg IV x 1, may repeat once after 10-15 min
  - ☐ Diazepam (Valium): 5-10 mg IV q 5-10 min
Key Strategies to Improve Response
Every case of severe hypertension/preeclampsia

- Rapid access to medications used for severe hypertension:
  - medications should be stocked and immediately available
  - Include brief guide for administration & dosage.

- System plan for escalation for maternal hypertension, obtaining appropriate consultation, and maternal transport, as needed
Every case of severe hypertension/preeclampsia

Facility-wide standard protocols with checklists and escalation policies for management and treatment of:

• severe hypertension
• eclampsia, seizure prophylaxis, and mag over-dosage
• postpartum presentation of severe hypertension/preeclampsia
Minimum requirements for protocol:

- Notification of primary physician or primary care provider if systolic BP ≥160 or diastolic ≥110 for 2 measurements within 15 min
- After second elevated reading, treatment should be initiated ASAP (within 60 min of verification)
- Includes onset and duration of magnesium sulfate therapy
- Appropriate labs sent and fetal assessment
Minimum requirements for protocol (cont):

• Includes escalation measures for those unresponsive to standard treatment
• Describes management and verification of follow-up within 7 to 14 days postpartum
• Describe postpartum patient education for women with preeclampsia
• Discharge instructions to include warning signs of HTN for ALL postpartum patients
Every case of severe hypertension/preeclampsia

- Postpartum patients presenting to the ED with hypertension, preeclampsia or eclampsia should either be assessed by or admitted to an obstetrical service

Systems should be in place to screen all women for pregnancy **AND** postpartum status in the ER
Every case of severe hypertension/preeclampsia

• Support and communication plan for patients, families, and staff for ICU admissions and serious complications of severe hypertension
Timely Response Matters!

1. Process for timely triage and evaluation of pregnant and postpartum women with hypertension, reduce time to treatment for severe range BP.

2. Include emergency department and outpatient

3. Rapid access to medications used for severe hypertension: medications should be stocked and immediately available. Include brief guide for administration & dosage.

4. System plan for escalation, obtaining appropriate consultation, and maternal transport, as needed

5. Emergency protocols – Eclampsia management, HTN treatment algorithms
Key Clinical Pearl

- Use of preeclampsia-specific checklists, team training and communication strategies, and continuous process improvement strategies will likely reduce hypertensive related morbidity.

- Use of patient education strategies, targeted to the educational level of the patients, is essential for increasing patient awareness of signs and symptoms of preeclampsia.
Readiness (every Provider and Unit)

Recognition & Prevention (every patient)

Response (every case of HIP)

Reporting/Systems Learning (every multidisciplinary team)
  - Unit Education on protocols, unit-based drills & simulations
  - Establish a culture of huddles for high risk patients and post-event debriefs to identify successes and opportunities
  - Establish a process for multi-disciplinary case reviews
California Pregnancy-Associated Mortality Review (CA-PAMR) Quality Improvement Review Cycle

1. Identification of cases

2. Information collection, review by multidisciplinary committee

3. Cause of Death, Contributing Factors and Quality Improvement (QI) Opportunities identified

4. Strategies to improve care and reduce morbidity and mortality

5. Evaluation and Implementation of QI strategies and tools
Common Errors/Problems in Managing Hypertension

• Failure to diagnose and recognize severity of the disease
• Failure to initiate timely antihypertensive medication
• Failure to initiate appropriate Magnesium Sulfate prophylaxis
• Failure to initiate early transfer to higher level of care when necessary
• Failure to organize safe care and management plans: Moving to delivery without adequate assessments and maternal stabilization
Potential Clinical Scenarios for Hypertension Drills

• Preeclampsia
• Eclampsia
• Hypertensive Urgency – BP ≥ 160/110 (105)
• Stroke
Goal Examples

• Teams will improve their response to BP > 160/110(105) hypertensive events and reduce time to treatment
• Teams will communicate better during hypertensive events
• Teams will respond in a timely fashion to signs of preeclampsia
• Teams will be able to efficiently evaluate a patient who presents with seizures
• Teams will effectively manage a patient who is actively seizing
Huddles / Debriefs

• Multidisciplinary review of all severe hypertension/eclampsia, complex cases, and those admitted to ICU for systems issues, lessons learned and outcome improvement opportunities (and include patient input)

• Debrief (nurse / provider) all hypertensive events (BP ≥160/110 (105)
  • discuss time to treatment: what went well, opportunities for improvement, team and patient communication, systems issues
ILPQC Maternal HTN Initiative
ILPQC HTN Initiative

Goal & Measures

Goal: Reduce preeclampsia maternal morbidity

<table>
<thead>
<tr>
<th>IL Measure</th>
<th>Type</th>
<th>Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Severe Maternal Morbidity</strong></td>
<td>Outcome</td>
<td>20% reduction</td>
</tr>
<tr>
<td>No. of women with severe maternal morbidities (e.g. Acute renal failure, ARDS, Pulmonary Edema, Puerperal CNS Disorder such as Seizure, DIC, Ventilation, Abruption) / No. pregnant &amp; postpartum women with new onset severe range HTN</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Appropriate Medical Management in under 60 minutes</strong></td>
<td>Process</td>
<td>100%</td>
</tr>
<tr>
<td>No. of women treated at different time points (30, 60, 90, &gt;90 min) after elevated BP is confirmed / No. of women with new onset severe range HTN</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em><em>Debriefs on all new onset severe range HTN</em> cases</em>*</td>
<td>Process</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Discharge education and follow-up</strong></td>
<td>Process</td>
<td>100%</td>
</tr>
<tr>
<td>within 7-10 days for all women with severe range HTN, 72 hours with all women with severe range HTN on medications</td>
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</tbody>
</table>

Severe range HTN: \( \geq 160 \) systolic / \( \geq 110(105) \) diastolic per hospital standard

*New onset severe range HTN: first episode of persistent severe range HTN (lasting \( >15 \) minutes) in a hospitalization (ER, L&D, or other inpatient setting), can be chronic HTN, gestational HTN, preeclampsia and/or postpartum diagnosis.
IL Maternal Hypertension: Data Form

**SEVERE HYPERTENSION DATA FORM**

**Topic:** Maternity service team review and document sequence of events, successes with and barriers to swift and coordinated response to preclampsia with severe features.

**Goal:** Reduce time to treatment (< 60 minutes) for new onset severe hypertension (>160 systolic OR >110 diastolic) with preclampsia or eclampsia or chronic/gestational hypertension with superimposed preclampsia (include patients from triage, L&D, Antepartum, PP, ED) in order to reduce preclampsia morbidity in Illinois.

**Instructions:** Complete within 24 hrs. after all cases of new onset severe hypertension (>160 systolic or >110 diastolic) event in pregnancy up to 6 wks postpartum. Debrief should include primary RN and primary MD to identify opportunities for improvement in identification and time to treatment of HTN.

**Date:**_______ GA at Event (weeks & days) OR # Days PP:

**Patient Location (check all that apply)** □ Triage □ L&D □ Postpartum □ Antepartum □ ED

**Maternal Age:** ___________ Years

**Height:** ___________ inches

**Current Weight:** ___________ pounds

**Diagnosis:** □ Chronic HTN □ Gestational HTN □ Pre-eclampsia □ Superimposed Pre-eclampsia □ Postpartum Pre-eclampsia □ Other

**PROCESS MEASURE (P1): Medical Management**

<table>
<thead>
<tr>
<th>Time (h, mm)</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BP reached ≥160 or diastolic ≥110 (sustained &gt;15 min)</td>
</tr>
<tr>
<td></td>
<td>First BP med given</td>
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<tr>
<td></td>
<td>BP reached &lt;160 and diastolic &lt;110</td>
</tr>
</tbody>
</table>

**Medications (check all that apply)**

<table>
<thead>
<tr>
<th>Medication</th>
<th>Dosage(s) given</th>
<th>Reason not given</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labetalol</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydralazine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nifedipine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Magnesium Sulfate</td>
<td>4 gm □ 6 gm □ Other</td>
<td></td>
</tr>
<tr>
<td>Sulfate</td>
<td>1 gm/1h □ 2 gm/1h</td>
<td></td>
</tr>
<tr>
<td>Maintenance</td>
<td>3 gm/1h □ Other</td>
<td></td>
</tr>
<tr>
<td>Any ANS (If &lt;34 wks)? □ Partial Course □ Complete Course □ Not Given</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**BALANCING MEASURE (P1.02): Obtain Medical Management**

B1. Did diastolic pressure fall to <80 within one hour after meds given?
   □ YES □ NO

B2. If yes, was there corresponding deterioration in FH rate (Category 3)?
   □ YES □ NO

**OB Complications (check all that apply)**

<table>
<thead>
<tr>
<th>OB Complication</th>
<th>Transport In? □ YES □ NO Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Transport Out? □ YES □ NO Date:</td>
</tr>
</tbody>
</table>

**Adverse Maternal Outcome:**

<table>
<thead>
<tr>
<th>Event</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>OB Hemorrhage with transfusion of &gt;4 units of blood products</td>
<td></td>
</tr>
<tr>
<td>Intracranial Hemorrhage or Ischemic event</td>
<td></td>
</tr>
<tr>
<td>Pulmonary Edema</td>
<td>□ ICU admission □ HELLP Syndrome</td>
</tr>
<tr>
<td>Oliguria</td>
<td>□ Eclampsia □ DIC</td>
</tr>
<tr>
<td>Renal Failure</td>
<td>□ Liver failure □ Ventilation</td>
</tr>
<tr>
<td>Placental Abruption</td>
<td>□ Other</td>
</tr>
<tr>
<td>Adverse Neonatal Outcome: Date:</td>
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</tbody>
</table>

**NILC/SICU admission □ IUD □ Other □ None**

**Maternal Race/Ethnicity (check all that apply):**

| Category | White □ Black □ Hispanic □ Asian □ Other |

**PROCESS MEASURE (P2): Discharge Management**

A. Discharge Education: Education about preclampsia given?
   □ YES □ NO

B. Discharge Management: Follow up appt scheduled within 3-10 days
   (for all women with any severe range hypertension/pre-eclampsia)
   □ YES □ NO

**If YES: Was follow up appointment scheduled in <72 hours?**
   □ YES □ NO

**COMMENTS about Medical Management, Monitoring, Discharge**

**Opportunities for improvement to reduce time to treatment (identification severe HTN to treatment goal <60 minutes): De-brief**

**Debrief Participants:** Primary MD □ YES □ NO Primary RN □ YES □ NO

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**TEAM ISSUES**

<table>
<thead>
<tr>
<th>Went well</th>
<th>Needs improvement</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication</td>
<td></td>
<td></td>
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<tr>
<td>Recognition of severe HTN</td>
<td></td>
<td></td>
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<tr>
<td>Assessing situation</td>
<td></td>
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<tr>
<td>Decision making</td>
<td></td>
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<tr>
<td>Teamwork</td>
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<tr>
<td>Leadership</td>
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</table>

**SYSTEM ISSUES**

<table>
<thead>
<tr>
<th>Went well</th>
<th>Needs improvement</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTN medication timeliness</td>
<td></td>
<td></td>
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<tr>
<td>Transportation (intra- inter-hospital transport)</td>
<td></td>
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<tr>
<td>Support (in-unit, other areas)</td>
<td></td>
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<tr>
<td>Med availability</td>
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<tr>
<td>Any other issues</td>
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ILPQC DATA FORM (Modified 4/19/16)

Adapted from CMQCC’s Pre-eclampsia: Debrief and Chart Review Tool
Keys to Success

• Team Participates on Monthly Team Call
  • 4th Monday of each month 12:30-1:30
  • Review data, discuss QI strategies for HTN bundle implementation, education topic and Team Talks (hear from teams across IL sharing progress)

• Submit monthly data in RedCap
  • Teams can track progress across time and compare to over 100 hospitals in initiative on reducing time to treatment for all patients with severe range BP

• Hold regular HTN Team meetings to review data, identify opportunities for improvement and drive QI work
Initiative Goals

• Early recognition of hypertension / preeclampsia triggers during pregnancy and postpartum period

• **Reduce time to treatment of severe range blood pressure, 160/110(105)**

• Provide patient education and appropriate discharge follow up

• Implementation of evidence based protocols
  • Management of severe HTN, preeclampsia triggers, magnesium, expectant management vs delivery, postpartum management, eclampsia
GOAL: To reduce preeclampsia maternal morbidity in Illinois hospitals

Key Drivers

Readiness: Implementation of standard processes for optimal care of severe maternal hypertension in pregnancy

Recognition: Screening and early diagnosis of severe maternal hypertension in pregnancy

Response: Care management for every pregnant or postpartum woman with new onset severe hypertension

Reporting/Systems Learning: Foster a culture of safety and improvement for care of women with new onset severe hypertension

Interventions

- Implement standard order sets and/or algorithms for early warning signs, diagnostic criteria, timely triage, monitoring and treatment of severe hypertension
- Ensure rapid access to medications used for severe hypertension with guide for administration and dosage
- Implement system plan for escalation, obtaining appropriate consultation, and maternal transport
- Perform regular simulation drills of severe hypertension protocols with post-drill debriefs
- Integrate severe hypertension processes (e.g. order sets, tracking tools) into your EHR

- Standardize protocol for measurement and assessment of blood pressure and urine protein for all pregnant and postpartum women
- Standardize response to early warning signs including listening to and investigating symptoms and assessment of labs
- Implement facility-wide standards for patient-centered education of women and their families on signs and symptoms of severe hypertension
- Educate OB, ED, and anesthesiology physicians, midwives, and nurses on recognition and diagnosis of severe hypertension that includes utilizing resources such as the AIM hypertension bundle and/or unit standard protocol

- Execute facility-wide standard protocols for appropriate medical management in under 60 minutes
- Create and ensure understanding of communication and escalation procedures (e.g. implementing a rapid response team through the use of TeamSTEPPS)
- Develop OB-specific resources and protocols to support patients, families, staff through major complications
- Provide patient-centered discharge education materials on preeclampsia and postpartum preeclampsia
- Implement patient protocols to ensure follow-up within 7-10 days for all women with severe hypertension and 72 hours for all women on medications

- Establish a system to perform regular debriefs after all new onset severe hypertension cases
- Establish a process in your hospital to perform multidisciplinary systems-level reviews on all severe hypertension cases admitted to ICU
- Continuously monitor, disseminate, and discuss your monthly data in ILPQC REDCap system at staff/administrative meetings
- Add maternal hypertension assessment and treatment protocols and education to provider and staff orientations, and annual competency assessments

AIM: By December 2017, to reduce the rate of severe morbidities in women with preeclampsia, eclampsia, or preeclampsia superimposed on pre-existing hypertension by 20%

Key Driver Diagram: Maternal Hypertension Initiative
CMQCC: 4-Step Program to Improve Preeclampsia Outcomes

- Make the Right Diagnosis (new criteria)
- Treat the BP!
- Deliver not too early, and not too late
- Patient education and early postpartum F/U
BP $\geq 160/110(105)$

Need To Treat*

*BP persistent 15 minutes, activate treatment algorithm with IV therapy ASAP, < 30-60 minutes
Treatment of Blood Pressure greater than or equal to 160/xx OR xx/110:
Position: semi-fowlers; cuff at level of heart; displace uterus

Primary RN
- Notify OB of BP
- Notify Charge RN

OB Provider
- Order IV push labetalol or hydralazine *
- Admit patient

Sample Process Flow Diagram for Management of Severe Range BP:
Kaiser Permanente, Roseville, CA

*MED NOTES:
Labetalol IVP: (q 10min PRN; 300mg max dose)
Peak response within 5 minutes
*Requires continuous pulse oximetry x 1 hr after each dose.
On M/B unit: contact Mgr re equip/staff requirements.
Contraindicated: Bronchial Asthma or Heart Block
Hydralazine IVP: (q 20min PRN; 25mg max dose)
Onset: 5-15 min
Peak response: 10-80 min
Contraindicated: Mitral Valvular disease
◆Be sure to CHECK ORDER for details◆

Primary RN
Notify OB of BP
Notify Charge RN

and

• Start IV and draw Labs
• Recommend IVP med* within 30-60 min of 2nd BP
• Monitor BP q 5 min 0
• Monitor EFM
• Admit patient

Remains ≥ 160/xx or xx/110? 30-60 min timeframe begins

Remains ≥ 160/xx or xx/110? May recheck with manual cuff* in 10 minutes *(for verification)

OB Provider
- Order IV push labetalol or hydralazine *
- Admit patient

Remains ≥ 160/xx or xx/110? 30-60 min timeframe begins

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• Monitor EFM
• Admit patient

Remains ≥ 160/xx or xx/110? May recheck with manual cuff* in 10 minutes *(for verification)
AIM Baseline Survey
Bundle Implementation Questions

Readiness - For every unit in your hospital do you have (Yes/No):

1. Standard protocols for early warning signs, diagnostic criteria, monitoring and treatment of severe preeclampsia/eclampsia (include order sets and algorithms).
   a. L&D
   b. Antepartum/Postpartum
   c. Triage/ED

2. Unit education on protocols, unit-based drills (with post-drill debriefs).
   a. L&D
   b. Antepartum/Postpartum
   c. Triage/ED

3. Process for timely identification, triage, and evaluation of pregnant and postpartum women with hypertension including ED and outpatient areas.

4. Rapid access to IV medications used for severe hypertension/eclampsia: Medications should be stocked and immediately available on L&D and in other areas where patients may be treated. Include brief guide for administration and dosage.
   a. L&D
   b. Antepartum/Postpartum
   c. Triage/ED

5. System plan for escalation, obtaining appropriate consultation and maternal transport, as needed for severe maternal hypertension, preeclampsia, and eclampsia.
   a. L&D
   b. Antepartum/Postpartum
   c. Triage/ED
AIM Baseline Survey
Bundle Implementation Questions

Recognition - For every OB/postpartum patient in your hospital do you have (Yes/No):


7. Standard response to maternal early warning signs including listening to and appropriately investigating patient symptoms and assessment of labs (i.e. CBC with platelets, AST and ALT)

8. Facility-wide standards for educating prenatal and postpartum women on signs and symptoms of preeclampsia and severe hypertension.
Response - For every case of severe hypertension/preeclampsia in your hospital do you have (Yes/No):

9. Facility-wide standard protocols with checklists and escalation policies for management and treatment of: Severe hypertension; Eclampsia, seizure prophylaxis, and magnesium over-dosage; and Postpartum, emergency department and outpatient presentations of severe hypertension/preeclampsia.

10. Minimum requirements for protocol: Notification of physician or primary care provider if systolic BP \geq 160 or diastolic BP \geq 110 for two measurements within 15 minutes; After the second elevated reading, treatment should be initiated ASAP (preferably within 60 minutes of verification); Includes onset and duration of magnesium sulfate therapy when indicated; Includes escalation measures for those unresponsive to standard treatment; Describes manner and verification of timely follow-up for blood pressure check and evaluation within 7 to 14 days postpartum; Describes postpartum patient education for women with hypertension/preeclampsia describing postpartum preeclampsia.

11. Support plan for patients, families, and staff for ICU admissions and serious complications of severe hypertension.
AIM Baseline Survey
Bundle Implementation Questions

Reporting - In every unit of your hospital, do you (Yes/No):

11. Establish a culture of huddles for high-risk patients and post-event debriefs to identify successes and opportunities for improvement.
   a. L&D
   b. Antepartum/Postpartum
   c. Triage/ED

12. Multidisciplinary review of all severe hypertension/eclampsia cases admitted to ICU for systems issues.
   a. L&D
   b. Antepartum/Postpartum
   c. Triage/ED

   a. L&D
   b. Antepartum/Postpartum
   c. Triage/ED
<table>
<thead>
<tr>
<th>Call Date</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 27</td>
<td>Readiness and Reporting - Bundle / Toolkit Overview AND Drills, Simulation, and Debriefs</td>
</tr>
<tr>
<td>12:30 – 2:30 pm</td>
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<tr>
<td>July 25</td>
<td>Recognition - Accurate BP Measurement &amp; Diagnosis</td>
</tr>
<tr>
<td>12:30 – 1:30 pm</td>
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<tr>
<td>August 22</td>
<td>Response - BP Medication and Treatment Algorithms</td>
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<td>12:30 – 1:30 pm</td>
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<tr>
<td>September 26</td>
<td>Response - Timing of Delivery</td>
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<td>12:30 – 1:30 pm</td>
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<tr>
<td>October 24</td>
<td>Response - Patient Education/Engagement and Postpartum Follow-up</td>
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<td>12:30 – 1:30 pm</td>
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CONCLUSION

- **Systolic BP ≥ 160 or diastolic BP ≥ 110** warrant:
  - Prompt evaluation at bedside
  - Treatment to decrease maternal morbidity and mortality

- Risk reduction and successful clinical outcomes require avoidance/management of severe systolic and diastolic hypertension in women with:
  - Preeclampsia
  - Eclampsia
  - Chronic hypertension + superimposed preeclampsia

- Increasing evidence indicates that standardization of care improves patient outcomes
Additional Resources

• Preeclampsia Foundation tools and materials
  • www.preeclampsia.org

• California Maternal Quality Care Collaborative
  • www.CMQCC.org

• Patient safety bundles and AIM program information
  • www.safehealthcareforeverywoman.org

• ACOG DII (New York) Safe Motherhood Initiative
  • https://www.acog.org/About-ACOG/ACOG-Districts/District-II/Safe-Motherhood-Initiative

• Illinois Perinatal Quality Collaborative (ILPQC)
  • www.ilpqc.org
References


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