Antepartum Intrapartum Management conference
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Grand Hyatt Hotel
San Francisco, CA

Preeclampsia/Eclampsia – 2016
A Tale of Two Task Forces
ACOG -HIP 2012
PAMR-PTF 2012

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I have no financial disclosures to report
Learning Objectives

- To review the impact of hypertensive disorders of pregnancy on maternal and perinatal morbidity and mortality.
- To delineate the most common causes of maternal morbidity and mortality secondary to hypertensive disorders of pregnancy.
- To review the most current recommendations for the diagnosis and management of hypertensive disorders of pregnancy from ACOG and the California Preeclampsia Task Force (PTF) of CMQCC.
- To outline a management algorithm to optimize care for patients with hypertensive disorders of pregnancy.
- To review the clinical impact of implementation of Task Force recommendations.

It is a multisystem disorder.
Definitions Related to Maternal and Pregnancy – Related Mortality

**Maternal Death**
- Death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes.

**Pregnancy-Related Death**
- Death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the cause of death.

**Maternal Mortality Ratio**
- Number of maternal deaths per 100,000 births


### British Maternal Mortality in the 19th and early 20th Centuries

Table 1: Estimates of maternal mortality rates (MMR) from records of 13 English parishes in 50 year periods.

<table>
<thead>
<tr>
<th>Year Range</th>
<th>MMR per 1,000 live births</th>
<th>MMR per 100,000 births</th>
</tr>
</thead>
<tbody>
<tr>
<td>1700 to 1750</td>
<td>10.5</td>
<td>1050</td>
</tr>
<tr>
<td>1750 to 1800</td>
<td>7.5</td>
<td>750</td>
</tr>
<tr>
<td>1800 to 1850</td>
<td>5.0</td>
<td>500</td>
</tr>
<tr>
<td>2013</td>
<td></td>
<td>22</td>
</tr>
<tr>
<td>USA</td>
<td></td>
<td>USA</td>
</tr>
<tr>
<td>California</td>
<td></td>
<td>California</td>
</tr>
</tbody>
</table>

Ref: Journal of the Royal Society of Medicine, Vol. 99, November 2006

Four Horsemen of Death

The Four Horsemen of Death in maternal mortality were:

- Puerperal pyrexia
- Hemorrhage
- Convulsions
- Illegal abortion

Ref: J R Soc Med 2008;99-559-663

Eclampsia

- Eclampsia is defined as **NEW ONSET** grand mal seizures in a woman with preeclampsia
- Incidence is 1 in 1,000 deliveries in U.S.
- Mortality from eclampsia ranges from approximately **1%** in the **developed** world, to as high as **15%** in the **developing** world


American Journal of Obstetrics and Gynecology 1925(17) and 1933(575)


The incidence of preeclampsia has increased by 25% in the United States during the past two decades.

Preeclampsia is a leading cause of maternal and perinatal morbidity and mortality, with an estimated 50,000-60,000 preeclampsia-related deaths per year worldwide.
Cause of U.S. Maternal Mortality

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

CDC Review of 14 years of coded data: 1979-1992

790 (19.6%) from preeclampsia

CDC Review of 14 years of coded data: 1979-1992

790 (19.6%) from preeclampsia

CDC Review of 14 years of coded data: 1979-1992

790 (19.6%) from preeclampsia


90% of CVA were from hemorrhage

Executive Summary:

Hypertension in Pregnancy

American College of Obstetricians and Gynecologists

James Martin, Jr, MD

Obstet Gynecol 2013;122:1122-31

CA-PAMR Causes of Death (Top 5), 2002-2004

<table>
<thead>
<tr>
<th>Grouped Cause of Death, per CA-PAMR Committee</th>
<th>Pregnancy-Related Deaths N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular disease</td>
<td>29 (20)</td>
</tr>
<tr>
<td>Cardiomyopathy</td>
<td>19 (13)</td>
</tr>
<tr>
<td>Other cardiovascular</td>
<td>10 (7)</td>
</tr>
<tr>
<td>Preeclampsia eclampsia</td>
<td>25 (17)</td>
</tr>
<tr>
<td>Obstetric hemorrhage</td>
<td>16 (11)</td>
</tr>
<tr>
<td>Amniotic fluid embolism</td>
<td>15 (10)</td>
</tr>
<tr>
<td>DVT PE</td>
<td>15 (10)</td>
</tr>
<tr>
<td>Other</td>
<td>45 (31)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>145</td>
</tr>
</tbody>
</table>

Pregnancy-Related Mortality Rate: 1.6 deaths /100,000 live births

CA-PAMR Final Cause of Death Among Preeclampsia Cases, 2002-2004 (n=25)

<table>
<thead>
<tr>
<th>Final Cause of Death</th>
<th>Number</th>
<th>%</th>
<th>Rate/100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hemorrhagic</strong></td>
<td>14</td>
<td><strong>87.5%</strong></td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Thrombotic</strong></td>
<td>2</td>
<td><strong>12.5%</strong></td>
<td></td>
</tr>
<tr>
<td>Hepatic (liver) Failure</td>
<td>4</td>
<td>16.0%</td>
<td>.25</td>
</tr>
<tr>
<td>Cardiac Failure</td>
<td>2</td>
<td>8.0%</td>
<td></td>
</tr>
<tr>
<td>Hemorrhage/DIC</td>
<td>1</td>
<td>4.0%</td>
<td></td>
</tr>
<tr>
<td>Multi-organ failure</td>
<td>1</td>
<td>4.0%</td>
<td></td>
</tr>
<tr>
<td>ARDS</td>
<td>1</td>
<td>4.0%</td>
<td></td>
</tr>
</tbody>
</table>

How Do Women Die Of Preeclampsia in CA?

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

<table>
<thead>
<tr>
<th>Cause of death</th>
<th>Preeclampsia</th>
<th>Eclampsia</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corebrovascular events</td>
<td>17.3%</td>
<td>21.4%</td>
<td>38.7%</td>
</tr>
<tr>
<td>Corebrovascular hemorrhage</td>
<td>15.6%</td>
<td>18.6%</td>
<td>34.2%</td>
</tr>
<tr>
<td>Cerebral edema</td>
<td>1.1%</td>
<td>1.5%</td>
<td>2.6%</td>
</tr>
<tr>
<td>Cerebral embolus</td>
<td>0.4%</td>
<td>0.8%</td>
<td>1.1%</td>
</tr>
<tr>
<td>Renal or hepatic failure</td>
<td>7.2%</td>
<td>5.4%</td>
<td>12.6%</td>
</tr>
<tr>
<td>HELLP syndrome</td>
<td>4.8%</td>
<td>2.3%</td>
<td>7.1%</td>
</tr>
<tr>
<td>Other complications of hypertension</td>
<td>13.9%</td>
<td>11.8%</td>
<td>25.7%</td>
</tr>
<tr>
<td>Not specified hypertension</td>
<td>7.6%</td>
<td>8.8%</td>
<td>16.4%</td>
</tr>
<tr>
<td>Preeclampsia and eclampsia</td>
<td>50.8%</td>
<td>49.2%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

HELP = hemolysis, elevated liver enzymes, and low platelet count syndrome

### CA-PAMR Pregnancy-Related Deaths, Chance to Alter Outcome by Grouped Cause of Death; 2002-2005 (N=207)

<table>
<thead>
<tr>
<th>Clinical Cause of Death</th>
<th>Chance to Alter Outcome (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strong/Good</td>
</tr>
<tr>
<td>Obstetric hemorrhage</td>
<td>14</td>
</tr>
<tr>
<td>Deep vein thrombosis/ pulmonary embolism</td>
<td>10</td>
</tr>
<tr>
<td>Sepsis/infection</td>
<td>7</td>
</tr>
<tr>
<td>Preeclampsia/eclampsia*</td>
<td>21(60)</td>
</tr>
<tr>
<td>Cardiomyopathy and other cardiovascular causes*</td>
<td>14</td>
</tr>
<tr>
<td>Cerebral vascular accident</td>
<td>3</td>
</tr>
<tr>
<td>Amniotic fluid embolism</td>
<td>0</td>
</tr>
<tr>
<td>All other causes of death</td>
<td>15</td>
</tr>
<tr>
<td><strong>Total (%)</strong></td>
<td>84</td>
</tr>
</tbody>
</table>

* Two deaths lacked sufficient records to make determination (one from each cause of death).

### Impact of Hypertension in CA-PAMR Cohort, 2002-2004

- Cohort of pregnancy-related deaths, N=145
  - 25 (17%) of deaths were grouped as “Preeclampsia/Eclampsia” cause of death (20%, CDC)

- Over half of all pregnancy-related deaths had HTN diagnoses
  - 50 (34%) had inpatient diagnosis of HTN
  - 57 (39%) had any diagnosis of HTN (inpatient, prenatal, preexisting)

### Maternal Morbidity and Mortality: Preeclampsia

- About 8 Preeclampsia Related Mortalities/2007 in CA

- Near Misses: 380/year (ICU admissions)
- Serious Morbidity: 3400/year (prolonged postpartum length of stay)

Source: 2007 All-California Rapid Cycle Maternal/Infant Database for CA Births: CMOCC
Adapted from: Table 3: Estimated Odds Ratios of Severe Obstetric Complications for Delivery Hospitalizations With Hypertensive Disorders compared With Delivery Hospitalizations Without Hypertensive Disorders: The 1998-2006 Nationwide Inpatient Sample (N=36,537,061)

Estimated Odds Ratio (95% Confidence Interval) Rounded

<table>
<thead>
<tr>
<th>Eclampsia/Preeclampsia</th>
<th>Hypertension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe</td>
<td>Mild</td>
</tr>
<tr>
<td>Acute Renal Failure</td>
<td>35</td>
</tr>
<tr>
<td>Pulmonary Edema</td>
<td>10</td>
</tr>
<tr>
<td>ARDS</td>
<td>12</td>
</tr>
<tr>
<td>PCD</td>
<td>17</td>
</tr>
<tr>
<td>DICS</td>
<td>15</td>
</tr>
<tr>
<td>Ventilation</td>
<td>11</td>
</tr>
<tr>
<td>Mortality</td>
<td>7</td>
</tr>
</tbody>
</table>

ARDs: adult respiratory distress syndrome, PCD: puerperal cerebrovascular disorder, DICS: disseminated intravascular coagulation syndrome.

Ref: Kuklina et al, OBGYN Hypertension and Obstetric Morbidity, Vol. 113, No 6, June 2009

Factors Contributing to Pregnancy-Related Deaths, CA-PAMR 2002-2004

<table>
<thead>
<tr>
<th>Contributing Factor (at least one factor probably or definitely contributed)</th>
<th>Preeclampsia N (%)</th>
<th>TOTAL N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OVERALL</td>
<td>25 (100%)</td>
<td>129 (89%)</td>
</tr>
<tr>
<td>PATIENT FACTORS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underlying significant medical conditions</td>
<td>8 (50%)</td>
<td>40 (39%)</td>
</tr>
<tr>
<td>Delay or failure to seek care</td>
<td>10 (63%)</td>
<td>27 (26%)</td>
</tr>
<tr>
<td>Lack of understanding the importance of a health event</td>
<td>9 (56%)</td>
<td>16 (15%)</td>
</tr>
<tr>
<td>HEALTHCARE PROFESSIONS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delay in diagnosis</td>
<td>22 (92%)</td>
<td>62 (54%)</td>
</tr>
<tr>
<td>Misdiagnosis</td>
<td>13 (54%)</td>
<td>36 (31%)</td>
</tr>
<tr>
<td>Use of ineffective treatment</td>
<td>19 (79%)</td>
<td>48 (42%)</td>
</tr>
<tr>
<td>Failure to refer or seek consultation</td>
<td>6 (25%)</td>
<td>26 (23%)</td>
</tr>
<tr>
<td>HEALTHCARE FACILITY</td>
<td>12 (48%)</td>
<td>72 (50%)</td>
</tr>
</tbody>
</table>

Funding for the development of this toolkit was provided by:
Federal Title V block grant funding from the California Department of Public Health; Maternal, Child and Adolescent Health Division and Stanford University.
Rocket science? Only 4 things Brain surgery?

Classification:
1) PE
2) CHT
3) CHT+PE
4) GHTN

Management:
1) BP control
2) Seizure prevention
3) Delivery-34 wks,37 wks.
4) Post partum surveillance

Blood pressure in pregnancy

New onset (>20 wks)-Gestational Preexisting (<20 wks)-Chronic HT

<table>
<thead>
<tr>
<th>Diagnostic</th>
<th>Acute Treatment Triggers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>140 or 90</td>
</tr>
<tr>
<td>Severe</td>
<td>160 or 110</td>
</tr>
</tbody>
</table>

PTF Alternative (155 or 105)

---

Diagnostic Criteria for Preeclampsia

<table>
<thead>
<tr>
<th>Blood Pressure</th>
<th>MILD (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 (160 or 110, repeat and treat 15 mins))</th>
</tr>
</thead>
<tbody>
<tr>
<td>AND Proteinuria (not present in 10%)</td>
<td>Greater than or equal to 300 mg per 24-hour urine collection (or this amount extrapolated from a timed collection) Or Protein/Creatinine ratio greater than or equal to 0.3 Or Dipstick reading of 1+ (used only if other quantitative methods not available)</td>
</tr>
</tbody>
</table>

SEVERE (Onset < 34 weeks more often severe)

| 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 (15 minutes) to facilitate timely antihypertensive therapy (30-60 min) |

Even in the absence of proteinuria, new-onset hypertension, (irrespective of level) with the new onset of any of the following:

- Thrombocytopenia
- Platelet count less than 100,000/ml
- Renal Insufficiency
- Serum creatinine concentration greater than 1.1 mg/dL or a doubling of the serum creatinine concentration in the absence of other renal disease
- Impaired Liver Function
- Elevated blood concentrations of liver transaminases to twice normal concentration
- Pulmonary Edema
- Severe persistent right upper quadrant or epigastric pain unresponsive to medication and not accounted for by alternative diagnosis, or both
- Cerebral or Visual Symptoms
- New onset headache most common
No Proteinuria
No End Organ Involvement

Gestational Hypertension (> 20 wks) (GHTN)
Mild - BP Only - Severe

- No Proteinuria
- No End Organ Involvement

HELLP Syndrome

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>Hemolysis (LDH)</td>
</tr>
<tr>
<td>EL</td>
<td>Elevated Liver Enzymes</td>
</tr>
<tr>
<td>LP</td>
<td>Low Platelets &lt; 100,000</td>
</tr>
</tbody>
</table>

Eclampsia

- Seizures
- Tonic/Clonic

The Deadly Triad

Severe Preeclampsia - HELLP Syndrome (20%) - Eclampsia (seizures)

Associated with an increased risk of adverse outcomes such as:
- Placental Abruption
- Renal Failure
- Sub-capsular Hepatic Hematoma
- Preterm Delivery
- Fetal or Maternal Death
- Recurrent Preeclampsia

ACOG Executive Summary on Hypertension In Pregnancy, Nov 2013

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. (Repeat and Treat)

Rocket science? Only 4 things

Brain surgery?

Classification: 1) PE
2) CHT
3) CHT+PE
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Management: 1) BP control
2) Seizure prevention
3) Delivery- 34 wks, 37 wks.
4) Post partum surveillance

Preeclampsia Mortality Rates in California and UK

<table>
<thead>
<tr>
<th>Cause of Death among Preeclampsia Cases</th>
<th>CA-PAMR (2002-04) Rate/100,000 Live Births</th>
<th>UK CMACE (2003-05) Rate/100,000 Live Births</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke</td>
<td>1.0</td>
<td>.47</td>
</tr>
<tr>
<td>Pulmonary/Respiratory</td>
<td>.06</td>
<td>.00</td>
</tr>
<tr>
<td>Hepatic</td>
<td>.25</td>
<td>.19</td>
</tr>
<tr>
<td>OVERALL</td>
<td>1.6</td>
<td>.66</td>
</tr>
</tbody>
</table>

The overall mortality rate for preeclampsia in California is greater than 2 times that of the UK, largely due to differences in deaths caused by stroke.

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 treatment of both systolic and diastolic blood pressure and has demonstrated a reduction in deaths.
Classification: 1) PE
2) CHT
3) CHT+PE
4) GHTN

Management: 1) BP control
2) Seizure prevention
3) Delivery - 34 wks, 37 wks.
4) Post partum surveillance

Seizure prevention/treatment

American Journal of Obstetrics and Gynecology 1925(17) and 1933(575)


**Recommendations for Women Who Should Be Treated With Magnesium**

<table>
<thead>
<tr>
<th></th>
<th>Preeclampsia without severe features</th>
<th>Severe Preeclampsia</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>X</td>
<td></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 (NNT) = 109 for “mild”, 63 for “severe”*

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**Rocket science? Only 4 things Brain surgery?**

- Classification: 1)PE
  - 2)CHT
  - 3)CHT+PE
  - 4)GHTN

- Management: 1)BP control
  - 2)Seizure prevention
  - 3)Delivery- 34 wks **With Severe**
    - 37 wks **Without Severe**
  - 4)Post partum surveillance

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**Delivery in preeclampsia/eclampsia**

Delivery is the most important therapeutic intervention towards cure, but residual endothelial cell damage often persists into the post partum period (42 days)

At GA 24-34 weeks, delay delivery for fetal wellbeing.

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**PAMR – Preeclampsia Maternal Deaths 2002 - 2007**

Gestational Age at Death

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>37+ weeks</td>
<td>21</td>
<td>39%</td>
</tr>
<tr>
<td>Less than 36 6/7 weeks</td>
<td>33</td>
<td>61%</td>
</tr>
<tr>
<td>Less than 34 weeks</td>
<td>21(64%)</td>
<td>39%</td>
</tr>
</tbody>
</table>

Unpublished data
Of 2,011,341 births during the study period, 38,269 women (1.9%) had preeclampsia w/o severe features and 31,834 (1.6%) had preeclampsia with severe features. Preeclampsia w/o severe features remained stable at 1.9% across all four years, while preeclampsia with severe features increased over time (1.4% in 2008 to 1.7% in 2011).

CONCLUSIONS

- Preeclampsia affects 3.5% of births in California and is increasing over time, primarily due to an increase in preeclampsia with severe features.

- Preeclampsia, particularly with severe features, contributes a substantial burden to preterm birth, with greater than 20% of births at 29 to 33 week gestational age occurring in mothers with preeclampsia.

Women with preeclampsia were significantly more likely to deliver preterm, especially those with severe features (figure below). Almost 25% of women delivering at 29 to 32 weeks had preeclampsia, and 85-90% of women with preeclampsia at those gestational ages had severe features.

Key Clinical Pearl

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

- Expectant management without delivery at 24-34 weeks gestation for stable patients.
- INPATIENT MANAGEMENT
- “Hope for the best, expect the worst”
- Delivery at 34 weeks for severe preeclampsia or severe gestational hypertension
- Delivery at 37 weeks for preeclampsia without severe features or mild gestational hypertension defined as BP<160 or <110


Rocket science? Only 4 things

Brain surgery?

- Classification: 1)PE
  - 2)CHT
  - 3)CHT+PE
  - 4)GHTN

- Management: 1)BP control
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  - 3)Delivery- 34 wks,37wks.
  - 4)Post partum surveillance

Yogi Berra

“It ain’t over till it’s over.”

CMQCC/ACOG

“It ain’t over till its over, 6 weeks postpartum”

Delivery in preeclampsia/eclampsia

DELIVERY — CURE

Delivery is the most important therapeutic intervention towards cure, but residual endothelial cell damage often persists into the post partum period. (42 days)
Timing of Pregnancy-Related Deaths, CA-PAMR, 2002 to 2004

Preeclampsia Deaths (n=25)

- 68% of deaths occurred within 4 days

Eclampsia

- Eclampsia is defined as **NEW ONSET grand mal** seizures in a woman with preeclampsia.
- Incidence is 1 in 1,000 deliveries in U.S.
- **Mortality** from eclampsia ranges from approximately **1%** in the developed world, to as high as **15%** in the developing world.

Eclampsia: Maternal-Perinatal Outcome In **254** Consecutive Cases over 12 years.
Total births 87K (**Incidence 1 in 330**)

- 49 patients (**19%**) did not have proteinuria
- 58 patients (**23%**) did not have hypertension
- 73 (**29%**) occurred postpartum
  - 40 cases (**54%**) occurred in the late postpartum period (**48hrs-4weeks**),
  - 18 of these 40 cases (**45%**) were normotensive
  - All 18 had symptoms of headache or visual disturbance


Key Clinical Pearls

- Early follow-up for all patients with preeclampsia/eclampsia
  - within **3-7 days** if medication was used during labor and delivery OR postpartum
  - within **7-14 days** if no medication was used

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

Preeclampsia Collaborative Summary
Jan 2013 – August 2014
Lessons Learned

Preeclampsia Collaborative: Measurement

- **Outcome Measures**
  - Severe Morbidity among women with Preeclampsia, Eclampsia, Preeclampsia superimposed on severe HTN
  - Prolonged postpartum LOS (≥4 days vaginal, ≥6 days cesarean)
- **Process Measures**
  - Appropriate Medical Management (Timely Treatment)
  - Debrief
- **Balance**
  - Monitor for dBP <80
    - FHR category change after treatment
    - Emergent delivery after treatment

Severe Maternal Morbidity Measure (SMM)

**Severe Maternal Morbidity (SMM)** was defined as: acute renal failure, pulmonary edema, ARDS, DIC, mechanical ventilation, PP hemorrhage, placental abruption, transfusion.*

*SMM was subdivided into with, and without transfusion.
Table 3: Antihypertensive treatment and severe maternal morbidity rates by increasing blood pressure severity in severely hypertensive women

<table>
<thead>
<tr>
<th>Categories of severe systolic blood pressure</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mildly severe (160–172)²</td>
<td></td>
</tr>
<tr>
<td>n = 1000</td>
<td>n (%)</td>
</tr>
<tr>
<td>Treated</td>
<td>790 (79.0)</td>
</tr>
<tr>
<td>Severe maternal morbidity</td>
<td>n = 1037</td>
</tr>
<tr>
<td>SMM</td>
<td>91 (8.8)</td>
</tr>
</tbody>
</table>

17% of women with persistent severe hypertension were not treated with antihypertensive medication. The most common reason (54%) for not treating these women was that magnesium sulfate was started instead. Magnesium sulfate is not recommended as an antihypertensive treatment, and these findings highlight an opportunity for improvement. All guidelines recommend antihypertensive treatment for severe hypertension and at least 2 directly state that magnesium sulfate is not recommended as an antihypertensive agent.
Dignity Health Rate of Eclampsia
Pre- and Post-Hypertension Bundle

Rate per 1000 Births

- 2012-13: N=162, 81/yr
- 2014: N=55
- Jan-Jul '15: N=32

31% reduction
P=0.02

Downton Abbey

Downton Abbey

OBG Management – May 2016 – Vol. 28 No. 5

TABLE: ACOG, USPSTF, WHO, NICE, and SOGC recommend aspirin to prevent pre-eclampsia in women at high risk

<table>
<thead>
<tr>
<th>Organization</th>
<th>Indications</th>
<th>Aspirin dose and timing of initiation</th>
</tr>
</thead>
<tbody>
<tr>
<td>American College of Obstetricians and Gynecologists (ACOG)</td>
<td>Pregnant women with a history of early-onset pre-eclampsia with resulting proteinuria at 20 weeks' gestation; Pregnant women with preeclampsia in 2 or more prior pregnancies</td>
<td>150 mg daily; Start before 20 weeks' gestation</td>
</tr>
<tr>
<td>US Preventive Services Task Force (USPSTF)</td>
<td>Pregnant women with a high-risk factor (multifetal gestation, chronic hypertension, type 1 or 2 diabetes, pregestational diabetes, renal disease, autoimmune disease, prior history of preeclampsia)</td>
<td>150 mg daily; Start at 12 weeks' gestation and continue until birth</td>
</tr>
<tr>
<td>World Health Organization (WHO)</td>
<td>Pregnant women at high risk for preeclampsia</td>
<td>15 mg daily; Start before 20 weeks' gestation</td>
</tr>
<tr>
<td>National Institute for Health and Care Excellence (NICE)</td>
<td>Pregnant women with 1 high-risk factor (chronic hypertension, obesity, pregestational diabetes, autoimmune disease, preeclampsia in a previous pregnancy)</td>
<td>15 mg daily; Start at 12 weeks' gestation and continue until birth</td>
</tr>
<tr>
<td>Society of Obstetricians and Gynecologists of Canada (SOGC)</td>
<td>Pregnant women at increased risk, such as those with a personal history of hypertension, chronic medical disease, or abnormal uterine artery Doppler results before 24 weeks' gestation</td>
<td>75-150 mg daily; Start before 10 weeks' gestation; Start before 10 weeks' gestation</td>
</tr>
</tbody>
</table>
Four Days Post-Partum

- **Four days after delivery of a healthy child**, a 31-year-old mother went to the emergency department (ED) reporting tightness in her chest, difficulty breathing, and swelling in her lower extremities.

- Pulmonary embolism was ruled out and she was discharged.

**Medical Verdicts**

Postpartum preeclampsia, mother dies: $6.9 M settlement
When she returned 3 days later, her legs were more swollen than before and her systolic blood pressure was 160 mm Hg.

She was sent home again.

Four days later, she suffered a seizure at home, in the ambulance during transport, and at the hospital.

She was transferred to another facility a few days later where she died a week after transfer.

Estate’s Claim

- The ED physicians and hospital staff were negligent in not diagnosing and treating postpartum preeclampsia.
- This led to seizures, brain damage, and death. Antihypertensive and antiseizure medications would have prevented her death.

Defendant’s Defense

- The actions taken were reasonable because she had no symptoms of preeclampsia during pregnancy or delivery.

Verdict

- A $6.9 million Illinois settlement was reached.
Severe Hypertension

- 17% of women with persistent severe hypertension were not treated with antihypertensive medication.
- The most common reason (54%) for not treating these women was that magnesium sulfate was started instead.
- Magnesium sulfate is **not recommended** as an antihypertensive treatment, and these findings highlight an opportunity for improvement, as all guidelines recommend antihypertensive treatment for severe hypertension and at least 2 directly state that magnesium sulfate is not recommended as an antihypertensive agent.
What can we do?

Make the diagnosis and act!!

Key Clinical Pearl

An organized tool to identify “clinical signs,” of high concern or triggers can aid clinicians to recognize and respond in a more timely manner to avoid delays in diagnosis and treatment.

Joint Commission 2010 Sentinel Alert

“Preventing Maternal Death”

Recommendations

- “All birthing facilities should develop a process for both the recognition and appropriate response in the event of a patient’s deteriorating condition with written criteria describing early warning signs and intervention strategies.”
- “Develop protocols and drills for recognizing, responding and treating preeclampsia.”

ACOG October 2014

The Maternal Early Warning Criteria

A Proposal From the National Partnership for Maternal Safety

<table>
<thead>
<tr>
<th>Table 1. The Maternal Early Warning Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic BP (mm Hg)</td>
</tr>
<tr>
<td>Diastolic BP (mm Hg)</td>
</tr>
<tr>
<td>Heart rate (beats per min)</td>
</tr>
<tr>
<td>Respiratory rate (breaths per min)</td>
</tr>
<tr>
<td>Oxygen saturation on room air, at sea level, %</td>
</tr>
<tr>
<td>Oliguria, ml/hr for ≥ 2 hours</td>
</tr>
<tr>
<td>Maternal agitation, confusion, or unresponsiveness; Patient with preeclampsia reporting a non-remitting headache or shortness of breath</td>
</tr>
</tbody>
</table>

Sentinel Event Alert 2010, Issue 44, Jan 26, 2010
PREECLAMPSIA TOOLKIT
TREATMENT
RECOMMENDATIONS

Consequences of Mis-Cuffing

<table>
<thead>
<tr>
<th>Overestimation of BP</th>
<th>Underestimation of BP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cuff too small (Systolic ↑ by as much as 15 mm Hg)</td>
<td>Cuff too large</td>
</tr>
<tr>
<td>Cuff not placed over brachial artery</td>
<td>Brachial artery above heart level</td>
</tr>
<tr>
<td>Cuff applied over clothing or too loose</td>
<td>Arm positioned below heart level and not supported</td>
</tr>
<tr>
<td>Deflation of cuff too slow</td>
<td>Deflation of cuff too fast</td>
</tr>
</tbody>
</table>

Preeclampsia Toolkit BP Treatment Recommendations

<table>
<thead>
<tr>
<th>Systolic ≥ 160</th>
<th>Diastolic ≥ 110</th>
<th>Repeat BP and treat within 60 minutes (ideally ASAP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 155</td>
<td>≥ 105-110</td>
<td>Alternative triggers*</td>
</tr>
</tbody>
</table>

These recommendations apply to all forms of hypertension in pregnancy:

Gestational HTN - Preeclampsia - Severe Preeclampsia


Committee Opinion

Emergent Therapy for Acute-Onset, Severe Hypertension During Pregnancy and the Postpartum Period

- Acute-onset, severe hypertension, 160 systolic, OR 110 diastolic, that is accurately measured using standard techniques and is persistent for 15 minutes or more is considered a hypertensive emergency.

- First-Line Therapy – Recommendations
  - IV labetalol or/and hydralazine
  - Evidence available suggests that oral nifedipine also may be considered as a first-line therapy.
Magnesium Sulfate

- Primary effect is via CNS depression
- Improves blood flow to CNS via small vessel vasodilation
- Blood pressure after magnesium infusion:
  - 6 gm loading then 2 gm/hr.

<table>
<thead>
<tr>
<th>Group</th>
<th>sBP 30 min</th>
<th>sBP 120 min</th>
<th>dBP 30 min</th>
<th>dBP 120 min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>145 ±10</td>
<td>141 ±14</td>
<td>79 ±9</td>
<td>82 ±9</td>
</tr>
<tr>
<td>Group</td>
<td>143 ±13</td>
<td>87 ±10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Magnesium sulfate should not be considered an antihypertensive medication


Process Improvement Summary

- Implementation of severe preeclampsia order sets
- Educational sessions for treatment thresholds and accurate BP measurements
- Stocking prefilled syringes of labetalol
- Improved communication and care transition between departments
- Removed barriers for IV antihypertensive medication administration
- Continuation of magnesium sulfate during cesarean section
- Debriefs become a part of hospital culture
Patient Safety Bundles - Hypertension

http://www.safehealthcareforeverywoman.org/

Getting The Job Done in Your Institution

- Establish tools / new recommendations
- Establish champions and collaborators
- Provide convincing rationale for change
- Get providers to adopt the changes
- Provide convincing evidence that the proposed changes in clinical care will improve outcome

Distribute the convincing rationale and evidence

For More Information and to Download the Toolkit

- Visit our website: www.cmqcc.org
- Or contact us: info@cmqcc.org

Available online at www.cmqcc.org

Table 1

Table 1. Pregnancy-Related Mortality Rates per 100,000 Live Births Among All Causes of Death by Race-Ethnicity, California, 2002-2015

<table>
<thead>
<tr>
<th>Cause of Death</th>
<th>Cardiovascular Disease</th>
<th>Preeclampsia or HELLP Syndrome</th>
<th>Obstetric Hemorrhage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate (105.000)</td>
<td>Rate (105.000)</td>
<td>Rate (105.000)</td>
<td>Rate (105.000)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>17</td>
<td>1.6 (0.8-3.3)</td>
<td>24</td>
</tr>
<tr>
<td>European-born</td>
<td>87</td>
<td>1.2 (0.8-1.7)</td>
<td>10</td>
</tr>
<tr>
<td>US-born</td>
<td>92</td>
<td>2.3 (0.8-5.7)</td>
<td>6</td>
</tr>
<tr>
<td>White</td>
<td>13</td>
<td>1.7 (0.8-3.7)</td>
<td>6</td>
</tr>
<tr>
<td>African-American</td>
<td>93</td>
<td>16.7 (10.0-27)</td>
<td>5</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>1.0 (0.3-3.1)</td>
<td>1</td>
</tr>
<tr>
<td>All races</td>
<td>49</td>
<td>1.3 (0.8-2.0)</td>
<td>16</td>
</tr>
</tbody>
</table>
### Table 1: Estimates of Maternal Mortality Rates (MMR) from Records of 13 English Parishes in 50-Year Periods

<table>
<thead>
<tr>
<th>Period</th>
<th>MMR per 1000 Live Births</th>
</tr>
</thead>
<tbody>
<tr>
<td>1700 to 1750</td>
<td>10.5</td>
</tr>
<tr>
<td>1750 to 1800</td>
<td>7.5</td>
</tr>
<tr>
<td>1800 to 1850</td>
<td>5.0</td>
</tr>
</tbody>
</table>

Ref: Journal of the Royal Society of Medicine, Vol. 99, November 2006

---

### Table 2

<table>
<thead>
<tr>
<th>Mode of delivery</th>
<th>Cases (n)</th>
<th>Deaths (n)</th>
<th>Maternal Mortality Rate (per 1000 live births)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vaginal</td>
<td>22 (54)</td>
<td>9 (43)</td>
<td>4.2 (18.2)</td>
</tr>
<tr>
<td>Cesarean (total)</td>
<td>1 (1)</td>
<td>1 (1)</td>
<td>100.0 (100.0)</td>
</tr>
<tr>
<td>Planned or Unscheduled</td>
<td>3 (6)</td>
<td>2 (2)</td>
<td>66.6 (44.4)</td>
</tr>
<tr>
<td>Unplanned or Labor</td>
<td>13 (27)</td>
<td>7 (28)</td>
<td>53.8 (44.4)</td>
</tr>
<tr>
<td>Cesarean</td>
<td>4 (1)</td>
<td>3 (1)</td>
<td>75.0 (22.2)</td>
</tr>
</tbody>
</table>

Ref: Journal of the Royal Society of Medicine, Vol. 99, November 2006
**Preeclampsia** (pre-CLAMP-si-a) is a condition unique to human pregnancy. It is diagnosed by the elevation of the expectant mother’s blood pressure usually after the twentieth week of pregnancy combined with the appearance of excessive protein in her urine.

Important symptoms that may suggest preeclampsia are as follows:

- Headaches
- Abdominal pain
- Shortness of breath or burning behind the sternum
- Nausea and vomiting
- Confusion
- Heightened state of anxiety and/or visual disturbances such as oversensitivity to light
- Blurred vision
- Flashing spots or auras

Preeclampsia and related hypertensive disorders of pregnancy impact 5-8% of all births in the United States.

Most women with preeclampsia will deliver a healthy baby and fully recover. However, some women will experience complications, several of which may be life-threatening to mother and/or baby. A woman’s condition can go from a mild form of preeclampsia to severe preeclampsia very quickly.

Preeclampsia and other hypertensive disorders of pregnancy can be devastating diseases, made worse by delays in diagnosis or management, seriously impacting or even killing both women and their babies before, during or after birth.

**What is the difference between preeclampsia, toxemia, PET and PIH?**

**There are two forms of preeclampsia:**

- Preeclampsia-eclampsia
- Preeclampsia superimposed on chronic hypertension

You may encounter other names like toxemia

PET (pre-eclampsia/toxemia)

PIH (pregnancy induced hypertension)

EPH gestosis (edema, proteinuria, hypertension), but these designations are all outdated terms and no longer used by medical experts.

**The Preeclampsia Foundation** also focuses on two other hypertensive disorders of pregnancy, which include:

- Chronic hypertension (hypertension when you are not pregnant) which may not have been diagnosed before pregnancy

- Gestational hypertension, blood pressure rising after the 20th week but not accompanied by proteinuria.

**Ages Affected**

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 2</td>
<td></td>
</tr>
<tr>
<td>3 - 5</td>
<td></td>
</tr>
<tr>
<td>6 - 13</td>
<td></td>
</tr>
<tr>
<td>14 - 18</td>
<td></td>
</tr>
<tr>
<td>19 - 40</td>
<td></td>
</tr>
<tr>
<td>41 - 60</td>
<td></td>
</tr>
<tr>
<td>60 +</td>
<td></td>
</tr>
</tbody>
</table>
Pregnancy-Related Mortality in California

**Original Research**

**RESULTS:**
Among the 207 pregnancy-related deaths, the five leading causes were cardiovascular disease, preeclampsia or eclampsia, hemorrhage, venous thromboembolism, and amniotic fluid embolism. Among the leading causes of death, we identified differing patterns for race, maternal age, body mass index, timing of death, and method of delivery. Overall, there was a good-to-strong chance to alter the outcome in 41% of deaths, with the highest rates of preventability among hemorrhage (70%) and preeclampsia (60%) deaths. Health care provider, facility, and patient contributing factors also varied by cause of death.

**CONCLUSION:**
Pregnancy-related mortality should not be considered a single clinical entity. Reducing mortality requires in-depth examination of individual causes of death. The five leading causes exhibit different characteristics, degrees of preventability, and contributing factors, with the greatest improvement opportunities identified for hemorrhage and preeclampsia. These findings provide additional support for hospital, state, and national maternal safety programs.

---

**British Maternal Mortality in the 19th and early 20th Centuries**

*Journal of the Royal Society of Medicine*

Vol. 99 November 2006

- It is only recently that the Church of England prayer book removed the service for the “churching of women who had recently given birth” which starts by giving thanks to God for:

  “The safe deliverance and preservation from the great dangers of childbirth.”

---

**ORGANIZATIONS**

ACOG
Pregnancy Taskforce
American College of OB/GYN

November 2013

CMQCC
California Maternal Quality Care Collaborative
Department of Health
California Department of Public Health

HIP (Hypertension in Pregnancy Taskforce)
American College of OB/GYN

Executive Summary – November 2013

PMR (Pregnancy Associated Mortality Review)
California Maternal Quality Care Collaborative

PAMR – January 2014

PTF
Pregnancy Task Force

Toolkit – January 2014

---

**What is preeclampsia?**
Severe Hypertension After 34 weeks

- Obstetric Intensive Care Manual 4th edition in Hypertensive Emergencies Chapter by Dr. Sibai

- “Approximately 40% of patients diagnosed with preterm gestational hypertension will subsequently develop preeclampsia or severe gestational hypertension. In addition, these pregnancies may result in fetal growth restriction and placental abruption. Those with severe gestational hypertension are at risk for adverse maternal and perinatal outcomes and should be managed like those with severe preeclampsia. If a woman with gestational hypertension receives antihypertensive therapy, she should be considered to have severe disease. Therefore, antihypertensive drugs should not be used during ambulatory management of these women.”
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 of Pregnancies < 34 Weeks Gestation

(From CMQCC Preeclampsia Toolkit, 2013)

**Severe Preeclampsia and Management Options for Delayed Delivery**

<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>Suggest liver capsule distension or rupture</td>
<td>No</td>
</tr>
<tr>
<td>Persistent epigastric pain or right upper quadrant pain</td>
<td></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>Severe Preeclampsia &gt; 160/110 mm Hg BP criteria for treatment</td>
<td>Yes, if responds to treatment</td>
</tr>
</tbody>
</table>

*See notes for ***, explanation.*
**Williams Obstetrics, 24th Edition**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Criteria Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gestational Hypertension</td>
<td>BP &gt; 140/90 mm Hg after 20 weeks in previously normotensive women</td>
</tr>
<tr>
<td>Preeclampsia – hypertension and:</td>
<td></td>
</tr>
<tr>
<td>Proteinuria</td>
<td>300 mg/24 h, or Protein: creatinine ratio ≥ 0.3 or Dipstick 1+ persistent</td>
</tr>
<tr>
<td>or</td>
<td></td>
</tr>
<tr>
<td>Thrombocytopenia</td>
<td>Platelets &lt; 100,000/uL</td>
</tr>
<tr>
<td>Renal Insufficiency</td>
<td>Creatinine &gt; 1.1 mg/dL or doubling of baseline</td>
</tr>
<tr>
<td>Liver Involvement</td>
<td>Serum transaminase levels twice normal</td>
</tr>
<tr>
<td>Cerebral Symptoms</td>
<td>Headache, visual disturbances, convulsions</td>
</tr>
<tr>
<td>Pulmonary Edema</td>
<td></td>
</tr>
</tbody>
</table>

Ref: Williams Obstetrics, 24th Edition, Table 40-1, page 729
Key Clinical Pearl

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”


Blood Pressure Basics

BP measurement is one of the most important basic clinical assessments that we do, yet it is often one of the most inaccurately performed assessments, leading to delays in diagnosis and treatment.

Laboratory Evaluation of Preeclampsia

- Initial lab studies should include:
  - CBC with platelet count
  - AST, ALT, LDH (hemolysis)
  - Creatinine, Bilirubin, Uric acid, Glucose

- For women with acute abdominal pain, add:
  - Serum amylase, lipase and ammonia
• Acute onset, persistent (lasting 15 min or more), severe systolic (≥160 mm Hg) or severe diastolic hypertension (≥110 mm Hg) or both in pregnant or postpartum women with preeclampsia/eclampsia constitutes a hypertensive emergency* and it is inadvisable to wait 4 hours for treatment.

• If BP is still elevated above threshold after 15 min, treat with antihypertensive medication within 30-60 min.

*Emergent Therapy for Acute-Onset, Severe Hypertension With Preeclampsia or Eclampsia, ACOG Committee Opinion, # 514, December 2011

Key Clinical Pearl

All patients with severe preeclampsia, irrespective of gestational age, should have an evaluation by an obstetrician as soon possible.

ACOG Task Force Recommendations

- For women with mild gestational hypertension, (less than 160/110).
  OR
- Preeclampsia without severe features at or beyond 37 0/7 weeks of gestation, delivery rather than continued observation is suggested.


Expectant Management in Pregnancies with Severe Preeclampsia >24- < 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

Severe Hypertension After 34 weeks

- Obstetric Intensive Care Manual 4th edition in Hypertensive Emergencies Chapter by Dr. Sibai
- “Approximately 40% of patients diagnosed with preterm gestational hypertension will subsequently develop preeclampsia or severe gestational hypertension. In addition, these pregnancies may result in fetal growth restriction and placental abruption. Those with severe gestational hypertension are at risk for adverse maternal and perinatal outcomes and should be managed like those with severe preeclampsia. If a woman with gestational hypertension receives antihypertensive therapy, she should be considered to have severe disease. Therefore, antihypertensive drugs should not be used during ambulatory management of these women.”

Quality Improvement Analysis revealed...

- Despite clear triggers indicating serious deterioration in the patient’s condition, HCP’s failed to recognize and respond in a timely manner
- Missed VS “triggers” occurred in 60% of the preeclampsia deaths
- Other “triggers” such as: proteinuria, H/A, epigastric pain, deteriorating fetal status and altered mental status were not recognized as serious

Medication Timing

- Treatment within 60 minutes
  - Nov 2012 (Baseline): 39.1%
  - Dec 14 (Collaborative): 85.2%

Key Clinical Pearl

- Magnesium sulfate therapy for seizure prophylaxis should be administered to any patients with:
  - Severe Preeclampsia
  - Preeclampsia with “severe features” i.e., subjective neurological symptoms (headache or blurry vision), abdominal pain, epigastric pain AND
  - should be considered in patients with mild preeclampsia (preeclampsia without severe features)
Early detection – BP confirmation within 15-20 min if BP > 160/110 mmHg
- Includes all departments where obstetrical patients present
- Treatment with IV antihypertensives – evidence-based algorithm, treatment within 1 hour of BP confirmation
- Magnesium Sulfate for seizure prophylaxis
- Follow-up with guidelines
  - within 3-7 days if medication was used during labor and delivery OR postpartum
  - within 7-14 days if no medication was used
- Standardized Patient Education
Of 2,011,341 births during the study period, 38,269 women (1.9%) had preeclampsia w/o severe features and 31,834 (1.6%) had preeclampsia with severe features. Preeclampsia w/o severe features remained stable at 1.9% across all four years, while preeclampsia with severe features increased over time (1.4% in 2008 to 1.7% in 2011). Women with preeclampsia were significantly more likely to deliver preterm, especially those with severe features (figure below). Almost 25% of women delivering at 29 to 32 weeks had preeclampsia, and 85-90% of women with preeclampsia at those gestational ages had severe features.

CONCLUSIONS

- Preeclampsia affects 3.5% of births in California and is increasing over time, primarily due to an increase in preeclampsia with severe features.
- Preeclampsia, particularly with severe features, contributes a substantial burden to preterm birth, with greater than 20% of births at 29 to 33 week gestational age occurring in mothers with preeclampsia.
Of 2,011,341 births during the study period, 38,269 women (1.9%) had preeclampsia w/o severe features and 31,834 (1.6%) had preeclampsia with severe features. Preeclampsia w/o severe features remained stable at 1.9% across all four years, while preeclampsia with severe features increased over time (1.4% in 2008 to 1.7% in 2011).

American Journal of Obstetrics and Gynecology

